SCREENING-LEVEL HUMAN HEALTH RISK ASSESSMENT FOR THE LOWER OTTAWA RIVER, OHIO

Prepared for:

LIMNO-TECH, INC.

October 2001

Prepared by:

INTERTOX, INC.
2819 Elliott Avenue
Suite 201
Seattle, WA 98121

206.443.2115 phone
206.443.2117 facsimile


Printed on recycled paper

EXECUTIVE SUMMARY

This document presents the screening-level Human Health Risk Assessment (HHRA) for the Lower Ottawa River, Ohio. This HHRA quantitatively evaluates both cancer risks and non-cancer health hazards from exposure to contaminants in the Lower Ottawa River, extending from the river's mouth on Maumee Bay in Lake Erie to River Mile (RM 8.8). The HHRA evaluates risks to children and adults in the absence of any remedial action and institutional controls, such as the fish consumption advisories currently in place. The HHRA uses the most recent U.S. EPA policy and guidance as well as additional site data and analyses.

The HHRA shows that cancer risks and non-cancer health hazards to the reasonable maximum exposure (RME) individual associated with consumption of fish from the Lower Ottawa River are above levels of concern. Consistent with U.S. EPA risk assessment guidance, the RME scenario is defined as the highest exposure that could reasonably be expected to occur for a given exposure pathway at a site. **The HHRA indicates that fish consumption is the primary pathway for contaminant exposure in the Lower Ottawa River and for potential adverse health effects, and that PCBs are the primary contaminant of concern in fish. Estimated cancer risks and non-cancer health hazards from other chemicals and exposure pathways are generally within U.S. EPA's range of acceptable risk levels.**

This HHRA was conducted using data on contaminant concentrations measured in fish, sediments, and river water collected in the Lower Ottawa River by the Ohio Environmental Protection Agency (OEPA) in 1998 through 2000. Separate evaluations were conducted for each of four river segments, established based on flow characteristics and river use patterns. These segments were Segment 1, extending from the river mouth to River Mile (RM) 3.2; Segment 2, extending from RM 3.2 to RM 4.9; Segment 3, extending from RM 4.9 to 6.5; and Segment 4, extending from RM 6.5 to 8.8. Adults and children ranging in age from 1 to 14 years were identified as populations possibly exposed to contaminants in the Lower Ottawa River due to fishing and recreational activities (*e.g.*, swimming, wading). Two separate populations were evaluated: people who fish in the river (anglers) and consume the fish that they catch, and people who recreate in the river. The exposure pathways identified in the HHRA for people who fish in the river are consumption of fish and dermal contact with river water. The exposure pathways identified for recreators are incidental ingestion of and dermal contact with sediments and river water. For these exposure pathways, average (central tendency) and RME estimates of exposure and cancer risks and non-cancer health hazards were calculated using individual point estimates for each exposure factor used in the calculations.

For fish consumption, central tendency and RME exposure factors were developed for each of the parameters needed to calculate the cancer risks and non-cancer health hazards. Based on 1988 and 1991-1992 surveys of fish consumption by licensed anglers in Michigan (West *et al.*, 1992; 1993), the central tendency fish ingestion rate was determined to be approximately 10

half-pound meals per year and the RME fish ingestion rate was determined to be 60 half-pound meals per year. No losses of contaminant due to cooking were assumed.

For direct contact exposures with river water and sediment during recreational activities, the RME estimate of time spent in recreational activities was 24 days per year for 3 hours per event for an adult and 48 days per year for 3 hours per event for a child. For the central tendency scenario, adults were assumed to engage in recreational activities for 16 days per year for 1 hour per event, and children were assumed to engage in recreational activities for 30 days per year for 1 hour per event.

The exposure duration was assumed to be 9 years for the central tendency exposure estimate and 30 years for the RME estimate. Standard U.S. EPA default factors were used for all other parameters, including body weight.

Both cancer risks and non-cancer health hazards to an adult and child anglers and recreators were calculated. Cancer risks were evaluated as the excess lifetime risk of developing cancer due to exposure to the chemicals being evaluated and non-cancer hazards were evaluated for other health effects, which include reproductive impairment, developmental disorders, and disruption of specific organ functions. The cancer risk is expressed as a probability and is based on the cancer potency of the chemical, known as a cancer slope factor or SF. The non-cancer hazard is expressed as the ratio of the chemical intake (dose) to a Reference Dose, or RfD. The chronic RfD represents an estimate (with uncertainty spanning perhaps an order of magnitude or greater) of a daily exposure level for the human population, including sensitive populations (*e.g.*, children), that is likely to be without an appreciable risk of deleterious effects during a lifetime. Chemical exposures exceeding the RfD do not necessarily mean that adverse effects will occur, however. U.S. EPA's Integrated Risk Information System, known as IRIS, provided the primary database of chemical-specific toxicity information used in this HHRA. The most current SFs and RfDs for the chemicals of interest evaluated in this assessment were used in calculating cancer risks and non-cancer hazards in the HHRA.

For known or suspected carcinogens, U.S. EPA under federal Superfund law generally considers upper-bound excess lifetime cancer risks to an RME individual of 10^{-6} to 10^{-4} (1 in 1,000,000 to 1 in 10,000) to be acceptable. The 1×10^{-6} (1 in a million) risk level is typically considered the "point of departure" for establishing remediation goals at contaminated sites. Risks less than 1 in a 1,000,000 are nearly always considered acceptable, whereas risks greater than 1 in 10,000 are typically considered unacceptable. To elaborate on the meaning of these risk designations, the average U.S. citizen has an approximately 1 in 4 chance (0.250000) of being diagnosed with cancer at some point in his or her lifetime. Thus, if the result of this cancer risk analysis estimated a 1 in a million (0.000001, also written as 1E-06 or 1×10^{-6}) excess cancer risk, the total cancer risk to an exposed individual would be 0.250001. Or, conversely, if the estimated excess

cancer risk is 1 in a million, then in an exposed population of one million people, an upperbound of one additional cancer due to the exposure would be expected.

In this HHRA, exposures to RME anglers who consume fish caught from the Lower Ottawa River result in the highest estimated cancer risks. Cancer risks are essentially the same, regardless of which river segment fish are caught from, ranging from approximately 2×10^{-3} (2 additional cancers in a population of one thousand) in Segments 2 and 4 to 3×10^{-3} (3 additional cancers in a population of one thousand) in Segments 1 and 3. Central tendency estimates of exposure to people who fish in the river result in excess upper-bound lifetime cancer risks of approximately 2×10^{-4} to 4×10^{-4} (2 to 4 additional cancers in a population of ten thousand). Estimated cancer risks for the RME recreator scenario range from 1×10^{-4} in Segments 1 and 3 to 5×10^{-5} in Segment 2.

Cancer Risk Summary

Pathway	RME Risk	Central Tendency Risk
Consumption of Fish and Exposure to Water while Fishing	Segment 1: 3×10^{-3} (3 in 1,000) Segment 2: 2×10^{-3} (2 in 1,000) Segment 3: 3×10^{-3} (3 in 1,000) Segment 4: 2×10^{-3} (2 in 1,000)	Segment 1: 4×10^{-4} (4 in 10,000) Segment 2: 2×10^{-4} (2 in 10,000) Segment 3: 3×10^{-4} (3 in 10,000) Segment 4: 2×10^{-4} (2 in 10,000)
Recreational Exposure to Sediment and Water	Segment 1: 1×10^{-4} (1 in 10,000) Segment 2: 5×10^{-5} (5 in 100,000) Segment 3: 1×10^{-4} (1 in 10,000) Segment 4: 6×10^{-5} (6 in 100,000)	Segment 1: 2×10^{-5} (2 in 100,000) Segment 2: 8×10^{-6} (8 in 1,000,000) Segment 3: 2×10^{-5} (2 in 100,000) Segment 4: 1×10^{-5} (1 in 100,000)

For anglers, estimated cancer risks are dominated by exposure to PCBs in fish, which contributes about 88 to 96% of the estimated risks for this population. For the recreators, estimated cancer risks are dominated by surface water contact with N-nitroso-di-n-propylamine (12-39% of the estimated risk) and pentachlorophenol (18-50% of the estimated risk), and sediment contact with PAHs (2-26% of the estimated risk), N-nitroso-di-n-propylamine (1-17% of the estimated risk), and PCBs (<1-20% of the estimated risk). However, many of the chemicals of interest in surface water and sediment were detected infrequently. When a chemical of interest was not detected, it was assumed to be present at a concentration equal to one half of its analytical detection limit, in a manner consistent with U.S. EPA's guidance for screening level risk assessments. Since many chemicals were detected infrequently and the detection limits for many of these chemicals actually exceed concentrations that would be associated with a *de minimis* cancer risk level (*i.e.*, 1×10^{-6}), a substantial fraction of the estimated risks to recreators is based on concentrations estimated from one-half of these chemicals' limits of detection. Further, several other chemicals, particularly in surface water, were not detected but had limits of detection that exceeded risk-based concentrations corresponding to the *de minimis* risk level. Therefore, significant uncertainties about the estimated risks associated with exposure to sediments and surface water

in the Lower Ottawa River exist, due to uncertainties about the actual concentrations of chemicals in sediment and surface water.

The evaluation of non-cancer health effects involved comparing the average daily exposure levels (dose) to the RfDs for non-cancer effects, to determine whether the estimated exposures exceed the RfD. For each scenario, the ratio of the site-specific calculated dose to the RfD for each exposure pathway is summed to calculate the Hazard Index (HI) for the exposed individual. An HI of one (1) is the reference level established by U.S. EPA above which concerns about non-cancer health effects should be evaluated further.

Exposure to RME anglers results in the highest estimate of non-cancer health hazards (ranging, for a child, from an HI of 85 for Segment 2 to 180 for Segment 1). Exposure to anglers for the average (central tendency) scenario results in HIs ranging from 15 for Segments 2 and 4 to 31 for Segment 1. Total HIs for the recreational exposure pathways are all less than one for all four river segments. For anglers, estimated non-cancer hazards are dominated by exposure to PCBs in fish, which contributes about 99% of the estimated non-cancer hazards for this population.

Noncancer Hazard Summary

Pathway	RME Hazard Index	Central Tendency Hazard Index
Consumption of Fish and Exposure to Water while Fishing	Segment 1: 180 (child), 170 (adult) Segment 2: 85 (child), 83 (adult) Segment 3: 180 (child), 170 (adult) Segment 4: 89 (child), 87 (adult)	Segment 1: 31 (child and adult) Segment 2: 15 (child and adult) Segment 3: 30 (child and adult) Segment 4: 15 (child and adult)
Recreational Exposure to Sediment and Water	Segment 1: 0.32 (child), 0.044 (adult) Segment 2: 0.22 (child), 0.029 (adult) Segment 3: 0.58 (child), 0.067 (adult) Segment 4: 0.21 (child), 0.026 (adult)	Segment 1: 0.094 (child), 0.021 (adult) Segment 2: 0.081 (child), 0.014 (adult) Segment 3: 0.25 (child), 0.037 (adult) Segment 4: 0.077 (child), 0.013 (adult)

Noncancer hazards from consumption of PCBs in fish were also evaluated based on fish consumption advisory categories established by the Great Lakes Sport Fish Advisory Task Force. Estimated hazards for all consumption categories, including limited consumption of only one meal every two months, exceeded U.S. EPA's level of concern of 1.0.

Noncancer Hazards for PCBs Calculated for Great Lakes Sport Fish Advisory Task Force Consumption Categories

Category 1	Hazard Index	
Category 1 (Unrestricted consumption)	Segment 1:	240
	Segment 2:	110
	Segment 3:	230
	Segment 4:	120
Category 1 (One meal per week)	Segment 1:	67
	Segment 2:	32
	Segment 3:	66
	Segment 4:	33
Category 3 (One meal per month)	Segment 1:	13
	Segment 2:	6.1
	Segment 3:	12
	Segment 4:	6.3
Category 4 (One meal every two months)	Segment 1:	6.2
	Segment 2:	3.0
	Segment 3:	6.1
	Segment 4:	3.1

Uncertainties are inherent in the risk assessment process and may exist in contaminant concentrations in environmental media, derivation of toxicity values, and estimating potential exposures. However, due to the conservatism in the U.S. EPA risk assessment process, the combined uncertainties are likely to overestimate, rather than underestimate, risks for the Lower Ottawa River.

Major Findings of the Lower Ottawa River HHRA

The Lower Ottawa River HHRA evaluated both cancer risks and non-cancer health hazards to children, adolescents, and adults posed by contaminants in the Lower Ottawa River. The highest risks are estimated for PCBs in fish. U.S. EPA has classified PCBs as probable human carcinogens and known animal carcinogens. Other long-term adverse health effects of PCBs observed in laboratory animals include a reduced ability to fight infections, low birth weights, and learning problems. The major findings of the report are:

- **Eating fish is the primary pathway for humans to be exposed to contaminants in the Lower Ottawa River.**
- Under the RME scenario for eating fish, the calculated cancer risk is approximately 2 to 3 additional cases of cancer for every 1,000 people exposed to fish caught between RM 0 and RM 8.8. These excess cancer risks are more than 1,000 times higher than U.S. EPA's point of departure for evaluating cancer risks from exposure to toxic chemicals at contaminated sites under federal Superfund law of 10^{-6} (1 in 1,000,000), and exceed the upper bound of the cancer risk range generally allowed under the federal Superfund law of 10^{-4} (1 in 10,000).

- For non-cancer health effects, the RME scenario for eating fish from the Lower Ottawa River results in a level of exposure to PCBs that is approximately 180 times higher than U.S. EPA's reference level (Hazard Index) of one for Segments 1 and 3, and approximately 85 times higher for Segments 2 and 4.
- For the fish consumption pathway, central tendency cancer risks for all four river segments exceed U.S. EPA's acceptable risk range of 10^{-6} to 10^{-4}, and non-cancer hazards under central tendency assumptions for all four river segments are also above the U.S. EPA's reference level (Hazard Index) of one.
- Under baseline conditions, the estimated RME cancer risk associated with exposure to contaminants in the Lower Ottawa River in Segments 1 and 3, through skin contact with and incidental ingestion of sediments and river water, is 1 in 10,000. This risk is at the upperbound of U.S. EPA's generally acceptable levels of concern for cancer for a 30 year exposure period. RME risks for the other two segments are within U.S. EPA's acceptable risk range of 10^{-6} to 10^{-4}. Central tendency risks are within U.S. EPA's acceptable risk range of 10^{-6} to 10^{-4} for all four river segments. Non-cancer health effects to recreators are below U.S. EPA's levels of concern.
- Many of the chemicals of interest in surface water and sediment were detected infrequently, and a substantial fraction of the estimated risks to recreators is based on concentrations estimated from one-half of these chemicals' limits of detection. Further, several chemicals in surface water, in particular, were not detected but had limits of detection that exceeded risk-based concentrations. Therefore, significant uncertainties about the estimated risks associated with exposure to sediments and surface water in the Lower Ottawa River exist, due to uncertainties about the actual concentrations of chemicals in sediment and surface water.
- Surface water COIs were detected at only five of the 21 surface water sample locations—at RM 0.5, 2.5, and 4.8. The highest estimated cancer risks for surface water for the recreator scenario were associated with samples collected at RM 0.5. Eight of the surface water COIs (2-chlorophenol, 4,4'-DDT, aldrin, dieldrin, gamma-BHC, heptachlor, N-nitroso-di-n-propylamine, and pentachlorophenol) were only detected in surface water at this location and of these, seven were also detected at their highest sediment concentrations at this location. Consequently, RM 0.5 may represent a hot spot for these compounds.
- The highest estimated cancer risks for sediment for the recreator scenario were associated with a sample collected at RM 5.86 (in Segment 3), in the vicinity of the mouth of the former Unnamed Tributary. The highest PCB sediment concentrations were measured at this location (156 mg/kg total PCBs in the 0"-24" layer). Examination of data for nearby locations suggests that these elevated PCB concentrations are extremely localized, since total PCB concentrations at nearby locations are much lower. Surface sediment PCB concentrations at other locations in the river are considerably lower (less than 10 mg/kg, and in most cases less than 5 mg/kg).

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ACRONYMS

ABS	Absorption Factor
ADD	Average Daily Dose
ATSDR	Agency for Toxic Substances and Disease Registry
BAF	Bioaccumulation Factor
BHC	Benzene Hexachloride
CDC	Centers for Disease Control
COI	Chemical of Interest
CT	Central Tendency
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
EPC	Exposure Point Concentration
ERA	Ecological Risk Assessment
GAF	Gastrointestinal Absorption Factor
HEAST	Health Effects Assessment Summary Tables
HHRA	Human Health Risk Assessment
HI	Hazard Index
HQ	Hazard Quotient
IEUBK	Integrated Exposure-Uptake Biokinetic Model
IRIS	Integrated Risk Information System
LADD	Lifetime Average Daily Dose
LTI	Limno-Tech, Inc.
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MRL	Minimal Risk Level
OEPA	Ohio Environmental Protection Agency
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PRG	Preliminary Remediation Goal
RAGS	Risk Assessment Guidance for Superfund
RBC	Risk Based Concentration
RfD	Reference Dose
RM	River Mile
RME	Reasonable Maximum Exposure
SF	Slope Factor
SVOC	Semi-volatile Organic Compound
TEF	Toxicity Equivalency Factor
TMACOG	Toledo Metropolitan Area Council of Governments
U.S. EPA	United States Environmental Protection Agency
U.S. FDA	United States Food and Drug Administration
U.S. FWS	United States Fish and Wildlife Service
UCL	Upper Confidence Limit

GLOSSARY

Absorption	The process of taking in. Chemicals can be absorbed through the skin into the bloodstream and then transported to other organs. Chemicals can also be absorbed into the bloodstream after breathing or swallowing.
Absorption Factor (ABS)	Dermal absorption factor used to estimate the rate at which a chemical desorbs from an environmental medium, such as soil or sediment, and absorbs through the skin upon dermal contact.
Average Daily Dose (ADD)	Exposure expressed as mass of a substance contacted per unit body weight per unit time, averaged over one year or the duration of exposure.
Background Level	A typical or average level of a chemical in the environment. Background often refers to naturally occurring or unconta minated levels.
Bioavailability	The fraction of a chemical substance that is absorbed into the bloodstream and available to cause toxicity.
Carcinogen	An agent capable of inducing a cancer response.
Carcinogenesis	The origin or production of cancer, very likely a series of steps. The carcinogenic event so modifies the genome and/or other molecular control mechanisms in the target cells that these can give rise to a population of altered cells.
CAS Number	A unique accession number assigned by the Chemical Abstracts Service, a division of the American Chemical Society. Other than being guaranteed unique to a given compound, this number has no particular meaning. CAS Registry Numbers are assigned to every uniquely-identifia ble substance.
Central Tendency (CT)	An estimate of the average exposure that is expected to occur at a site. Usually presented in conjunction with the RME scenario in a U.S. EPA risk assessment, to provide perspective on the range of exposures that are likely to occur at a site.
CERCLA	The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, also known as Superfund.
Chemical of Interest (COI)	Chemicals carried through the risk assessment process. These chemicals are usually sele cted from all the chemicals potentially present at a site, to identify those that are most likely to contribute significantly to the overall site risk.
Chronic Exposure	Multiple exposures occurring over an extended period, or a significant fraction of the individual's life-time.
Concentration	The amount of one substance dissolved or contained in a given amount of another. For example, seawater contains a higher concentration of salt than fresh water.

Conceptual Model	An illustration of the problem to be addressed in a risk assessment for a site. The conceptual model illustrates known and suspected sources of contamination, types of contaminants and affected media, known and potential routes of migration, and known or potential human and environmental receptors.
Critical Effect	The first adverse effect, or its known precursor, that occurs to the most sensitive species as the dose rate of an agent increases.
Dermal	Referring to the skin. For example, dermal absorption means absorption through the skin.
Developmental Toxicity	The study of adverse effects on the developing organism (including death, structural abnormality, altered growth, or functional deficiency) resulting from exposure prior to conception (in either parent), during prenatal development, or postnatally up to the time of sexual maturation.
Dose	The amount of a substance taken in by an individual over a period of time from a variety of sources, including food, water, soil, and air, by such exposure pathways as ingestion, inhalation, or absorption through the skin. In this assessment, doses are described as daily intake rates averaged over periods of one year (for noncarcinogenic effects) or a lifetime (for cancer), and presented on a per kilogram of body weight basis.
Excess Lifetime Risk	The additional or extra risk incurred over the lifetime of an individual by exposure to a toxic substance.
Exposure	Contact of an organism with a chemical or physical agent. Exposure is quantified as the amount of the agent available at the exchange boundaries of the organism (*e.g.*, skin, lungs, gut) and available for absorption.
Exposure Assessment	The determination or estimation (qualitative or quantitative) of the magnitude, frequency, duration, and route of exposure.
Exposure Pathway	The course a chemical or physical agent takes from a source to an exposed organism. An exposure pathway describes a unique mechanism by which an individual or population is exposed to chemicals or physical agents at or originating from a site. Each exposure pathway includes a source or release from a source, an exposure point, and an exposure route. If the exposure point differs from the source, a transport/exposure medium (*e.g.*, air) or media (in cases of intermedia transfer) also is included.
Exposure Point	A location of potential contact between an organism and a chemical or physical agent.
Exposure Point Concentration (EPC)	The concentration term used in the dose equation to estimate exposure. The concentration term is typically regarded as a reasonable estimate of the average concentration that is likely to be contacted over time.

Exposure Route	The way a chemical or physical agent comes in contact with an organism (*e.g.*, by ingestion, inhalation, dermal contact).
Gastrointestinal Absorption Factor (GAF)	A factor representing the absorption efficiency of a compound following oral exposure in the toxicity study upon which an oral toxicity criterion is based. The GAF is used to adjust an oral toxicity criterion based on an administered dose to an absorbed dose value, for use in evaluating dermal exposures.
Hazard	A source of risk that does not necessarily imply potential for occurrence. A hazard produces risk only if an exposure pathway exists, and if exposures create the possibility of adverse consequences.
Hazard Index (HI)	The sum of more than one hazard quotient for multiple substances and/or multiple exposure pathways. The HI is calculated separately for chronic, subchronic, and shorter-duration exposures. Used to evaluate noncancer effects.
Hazard Quotient (HQ)	The ratio of a single substance exposure level over a specified time period (*e.g.*, subchronic) to a reference dose for that substance derived from a similar exposure period. Used to evaluate noncancer effects.
Integrated Risk Information System (IRIS)	A U.S. EPA database containing verified RfDs and slope factors and up-to-date health risk and U.S. EPA regulatory information for numerous chemicals. IRIS is U.S. EPA's preferred source for toxicity information for Superfund.
Lifetime Average Daily Dose (LADD)	Exposure expressed as mass of a substance contacted per unit body weight per unit time, averaged over a lifetime.
Lowest Observed Adverse Effect Level (LOAEL)	The lowest exposure level at which there are statistically or biologically significant increases in frequency or severity of adverse effects between the exposed population and its appropriate control group.
Maximum Contaminant Level (MCL)	The maximum level of certain contaminants permitted in drinking water supplied by a public water system as set by U.S. EPA under the federal Safe Drinking Water Act.
Maximum Contaminant Level Goal	The maximum level of a contaminant that is associated with no adverse health effects from drinking water containing that contaminant over a lifetime. For chemicals believed to cause cancer, the MCLGs are set at zero. MCLGs are not enforceable, but are ideal, health-based goals which are set in the National Primary Drinking Water Standards developed by U.S. EPA. MCLs are set as close to MCLGs as possible, considering costs and technology.
Media	Soil, water, air, plants, animals, or any other parts of the environment that can contain contaminants.

Micrograms/Kilogram (µg/kg)	A measure of concentration used in the measurement of solids, such as soil, sediment, or food. A µg/kg is one one-thousandth of a mg/kg, and is equivalent to one part per billion.
Micrograms/Liter (µg/L)	A measure of concentration used in the measurement of fluids. A µg/L is one one-thousandth of a mg/L, and is roughly equivalent to one part per billion.
Milligrams/Kilogram (mg/kg)	A measure of concentration used in the measurement of solids, such as soil, sediment, or food. Mg/kg is the most common way to present a concentration in soil and is equivalent to parts per million.
Milligrams/Liter (mg/L)	A measure of concentration used in the measurement of fluids. Mg/L is the most common way to present a concentration in water and is roughly equivalent to parts per million.
No Observed Adverse Effect Level (NOAEL)	The highest exposure level at which there are no statistically or biologically significant increases in the frequency or severity of adverse effect between the exposed population and its appropriate control; some effects may be produced at this level, but they are not considered adverse, nor precursors to adverse effects.
Polychlorinated Biphenyls (PCBs)	A group of toxic, persistent chemicals used in electrical transformers and capacitors for insulating purposes and in gas pipeline systems as a lubricant. The sale and new use of PCBs in the U.S. was banned by law in 1979.
Preliminary Remediation Goal (PRG)	Risk-based concentrations derived by U.S. EPA Region IX for evaluating contaminated sites. The values are derived from standardized equations, combining exposure assumptions and U.S. EPA toxicity criteria, and represent concentrations that are considered protective of humans, including sensitive groups, over a lifetime of exposure.
Reasonable Maximum Exposure (RME)	The highest exposure that is reasonably expected to occur at a site. Per U.S. EPA risk assessment guidance, actions at Superfund sites should be based on an estimate of the RME.
Reference Dose (RfD)	A dose rate of a chemical that is not expected to cause adverse health effects over a lifetime of daily exposure in humans (including sensitive subgroups). Expressed in units of milligrams per kilogram of body weight per day (mg/kg-d).
Risk	The probability of injury, disease, or death under specific circumstances. In quantitative terms, risk is expressed in values ranging from zero (representing the certainty that harm will not occur) to one (representing the certainty that harm will occur). The following are examples showing the manner in which risk is expressed in U.S. EPA risk assessment: E-4 or 10^{-4}= a risk of 1/10,000; E-5 or 10^{-5}= a risk of 1/100,000; E-6 or 10^{-6}= a risk of 1/1,000,000. Similarly, 1.3E-3 or 1.3×10^{-3}= a risk of 1.3/1,000 = 1/770; 8E-3 or 8×10^{-3}= a risk of 8/1,000 = 1/125.

GLOSSARY (CONT.)

Risk Assessment	A process to determine the increased risk from exposure to environmental pollutants together with an estimate of the severity of impact. Risk assessments use specific chemical information plus exposure information.
Slope Factor (SF)	An estimate of the upper-bound probability of an individual developing cancer as a result of a lifetime of exposure to a particular level of a potential carcinogen. The units of the slope factor are usually expressed as 1/(mg/kg-day).
Superfund	Federal authority, established by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in 1980, given to the U.S. EPA to respond directly to releases or threatened releases of hazardous substances that may endanger health or welfare.
Threshold	The dose or exposure below which no deleterious effect is expected to occur.
Toxic Substance	A chemical or mixture that can cause illness, death, disease, or birth defects when ingested, inhaled, or absorbed by living organisms. The quantities and exposures necessary to cause these effects can vary widely. Many toxic substances are pollutants and contaminants in the environment.
Toxicity Equivalency Factor (TEF)	A generally 10-fold factor used to establish cancer slope factors for polycyclic aromatic hydrocarbon compounds based on the relative potency of the compound compared to benzo(a)pyrene.
Uncertainty Factor	One of several, generally 10-fold factors, used in operationally deriving the Reference Dose (RfD) from experimental data. UFs are intended to account for (1) the variation in sensitivity among the members of the human population; (2) the uncertainty in extrapolating animal data to the case of humans; (3) the uncertainty in extrapolating from data obtained in a study that is of less-than-lifetime exposure; and (4) the uncertainty in using LOAEL data rather than NOAEL data.
Upper Confidence Limit (UCL)	The 95% UCL about the arithmetic mean is typically used as the concentration term for chemicals of interest in environmental media in U.S. EPA risk assessments. Because of the uncertainty associated with estimating the true average concentration at a site, the 95% UCL of the arithmetic mean is used as an estimate of the average concentration.
Weight of Evidence Classification	A U.S. EPA classification system for characterizing the extent to which the available data indicate that an agent is a human carcinogen. Recently, U.S. EPA has developed weight-of-evidence classification systems for some other kinds of toxic effects, such as developmental effects.

SCREENING-LEVEL HUMAN HEALTH RISK ASSESSMENT FOR THE LOWER OTTAWA RIVER, OHIO

1.0 INTRODUCTION

In January 2000, the Toledo Metropolitan Area Council of Governments (TMACOG) initiated the Lower Ottawa River Hot Spot Delineation Project to assess the human health risks posed by existing conditions in the lower 8.8 miles of the Ottawa River (the Lower Ottawa River), Ohio, and apply the risk estimates in the prioritization of areas for remediation. The Hot Spot Delineation and Risk Assessment project, conducted by Limno-Tech, Inc. (LTI), Parametrix Inc., and Intertox Inc. (the Project Team), includes several components:

- Development of a database of existing environmental sampling data collected in the Lower Ottawa River and identification of data gaps to focus additional sample collection (led by LTI);
- Consolidation of new data from additional sampling of the Lower Ottawa River with the existing information (led by LTI);
- Conduct of an ecological risk assessment (ERA) (led by Parametrix); and
- Conduct of a human health risk assessment (HHRA) (led by Intertox).

1.1 Objectives of the HHRA

As initially described in the *Proposal for the Ottawa River Environmental "Hot Spot" Delineation and Risk Assessment*, submitted to TMACOG by LTI, Intertox, and Parametrix in January 2000, and clarified during subsequent meetings between TMACOG and the project team, the goals of the HHRA are:

- To evaluate human health risks associated with exposure to contaminants in the Ottawa River, under current (baseline) contaminant concentration and exposure conditions;
- To estimate central tendency and upper percentile exposures for the populations of interest;
- To identify the contaminants and pathways that are likely to contribute most significantly to risks, and characterize risks to populations that are likely to be most significantly exposed;
- To rank river areas of concern based on risk estimates, to assist in the delineation of hot spots;
- To provide information to support the evaluation of remedial alternatives and setting of remediation priorities; and
- To provide information on factors that contribute most significantly to uncertainties in risk estimates, to focus potential future investigations.

This screening-level risk assessment provides conservative estimates of risks to potentially exposed populations assuming that no remediation or institutional controls are applied to the site. The resulting risk estimates are intended to not underestimate risks, but likely overestimate risks for most scenarios.

The HHRA was conducted in accordance with current regional and national U.S. EPA and State of Ohio risk assessment guidance and policy. The principal guidance documents included the following:

- U.S. EPA, 1989. *Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual, Part A*. Interim Final. Office of Solid Waste and Emergency Response, United States Environmental Protection Agency. Washington, D.C. EPA/540/1-89/002. December.
- U.S. EPA, 1991a. *Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Parameters*. Office of Solid Waste and Emergency Response, United States Environmental Protection Agency. Washington, D.C. June.
- U.S. EPA, 1997a. *Exposure Factors Handbook*. Office of Research and Development, United States Environmental Protection Agency. Washington, D.C. EPA/600/P-95/002/Fa. August.
- Great Lakes Sport Fish Advisory Task Force, 1993. *Protocol for a Uniform Great Lakes Sports Fish Consumption Advisory*. September.

1.2 Document Overview

The subsequent sections of this document are organized as follows:

- **Data Evaluation and Hazard Characterization (Section 2.0).** This section describes the process used to evaluate the quality of available data for conducting the HHRA, outlines the process used to select chemicals of interest (COIs) for purposes of the HHRA, and identifies the COIs.
- **Exposure Assessment (Section 3.0).** This section identifies and characterizes the populations and pathways for which exposures will be evaluated and outlines the development of contaminant-specific estimates of intake.
- **Toxicity Assessment (Section 4.0).** This section characterizes the toxicity of the COIs and identifies quantitative toxicity criteria for each chemical, for use in evaluating the significance of estimated exposures.
- **Risk Characterization (Section 5.0).** This section integrates the results of the toxicity and exposure assessments to develop quantitative measures of the potential for adverse health effects.
- **Conclusions and Recommendations (Section 6.0).** This section summarizes the results of the risk assessment, and provides recommendations for further evaluation.
- **References (Section 7.0).** This section provides the references used to conduct this evaluation.

2.0 DATA EVALUATION AND HAZARD CHARACTERIZATION

The objective of the data evaluation and hazard characterization step is to review the quality of the available data for purposes of conducting the HHRA and to identify chemicals of interest (COIs) to be evaluated in the HHRA. This section of the HHRA addresses the following:

- Identification of areas and media of concern through which people may be exposed to contaminants in the Lower Ottawa River;
- Identification of available chemical contaminant data for each of the areas and media of concern, and evaluation of the appropriateness of the data for purposes of conducting the HHRA; and
- Identification of COIs in each area and medium, based on detected concentrations and comparison to risk-based screening benchmarks and background concentrations.

Results of this step are discussed below.

2.1 Site Description and Identification of Areas of Concern

The Hot Spot Delineation and Risk Assessment project focuses on the current Ottawa River fish advisory zone in the Ottawa River, extending from the mouth of the Ottawa River on Lake Erie to river mile (RM) 8.8. This area is also known as the "Lower Ottawa River." The Lower Ottawa River was divided into several zones or areas of concern for purposes of the HHRA and the ERA, based on river flow characteristics and use patterns.

From RM 8.8 to 7.0, the Ottawa River is relatively free flowing with unidirectional flow. The river flows through a transitional zone from RM 7.0 to 2.5. In this zone, flow velocities are considerably slower and flow reversals occur in some areas. Bathymetry (water depth) data suggest there are two "basins" in this zone, above and below approximately RM 4.0. Downstream of RM 2.5, the magnitude of flows and frequencies of flow reversals increase.

In addition to flow information, the State of Ohio Environmental Protection Agency (OEPA) has characterized the Lower Ottawa River in terms of human use patterns and wildlife observations, based primarily on field observations (Phil Williams Personal Communication and field notes, 2001). Based on this information, risks were evaluated for the following four segments of the Lower Ottawa River (Figure 2-1):

- **Segment 1: RM 0 to (<) RM 3.2**. Compared to the upper areas of the river, the segment at the mouth of the river (RM 0 to 3.2) is wider, and is characterized by a high level of recreational use and frequent flow reversals. Residential areas are present on both sides of the river. In addition, several large storm sewer outlets exist in this reach of the river. During the summer 2000 sampling events, jet skiing, boating, fishing, and swimming were observed in this zone. Wildlife, including waterfowl, was also observed.

- **Segment 2: RM 3.2 to (<) RM 4.9**. The area from RM 3.2 to 4.9 is a depositional zone, with large areas of exposed sediments (mud flats) under low water conditions. Children have been observed walking along the banks and fishing at about RM 3.6. During the summer 2000 sampling events, wading birds and other wildlife, including turtles, were observed in this area.
- **Segment 3: RM 4.9 to (<) RM 6.5**. From RM 4.9 to 6.5, signs of human use are apparent along the riverbank, including dirt bike trails. In addition, there is public access to the river at the railroad trestle where fishing may occur. This zone is bordered by landfills but includes some wetland areas where turtles and waterfowl, including geese, ducks, and wading birds, have been observed.
- **Segment 4: RM 6.5 to RM 8.8**. From RM 6.5 to 8.8, children fishing and wading in the river have been observed. Field notes from the summer 2000 sampling event indicate signs of human use near the Highway 475/75 overpass.

For purposes of this risk assessment, the area upstream of RM 8.8 is considered to represent "background" conditions (*i.e.*, conditions associated with natural or human-made but non-site sources). In this HHRA, maximum-detected chemical concentrations measured in sediment, surface water, and fish at or around RM 11, if available, were compared to concentrations detected in these media from RM 0 to 8.8, to provide some perspective on typical contaminant exposure levels in this geographical area.

2.2 Identification of Media of Concern

The HHRA focuses on the evaluation of human exposures to contaminants in the following media in the first 8.8 miles of the Lower Ottawa River:

- Surface sediments (at a starting depth of 6-inches, extending to no more than 12 inches below the sediment surface, including sediments in the river channel and along the shoreline);
- Surface water (dissolved and total suspended particulate concentrations); and
- Fish (of the size and species likely to be caught by anglers and retained for consumption).

2.3 Data Evaluation

Data were reviewed for quality by LTI prior to delivery to Intertox for use in the HHRA. Multiple data sets compiled by LTI and input into the project database were queried for appropriate data for use in the risk assessment.

2.3.1 Data Sets Included in the HHRA

The following data sets were used in the HHRA:

- *Samples of fish collected in 1999 (Inventory 16; OEPA, 2000).* The purpose of this study was to measure concentrations of polychlorinated biphenyls (PCBs), chlorinated pesticides, bioaccumulative metals, and chromium in edible portions of fish from the

lower 12 miles of the Ottawa River for health advisory purposes. A total of forty-two samples were collected from six stations between RM 0 and 8.8. In addition, five samples were collected at RM 11.5. Fish samples consisted of skin on and skin off fillets; some of the samples were composited within species. Fish species included white crappie, common carp, largemouth bass, bluegill, and others.

- *Sediment samples collected in 1998 (Inventory 15; OEPA, 1998).* The purpose of this study was to evaluate the distribution of contaminants in the upper zone of the river (RM 4.9 to 8.8) and in the depositional zone (mouth to RM 4.9). A total of 352 sediment samples were collected and analyzed for metals and semi-volatile organic compounds (SVOCs), including polycyclic aromatic hydrocarbons (PAHs), pesticides, and PCB Aroclors. Samples were collected on the right and left sides of the river, and in the middle of the channel. Samples from this study are primarily composited surface interval samples (*i.e.*, from sediment cores collected at depths extending from the surface to some depth below the surface), homogenized prior to laboratory analysis. Since human exposures to sediment in the Ottawa River are likely to be primarily to surface sediments, samples collected at a start depth of 0 or 2 inches and extending to a maximum depth of no more than 24 inches were used for purposes of this HHRA—this includes 121 samples collected from 121 stations between RM 0 and RM 8.8. One sample in this depth interval was collected upstream of RM 8.8 (at RM 12.5).
- *Sediment samples collected in 2000 (Inventory 20; OEPA, 2000).* The purpose of this study was to characterize surface sediment concentrations for purposes of risk assessment. Eighty-eight surface samples were collected from 23 stations between RM 0 and 8.8. Samples were analyzed for PCB Aroclors, metals, SVOCs, and pesticides. No samples were collected upstream of RM 8.8.
- *Surface water collected in 2000 (Inventory 20; OEPA, 2000).* The purpose of this study was to characterize surface water concentrations for purposes of risk assessment. Fifty-nine samples were collected from 21 stations between RM 0 and 8.8. Samples were analyzed for PCB Aroclors, metals, SVOCs, and pesticides. No samples were collected upstream of RM 8.8.

Data from two additional sampling programs included in the LTI database were not used in the HHRA. These included data from sediment samples collected in 1994 and 1995 (Inventory 8; OEPA, 1995). These data were not used in the HHRA since more recent samples were collected at these locations during 1998 and 2000 and analyzed for the same analytes. In addition, data from the Ohio EPA forage fish tissue analyses in 2000 (Inventory 21) were not used in the HHRA, since these data were collected primarily to characterize wildlife exposures, and fish were of a smaller size than likely to be caught for human consumption (*i.e.*, less than 6 inches). Adequate data from fish of the size likely to be caught and consumed for human consumption were available from Inventory 16.

A summary of the sources of the data used in the HHRA is provided in Table 2-1, differentiated by media type and river segment.

2.3.2 Initial Data Review

All appropriate data from the above identified sampling programs were evaluated for use in the HHRA. Data validation results were reviewed to identify data with "R" qualifiers (indicating rejected results); all data with R qualifiers were excluded from use in the HHRA. When replicate analyses were conducted on the same sample, only one of the analyses was used in the HHRA; if the analyte was detected in one or more of these samples, the highest detected concentration was used. If the analyte was detected in neither sample, the sample with the lowest limit of detection was used.

One surface sediment analysis for lead was identified as an outlier ($p<0.05$), using Grubb's Test for statistical outliers (Taylor, 1982). This sample—sample number MENW33 collected at RM 5.5 from Inventory 20—had a reported lead concentration of 26,000 mg/kg (dry weight). Detected lead concentrations in all other samples used in the risk assessment ranged from 2.4 to 427 mg/kg ($n = 53$). Exclusion of this sample from the risk analysis was judged to be appropriate since all other detections of this analyte, measured in samples collected throughout the Lower Ottawa River, were significantly lower, and use of this value significantly skews estimates of the average lead concentration that people are likely to contact as they move throughout the river.

All other data from the above identified programs were used to identify chemicals of interest for purposes of the HHRA and establish exposure point concentrations.

2.4 Identification of Chemicals of Interest

The term "chemicals of interest" (COIs) is used to refer to those chemicals detected in site media that are likely to be of greatest toxicological significance and are selected for analysis in the HHRA. All analytes detected in sediment, surface water, or fish in the sampling programs identified in Section 2.3.1 were included in the screening process for identifying COIs.

The following criteria were used to identify COIs for purposes of conducting the HHRA (Figure 2-2):

- *Frequency of detection.* All analyses for each area and medium were used to assess the frequency of detection of a given chemical. If a chemical was never detected, it was excluded as a COI. In general, even if a chemical was detected infrequently (*e.g.*, at a frequency of less than 5%), it was retained for further screening based on comparison to background concentrations and risk-based screening concentrations, in order to avoid exclusion of chemicals that were detected infrequently but at high concentrations potentially of significance to human health.
- *Comparison to risk-based screening concentrations*. Maximum-detected concentrations of chemicals in each medium in the Lower Ottawa River were compared to risk-based screening concentrations, as described below. If the

maximum-detected concentration was less than the risk-based screening concentration, the chemical was excluded as a COI.

Measured concentrations of chemicals of potential concern in the Lower Ottawa River were compared with measured background concentrations in the same environmental medium and sampling program, if available. However, no appropriate data were available for surface water and only one sample was available for sediment. Consequently, background concentrations in surface water and sediment were not used as a criterion for exclusion of a chemical as a COI. Fish were collected in Inventory 16 upstream of the study area at RM 11.5. However, since a fish's range is assumed to extend to different parts of the river, these samples were not considered to be representative of true background conditions and were not used for comparison to concentrations measured in fish from RM 0 to 8.8.

The maximum-detected chemical concentrations in each medium were compared to risk-based screening concentrations as follows:

- Chemical concentrations were screened using risk-based screening concentrations [either U.S. EPA Region IX Preliminary Remediation Goals (PRGs) or U.S. EPA Region III Risk Based Concentrations (RBCs)] corresponding to a lifetime excess cancer risk of 1×10^{-6} for carcinogens or a hazard quotient (HQ) of 1 for noncarcinogens;
- Sediment concentrations were compared to Region 9 PRGs for residential soil;
- Surface water concentrations were compared to Region 9 PRGs for drinking water; and
- Fish concentrations were compared to Region 3 PRGs for fish consumption.

The U.S. EPA has developed PRGs and RBCs as risk-based tools for evaluating and cleaning up contaminated sites. Chemical concentrations above these levels do not automatically designate a site as "dirty" or trigger a response of action. However, exceeding a PRG suggests that further evaluation of the potential risks that may be posed by site contaminants is appropriate (U.S. EPA Region IX, 2000). These values combine current U.S. EPA toxicity values with "standard" exposure factors to estimate contaminant concentrations in environmental media (soil, sediment, air, water) that are considered protective of humans, including sensitive groups, over a lifetime. For carcinogens, the risk-based concentrations are based on a cancer risk level of 1×10^{-6} (*i.e.*, 1 in 1,000,000), while for noncarcinogens, the risk-based concentrations are based on a HQ of 1 (see Section 5.1 and 5.2 for further discussion of these risk thresholds). Consistent with U.S. EPA risk assessment guidance (U.S. EPA Region IV, 2000), if the maximum-detected concentration of contaminant in a given medium exceeded its RBC or PRG, the chemical was retained as a COI.

For some chemicals, no risk-based screening concentrations were available. However, for several of these chemicals, screening concentrations were available for structurally similar

chemicals. To avoid exclusion of these chemicals from the HHRA due to lack of toxicity values, these chemicals were evaluated using these surrogate values. The surrogate values were as follows:

- Alpha-chlordane, Gamma-chlordane, Oxychlordane, cis-Nonachlor, and trans-Nonachlor were evaluated using values for chlordane (toxicity values for chlordane are based on a mixture of compounds that include chlordane and nonachlor congeners);
- delta-Benzene hexachloride (delta-BHC) was evaluated using values for alpha-BHC (structurally similar and most conservative toxicity value of the BHC congeners);
- Endosulfan II and Endosulfan sulfate were evaluated using values for Endosulfan (structurally similar);
- Endrin aldehyde and Endrin ketone were evaluated using values for Endrin (structurally similar);
- 2-Nitrophenol was evaluated using values for 4-Nitrophenol (structurally similar);
- Acenaphthylene, Benzo(g,h,i)perylene, Phenanthrene were evaluated using values for Pyrene (structurally similar);
- 4-Chloro-3-methylphenol was evaluated using values for 3-Methylphenol (structurally similar);
- bis(2-Chloroethoxy)methane was evaluated using values for bis(2-Chloroethyl)ether (structurally similar); and
- 3-Nitroaniline and 4-Nitroaniline were evaluated using values for 2-Nitroaniline (structurally similar).

For several chemicals detected in sediment, appropriate surrogate values were not identified; consequently, these chemicals could not be quantitatively evaluated in the HHRA. These chemicals are as follows:

- 2,4,6-Tribromophenol
- 2-Fluorobiphenyl
- 2-Fluorophenol
- Decachlorobiphenyl
- Nitrobenzene-d5
- Phenol-d5
- Terphenyl-d14
- Tetrachloro-m-xylene

However, it should be noted that exclusion of these chemicals does not mean that they pose no risks to human health. If toxicity criteria become available for these chemicals in the future, then further evaluation of their possible human health risks may be warranted.

Chemical data and COI selection criteria for each medium of interest are summarized in Appendix A. Table 2-2 lists the chemicals identified as COIs for each medium.

2.5 Chemicals of Interest Selection Uncertainties

In some cases, a chemical's detection limit exceeded its risk-based concentration. Chemicals with detection limits greater than their risk-based concentration in at least one sample are listed in Table 2-3 for each medium. For surface water, in particular, detection limits for many of the analytes exceeded risk-based screening levels. Chemicals that were never detected in surface water, but that had maximum detection limits greater than 10 times their risk-based screening value are listed in Table 2-4. Chemicals that were never detected in fish, but that had maximum detection limits greater than 10 times their risk-based screening value are listed in Table 2-5. The failure to detect compounds that are present above screening values could underestimate risks. However, for most other analytes in surface water and most analytes in sediment and fish, chemicals were detected at least once and the detected concentrations were compared to risk-based concentrations. Thus, it is likely that few, if any, chemicals present in the Lower Ottawa River that could contribute significantly to risk were excluded from the HHRA due to lack of detection.

As indicated above, several chemicals detected in surface sediment in the Lower Ottawa River did not have verified toxicity guideline values. Consequently, these chemicals were not included in the screening process for chemicals of interest. This could underestimate risks for exposure to sediment.

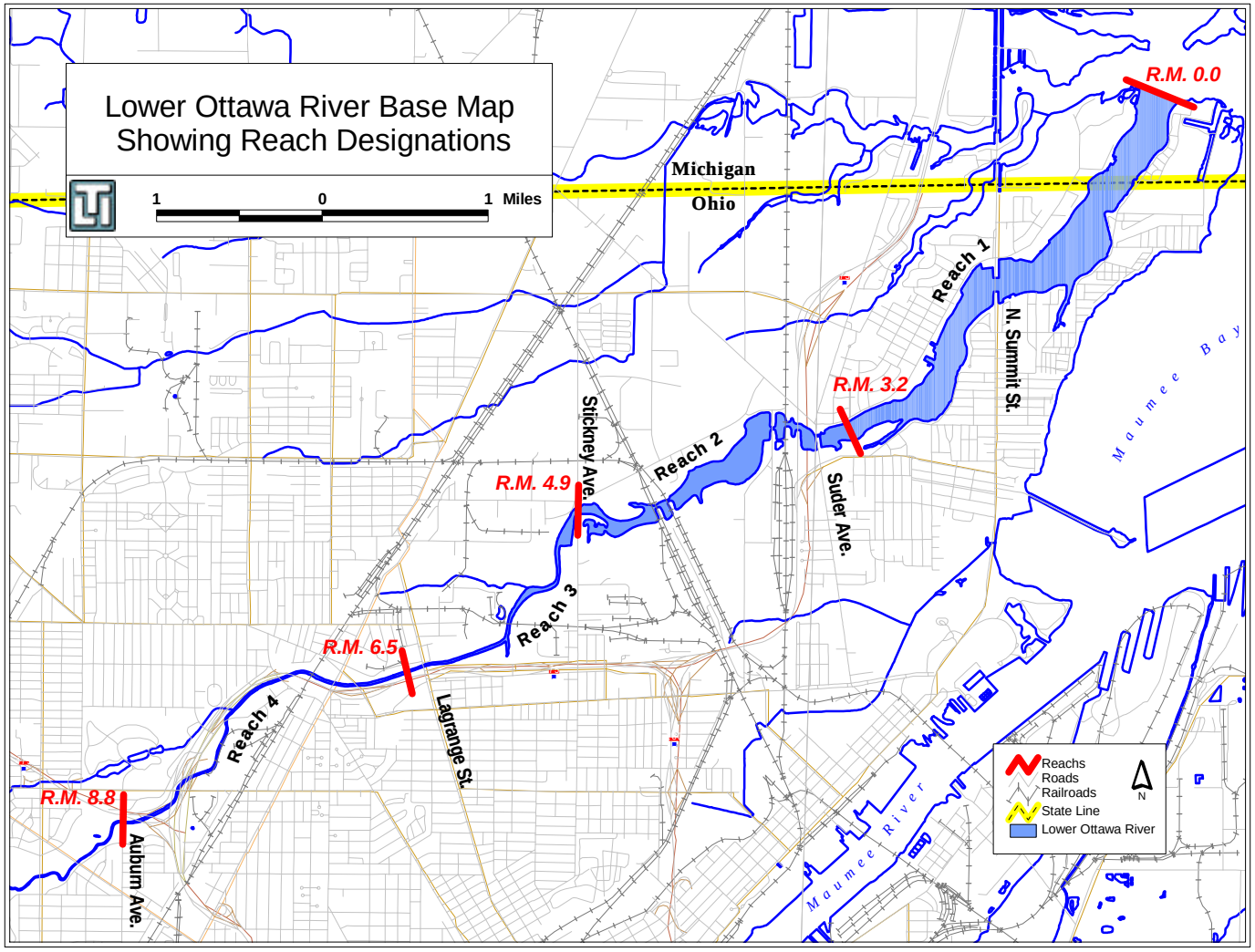

Lower Ottawa River Base Map
Showing Reach Designations
1 0 1 Miles
Michigan
Ohio
R.M. 0.0
Reach 1
N. Summit St.
R.M. 3.2
Reach 2
Stickney Ave.
R.M. 4.9
Suder Ave.
Reach 3
R.M. 6.5
Reach 4
Lagrange St.
R.M. 8.8
Auburn Ave.
Maumee Bay
Maumee River
Reachs
Roads
Railroads
State Line
Lower Ottawa River
N

Figure 2-2. Selection of Chemicals of Interest for the Lower Ottawa River Human Health Risk Assessment

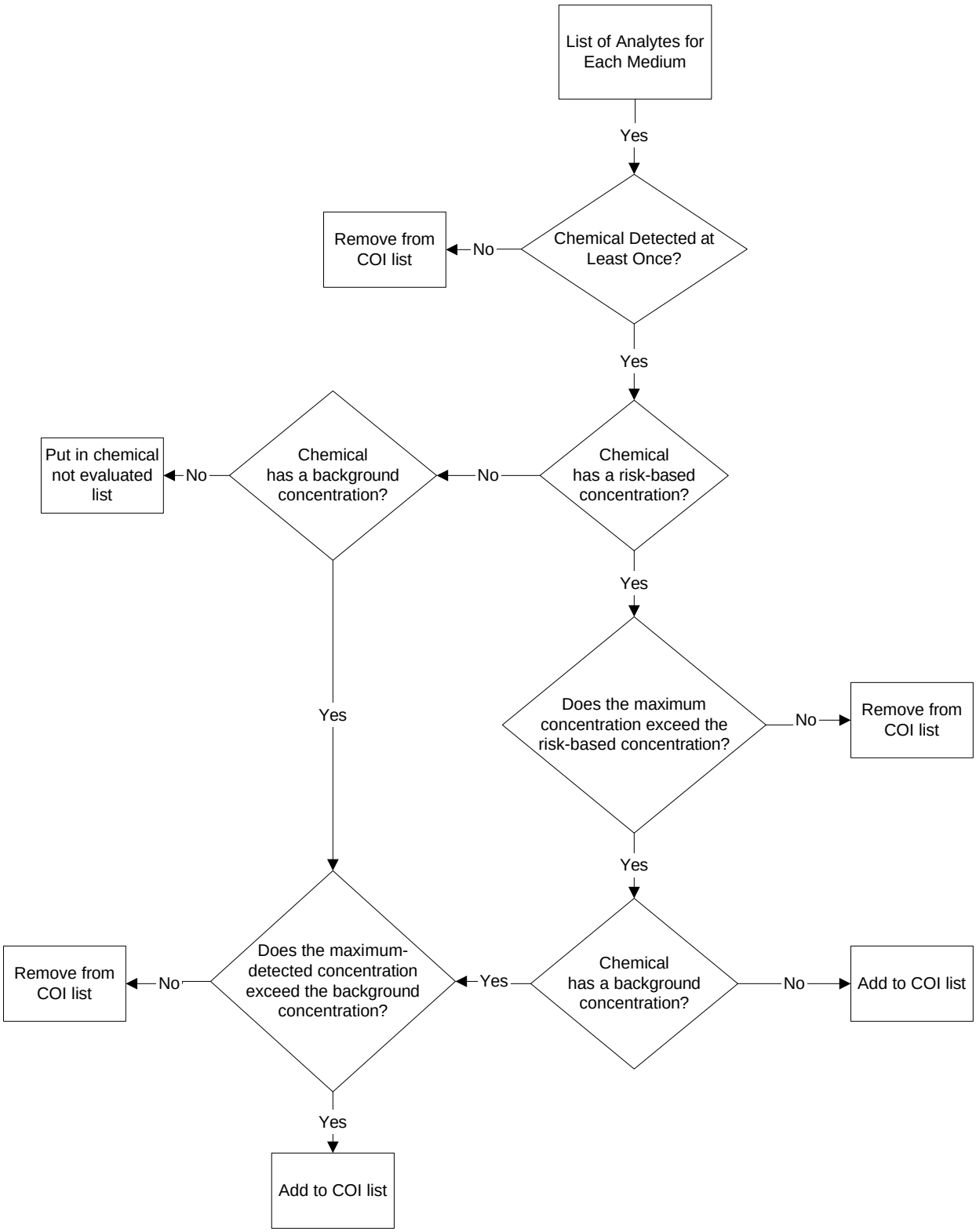


Table 2-1. Summary of Data Used in the Human Health Risk Assessment for the Lower Ottawa River

Medium	Segment 1 (RM 0 to <3.2)	Segment 2 (RM 3.2 to <4.9)	Segment 3 (RM 4.9 to <6.5)	Segment 4 (RM 6.5 to 8.8)
Sediment	• 71 stations (one to three stations every 0.1 mile) with 71 samples (OEPA, 1998) • 2 stations (RM 0.5) with 5 samples (OEPA, 2000) • 2 stations (RM 1.3) with 10 samples (OEPA, 2000) • 2 stations (RM 2) with 4 samples (OEPA, 2000) • 3 stations (RM 2.5) with 7 samples (OEPA, 2000) • 1 station (RM 2.8) with 2 samples (OEPA, 2000)	• 27 stations (one to three stations every 0.1 mile) with 27 samples (OEPA, 1998) • 2 stations (RM 3.6) with 10 samples (OEPA, 2000) • 1 station (RM 4.2) with 3 samples (OEPA, 2000) • 1 station (RM 4.8) with 4 samples (OEPA, 2000)	• 10 stations (appx every 0.1 mile) with 10 samples (OEPA, 1998) • 1 station (RM 5.1) with 2 samples (OEPA, 2000) • 1 station (RM 5.5) with 2 samples (OEPA, 2000) • 1 station (RM 5.7) with 2 samples (OEPA, 2000) • 2 stations (RM 5.8) with 6 samples (OEPA, 2000) • 1 station (RM 6.1) with 3 samples (OEPA, 2000)	• 13 stations (appx every 0.1 to 0.2 miles) with 13 samples (OEPA, 1998) • 1 station (RM 7.2) with 2 samples (OEPA, 2000) • 1 station (RM 7.6) with 2 samples (OEPA, 2000) • 1 station (RM 8.3) with 4 samples (OEPA, 2000)
Surface Water	• 4 stations (RM 0.5) with 8 samples (OEPA, 2000) • 2 stations (RM 1.3) with 6 samples (OEPA, 2000) • 2 stations (RM 2) with 6 samples (OEPA, 2000) • 2 stations (RM 2.5) with 6 samples (OEPA, 2000) • 1 station (RM 2.8) with 3 samples (OEPA, 2000)	• 2 stations (RM 3.6) with 6 samples (OEPA, 2000) • 1 station (RM 4.2) with 3 samples (OEPA, 2000) • 1 station (RM 4.8) with 3 samples (OEPA, 2000)	• 1 station (RM 5.5) with 3 samples (OEPA, 2000) • 2 station (RM 5.8) with 6 samples (OEPA, 2000) • 1 station (RM 6.1) with 3 samples (OEPA, 2000)	• 1 station (RM 7.2) with 3 samples (OEPA, 2000) • 1 station (RM 8.3) with 3 samples (OEPA, 2000)
Fish	• 1 station (RM 1.6) with 7 samples (OEPA, 2000)	• 1 station (RM 3.4) with 7 samples (OEPA, 2000)	• 1 station (RM 5.3) with 7 samples (OEPA, 2000) • 1 station (RM 5.9) with 14 samples (OEPA, 2000)	• 1 station (RM 7.2) with 5 samples (OEPA, 2000) • 1 station (RM 8) with 2 samples (OEPA, 2000)
Total Number of Samples	• *99 sediment (81 stations)* • *29 surface water (11 stations)* • *7 fish (1 station)*	• *44 sediment (31 stations)* • *12 surface water (4 stations)* • *7 fish (1 station)*	• *25 sediment (16 stations)* • *12 surface water (4 stations)* • *21 fish (2 stations)*	• *21 sediment (16 stations)* • *6 surface water (2 stations)* • *7 fish (2 stations)*

Table 2-2. Chemicals of Interest Evaluated in the Lower Ottawa River Human Health Risk Assessment

Fish	Sediment	Surface Water
4,4'-DDD (p,p'-)	Aldrin	2-Chlorophenol
4,4'-DDE (p,p'-)	Arsenic	4,4'-DDT (p,p'-)
4,4'-DDT (p,p'-)	Benzo(a)anthracene	Aldrin
Aldrin	Benzo(a)pyrene	Arsenic
alpha-Chlordane	Benzo(b)fluoranthene	Atrazine
Arsenic	Benzo(k)fluoranthene	Dieldrin
Chlordane	Dibenz(a,h)anthracene	gamma-Benzene hexachloride
Dieldrin	Dieldrin	Heptachlor
gamma-Chlordane	Heptachlor epoxide	Lead
PCB Aroclor 1242	Indeno(1,2,3-cd)pyrene	N-Nitroso-di-n-propylamine
PCB Aroclor 1260	Lead	Pentachlorophenol
Total PCBs	N-Nitroso-di-n-propylamine	Thallium
	PCB Aroclor 1016	
	PCB Aroclor 1242	
	PCB Aroclor 1248	
	PCB Aroclor 1254	
	Total PCBs	
	Thallium	

Table 2-3. Summary of Analytes With Limits of Detection that Exceeded Screening Levels for at Least One Sample, Lower Ottawa River Human Health Risk Assessment

Fish	Sediment	Surface Water	
Aldrin	2,2'-Oxybis(1-Chloropropane)*	2,4,6-Trichlorophenol*	Heptachlor
alpha-Benzene hexachloride (a-BHC)*	2-Nitroaniline*	2-Methylnaphthalene*	Heptachlor epoxide*
alpha-Chlordane	3,3'-Dichlorobenzidine*	2-Nitroaniline*	Hexachlorobenzene *
Arsenic	3-Nitroaniline*	3,3'-Dichlorobenzidine*	Hexachlorobutadiene*
beta-Benzene hexachloride (b-BHC)*	4,6-Dinitro-2-methylphenol *	3-Nitroaniline*	Hexachloroethane*
Chlordane	4-Nitroaniline*	4-Nitroaniline*	Indeno(1,2,3-cd)pyrene*
cis-Nonachlor*	Acetophenone*	Acetophenone*	Lead
delta-Benzene hexachloride (d-BHC)*	Arsenic	Aldrin	Magnesium
Dieldrin	Atrazine*	alpha-Benzene hexachloride (a-BHC)*	Manganese
gamma-Benzene hexachloride (g-BHC)*	Benzo(a)anthracene	Aluminum	Mercury
gamma-Chlordane	Benzo(a)pyrene	Ammonia	Naphthalene*
Heptachlor*	Benzo(b)fluoranthene	Arsenic	Nickel
Heptachlor epoxide*	bis(2-Chloroethoxy) methane*	Atrazine	Nitrobenzene*
Hexachlorobenzene *	bis(2-Chloroethyl) ether*	Barium	N-Nitroso-di-n-propylamine
Oxychlordane*	Dibenz(a,h)anthracene	Benzo(a)anthracene*	N-Nitrosodiphenylamine*
PCB Aroclor 1016*	Hexachlorobenzene*	Benzo(a)pyrene*	PCB Aroclor 1016*
PCB Aroclor 1221*	Hexachlorobutadiene*	Benzo(b)fluoranthene*	PCB Aroclor 1221*
PCB Aroclor 1232*	Indeno(1,2,3-cd)pyrene	Benzo(k)fluoranthene*	PCB Aroclor 1232*
PCB Aroclor 1242	N-Nitroso-di-n-propylamine	beta-Benzene hexachloride (b-BHC)*	PCB Aroclor 1242*
PCB Aroclor 1248*	PCB Aroclor 1016	bis(2-Chloroethoxy) methane*	PCB Aroclor 1248*
PCB Aroclor 1254*	PCB Aroclor 1221*	bis(2-Chloroethyl) ether*	PCB Aroclor 1254*
PCB Aroclor 1260	PCB Aroclor 1232*	bis(2-Ethylhexyl)phthalate	PCB Aroclor 1260*
Selenium	PCB Aroclor 1242	Calcium	Pentachlorophenol
Toxaphene*	PCB Aroclor 1248	Carbazole*	Phosphorus
trans-Nonachlor	PCB Aroclor 1254	Chromium	Potassium
	PCB Aroclor 1260	Chrysene*	Sodium
	Pentachlorophenol	Copper	Thallium
	Toxaphene*	delta-Benzene hexachloride (d-BHC)*	Toxaphene*
		Dibenz(a,h)anthracene*	Vanadium
		Dieldrin	Zinc

* Chemical never detected in sample medium

Table 2-4. Chemicals Never Detected in Surface Water with Maximum Limits of Detection Greater than Ten Times Risk-Based Screening Values, Lower Ottawa River Human Health Risk Assessment

Chemical	Frequency of Detection	Range of Detection Limits (µg/L)	U.S. EPA Region IX PRG (µg/L) [a]
2-Nitroaniline	0/21	25 - 50	2.1
3,3'-Dichlorobenzidine	0/20	10 - 20	0.15
3-Nitroaniline	0/21	25 - 50	2.1
4-Nitroaniline	0/21	25 - 50	2.1
Acetophenone	0/21	10 - 20	0.042
Benzo(a)anthracene	0/19	10 - 20	0.092
Benzo(a)pyrene	0/19	10 - 20	0.0092
Benzo(b)fluoranthene	0/19	10 - 20	0.092
Benzo(k)fluoranthene	0/19	10 - 20	0.92
bis(2-Chloroethoxy) methane	0/21	10 - 20	0.0098
bis(2-Chloroethyl) ether	0/21	10 - 20	0.0098
Dibenz(a,h)anthracene	0/19	10 - 20	0.0092
Hexachlorobenzene	0/21	10 - 20	0.042
Hexachlorobutadiene	0/21	10 - 20	0.86
Indeno(1,2,3-cd)pyrene	0/19	10 - 20	0.092
PCB Aroclor 1221	0/21	2	0.034
PCB Aroclor 1232	0/21	1	0.034
PCB Aroclor 1242	0/21	1	0.034
PCB Aroclor 1248	0/21	1	0.034
PCB Aroclor 1254	0/21	1	0.034
PCB Aroclor 1260	0/21	1	0.034
Toxaphene	0/21	5	0.061

(a) U.S. EPA Region IX, 2000

Table 2-5. Chemicals Never Detected in Fish with Maximum Limits of Detection Greater than Ten Times Risk-Based Screening Values, Lower Ottawa River Human Health Risk Assessment

Chemical	Frequency of Detection	Range of Detection Limits (µg/kg)	U.S. EPA Region IX PRG (µg/kg) [a]
alpha-Benzene hexachloride (a-BHC)	0/42	9.35 - 10.4	0.50
delta-Benzene hexachloride (d-BHC)	0/42	9.35 - 10.4	0.50
Heptachlor	0/42	9.35 - 9.87	0.70
Heptachlor epoxide	0/42	9.35 - 10.4	0.35

(a) U.S. EPA Region IX, 2000

3.0 EXPOSURE ASSESSMENT

The goal of the Exposure Assessment is to identify and characterize the populations and pathways for which exposures will be evaluated and to develop contaminant-specific estimates of average daily doses. The populations and pathways that were evaluated in the HHRA and the exposure parameters that were used to estimate doses and risks are described below. The conceptual site model for the HHRA, showing the populations, scenarios, and pathways evaluated in this HHRA, is presented in Figure 3-1.

3.1 Exposure Populations and Scenarios

The HHRA focuses on populations likely to be significantly exposed to contaminants in the Lower Ottawa River through recreational activities and consumption of recreationally caught fish. The following populations were evaluated:

- Adult and child recreators exposed to contaminants through direct contact with sediments and surface water during such activities as swimming and wading;
- Anglers exposed to contaminants through direct contact with surface water while fishing; and
- Consumers of recreationally caught fish, including recreational anglers and members of their households who consume the fish (adults and children).

The recreator population is considered representative of people who spend time engaged in activities that result in full immersion in surface water, such as swimming and jet skiing, or who engage in activities that result in partial submersion, such as wading. These individuals are also assumed to come in direct contact with sediments. The angler population is considered representative of people who catch and consume fish from the Lower Ottawa River; these people are also assumed to contact surface water while fishing, either from a boat or from the shoreline.

Susceptible populations (*e.g.*, certain ethnic groups, sport anglers, women, children, nursing infants, the elderly) can be exposed to contaminants via consumption of fish (ATSDR, 2000). In addition, toxicity data suggest that reproductive function may be disrupted by exposure to PCBs, one of the primary COIs in this risk assessment, and that neurobehavioral and developmental deficits have occurred in newborns who had *in utero* exposure to PCBs and other persistent organic substances (ATSDR, 2000; U.S. EPA, 1997b). The intake rate used in this HHRA was based on upperbound and average fish consumption rates for the general population of licensed anglers. However, since the amount of fish consumed determines the level of exposure to contaminants in fish, exposures to potentially susceptible populations including ethnic groups who consume greater amounts of fish, women of childbearing age, and young children can be estimated by adjusting the intake rate in the exposure equations.

Two different exposure scenarios were evaluated for these populations: a reasonable maximum exposure (RME) and a central tendency (CT) scenario. The RME scenario is defined as the highest exposure that could reasonably be expected to occur for a given exposure pathway at a site, and accounts for both uncertainty in the contaminant concentration and variability in the exposure parameters. The CT scenario represents a more likely or average exposure scenario, and provides perspective on the range of potential exposure and risk estimates for the populations of interest.

It is possible that a small number of individuals catch and consume fish from the Ottawa River as a primary dietary food source (*i.e.*, subsistence anglers). However, exposures to subsistence anglers were not evaluated in this assessment. If fish consumption rates for subsistence anglers are identified, they can be combined with data on concentrations in fish from different areas of the river, presented in Section 5.0, to estimate risks to this subpopulation.

3.2 Exposure Pathways

An exposure pathway describes the course a chemical takes from its source to the exposed individual. In order for an exposure pathway to be complete, it must have four elements (U.S. EPA, 1989):

- A source and mechanism of chemical release,
- A retention or transport medium,
- A point of potential human contact with the contaminated medium, and
- An exposure route (*e.g.*, ingestion) at the contact point.

Based on these elements, the following exposure pathways to contaminants in the Lower Ottawa River were identified as potentially complete for the populations of interest and were quantitatively evaluated in this HHRA:

- Incidental ingestion of sediment while swimming or engaged in other recreational activities such as wading or playing on the shoreline;
- Dermal contact with sediment while swimming or engaged in other recreational activities such as wading or playing on the shoreline;
- Incidental ingestion of surface water while swimming or engaged in other recreational activities such as wading or playing on the shoreline;
- Dermal contact with surface water while swimming or engaged in other recreational activities such as wading or playing on the shoreline, or while fishing from a boat; and
- Consumption of recreationally caught fish.

Inhalation of volatilized substance or wind-blown dust was not evaluated, since it is expected that the contribution of the inhalation pathway is insignificant for the relatively nonvolatile

chemicals in surface water and sediment in the Lower Ottawa River, and entrainment of dust particles from contaminated sediment is not expected to be significant.

3.3 Quantification of Exposure

The following sections present the equations used to calculate estimated daily doses of each COIs, the methods used to estimate exposure point concentrations, and the parameters used to estimate dose.

3.3.1 Exposure Equations

The equations used to estimate intake (dose) for each pathway evaluated in the HHRA are provided below.

Incidental Ingestion of Sediment

$$Dose_{ing-sed}\ (mg/kg-d) = \frac{C_{sed} \times IR_{sed} \times f_i \times B_{oral} \times EF \times ED}{BW \times AT}$$

Where:

C_{sed}	=	Concentration of contaminant in surface sediment, mg/kg
IR_{sed}	=	Sediment ingestion rate, kg/d
f_i	=	Fraction ingested from a contaminated source, unitless
B_{oral}	=	Relative oral bioavailability, unitless
EF	=	Exposure frequency, event/yr
ED	=	Exposure duration, yr
BW	=	Body weight, kg
AT	=	Averaging time, d

Dermal Contact with Sediment

$$Dose_{derm-sed}\ (mg/kg-d) = \frac{C_{sed} \times SA_{sed} \times AF \times ABS \times CF \times EF \times ED}{BW \times AT}$$

Where:

C_{sed}	=	Concentration of contaminant in surface sediment, mg/kg
SA_{sed}	=	Skin surface area available for contact with sediment, cm^2/event
AF	=	Sediment to skin adherence factor, mg/cm^2
ABS	=	Dermal absorption factor, unitless
CF	=	Conversion factor, kg/mg
EF	=	Exposure frequency, event/yr
ED	=	Exposure duration, yr
BW	=	Body weight, kg
AT	=	Averaging time, d

Incidental Ingestion of Surface Water

$$Dose_{ing-water}\ (mg/kg-d) = \frac{C_{water} \times IR \times ET \times EF \times ED}{BW \times AT}$$

Where:

C_{sed}	=	Concentration of contaminant in surface water, mg/L
IR_{water}	=	Incidental surface water ingestion rate, L/hr
ET	=	Exposure time, hr/event
EF	=	Exposure frequency, event/yr
ED	=	Exposure duration, yr
BW	=	Body weight, kg
AT	=	Averaging time, d

Dermal Contact with Surface Water

$$Dose_{derm-water}\ (mg/kg-d) = \frac{C_{water} \times SA \times Kp \times CF \times ET \times EF \times ED}{BW \times AT}$$

Where:

C_{sed}	=	Concentration of contaminant in surface water, mg/L
SA	=	Skin surface area available for contact with surface water, cm^2
Kp	=	Chemical-specific dermal permeability constant, cm/hr
CF	=	Conversion factor, L/cm^3
ET	=	Exposure time, hr/event
EF	=	Exposure frequency, event/yr
ED	=	Exposure duration, yr
BW	=	Body weight, kg
AT	=	Averaging time, d

Consumption of Fish

$$Dose_{fish}\ (mg/kg-d) = \frac{C_{fish} \times IR \times f_i \times CF \times EF \times ED}{BW \times AT}$$

Where:

C_{sed}	=	Concentration of contaminant in edible portion of fish, mg/kg (wet weight)
IR	=	Fish ingestion rate, g/d
f_i	=	Fraction ingested from a contaminated source, unitless
CF	=	Conversion factor, kg/g
EF	=	Exposure frequency, d/yr
ED	=	Exposure duration, yr
BW	=	Body weight, kg
AT	=	Averaging time, d

3.3.2 Exposure Point Concentrations

Samples collected in each river segment were used to calculate the exposure point concentrations (EPCs) used to estimate intakes of each COI. For each COI in each medium, separate exposure point concentrations were calculated for each of the four river segments. The rationale used to group the data outlined in Section 2.3.1 for purposes of calculating EPCs includes the following considerations:

- **Concentrations in Sediment**. Since people who recreate in the Lower Ottawa River are most likely to contact contaminants in the upper layers of sediment, surface sediment samples only were used (*i.e.*, collected at the surface or at a start depth of 0- or 2-inches extending to no more than 24-inches below the surface).
- **Concentrations in Surface Water**. All surface water data were used.
- **Concentrations in Fish**. Fish data used for this HHRA consisted of samples of "skin off" fillet and "skin on" fillet or the whole organism. Although U.S. EPA recommends that fish filets be used to establish chemical concentrations for purposes of HHRA, since this is the portion consumed by humans (U.S. EPA, 1989), examination of the fish data collected from the Lower Ottawa River revealed no apparent pattern in the relative concentrations of contaminants in skin-on filets, skin-off filets, and whole fish. Further, some populations may consume whole fish, and some may consume fish with the skin on or off. Consequently, all fish samples collected within a river segment were averaged for purposes of evaluating risks associated with fish consumption. No reduction of fish concentration due to cooking methods was assumed.

For nondetect values, one-half of the method detection limit was used to calculate exposure point concentrations. However, for several of the COIs in surface water, in particular, chemicals were detected infrequently but had detection limits that were greater than their risk-based screening values. Thus, use of one-half the detection limit for these compounds can result in a large fraction of estimated risks being due to nondetected values. Surface water COIs with elevated detection limits are shown in Table 3-1. Note that for each of the organic compounds listed in this table, all reported detected concentrations are estimated values (*i.e.*, "J" qualified).

Per U.S. EPA risk assessment guidance (U.S. EPA, 1989; 1992c), the 95 percent upper confidence limit (95% UCL) of the arithmetic mean was used as an estimate of the contaminant's arithmetic average concentration in each river segment for both the RME and CT scenarios. Use of the 95% UCL provides reasonable confidence that the true average in each river segment will not be underestimated.

Prior to calculating 95% UCLs, the data were transformed using the natural logarithm function (*i.e.*, $ln(x)$) based on the assumption that the environmental contaminant data set is lognormally distributed . The 95% UCL of the arithmetic mean for a lognormally distributed data set was calculated using the following equation (U.S. EPA, 1992c):

$$UCL = \exp(\bar{x} + 0.5s^2 + \frac{sH}{\sqrt{n-1}})$$

Where:

UCL	=	Upper confidence limit
$\bar{x}$	=	Mean of the transformed data
s	=	Standard deviation of the transformed data
H	=	H-statistic
n	=	Number of samples

Consistent with U.S. EPA guidance, if the calculated 95% UCL exceeded the maximum-detected concentration in a given medium, the maximum detected concentration was used (U.S. EPA, 1989; 1992c). Detailed summaries of EPCs are presented in Appendix B. EPCs used in the HHRA are summarized in Tables 3-2 through 3-4. These tables also compare EPCs to other criteria, including Ohio and federal surface water quality standards and United States Food and Drug Administration (U.S. FDA) action levels for fish.

In some cases, chemicals were detected in surface water but were never analyzed in fish. For chemicals in surface water that were identified as COIs, bioaccumulation factors (BAFs) were used to estimate the rate at which a chemical is accumulated from surface water into fish tissue. BAFs were selected for use in the HHRA from the scientific literature and current U.S. EPA and regional guidance, using values specific to the Great Lakes region where available. BAFs applied in this assessment were:

- Atrazine: 66 (mg/kg)/(mg/L)
- 2-Chlorophenol: 28 (mg/kg)/(mg/L)
- Di-n-butylphthalate: 3,100 (mg/kg)/(mg/L)
- N-Nitroso-di-n-propylamine: 6.8 (mg/kg)/(mg/L)
- Pentachlorophenol: 180,000 (mg/kg)/(mg/L)
- Thallium: 100 (mg/kg)/(mg/L)

Use of these values combined with EPCs for these chemicals in surface water results in estimates of fish tissue concentrations for some of these chemicals that significantly exceed risk-based screening concentrations, specifically for atrazine, N-nitroso-di-n-propylamine, pentachlorophenol, and thallium (Table 3-5). All four of these chemicals, however, were detected infrequently in surface water, as follows:

- Atrazine: Frequency of Detection in surface water = 1/22 (detected values was estimated)

- N-Nitroso-di-n-propylamine: Frequency of Detection in surface water = 2/22 (both detected values were estimated)
- Pentachlorophenol: Frequency of Detection in surface water = 2/22 (both detected values were estimated)
- Thallium: Frequency of Detection in surface water = 1/19

Inclusion of these contaminants in the risk evaluation could significantly inflate risk estimates for consumption of fish based on estimates of fish tissue concentrations that are highly uncertain. Consequently, these chemicals were not included in the risk evaluation for fish consumption; however, estimated risks associated with consumption of these contaminants in fish, assuming they are present in fish at the concentrations estimated using the surface water EPCs and BAFs, are presented for illustrative purposes in Section 5 (Table 5-11).

3.3.3 Exposure Parameters

As shown in the equations in Section 3.3.1, quantification of exposure requires information on the behavioral characteristics of the population of interest (*e.g.*, how frequently the population engages in an activity, how many years the population is exposed). Where available, site-specific information for the Ottawa River or nearby areas was used to quantify potential exposures. In the absence of site-specific information, information on average exposures to U.S. populations, such as presented in U.S. EPA's *Exposure Factors Handbook* (U.S. EPA, 1997a), or U.S. EPA standardized default exposure parameters were used.

Consistent with U.S. EPA guidance, exposure parameters for the RME scenario were selected to represent reasonable upper-bound estimates of exposure (U.S. EPA, 1989). For the CT scenario, exposure parameters were based on estimates of exposure more reflective of the population average.

Exposure parameters for the populations of interest for the RME and CT scenarios are presented in Appendix C. Considerations for selection of exposure parameters for specific activities are discussed below.

3.3.3.1 Recreational Activity Patterns

As available and appropriate, recreational activity patterns were based on information collected at or near the Ottawa River. The frequency of participation in recreational activities in the Ottawa River, such as boating, was based on survey data (Hushak, 2000). Specifically, the upperbound (RME) exposure duration and frequency for individuals exposed to surface water while fishing (*i.e.*, boaters) was based on the upperbound exposure duration and frequency for boaters reported in Hushak (2000)—6 hours per day and 30 events per year. Other site-specific activities data such as swimming was not available for Ohio. In the absence of such information, information on national average exposure durations for different

recreational activities, gathered by U.S. EPA and reported in U.S. EPA's *Exposure Factors Handbook*, was used to establish these parameters (U.S. EPA, 1997a).

Specifically, for the RME scenario it was assumed that an adult recreator engaged in recreational activities that involved intensive contact with Ottawa River water for 24 days per year (approximately 4 days per month for 4 months and 1 day per month for 8 months) for 3 hours per event. For the RME scenario it was assumed that child recreators (ages 1 through 14 years) engaged in recreational activities in the Ottawa River for an average of 48 days per year (approximately 8 days per month for 4 months and 2 days per month for 8 months) for 3 hours per event. For the CT scenario, adults were assumed to engage in recreational activities for 16 days per year (approximately 2 days per month for 4 months plus 1 day per month for 8 months) for 1 hour per event, and children were assumed to engage in recreational activities for 30 days per year (approximately 1 day per week for 4 months, 2 days per month for 4 months, and 1 day per month for 4 months) for 1 hour per event.

3.3.3.2 Fish Consumption Rates

Fish consumption rates for the angler populations evaluated in this HHRA were based on the assumption that the population of interest is recreational anglers who fish regularly for recreation or sport and their family members who consume the recreationally caught fish. Fish consumption by subsistence anglers (*i.e.*, those who fish mainly to provide a dietary staple) was not evaluated in this HHRA.

It is assumed that the anglers evaluated in this assessment consume fish at a higher average rate than the general U.S. population. For example, some authors have found that persons who eat sport-caught fish consume two- to three-times more fish than the overall U.S. population (ATSDR, 2000). Consequently, use of fish consumption rates from national consumption surveys is inappropriate. Since site-specific information on fish consumption rates have not been collected as part of this project, data from other regional studies (*i.e.*, from the Great Lakes region) were used to assess exposures via this pathway.

Among the data used to assess fish consumption patterns for the populations of interest is a mail survey conducted of Michigan sport fish license holders by West *et al*. (1992; 1993 as cited in CalEPA, 1997). In 1988, West *et al*. gathered fish consumption information for all members of the household for a seven-day recall period, including information on self-caught fish (West *et al*., 1992). A main objective of the survey was to collect information on fish consumption rates by subgroups, especially minorities, who may have an especially high rate of fish consumption. The overall mean rate for fish consumption reported by West *et al*. (1992) is 18.3 g/person/day for the winter-spring period for sport anglers and their family members who consumed fish. They noted that higher rates of consumption would be expected during the summer-fall months. The authors estimated an average sport fish

consumption rate of 14.5 g/person/day (adjusted downward by 2.2 g to account for nonresponse, assuming that those who did not respond to the survey were less likely to consume as much fish), with an upper level intake (96^{th} percentile) of 81.6 g/person/day. Average fish consumption rates were higher among some minority groups (20.3 g/day for Blacks, 24.3 g/day for Native American, and 17.9 g/day for other minorities).

In 1991-92, West *et al*. conducted a year-long study to more thoroughly evaluate fish consumption rates in Michigan (West *et al*., 1993). The mail survey was randomly delivered to 7,000 licensed anglers, who were asked to provide fish consumption information for the licensee only (not the household members) for a seven-day recall period (the 1988 survey had found that household member consumption rates were statistically interdependent with the license holders, and that they consumed proportionally less according to body weight). Consumption information was collected throughout the year to capture a full year cycle in fish consumption behavior. Information was gathered on sport fish consumption from any Michigan waters, including the Great Lakes and Michigan Rivers that flow into the Great Lakes. Sport fish consumption averaged 14.5 g/person/day (adjusted for nonresponse bias). West *et al*. (1993) also found that lower income groups had higher mean rates of sport fish consumption (21.0 g/person/day for <$14,999 per year and 20.6 g/person/day for $15,000-24,999 per year). In addition, minority anglers had significantly higher mean consumption rates than White anglers (23.2 vs. 16.3 g/person/day). Lower income minorities (= $24,999) had the highest mean sport fish consumption rates of 43.1 g/person/day.

Data from these surveys (West *et al*., 1992; 1993) were used assess exposures to contaminants in the Lower Ottawa River via sport fish consumption. To reflect the possible range of exposures, upper percentile and mean fish consumption rates described by West *et al*. (1992; 1993) were used to assess potential risks to recreational anglers. However, due to the proximity of the Lake Erie to the Lower Ottawa River, it is assumed that anglers only spend a portion of their time fishing in the Lower Ottawa River and that only a fraction of their annual consumption of self-caught fish comes from the Lower Ottawa River. For purposes of this HHRA, it was assumed that one-half of the upper percentile and mean fish consumption rates for Michigan sport anglers reported by West *et al*. provided a reasonable estimate of sport fish consumption rates for the Lower Ottawa River. Specifically, risks were calculated assuming an upper percentile ingestion rate of 41 g/day for the adult RME scenario and a mean ingestion rate of 7.3 g/day for the adult CT scenario. These consumption rates correspond to approximately 60 and 10 8-ounce fish meals per year, respectively (an 8-ounce filet of fish is approximately the size of a deck of cards). For the child exposure scenario, consumption rates were adjusted on a per body weight basis. The resulting upper percentile and mean ingestion rates for children were 18 and 3.1 g/day, respectively.

3.3.4 Chemical-Specific Uptake Factors

Chemical-specific uptake factors are used to estimate absorption of chemicals into tissue. For this HHRA, uptake factors were identified from U.S. EPA guidance documents and the scientific literature, as appropriate. Uptake factors used in the HHRA include:

- *Dermal absorption factors (ABS*), used to estimate the rate at which a chemical desorbs from sediment and absorbs through the skin upon dermal contact;
- *Permeability constants* (*Kp*), used to estimate the rate at which a chemical in surface water absorbs through the skin; and
- *Gastrointestinal absorption factors* (*GAF*), used to estimate the rate at which a chemical ingested in soil desorbs from the soil and is absorbed through the gastrointestinal tract, for use in adjusting administered dose oral reference doses (RfDs) or slope factors to absorbed dose dermal RfDs or slope factors.

GAFs are presented in Table 4-1 (Toxicity Criteria). Other chemical-specific uptake factors used in the HHRA are presented in Table 3-6.

3.4 Derivation of Dose Estimates

For each exposure population, doses were estimated for each pathway and chemical and presented in units of milligrams per kilogram body weight per day (mg/kg-d). For evaluation of noncarcinogenic effects, doses were averaged over one year and presented as average daily doses (ADDs). For evaluation of cancer risk, doses were averaged over a lifetime (assumed to be 70 years) and presented as lifetime average daily doses (LADDs). These dose estimates are compared to toxicity information in the Risk Characterization section.

3.5 Evaluation of Fish Consumption Advisory Categories

Exposures to PCBs in fish were also evaluated for different fish consumption advisory categories, in accordance with the *Protocol for a Uniform Great Lakes Fish Consumption Advisory* (Great Lakes Sport Fish Advisory Task Force, 1993). Consistent with this protocol, noncancer hazards for consumption of fish in different river segments were calculated for the following five advisory categories based on fish tissue concentrations of PCBs:

- Category 1: Unrestricted consumption (225 meals/year or 140 g/day)
- Category 2: One meal a week (52 meals/year or 40 g/day)
- Category 3: One meal a month (12 meals/year or 7.5 g/day)
- Category 4: One meal every 2 months (6 meals/year or 3.7 g/day)
- Category 5: No Consumption (Do Not Eat)

Consumption rates in grams per year are based on an assumed average meal size of 227 g (1/2 pound) of uncooked fish (Great Lakes Sport Fish Advisory Task Force, 1993). Calculations considered PCBs only since "the Task Force agreed that the health protection value developed

for the PCBs would in most instances account for the majority of the potential health risk from the mixture of chemicals present in fish."

3.6 Evaluation of Exposure to Lead

Exposure to lead was evaluated using U.S. EPA's Integrated Exposure-Uptake Biokinetic (IEUBK) model for calculation of blood lead concentrations in children from exposure to lead in different environmental media and the diet (U.S. EPA, 2001b). In the Lower Ottawa River HHRA, lead was identified as a COI for sediment. Since uptake of lead through dermal contact is considered to be insignificant (U.S. EPA, 2001), lead exposures were evaluated for one population only, the child recreators, exposed to lead through incidental ingestion of sediment.

Inputs to the blood lead model used in this HHRA were as follows:

- Model default inputs were assumed for exposure to lead in air, water, and diet.
- The model soil/dust concentration was assumed to be equal to the sediment EPC for each segment. If the sediment EPC was less than 200 mg/kg (the IEUBK model default for background exposures to lead in soil/dust), a soil/dust concentration of 200 mg/kg was assumed.

Using these inputs, blood lead concentrations were calculated for four-hour intervals for a total exposure period of 84 months (7 years), for each river segment for both the RME and CT scenarios.

3.7 Exposure Assessment Uncertainties

EPCs were calculated assuming that for nondetected analytes, the COI was present in the sample at one-half its detection limit. This practice is consistent with U.S. EPA guidance for screening level risk assessments (U.S. EPA, 1989). For surface water in particular, some infrequently detected COIs had reported detection limits that exceed risk-based screening levels. Thus, even when these chemicals were not detected, a significant risk could be estimated simply by assuming the chemical is present at one-half its detection limit. Use of one-half the limit of detection as the assumed concentration for these nondetected chemicals may significantly overestimate actual exposures and risks. In fact, eight of the 13 COIs in surface water (2-chlorophenol, 4,4'-DDT, aldrin, dieldrin, gamma-BHC, heptachlor, N-nitroso-di-n-propylamine, and pentachlorophenol) were detected in only two samples, both collected at RM 0.5 in Segment 1 (in samples #ENW03MS and #ENW03MSD, collected from the left side of the river during the 2000 OEPA sampling program). Examination of the sediment data shows that the highest detected sediment concentrations of seven of these eight compounds (2-chlorophenol, 4,4'-DDT, dieldrin, gamma-BHC, heptachlor, N-nitroso-di-n-propylamine, and pentachlorophenol) were also measured at this location. Thus, it appears that the water concentrations are "real" (*e.g.*, they do not reflect sample contamination or

another error) and that RM 0.5 could be a hot spot for these chemicals. As such, inclusion of these compounds as COIs for surface water—and assuming they could be present in surface water at other locations at a concentration equal to one-half their detection limit—is an appropriately conservative assumption for this screening-level HHRA.

EPCs for sediment are based, in part, on core samples collected in the Ottawa River at depths extending from the surface to up to 12 inches below the surface. Since these core samples were homogenized prior to analysis, the reported concentrations essentially represent the average concentration over the depth interval. Use of these samples may underestimate concentrations in sediment at the surface, which people are more likely to contact, if sediment concentrations in the first several inches of sediment are higher than concentrations at depth.

EPCs in fish are based on the average of concentrations detected in fish of a range of sizes representative of the sizes of fish likely to be caught and consumed by recreational anglers (*i.e.*, ranging from about 5 to 25 inches in length, with an average of about 12.5 inches in length). However, at the same locations, larger fish within the same species tend to accumulate higher concentrations of contaminants than smaller fish. Figure 3-2 shows PCBs concentrations in fish measured in the Lower Ottawa River compared to fish length. Thus, the exposure assessment may underestimate the average concentration of contaminants in fish caught for consumption by anglers who tend to catch and retain only larger fish. Conversely, the exposure assessment may overestimate average concentrations in fish caught for consumption by anglers who tend to catch and retain smaller fish.

EPCs in fish are based on a combination of whole fish and skin-on and skin-off filets. Preparing fish by removing skin and trimming fat can reduce the concentrations of contaminants in consumed fish, since many contaminants tend to accumulate in the fatty parts of fish. As discussed previously, however, no clear difference in concentrations between whole fish and skin-on and -off filets was noted.

EPCs in fish assume no reduction in contaminant concentrations due to cooking. In reality, cooking methods such as baking, broiling, grilling, or steaming allow juices to drain away from the fish and remove much of the fat from fish, therefore significantly reducing the levels of organic contaminants including PCBs and organochlorine pesticides (sometimes by as much as 30-50%) (U.S. EPA, 1997b). Consequently, the exposure assessment may overestimate concentrations in consumed fish.

Nursing and pregnant women and young children may be more sensitive to the harmful effects of some contaminants evaluated in this HHRA, such as PCBs. In this assessment, exposures from consumption of fish were estimated for an average adult and child. Since fish consumption rates are assumed to be proportional to an individual's body weight and doses in this risk assessment are presented in terms of milligrams of contaminant per kilogram body

weight per day, doses from consumption of fish on a per kilogram of body weight basis are expected to be comparable for different individuals within a population. Thus estimated doses for adults should be representative of doses to nursing and pregnant women, and estimated doses for children should be representative of doses for young children.

Exposure parameters used in this HHRA are based on local data if available. However, for several parameters, default values compiled by U.S. EPA are used. Doses estimated using these parameters may underestimate or overestimate actual exposures to individuals who are exposed to contaminants in the Lower Ottawa River. However, since the parameters compiled by U.S. EPA are generally intended to represent upperbound estimates of exposures for average populations, it is likely that doses estimated in this assessment overestimate exposures to most individuals who come in contact with the Lower Ottawa River.

This HHRA assumes that chemicals in ingested sediment are 100% bioavailable (that is, the chemicals are as likely to be absorbed into the systemic circulation following ingestion in sediment as they are in the studies upon which the toxicity criteria for these chemicals are based). However, most toxicity criteria are based on highly available forms of these chemicals (*e.g.*, water soluble forms) administered in food or water to laboratory animals, whereas chemicals in sediment are likely to be more tightly bound to sediment particles such that only a fraction of the total ingested dose is absorbed into the circulation. Thus, assuming 100% bioavailability likely overestimates exposures for the sediment ingestion pathway.

Figure 3-1. Lower Ottawa River Human Health Risk Assessment Conceptual Model

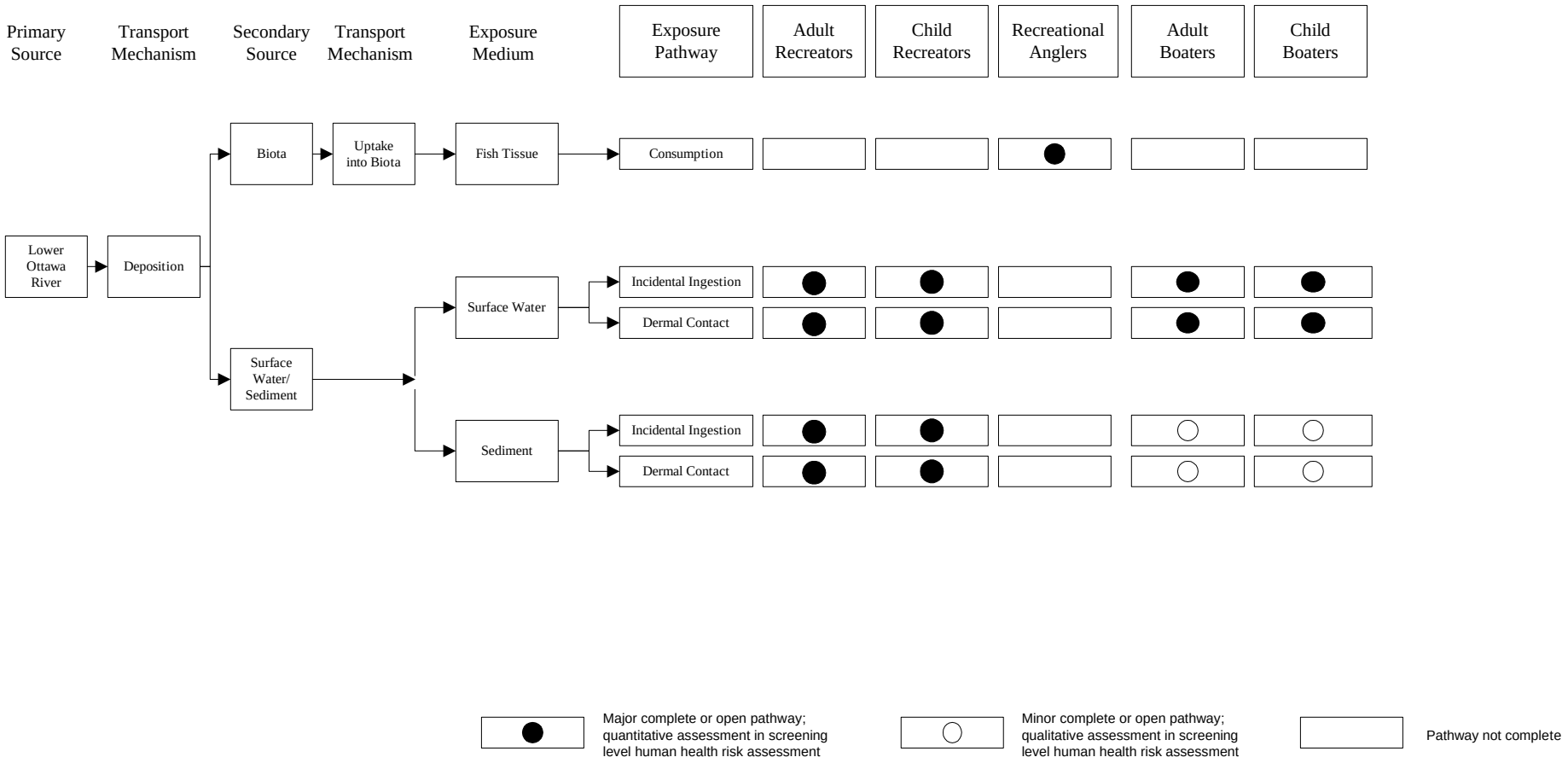
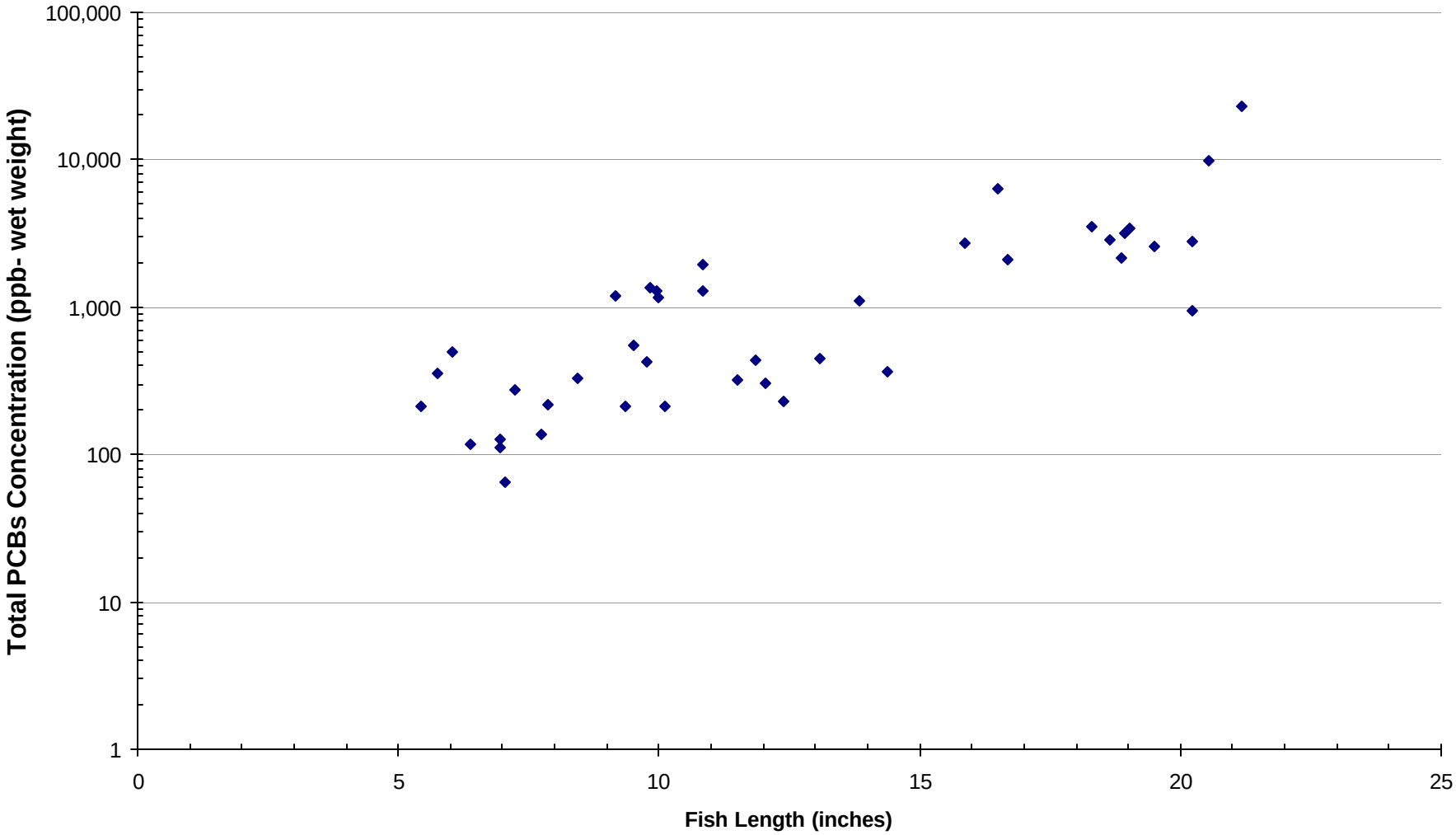


Figure 3-2. Comparison of Total PCBs Concentrations in Fish Collected from the Lower Ottawa River* (ppb) vs. Fish Length (inches)



* Collected from River Mile 0 - 8.8, Inventory 16

Table 3-1. COIs in Surface Water with Maximum Limits of Detection Greater than Ten Times Risk-Based Screening Values, Lower Ottawa River Human Health Risk Assessment

Chemical	Frequency of Detection	Range of Detection Limits (µg/L)	Maximum Detected Concentration (µg/L)	U.S. EPA Region IX PRG (µg/L) [a]
Aldrin	2/21	0.05	0.22 [b]	0.0040
Arsenic	3/19	2.3	3.8	0.045
Atrazine	1/21	10 - 20	1 [b]	0.30
Dieldrin	2/21	0.1	0.48 [b]	0.0042
N-Nitroso-di-n-propylamine	2/21	10	37 [b]	0.0096
Pentachlorophenol	2/21	25	79 [b]	0.56

(a) U.S. EPA Region IX, 2000

(b) All reported detected concentrations are estimated ("J" qualified) values

Table 3-2. Surface Sediment Exposure Point Concentration Summary, Lower Ottawa River Human Health Risk Assessment

Chemical	Exposure Point Concentration (mg/kg)				U.S. EPA Region IX PRG Residential Soil (mg/kg)[a]
	Segment 1 (RM 0 to <3.2)	Segment 2 (RM 3.2 to <4.9)	Segment 3 (RM 4.9 to <6.5)	Segment 4 (RM 6.5 to 8.8)	
Aldrin	0.020	0.045	0.054	0.0037	0.029
Arsenic	9.4	11	9.1	8.4	0.39
Benzo(a)anthracene	0.31	0.89	2.5	2.3	0.62
Benzo(a)pyrene	0.37	0.75	3.0	2.4	0.062
Benzo(b)fluoranthene	0.42	1.3	3.9	3.0	0.62
Benzo(k)fluoranthene	0.72	0.71	3.4	3.0	6.2
bis(2-Ethylhexyl)phthalate	2.1	11	220	7.4	35
Dibenz(a,h)anthracene	0.40	0.60	6.5	0.87	0.062
Dieldrin	0.039	0.030	0.017	0.0071	0.030
Heptachlor epoxide	0.025	0.081	0.040	0.0054	0.053
Indeno(1,2,3-cd)pyrene	0.29	0.58	2.6	2.1	510
Lead	113	363	287	189	400
N-Nitroso-di-n-propylamine	0.54	1.0	6.5	3.1	0.069
PCB Aroclor 1016	0.017	0.34	25	1.3	0.22
PCB Aroclor 1242	1.8	3.4	8.5	3.0	0.22
PCB Aroclor 1248	0.024	0.046	0.33	0.11	0.22
PCB Aroclor 1254	0.019	0.048	0.48	0.96	0.22
Total PCBs	1.3	3.7	50	4.0	0.22
Thallium	6.2	5.8	4.6	2.8	5.2

(a) U.S. EPA Region IX, 2000

Table 3-3. Surface Water Exposure Point Concentration Summary, Lower Ottawa River Human Health Risk Assessment

Chemical	Exposure Point Concentration (µg/L)				U.S.EPA Region IX PRG Tap Water (µg/L)[a]	U.S. EPA MCL (µg/L) [b]	U.S. EPA MCLG (µg/L) [b]	Lake Erie Basin HH Screening Values (nondrinking) (µg/L) [c]
	Segment 1 (RM 0 to <3.2)	Segment 2 (RM 3.2 to <4.9)	Segment 3 (RM 4.9 to <6.5)	Segment 4 (RM 6.5 to 8.8)				
2-Chlorophenol	29	5.0	5.0	5.0	30	NA	NA	150
4,4'-DDT (p,p'-)	0.21	0.050	0.050	0.050	0.2	NA	NA	0.00015
Aldrin	0.12	0.025	0.025	0.025	0.004	NA	NA	NA
Arsenic	2.1	3.8	1.2	1.2	0.045	50	NA	580
Atrazine	9.0	5.0	5.0	5.0	0.3	3	3	NA
Dieldrin	0.26	0.050	0.050	0.050	0.0042	NA	NA	0.0000065
gamma-Benzene hexachloride	0.11	0.025	0.025	0.025	0.052	0.2	0.2	0.5
Heptachlor	0.10	0.025	0.025	0.025	0.015	0.4	0	NA
Lead	7.8	7.3	5.9	2.4	NA	15	0	190
N-Nitroso-di-n-propylamine	18	5.0	5.0	5.0	0.0096	NA	NA	NA
Pentachlorophenol	38	13	13	13	0.56	1	0	1.6
Thallium	2.5	1.6	1.6	1.6	2.4	2	0.5	3.7

(a) U.S. EPA Region IX, 2000
(b) U.S. EPA, 2001c
(c) Ohio EPA, 1999

Table 3-4. Fish Exposure Point Concentration Summary, Lower Ottawa River Human Health Risk Assessment

Chemical	Exposure Point Concentration (mg/kg)				U.S. EPA Region III RBC Fish (mg/kg) [a]	U.S. FDA Action Levels for Edible Portions (mg/kg) [b]
	Segment 1 (RM 0 to <3.2)	Segment 2 (RM 3.2 to <4.9)	Segment 3 (RM 4.9 to <6.5)	Segment 4 (RM 6.5 to 8.8)		
4,4'-DDD (p,p'-)	0.092	0.046	0.052	0.091	0.013	5
4,4'-DDE (p,p'-)	0.16	0.11	0.081	0.13	0.093	5
4,4'-DDT (p,p'-)	0.19	0.070	0.041	0.20	0.093	5
Aldrin	0.0049	0.0049	0.012	0.0050	0.00019	0.3
alpha-Chlordane	0.018	0.0049	0.0056	0.031	0.0090	0.3
Arsenic	0.16	0.15	0.090	0.094	0.0021	NA
Chlordane	0.16	0.065	0.21	0.076	0.0090	0.3
Dieldrin	0.020	0.0051	0.0049	0.034	0.00020	0.3
gamma-Chlordane	0.13	0.065	0.16	0.035	0.0090	0.3
PCB Aroclor 1242	5.4	2.6	6.7	2.5	0.0016	2
PCB Aroclor 1260	0.40	0.32	0.38	0.45	0.0016	2
Total PCBs	5.9	2.8	5.8	2.9	0.0016	2
trans-Nonachlor	0.0049	0.0049	0.0049	0.011	0.0090	0.3

(a) U.S. EPA Region III, 2000

(b) U.S. FDA, 1998

Table 3-5. Fish Tissue Concentrations Estimated from Surface Water Concentrations and Bioaccumulation Factors, Lower Ottawa River Human Health Risk Assessment

Chemical	Estimated Fish Tissue Concentration (mg/kg)				U.S. EPA Region III RBC Fish (mg/kg) [a]	U.S. FDA Action Levels for Edible Portions (mg/kg) [b]
	Segment 1 (RM 0 to <3.2)	Segment 2 (RM 3.2 to <4.9)	Segment 3 (RM 4.9 to <6.5)	Segment 4 (RM 6.5 to 8.8)		
2-Chlorophenol	0.81	16	0.14	0.14	6.8	NA
Atrazine	0.60	0.33	0.33	0.33	0.014	NA
Di-n-butylphthalate	19	16	16	16	140	NA
N-Nitroso-di-n-propylamine	0.12	0.034	0.034	0.034	0.00045	NA
Pentachlorophenol	183	60	60	60	0.026	NA
Thallium	0.25	0.16	0.16	0.16	0.095	NA

(a) U.S. EPA Region III, 2000

(b) U.S. FDA, 1998

Table 3-6. Chemical-Specific Uptake Factors Used in the Lower Ottawa River HHRA

Chemical	CAS No.	Dermal Absorption Factor (ABS) [(a)]	Absorption Factor (K_p) (cm/hr)	K_p Reference
2-Chlorophenol	95-57-8	0.1	3.30E-02	U.S. EPA, 1992a
Aldrin	309-00-2	0.1	1.60E-03	RAIS, 2001 (calc from log Kow)
Arsenic	7440-38-2	0.032	1.00E-03	U.S. EPA, 1992a
Atrazine	1912-24-9	0.1	7.60E-03	RAIS, 2001 (calc from log Kow)
Benzo(a)anthracene	56-55-3	0.1	8.10E-01	RAIS, 2001 (calc from log Kow)
Benzo(a)pyrene	50-32-8	0.1	1.20E+00	RAIS, 2001 (calc from log Kow)
Benzo(b)fluoranthene	205-99-2	0.1	1.20E+00	RAIS, 2001 (calc from log Kow)
Benzo(k)fluoranthene	207-08-9	0.1	6.00E-01	RAIS, 2001 (calc from log Kow)
bis(2-Ethylhexyl)phthalate	117-81-7	0.1	3.30E-02	RAIS, 2001 (calc from log Kow)
Chlordane	12789-03-6	0.1	5.20E-02	RAIS, 2001 (calc from log Kow)
DDD	72-54-8	0.1	2.80E-01	RAIS, 2001 (calc from log Kow)
DDE	72-55-9	0.1	2.40E-01	RAIS, 2001 (calc from log Kow)
DDT	50-29-3	0.1	4.30E-01	RAIS, 2001 (calc from log Kow)
Dibenzo(a,h)anthracene	53-70-3	0.1	2.70E+00	RAIS, 2001 (calc from log Kow)
Dieldrin	60-57-1	0.1	1.60E-02	RAIS, 2001 (calc from log Kow)
Di-n-butylphthalate	84-74-2	0.1	3.30E-02	U.S. EPA, 1992a
g-BHC (Lindane)	58-89-9	0.1	1.40E-02	RAIS, 2001 (calc from log Kow)
Heptachlor	76-44-8	0.1	1.10E-02	RAIS, 2001 (calc from log Kow)
Heptachlor epoxide	1024-57-3	0.1	5.50E-02	RAIS, 2001 (calc from log Kow)
Indeno[1,2,3-cd]pyrene	193-39-5	0.1	1.90E+00	RAIS, 2001 (calc from log Kow)
Lead	7439-92-1	0.01	4.00E-06	U.S. EPA, 1992a
N-Nitroso-di-n-propylamine	621-64-7	0.1	2.80E-03	RAIS, 2001 (calc from log Kow)
PCB Aroclor 1016	12674-11-2	0.06	7.90E-01	RAIS, 2001 (calc from log Kow)
PCB Aroclor 1242	53469-21-9	0.06	3.70E-02	RAIS, 2001 (calc from log Kow)
PCB Aroclor 1248	12672-29-6	0.06	3.70E-01	RAIS, 2001 (calc from log Kow)
PCB Aroclor 1254	11097-69-1	0.06	3.50E-01	RAIS, 2001 (calc from log Kow)
PCB Aroclor 1260	11096-82-5	0.06	1.10E+00	RAIS, 2001 (calc from log Kow)
PCBs (high risk and persistence)	1336-36-3	0.06	3.50E-01	RAIS, 2001 (calc from log Kow)
PCBs (low risk and persistence)	1336-36-3	0.06	3.50E-01	RAIS, 2001 (calc from log Kow)
Pentachlorophenol	87-86-5	0.244	6.50E-01	RAIS, 2001 (calc from log Kow)
Thallium	7440-28-0	0.01	1.00E-03	U.S. EPA, 1992a
Toxaphene	8001-35-2	0.1	1.50E-02	RAIS, 2001 (calc from log Kow)

(a) U.S. EPA Region III, 1995

NA Not applicable or Not available

4.0 TOXICITY ASSESSMENT

The goal of the Toxicity Assessment step is to characterize the toxicity of the COIs and identify quantitative toxicity criteria for each chemical, for use in evaluating the likelihood of adverse health effects from estimated exposures.

4.1 Types of Toxicity Criteria

Availability of the following types of toxicity criteria was determined for each of the COIs:

- U.S. EPA reference doses (RfDs) for evaluation of noncarcinogenic effects; and
- U.S. EPA slope factors (SFs) for evaluation of cancer risks.

The approach used by the U.S. EPA and other regulatory agencies to assess risks associated with noncarcinogenic effects is to identify an exposure threshold below which adverse effects are not observed. The first adverse effect that occurs as the dose or concentration increases beyond the threshold is called the "critical effect" (U.S. EPA, 2001a). Selection of regulatory levels for noncarcinogenic effects is based on the assumption that if the critical effect is prevented, then all toxic effects are prevented. For evaluation of noncarcinogenic effects, U.S. EPA has established RfDs, which are estimates (with uncertainty spanning perhaps an order of magnitude) of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime (U.S. EPA, 2001a). U.S. EPA derives RfDs from threshold doses based on No Observed Adverse Effect Levels (NOAELs), Lowest Observed Adverse Effect Levels (LOAELs), or benchmark doses, for noncarcinogenic endpoints such as effects on reproduction, developmental effects, learning deficits, or immunological effects. A NOAEL is the highest dose in a given study at which no statistically or biologically significant indication of the toxic effect of concern has been identified, while a LOAEL is the lowest dose at which the toxic dose has been identified. NOAELs and LOAELs are typically established from studies in animals or worker exposure studies. Since there are limitations inherent in these data for determining the risks associated with human exposure to these chemicals in the environmental, these threshold doses are divided by uncertainty factors to develop RfDs.

U.S. EPA evaluates cancer risks based on extrapolations from estimates of the increase in cancer incidence associated with exposure to specific doses of the substance in animal or worker exposure studies. To evaluate cancer, U.S. EPA has developed cancer slope factors (SFs), which are upper bounds, approximating 95% confidence limits, on the increased cancer risk from a lifetime exposure to an agent. SFs, usually expressed in units of proportion (of a population) affected per mg/kg/day, are generally reserved for use in the low-dose region of

the dose-response relationship, that is, for exposures corresponding to risks less than 1 in 100 (U.S. EPA, 2001a).

4.2 Sources of Toxicity Criteria

Availability of the following types of toxicity criteria was determined for each of the COIs:

- U.S. EPA reference doses (RfDs) for evaluation of noncarcinogenic effects;
- U.S. EPA slope factors (SFs) for evaluation of cancer risks; and
- Agency for Toxic Substances and Disease Registry (ATSDR) minimal risk levels (MRLs) for evaluation of noncarcinogenic effects.

Several sources of toxicity criteria were consulted. For purposes of the HHRA, toxicity criteria were identified according to the following hierarchy of sources:

- *U.S. EPA's Integrated Risk Information System (IRIS) database* (U.S. EPA, 2001a). This database was the primary source of toxicity criteria for the HHRA. The IRIS database includes verified RfDs and SFs developed by the U.S. EPA, as well as information on the derivation of these values, and is regularly reviewed and updated. Consistent with U.S. EPA risk assessment guidance (U.S. EPA, 1989), information in IRIS superseded all other sources.
- *U.S. EPA's Region IX PRG and Region III RBC tables*. These tables (U.S. EPA Region IX, 2000 and U.S. EPA Region III, 2000) provide risk-based screening levels, as described in Section 2.4, that are based largely on U.S. EPA RfDs and SFs compiled from the IRIS database. However, since toxicity criteria are often withdrawn from the IRIS database for review, these tables also include withdrawn U.S. EPA toxicity values published in earlier versions of IRIS or in U.S. EPA's Health Effects Assessment Summary Tables (HEAST), in order to avoid exclusion of chemicals due to a lack of toxicity criteria. If a toxicity criterion for a given chemical was not listed in IRIS but was listed in the PRG or RBC tables, the criterion listed in the PRG and RBC tables was used in the HHRA.
- *Agency for Toxic Substances and Disease Registry Minimal Risk Levels (MRLs)*. The ATSDR has established MRLs as estimates of the daily human exposure to hazardous substances that are likely to be without appreciable risk of adverse noncancer health effects over a specified duration of exposure (ATSDR, 2001). These values are established in a manner similar to U.S. EPA RfDs, are intended to serve as screening levels, and are used by ATSDR health assessors and other responders to identify contaminants and potential health effects that may be of concern at hazardous waste sites. ATSDR has established MRLs for inhalation and ingestion routes of exposure, for acute, subchronic, and chronic exposure durations. If a toxicity criterion for a given chemical was not listed in IRIS or in the PRG or RBC tables, the ATSDR MRLs were consulted. However, none of the chemicals lacking toxicity criteria after review of IRIS or the PRG or RBC tables had ATSDR MRLs.
- *U.S. EPA's Integrated Exposure-Uptake Biokinetic (IEUBK) Model (U.S. EPA, 2001b)*. Since the U.S. EPA has not published toxicity criteria (RfDs or SFs) for lead, this model was used to evaluate exposures to lead. The IEUBK model estimates blood

lead concentrations resulting from exposure to lead through different pathways. Estimated blood lead concentrations were then compared to the Centers for Disease Control recommended target blood lead concentration of 10 µg/dL.

Toxicity criteria used in this HHRA are presented in Table 4-1.

In addition, several other health-risk based standards were identified, including the following:

- U.S. EPA national primary drinking water standards including Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs);
- State of Ohio surface water quality standards (OEPA, 1999) established as the minimum water quality levels for the waters of the Great Lakes and their tributaries; and
- U.S. Food and Drug Administration (U.S. FDA) action levels for fish.

These are compared to EPCs for each of the COIs in Tables 3-2, 3-3, and 3-4.

4.3 Evaluation of PCB Toxicity

PCB concentrations can be presented either as specific congeners or as Aroclor mixtures. The term "congener" refers to specific PCB compounds distinguished by the number and arrangement of chlorine atoms bound to the molecule's 10 carbon atoms, while "Aroclor" is the tradename for commercial mixtures of congeners that were manufactured in the United States. Aroclors (Aroclors 1016, 1242, 1248, 1254, and 1260) have been measured in Lower Ottawa River sediments and fish. None of the samples collected from the Lower Ottawa River has been analyzed for congeners. Although fish collected by the U.S. Fish and Wildlife Service (U.S. FWS) in 1999 in North Maumee Bay of Lake Erie, within 0.25 miles of the inside (south) shore of the Woodtick Peninsula, were analyzed for PCB congeners and Aroclors (U.S. FWS, 1999), these data were not used in the HHRA since none of the fish were collected in the Ottawa River. U.S. EPA has stated that evaluation of PCB exposures in terms of Aroclors can be imprecise since Aroclors are commercial mixtures of congeners and the the composition of PCB mixtures can change in the environment over time (U.S. EPA, 1996). However, in this HHRA, PCB toxicity was evaluated based on the Aroclor concentrations since no other data were available for any of the media evaluated in this assessment.

U.S. EPA has published noncancer RfDs for two Aroclors, Aroclor 1016 and Aroclor 1254, based on reproductive effects (reduced birth weight) in monkeys administered Aroclor 1016 and immunologic effects in monkeys administered Aroclor 1254. Overall, human studies have provided limited to inadequate evidence of carcinogenicity but animal studies have been considered to provide sufficient evidence of carcinogenicity. Based on these findings, some commercial PCB mixtures have been characterized as probably carcinogenic to humans,

although U.S. EPA has stated, "there has been some controversy about how this conclusion applies to PCB mixtures found in the environment" (U.S. EPA, 1996).

Studies have demonstrated that the range of cancer potency for different PCB mixtures is influenced by the chlorine content, with congeners with higher chlorine content having higher toxicity. In addition, congeners with higher chlorine content tend to be more persistent. For example, congeners in soil and sediment or that have bioaccumulated (*e.g.*, in fish) tend to be highest in chlorine content and persistence (U.S. EPA, 1996). In addition, certain population groups including children may be more susceptible to health effects from exposure to PCB mixtures. Since the actual composition of PCB mixtures in the environment is uncertain and the toxicity of different mixtures can vary, U.S. EPA recommends using a tiered approach to evaluate the cancer potency of PCB mixtures in the environment (U.S. EPA, 1996, 2001a). According to this approach, cancer slope factors are selected based on information about exposed populations, potential pathways of exposure, and the likely environmental persistence of the particular PCB mixture

In their tiered approach for evaluation of exposure to PCB mixtures, U.S. EPA (1996) recommends the following:

- To evaluate food chain exposure, sediment or soil exposure, dermal exposure, and early life exposure (*i.e.*, "high risk and persistence" exposure), use an upper-bound slope factor of 2.0 $(mg/kg\text{-}d)^{-1}$ and a central-estimate slope factor of 1.0 $(mg/kg\text{-}d)^{-1}$ (U.S. EPA, 1996);
- To evaluate adult ingestion of water soluble congeners (*i.e.*, "low risk and persistence" exposure), use an upper-bound slope factor of 0.4 $(mg/kg\text{-}d)^{-1}$ and a central estimate slope factor of 0.3 $(mg/kg\text{-}d)^{-1}$ (U.S. EPA, 1996).

The upperbound SFs for PCBs were used in this HHRA.

PCB hazards were also evaluated for different fish consumption categories consistent with the Protocol for a Uniform Great Lakes Sport Fish Consumption Advisory developed by the Great Lakes Sport Fish Advisory Task Force (1993) (discussed in Section 3-5). For this evaluation, the Task Force-recommended "weight-of-evidence derived" RfD of 0.00005 mg/kg-d was used.

4.4 Evaluation of Carcinogenic Polycyclic Aromatic Hydrocarbons

A number of polycyclic aromatic hydrocarbons (PAHs) were identified as COIs in sediment. Of these, only one (benzo(a)pyrene)) has a U.S. EPA cancer slope factor. U.S. EPA has identified Toxicity Equivalency Factors (TEFs) for other carcinogenic PAHs, based on the potency of each compound relative to that of benzo(a)pyrene (U.S. EPA, 1993). These TEFs were used to convert each carcinogenic PAH concentration to an equivalent concentration of benzo(a)pyrene, as follows:

- Benzo(a)pyrene: TEF = 1.0;
- Benzo(a)anthracene: TEF = 0.1;
- Benzo(b)fluoranthene: TEF = 0.1;
- Benzo(k)fluoranthene: TEF = 0.01;
- Chrysene: TEF = 0.001;
- Dibenz(a,h)anthracene: TEF = 1.0; and
- Indeno(1,2,3-cd)pyrene: TEF = 0.1.

4.5 Evaluation of Arsenic Toxicity through Fish Consumption

A number of studies have demonstrated that both inorganic and organic forms of arsenic are present in the tissue of freshwater finfish, with most of the arsenic in an organic form (U.S. EPA Region VI, 1998). However, the toxicity of inorganic and organic forms of arsenic has been shown to differ: organic arsenic has not been shown to be carcinogenic while inorganic arsenic has been demonstrated to be a carcinogen (U.S. EPA Region IV, 1998). Consequently, assuming that 100% of the arsenic in fish is inorganic will likely overestimate the cancer risk from consumption of arsenic in fish. Although most studies of arsenic speciation in fish have measured less than 10% of the arsenic as inorganic (range 0.1 to 30%), U.S. EPA Region VI recommends assuming that 30% of the arsenic is inorganic for purposes of assessing arsenic cancer risks associated with fish ingestion (U.S. EPA Region VI, 1998). For purposes of this HHRA, the assumption that 30% of the arsenic in fish is inorganic was applied.

4.6 Route-to-Route Extrapolation of Reference Doses and Slope Factors

Because the U.S. EPA has not promulgated dermal toxicity values for most chemicals, oral RfDs and SFs were modified using gastrointestinal absorption data to evaluate exposures to chemicals via the dermal route. Since the intake equations for the dermal routes presented in Section 3.2 generate estimates of absorbed dose, and most oral toxicity criteria are based on administered dose, dermally absorbed doses were calculated by adjusting the oral toxicity criteria based on the oral absorption rate (represented by the gastrointestinal absorption factor or GAF), using the following equations (U.S. EPA, 1989).

To adjust an administered dose RfD to an absorbed dose (dermal) RfD, the following equation was used:

$$RfD_{adm} \times \textit{Oral absorption rate}\,(GAF) \;=\; RfD_{abs}$$

To adjust an administered dose slope factor to an absorbed dose (dermal) slope factor, the following equation was used:

$$\frac{SF_{adm}}{Oral\ \ absorption\ rate\ (GAF)} \quad = \quad SF_{abs}$$

GAFs used in this HHRA are presented in Table 4-1.

4.7 Evaluation of Lead Toxicity

Hazards associated with exposure to lead were evaluated using the U.S. EPA IEUBK model, which estimates concentrations of lead in blood in children based on exposure to lead in different environmental media combined with background exposures to lead in the diet and in drinking water. The model provides output in the form of geometric mean and 90th percentile blood lead concentrations, for different age groups ranging from six months to seven years. For purposes of evaluating potential hazards from lead exposure, these concentrations were then compared to the Centers for Disease Control (CDC) target blood lead level for children of 10 µg/dL. This target level is based on studies in children that identified harmful effects on neurodevelopment and other endpoints at blood lead levels higher than 10 µg/dL.

4.8 Toxicity Assessment Uncertainties

A number of uncertainties are evident in the toxicity criteria used in this HHRA to evaluate the likelihood of adverse health effects from exposure to chemical contaminants. For example, most toxicity criteria are based on observations of adverse health effects in animals exposed to very high concentrations of chemicals in the diet or water, or on data on adverse effects in adult workers exposed to high concentrations of chemicals in the workplace. Because of differences between the exposures that are the basis for these criteria and exposures evaluated in this HHRA, these criteria may under- or overestimate, but most likely overestimate, actual risks to people from exposure to lower concentrations in environmental media.

In this assessment, risks from exposure to PCBs are evaluated based on concentrations of Aroclor mixtures measured in surface water, sediment, or fish. However, Aroclors are commercial mixtures of PCB congeners and, once released to the environment, the composition of these mixtures can change due to differences in partitioning, chemical transformation, and bioaccumulation of the different congeners in the mixture (U.S. EPA, 1996). Thus, concentrations of PCBs estimated based on Aroclor mixtures can be imprecise, and estimated concentrations may over- or underestimate actual concentrations of total PCBs that are present. Further, congeners vary in toxicity, and since data on Aroclor toxicity are based on the commercial mixtures rather than the mixtures that are present in the environment, toxicity estimates based on commercial Aroclors may under- or over-estimate

risks for the mixture of PCB congeners present in the environment. However, U.S. EPA's tiered approach for evaluating the toxicity of PCBs in the environment based on the assumed pathways of exposure to PCBs and the relative persistence of PCBs likely to be present in different environmental media, is intended to provide a conservative estimate of potential PCB mixtures in the environment.

Table 4-1. Toxicity Criteria Used in the Lower Ottawa River Human Health Risk Assessment

Chemical	CAS No.	Oral RfD (mg/kg-d)	Dermal RfD (mg/kg-d) [a]	Oral SF $(mg/kg\text{-}d)^{-1}$	Dermal SF $(mg/kg\text{-}d)^{-1}$ [b]	US EPA Cancer Classification	GI Absorption Factor (GAF)	GAF Reference
2-Chlorophenol	95-57-8	5.0E-03	2.5E-03	NA	NA	NA	0.5	RAIS, 2001
Aldrin	309-00-2	3.0E-05	1.5E-05	1.7E+01	3.4E+01	B2	0.5	ATSDR, 1993a
Arsenic	7440-38-2	3.0E-04	1.2E-04	1.5E+00	3.7E+00	A	0.41	Bettley and O'Shea, 1975
Atrazine	1912-24-9	3.5E-02	1.8E-02	NA	NA	NA	0.5	RAIS, 2001
BenzoNAanthracene	56-55-3	NA	NA	7.3E-01	NA	B2	0.31	Rahman et al., 1986
BenzoNApyrene	50-32-8	NA	NA	7.3E+00	2.4E+01	B2	0.31	Rahman et al., 1986
Benzo(b)fluoranthene	205-99-2	NA	NA	7.3E-01	NA	B2	0.31	Rahman et al., 1986
Benzo(k)fluoranthene	207-08-9	NA	NA	7.3E-02	NA	B2	0.31	Rahman et al., 1986
bis(2-Ethylhexyl)phthalate	117-81-7	2.0E-02	3.8E-03	1.4E-02	7.4E-02	B2	0.19	Teirlynck and Belpaire, 1985
Chlordane	12789-03-6	5.0E-04	2.5E-04	3.5E-01	7.0E-01	B2	0.5	ATSDR, 1992a
DDD	72-54-8	NA	NA	2.4E-01	3.4E-01	B2	0.7	ATSDR, 1992b
DDE	72-55-9	NA	NA	3.4E-01	4.9E-01	B2	0.7	ATSDR, 1992b
DDT	50-29-3	5.0E-04	3.5E-04	3.4E-01	4.9E-01	B2	0.7	ATSDR, 1992b
Dibenzo(a,h)anthracene	53-70-3	NA	NA	7.3E+00	NA	B2	0.31	Rahman et al., 1986
Dieldrin	60-57-1	5.0E-05	2.5E-05	16	3.2E+01	B2	0.5	ATSDR, 1993a
Di-n-butylphthalate	84-74-2	1.0E-01	1.0E-01	NA	NA	D	1	RAIS, 2001
g-BHC (Lindane)	58-89-9	3.0E-04	2.9E-04	NA	NA	NA	0.97	Sabourin et al., 1987
Heptachlor	76-44-8	5.0E-04	3.6E-04	4.5E+00	6.3E+00	B2	0.72	ATSDR, 1993b
Heptachlor epoxide	1024-57-3	1.3E-05	9.4E-06	9.1E+00	1.3E+01	B2	0.72	ATSDR, 1993b
Indeno[1,2,3-cd]pyrene	193-39-5	NA	NA	7.3E-01	NA	B2	0.31	RAIS, 2001
Lead	7439-92-1	NA	NA	NA	NA	B2	0.15	Goyer 1991
N-Nitroso-di-n-propylamine	621-64-7	NA	NA	7.0E+00	28	B2	0.25	RAIS, 2001
PCB Aroclor 1016	12674-11-2	7.0E-05	6.3E-05	NA	NA	B2	0.9	RAIS, 2001
PCB Aroclor 1242	53469-21-9	NA	NA	NA	NA	B2	0.9	RAIS, 2001
PCB Aroclor 1248	12672-29-6	NA	NA	NA	NA	B2	0.9	RAIS, 2001
PCB Aroclor 1254	11097-69-1	2.0E-05	1.8E-05	NA	NA	B2	0.9	RAIS, 2001
PCB Aroclor 1260	11096-82-5	NA	NA	NA	NA	B2	0.9	RAIS, 2001
PCBs (high risk and persistence)	1336-36-3	NA	NA	2.0E+00	2.2E+00	B2	0.9	US EPA, 1992
PCBs (low risk and persistence)	1336-36-3	NA	NA	4.0E-01	4.4E-01	B2	0.9	RAIS, 2001
Pentachlorophenol (PCP)	87-86-5	3.0E-02	3.0E-02	1.20E-01	1.2E-01	B2	1	RAIS, 2001
Thallium	7440-28-0	6.7E-05	1.0E-05	NA	NA	D	0.15	RAIS, 2001
Toxaphene	8001-35-2	NA	NA	1.1E+00	2.2E+00	B2	0.5	US EPA Region IV, 2000

(a) Absorbed Dermal RfDs based on available Oral RfDs and GI Absorption Factors

(b) Absorbed Dermal SFs based on available Oral SFs and GI Absorption Factors

(c) US EPA Cancer Classification: A, Human carcinogen; B1, Probable human carcinogen; B2, Probable human carcinogen; C, Possible human carcinogen; D, Not classifiable as to human carcinogenicity

NA Not applicable or Not available

5.0 RISK CHARACTERIZATION

In the Risk Characterization section, the results of the toxicity and exposure assessments are integrated to develop quantitative measures of the potential for adverse health effects. Specifically, dose estimates are compared to quantitative toxicity criteria to provide a quantitative measure of the likelihood of noncarcinogenic effects or lifetime excess cancer risk.

5.1 Noncarcinogenic Effects

The potential for noncarcinogenic effects was evaluated using the Hazard Index (HI) approach. This approach assumes that simultaneous subthreshold exposures to several chemicals could result in an adverse health effect and that the magnitude of the adverse effect is proportional to the sum of the ratios of the subthreshold exposures to acceptable exposures (U.S. EPA, 1989). The HI is equal to the sum of Hazard Quotients (HQs) calculated for each chemical- and pathway-specific dose. HQs were calculated by dividing the estimated ADD for each chemical and pathway by the appropriate RfD for that chemical and pathway, using the following equation:

$$HQ = \frac{ADD\,(mg/kg-d)}{RfD\,(mg/kg-d)}$$

Then, HQs for each pathway were summed to obtain an HI for each pathway. Pathway-specific HIs were summed to obtain an HI for each population and scenario. According to U.S. EPA (1989) guidance, if the resulting HI is below unity (1), then adverse health effects are not expected. However, if an HI is equal to or exceeds 1, it does not necessarily mean that adverse health effects are expected or will occur.

5.2 Cancer Risks

Pathway-specific excess cancer risks for exposure to the COIs were calculated by multiplying each LADD estimate by the chemical- and pathway-specific SF, using the following equation:

$$Excess\ Cancer\ Risk = LADD\,(mg/kg-d) \times SF\,(mg/kg-d)^{-1}$$

Similar to the HQ calculation, the chemical-specific excess cancer risks were then summed to obtain a total lifetime excess cancer risk value for each pathway. These pathway-specific cancer risk estimates were then summed to estimate lifetime excess cancer risks for each population and scenario. Lifetime excess cancer risk is presented as the probability of cancer occurring as the result of the exposure at some point during an individual's lifetime (U.S. EPA, 1989). More specifically, lifetime excess cancer risk is defined as the additional or extra cancer risk incurred over the lifetime of an individual as a result of exposure to a toxic

substance. To elaborate, the average U.S. citizen has an approximately 1 in 4 chance (0.250000) of being diagnosed with cancer at some point in his or her lifetime. If the result of this cancer risk analysis estimated a 1 in a million (0.000001, also written as 1E-06 or 1×10^{-6}) excess cancer risk, the total cancer risk to an exposed individual would be 0.250001. Cancer risks are presented as probabilities (*e.g.*, 1 in one million or 1×10^{-6}).

Although there is no universally accepted acceptable risk standard, the U.S. EPA Superfund program established under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) generally considers risks above 1×10^{-6} (1 in 1,000,000) to be acceptable in nearly all circumstances and risks within the range of 1×10^{-4} to 1×10^{-6} (1 in 10,000 to 1 in 1,000,000) to be acceptable depending on specific site and exposure characteristics (U.S. EPA, 1989; U.S. EPA, 1991b). The National Contingency Plan (U.S. EPA, 1990), which provides the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances, pollutants, or contaminants under CERCLA, defines the 1×10^{-6} (1 in a million) risk level as the "point of departure" for establishing remediation goals at contaminated sites. Risks above 1×10^{-4} are nearly always considered to be unacceptable. More specific acceptable risk levels have been identified for certain circumstances. For example, under U.S. EPA's Great Lakes Initiative (U.S. EPA, 1995), a 1×10^{-5} (1 in 100,000) risk level is identified for use in deriving criteria and values for individual carcinogens in Great Lakes surface water and fish.

5.3 Results

The results of the risk assessment are presented in Tables 5-1 through 5-12, as follows:

- Table 5-1: Population- and scenario-specific risks for each area of concern, based on the sum of pathway-specific risks;
- Tables 5-2 through 5-5: Chemical-specific risks for each exposure medium, population, scenario, and area of concern;
- Tables 5-6 through 5-9: Chemical-specific risks for each population, scenario, and area of concern;
- Table 5-10: IEUBK Model output;
- Table 5-11: Cancer risks for consumption of fish with COIs at fish tissue concentrations estimated from surface water concentrations and BAFs; and
- Table 5-12: Fish consumption category risks.

More detailed calculation results are presented in Appendix D.

Results for each population are summarized below.

5.3.1 Results for the Recreator Scenarios

As shown in Table 5-1, estimated lifetime excess cancer risks for the RME recreator scenario range from 1×10^{-4} for Segments 1 and 3 (RM 0 to <3.2 and RM 4.9 to <6.5) to 5×10^{-5} for Segment 2 (RM 3.2 to <4.9). These estimated risks for surface water and sediment contact and total estimated risks for each river segment are illustrated in Figure 5-1. As shown, estimated risks for Segments 1 and 3 are at the upperbound of U.S. EPA's acceptable risk range (*i.e.*, 10^{-4} to 10^{-6}) (U.S. EPA, 1991b). Risks for the other two segments are within the range for acceptable risks, but exceed U.S. EPA's point of departure of 10^{-6}. As shown in Table 5-2 and in Figures 5-2 and 5-3, in all four segments, estimated cancer risks are dominated by surface water contact with N-nitroso-di-n-propylamine (12-39% of the total estimated risk) and pentachlorophenol (18-50% of the total estimated risk), and sediment contact with PAHs (2-26% of the total estimated risk), N-nitroso-di-n-propylamine (1-17% of the total estimated risk), and PCBs (<1-20% of the total estimated risk). Estimated cancer risks for the CT recreator scenario range from 2×10^{-5} for Segments 1 and 3 to 8×10^{-6} for Segment 2.

As discussed in Sections 2.5 and 3.7, eight of the 13 COIs in surface water (2-chlorophenol, 4,4'-DDT, aldrin, dieldrin, gamma-BHC, heptachlor, N-nitroso-di-n-propylamine, and pentachlorophenol) were detected in only two surface water samples, both collected at RM 0.5 in Segment 1 (samples #ENW03MS and #ENW03MSD, collected from the left side of the river during the 2000 OEPA sampling program). Seven of these eight chemicals were also detected at their highest sediment concentration at this location. Consequently, it is possible that the location sampled at RM 0.5 represents a hot spot for these chemicals. Identification of possible hot spots in the Lower Ottawa River, based on the results of the screening level HHRA, is discussed further in Section 5.4.

As shown in Table 5-1, estimated noncancer HIs for the RME child recreator scenario range from 0.21 for Segment 4 to 0.58 for Segment 3. Estimated noncancer HIs for the RME adult recreator scenario range from 0.026 for Segment 4 to 0.067 for Segment 3. In all cases, estimated noncancer HIs are less than 1.0; consequently, noncancer hazards to people who recreate in the Lower Ottawa River are not considered to be significant.

As shown in Table 5-10, estimated geometric mean blood lead concentrations in children associated with exposure to lead in sediment are all significantly less than 10 µg/dL. Consequently, hazards due to lead exposure are not considered to be significant.

5.3.2 Results for the Angler/ Fish Consumer Scenarios

As shown in Table 5-1, based on the upperbound sportfish consumption rate estimated for the Lower Ottawa River (41 g/day or 60 8-ounce fish meals per year by adults and 18 g/day for children), estimated lifetime excess cancer risks for the RME angler/fish consumer scenario

range from 2×10^{-3} in Segments 2 and 4 to 3×10^{-3} in Segments 1 and 3. Estimated cancer risks for surface water contact and fish consumption and total estimated risks for each river segment are illustrated in Figure 5-4. As shown, total estimated lifetime excess cancer risks for all four segments exceed U.S. EPA's acceptable risk range of 10^{-4} to 10^{-6} (U.S. EPA, 1991b) and the acceptable risk level for fish consumption in the Great Lakes established under U.S. EPA's Great Lakes Initiative of 10^{-5} (U.S. EPA, 1995). As shown in Table 5-2 and illustrated in Figure 5-5, risks for all segments are dominated by consumption of PCBs in fish, which contributes greater than 90% of the total estimated risks. In addition, estimated risks for consumption of dieldrin in fish in Segment 4 exceed U.S. EPA's acceptable risk range (*i.e.*, they are greater than 1×10^{-4}). Estimated cancer risks for the CT angler scenario (based on a mean adult fish consumption rate of 7.3 g/day, or 10 8-ounce fish meals per year) range from 2×10^{-4} for Segments 2 and 4 to 4×10^{-4} for Segment 1.

As shown in Table 5-1 and illustrated in Figure 5-6, estimated noncancer HIs for the RME child and adult angler/ fish consumer scenarios range from 83 and 85, respectively, in Segment 2, to 180 and 170, respectively, in Segment 1. These HIs all significantly exceed 1.0. As shown in Table 5-4, in all cases, the estimated HIs are dominated by Total PCBs, contributing approximately 99% of the total estimated HI in each segment. Estimated HIs for all other individual COIs in fish are less than 1.0. Estimated noncancer HIs for the CT angler scenarios range from 15 for Segments 2 and 4 to 31 for Segment 1.

As indicated in Section 3.3.2, risks from consumption of fish containing COIs that were not analyzed for in fish but were estimated from water concentrations and BAFs were not incorporated into the above risk calculations. However, risks calculated based on these estimated concentrations in fish are significant for N-nitroso-di-n-propylamine and pentachlorophenol (Table 5-11). As indicated in Section 3.3.2, since these chemicals were detected infrequently in surface water, inclusion of these estimated fish tissue concentrations in the risk evaluation was judged to be inappropriate due to significant uncertainty about the actual concentrations of these contaminants in fish.

5.3.3 Results of the Fish Consumption Advisory Evaluation

Estimated noncancer hazards from consumption of PCBs for the Great Lakes Sport Fish Advisory Task Force fish consumption advisory categories are shown in Table 5-12. Calculation details are presented in Appendix E. As shown, for all four river segments and all fish consumption categories, estimated HIs exceed 1.0. As shown in Table 5-13 and illustrated in Figure 5-7, none of the fish caught in the Lower Ottawa River and analyzed for PCBs had total PCB concentrations within the concentration range acceptable for "unrestricted consumption" (Category 1, 0 to 0.05 ppm). In fact, one-third of the fish had PCB concentrations warranting a "no consumption" rating (*i.e.*, greater than 1.9 ppm). The lowest detected total PCBs fish tissue concentration was 0.065 ppm.

Figure 5-1. Estimated Cancer Risks for the RME Recreator Scenario, Lower Ottawa River Human Health Risk Assessment

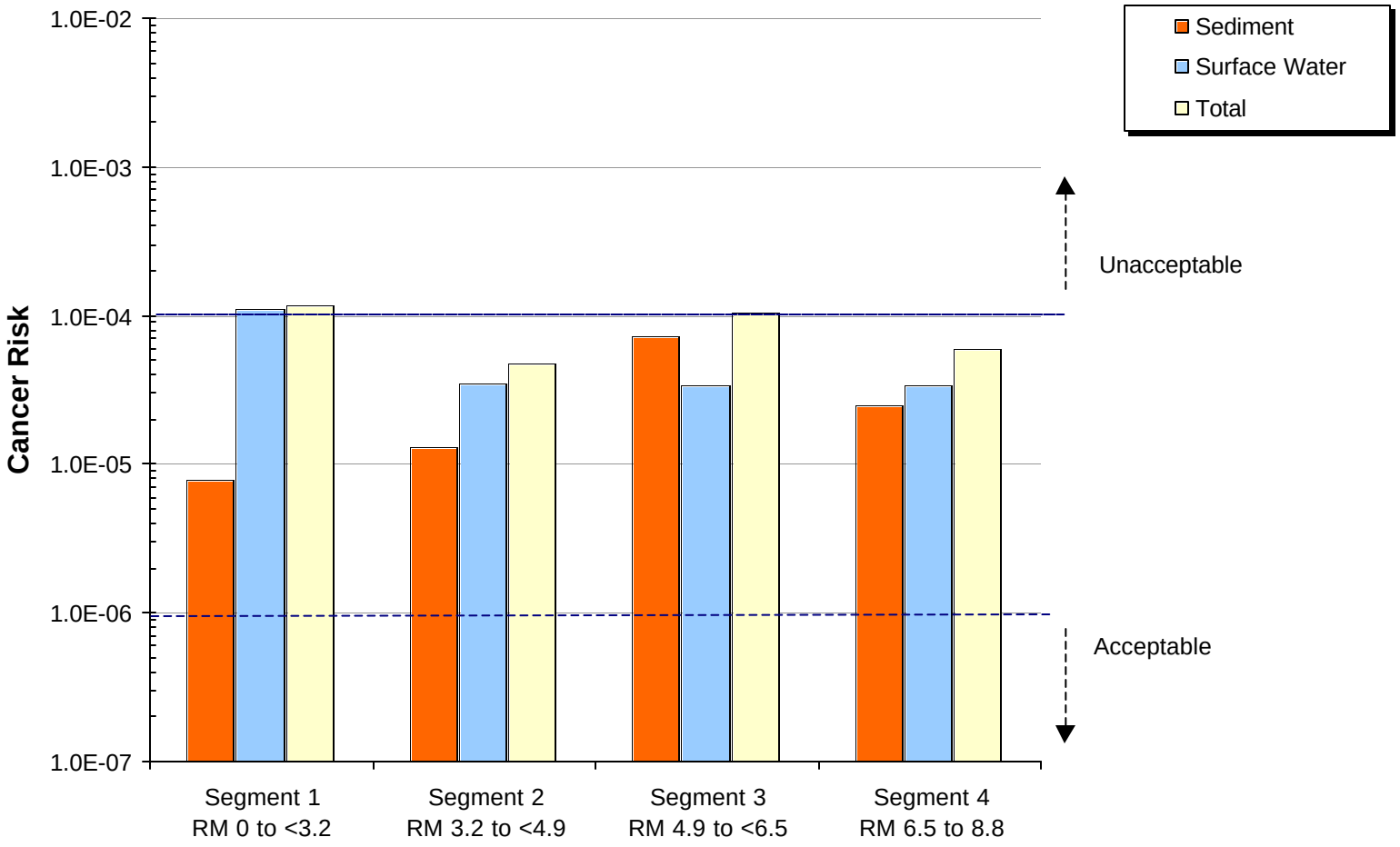


Figure 5-2. Contribution of COIs to Total Estimated Cancer Risks for Contact with Sediment, RME Recreator Scenario, Lower Ottawa River HHRA

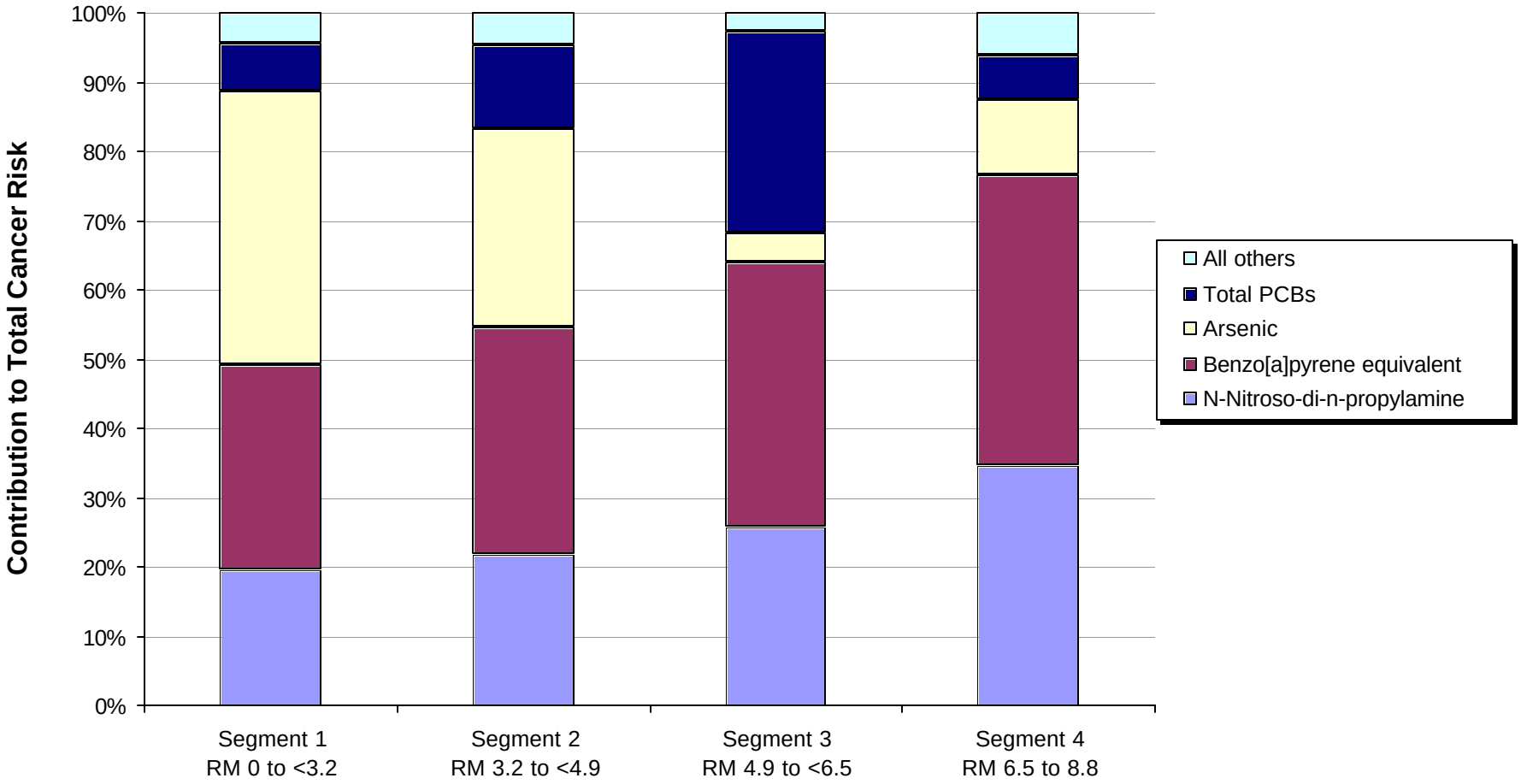


Figure 5-3. Contribution of COIs to Total Estimated Cancer Risks for Contact with Surface Water, RME Recreator Scenario, Lower Ottawa River HHRA

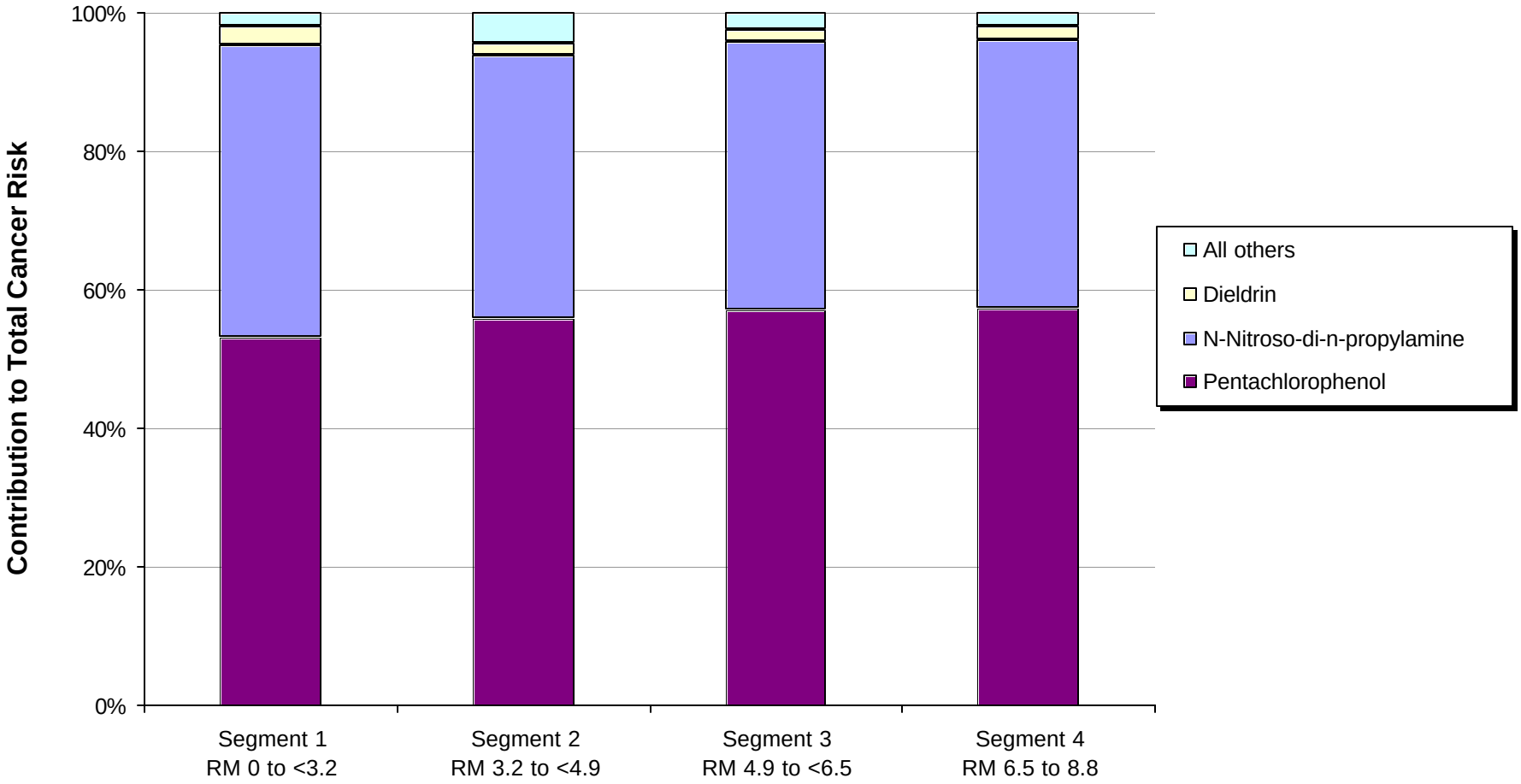


Figure 5-4. Estimated Cancer Risks for the RME Angler Scenario, Lower Ottawa River Human Health Risk Assessment

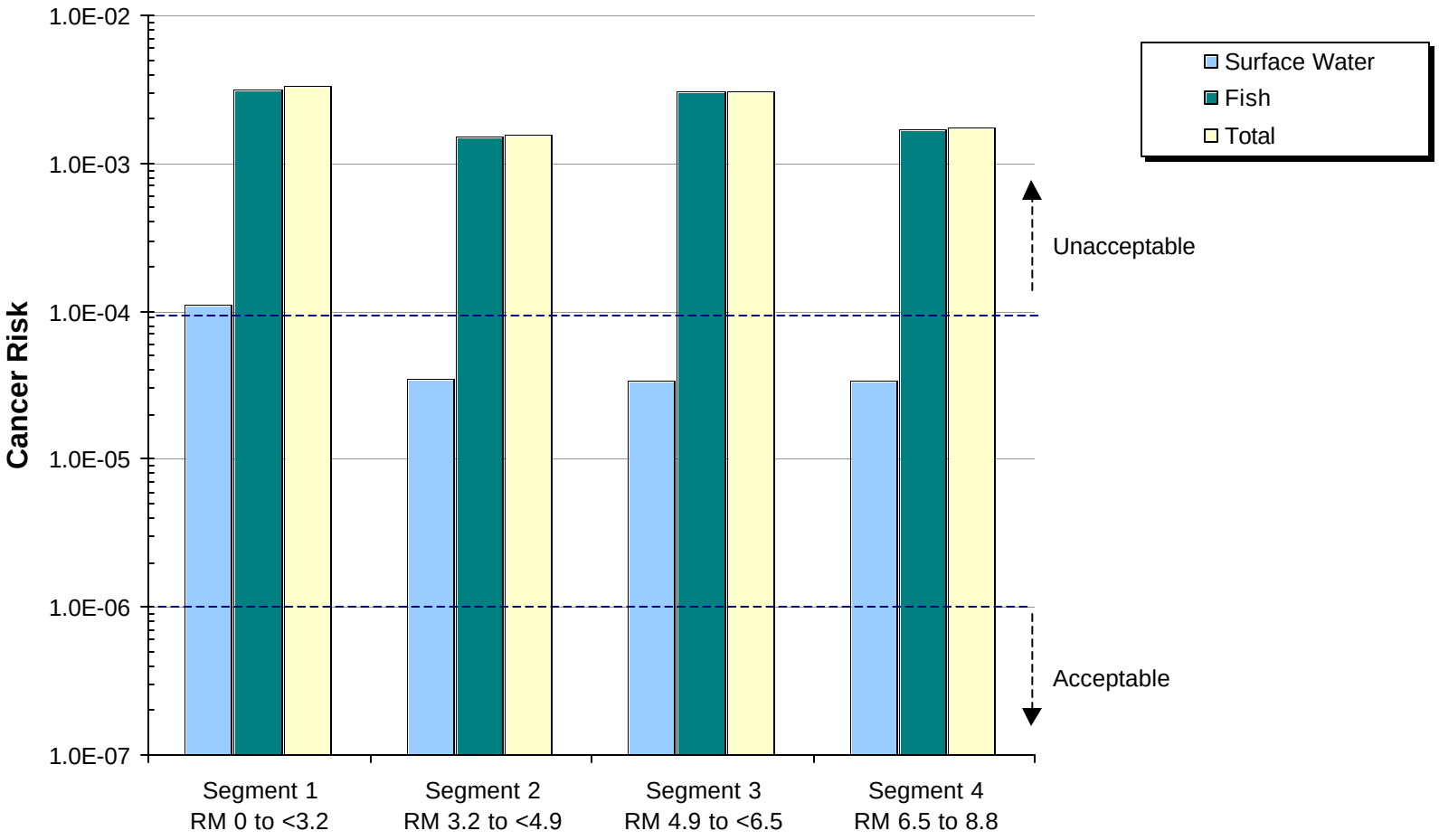


Figure 5-5. Contribution of COIs to Total Estimated Cancer Risks for Fish Consumption, RME Angler Scenario, Lower Ottawa River HHRA

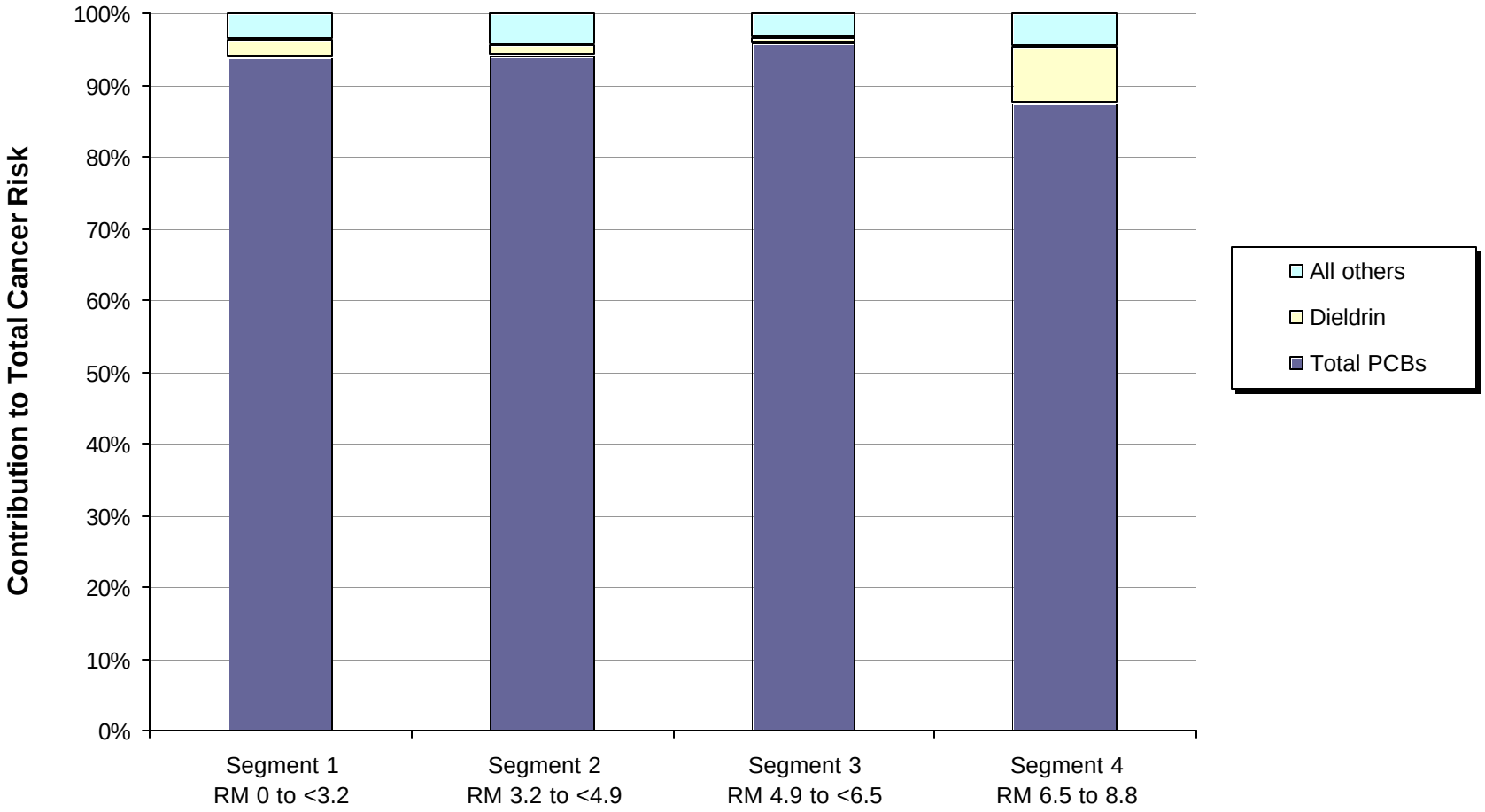


Figure 5-6. Estimated Noncancer Hazards for the RME Angler Scenario, Lower Ottawa River Human Health Risk Assessment

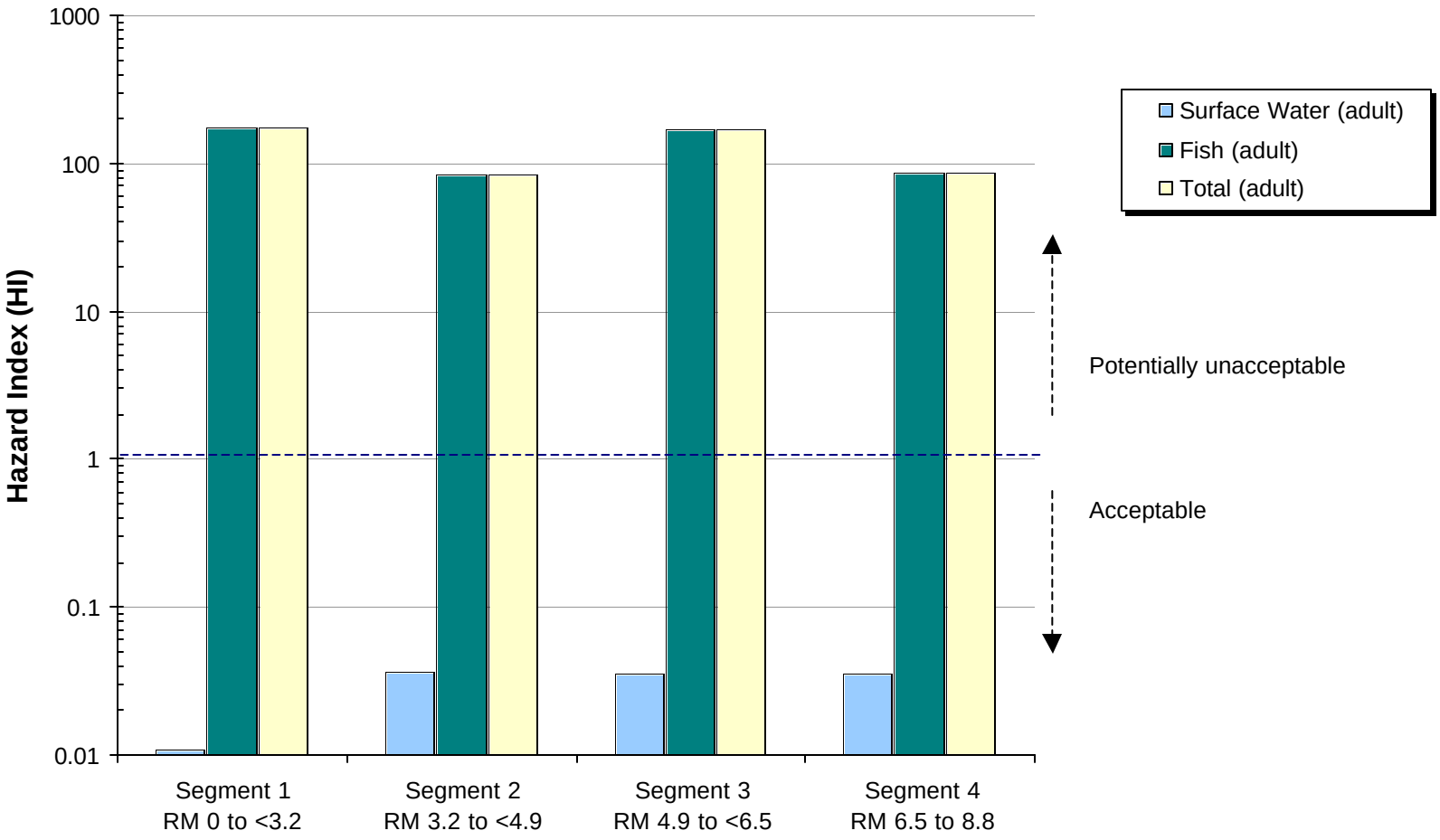


Figure 5-7. Total PCBs Concentrations in Fish Collected from the Lower Ottawa River (ppm) vs. River Mile

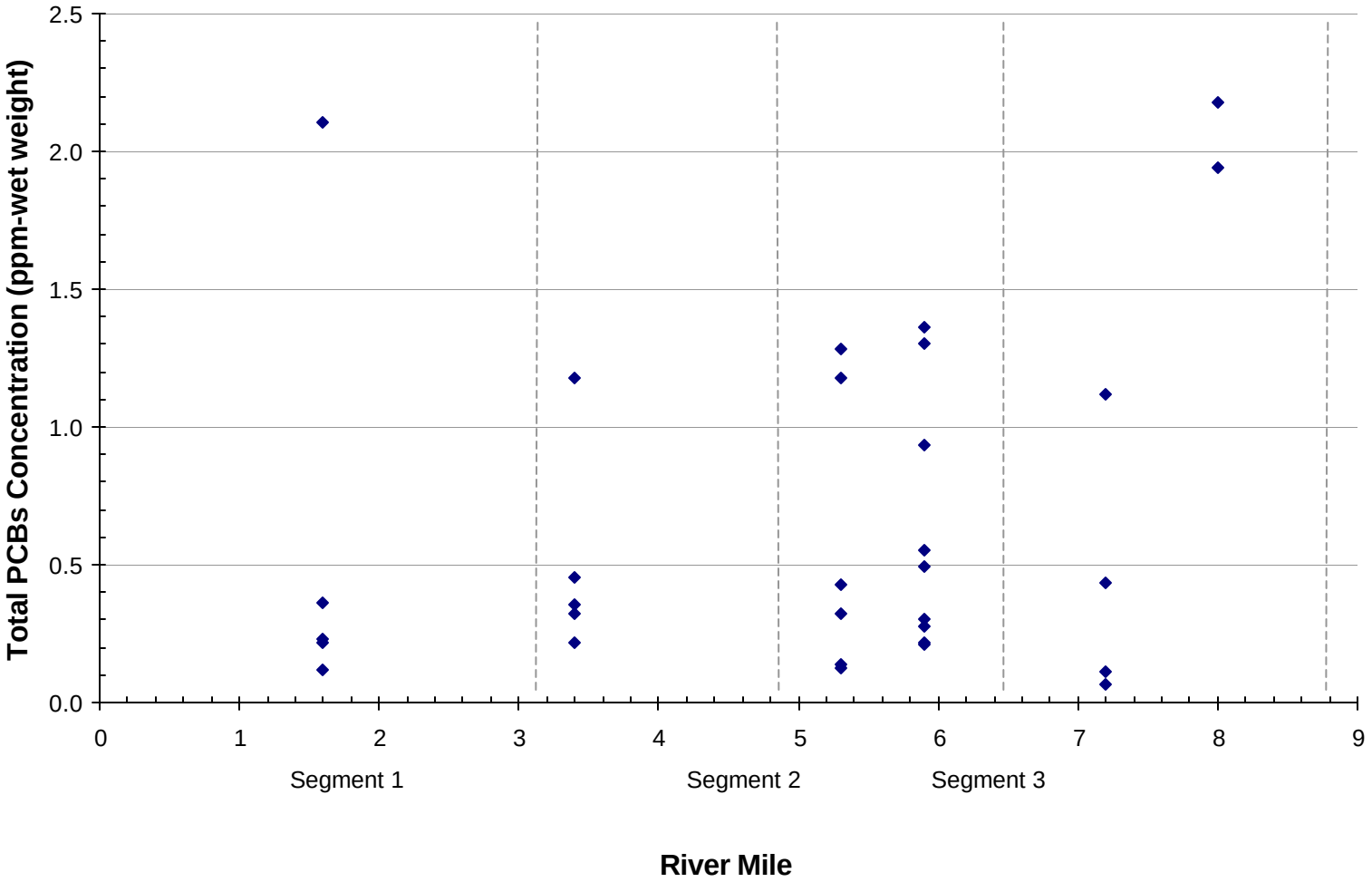


Table 5-1. Summary of Cancer Risks and Noncancer Hazards
Lower Ottawa River Human Health Risk Assessment

Cancer Risk			Noncancer Hazard		
Population	**RME**	**CT**	**Population**	**RME**	**CT**
Segment 1 (RM 0 to <3.2)					
Recreator	1E-04	2E-05	Adult Recreator	0.044	0.021
			Child Recreator	0.32	0.094
Angler/ Fish Consumer	3E-03	4E-04	Adult Angler/ Fish Consumer	170	31
			Child Angler/ Fish Consumer	180	31
Segment 2 (RM 3.2 to <4.9)					
Recreator	5E-05	8E-06	Adult Recreator	0.029	0.014
			Child Recreator	0.22	0.081
Angler/ Fish Consumer	2E-03	2E-04	Adult Angler/ Fish Consumer	83	15
			Child Angler/ Fish Consumer	85	15
Segment 3 (RM 4.9 to <6.5)					
Recreator	1E-04	2E-05	Adult Recreator	0.067	0.037
			Child Recreator	0.58	0.25
Angler/ Fish Consumer	3E-03	3E-04	Adult Angler/ Fish Consumer	170	30
			Child Angler/ Fish Consumer	180	30
Segment 4 (RM 6.5 to 8.8)					
Recreator	6E-05	1E-05	Adult Recreator	0.026	0.013
			Child Recreator	0.21	0.077
Angler/ Fish Consumer	2E-03	2E-04	Adult Angler/ Fish Consumer	87	15
			Child Angler/ Fish Consumer	89	15

Table 5-2. Summary of Chemical- and Media- Specific Cancer Risks, Reasonable Maximum Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Medium: Sediment	% of Total	Surface Water	% of Total	Fish	% of Total	Exposure Pathways Total	% of Total
Segment 1 (RM 0 to <3.2)								
Recreator								
4,4'-DDT (p,p'-)	---	---	8.6E-07	<1%	---	---	8.6E-07	<1%
Aldrin	9.9E-08	1.3%	4.3E-07	<1%	---	---	5.3E-07	<1%
Arsenic	3.1E-06	39.5%	6.3E-07	<1%	---	---	3.7E-06	3.1%
Benzo[a]anthracene	8.1E-08	1.0%	---	---	---	---	8.1E-08	<1%
Benzo[a]pyrene	9.9E-07	12.6%	---	---	---	---	9.9E-07	<1%
Benzo[b]fluoranthene	1.1E-07	1.4%	---	---	---	---	1.1E-07	<1%
Benzo[k]fluoranthene	1.9E-08	<1%	---	---	---	---	1.9E-08	<1%
bis(2-Ethylhexyl)phthalate	1.4E-08	<1%	---	---	---	---	1.4E-08	<1%
Dibenz[a,h]anthracene	1.1E-06	13.4%	---	---	---	---	1.1E-06	<1%
Dieldrin	1.8E-07	2.3%	3.2E-06	2.8%	---	---	3.4E-06	2.8%
Heptachlor	---	---	2.1E-07	<1%	---	---	2.1E-07	<1%
Heptachlor epoxide	5.8E-08	<1%	---	---	---	---	5.8E-08	<1%
Indeno[1,2,3-cd]pyrene	7.5E-08	<1%	---	---	---	---	7.5E-08	<1%
N-Nitroso-di-n-propylamine	1.5E-06	19.5%	4.8E-05	42.2%	---	---	4.9E-05	40.8%
Total PCBs	5.4E-07	6.9%	---	---	---	---	5.4E-07	<1%
Pentachlorophenol	---	---	6.0E-05	53.0%	---	---	6.0E-05	49.6%
(Total)	**7.9E-06**		**1.1E-04**		**0.0E+00**		**1.2E-04**	
Angler								
4,4'-DDD (p,p'-)	---	---	---	---	5.6E-06	<1%	5.6E-06	<1%
4,4'-DDE (p,p'-)	---	---	---	---	1.4E-05	<1%	1.4E-05	<1%
4,4'-DDT (p,p'-)	---	---	1.6E-06	<1%	1.7E-05	<1%	1.8E-05	<1%
Aldrin	---	---	2.3E-07	<1%	2.1E-05	<1%	2.2E-05	<1%
alpha-Chlordane	---	---	---	---	1.4E-05	<1%	1.4E-05	<1%
Arsenic	---	---	2.7E-07	<1%	1.9E-05	<1%	1.9E-05	<1%
Chlordane	---	---	---	---	1.4E-05	<1%	1.4E-05	<1%
Dieldrin	---	---	4.7E-06	2.8%	8.1E-05	2.6%	8.6E-05	2.6%
gamma-Chlordane	---	---	---	---	1.2E-05	<1%	1.2E-05	<1%
N-Nitroso-di-n-propylamine	---	---	5.1E-05	30.8%	---	---	5.1E-05	1.5%
Pentachlorophenol	---	---	1.1E-04	65.2%	---	---	1.1E-04	3.2%
Total PCBs	---	---	---	---	3.0E-03	93.8%	3.0E-03	89.1%
trans-Nonachlor	---	---	---	---	4.4E-07	<1%	4.4E-07	<1%
(Total)	**0.0E+00**		**1.7E-04**		**3.2E-03**		**3.4E-03**	
Segment 2 (RM 3.2 to <4.9)								
Recreator								
4,4'-DDT (p,p'-)	---	---	2.1E-07	<1%	---	---	2.1E-07	<1%
Aldrin	2.2E-07	1.7%	9.3E-08	<1%	---	---	3.2E-07	<1%
Arsenic	3.8E-06	28.7%	1.2E-06	3.4%	---	---	4.9E-06	10.3%
Benzo[a]anthracene	2.3E-07	1.8%	---	---	---	---	2.3E-07	<1%
Benzo[a]pyrene	2.0E-06	15.1%	---	---	---	---	2.0E-06	4.1%
Benzo[b]fluoranthene	3.4E-07	2.6%	---	---	---	---	3.4E-07	<1%
Benzo[k]fluoranthene	1.9E-08	<1%	---	---	---	---	1.9E-08	<1%
bis(2-Ethylhexyl)phthalate	7.4E-08	<1%	---	---	---	---	7.4E-08	<1%
Dibenz[a,h]anthracene	1.6E-06	12.1%	---	---	---	---	1.6E-06	3.3%
Dieldrin	1.4E-07	1.1%	6.3E-07	1.8%	---	---	7.7E-07	1.6%
Heptachlor	---	---	5.1E-08	<1%	---	---	5.1E-08	<1%
Heptachlor epoxide	1.9E-07	1.4%	---	---	---	---	1.9E-07	<1%
Indeno[1,2,3-cd]pyrene	1.5E-07	1.2%	---	---	---	---	1.5E-07	<1%
N-Nitroso-di-n-propylamine	2.8E-06	21.8%	1.3E-05	37.9%	---	---	1.6E-05	33.5%
Total PCBs	1.6E-06	11.9%	---	---	---	---	1.6E-06	3.3%
Pentachlorophenol	---	---	1.9E-05	55.9%	---	---	1.9E-05	40.6%
(Total)	**1.3E-05**		**3.5E-05**		**0.0E+00**		**4.8E-05**	

Table 5-2. Summary of Chemical- and Media- Specific Cancer Risks, Reasonable Maximum Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Medium: Sediment	% of Total	Surface Water	% of Total	Fish	% of Total	Exposure Pathways Total	% of Total
Angler								
4,4'-DDD (p,p'-)	---	---	---	---	2.8E-06	<1%	2.8E-06	<1%
4,4'-DDE (p,p'-)	---	---	---	---	9.1E-06	<1%	9.1E-06	<1%
4,4'-DDT (p,p'-)	---	---	3.8E-07	<1%	6.1E-06	<1%	6.4E-06	<1%
Aldrin	---	---	4.9E-08	<1%	2.1E-05	1.4%	2.1E-05	1.4%
alpha-Chlordane	---	---	---	---	4.4E-07	<1%	4.4E-07	<1%
Arsenic	---	---	5.0E-07	<1%	1.7E-05	1.1%	1.7E-05	1.1%
Chlordane	---	---	---	---	5.7E-06	<1%	5.7E-06	<1%
Dieldrin	---	---	9.3E-07	1.8%	2.1E-05	1.4%	2.2E-05	1.4%
gamma-Chlordane	---	---	---	---	5.7E-06	<1%	5.7E-06	<1%
N-Nitroso-di-n-propylamine	---	---	1.4E-05	27.6%	---	---	1.4E-05	<1%
Pentachlorophenol	---	---	3.5E-05	68.7%	---	---	3.5E-05	2.2%
Total PCBs	---	---	---	---	1.4E-03	94.1%	1.4E-03	91.1%
trans-Nonachlor	---	---	---	---	4.4E-07	<1%	4.4E-07	<1%
(Total)	**0.0E+00**		**5.1E-05**		**1.5E-03**		**1.6E-03**	
Segment 3 (RM 4.9 to <6.5)								
Recreator								
4,4'-DDT (p,p'-)	---	---	2.1E-07	<1%	---	---	2.1E-07	<1%
Aldrin	2.7E-07	<1%	9.3E-08	<1%	---	---	3.6E-07	<1%
Arsenic	3.0E-06	4.2%	4.9E-07	1.4%	---	---	3.5E-06	3.3%
Benzo[a]anthracene	6.6E-07	<1%	---	---	---	---	6.6E-07	<1%
Benzo[a]pyrene	7.9E-06	11.0%	---	---	---	---	7.9E-06	7.5%
Benzo[b]fluoranthene	1.0E-06	1.4%	---	---	---	---	1.0E-06	<1%
Benzo[k]fluoranthene	9.0E-08	<1%	---	---	---	---	9.0E-08	<1%
bis(2-Ethylhexyl)phthalate	1.5E-06	2.1%	---	---	---	---	1.5E-06	1.4%
Dibenz[a,h]anthracene	1.7E-05	23.8%	---	---	---	---	1.7E-05	16.2%
Dieldrin	7.9E-08	<1%	6.3E-07	1.8%	---	---	7.1E-07	<1%
Heptachlor	---	---	5.1E-08	<1%	---	---	5.1E-08	<1%
Heptachlor epoxide	9.3E-08	<1%	---	---	---	---	9.3E-08	<1%
Indeno[1,2,3-cd]pyrene	6.9E-07	<1%	---	---	---	---	6.9E-07	<1%
N-Nitroso-di-n-propylamine	1.8E-05	25.7%	1.3E-05	38.7%	---	---	3.2E-05	29.8%
Total PCBs	2.1E-05	29.3%	---	---	---	---	2.1E-05	19.9%
Pentachlorophenol	---	---	1.9E-05	57.0%	---	---	1.9E-05	18.3%
(Total)	**7.2E-05**		**3.4E-05**		**0.0E+00**		**1.1E-04**	
Angler								
4,4'-DDD (p,p'-)	---	---	---	---	3.2E-06	<1%	3.2E-06	<1%
4,4'-DDE (p,p'-)	---	---	---	---	7.0E-06	<1%	7.0E-06	<1%
4,4'-DDT (p,p'-)	---	---	3.8E-07	<1%	3.5E-06	<1%	3.9E-06	<1%
Aldrin	---	---	4.9E-08	<1%	5.0E-05	1.6%	5.0E-05	1.6%
alpha-Chlordane	---	---	---	---	5.0E-07	<1%	5.0E-07	<1%
Arsenic	---	---	1.5E-07	<1%	1.0E-05	<1%	1.0E-05	<1%
Chlordane	---	---	---	---	1.9E-05	<1%	1.9E-05	<1%
Dieldrin	---	---	9.3E-07	1.8%	2.0E-05	<1%	2.1E-05	<1%
gamma-Chlordane	---	---	---	---	1.4E-05	<1%	1.4E-05	<1%
N-Nitroso-di-n-propylamine	---	---	1.4E-05	27.8%	---	---	1.4E-05	<1%
Pentachlorophenol	---	---	3.5E-05	69.2%	---	---	3.5E-05	1.1%
Total PCBs	---	---	---	---	2.9E-03	95.8%	2.9E-03	94.3%
trans-Nonachlor	---	---	---	---	4.4E-07	<1%	4.4E-07	<1%
(Total)	**0.0E+00**		**5.1E-05**		**3.1E-03**		**3.1E-03**	

Table 5-2. Summary of Chemical- and Media- Specific Cancer Risks, Reasonable Maximum Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Medium: Sediment	% of Total	Surface Water	% of Total	Fish	% of Total	Exposure Pathways Total	% of Total
Segment 4 (RM 6.5 to 8.8)								
Recreator								
4,4'-DDT (p,p'-)	---	---	2.1E-07	<1%	---	---	2.1E-07	<1%
Aldrin	1.8E-08	<1%	9.3E-08	<1%	---	---	1.1E-07	<1%
Arsenic	2.8E-06	10.9%	3.5E-07	1.0%	---	---	3.1E-06	5.3%
Benzo[a]anthracene	6.1E-07	2.4%	---	---	---	---	6.1E-07	1.0%
Benzo[a]pyrene	6.3E-06	24.9%	---	---	---	---	6.3E-06	10.7%
Benzo[b]fluoranthene	7.9E-07	3.1%	---	---	---	---	7.9E-07	1.3%
Benzo[k]fluoranthene	7.9E-08	<1%	---	---	---	---	7.9E-08	<1%
bis(2-Ethylhexyl)phthalate	1.5E-06	5.8%	---	---	---	---	1.5E-06	2.5%
Dibenz[a,h]anthracene	2.3E-06	9.0%	---	---	---	---	2.3E-06	3.8%
Dieldrin	3.3E-08	<1%	6.3E-07	1.9%	---	---	6.6E-07	1.1%
Heptachlor	---	---	5.1E-08	<1%	---	---	5.1E-08	<1%
Heptachlor epoxide	1.3E-08	<1%	---	---	---	---	1.3E-08	<1%
Indeno[1,2,3-cd]pyrene	5.5E-07	2.2%	---	---	---	---	5.5E-07	<1%
N-Nitroso-di-n-propylamine	8.8E-06	34.6%	1.3E-05	38.8%	---	---	2.2E-05	37.0%
Total PCBs	1.7E-06	6.6%	---	---	---	---	1.7E-06	2.8%
Pentachlorophenol	---	---	1.9E-05	57.2%	---	---	1.9E-05	32.7%
(Total)	**2.5E-05**		**3.4E-05**		**0.0E+00**		**5.9E-05**	
Angler								
4,4'-DDD (p,p'-)	---	---	---	---	5.6E-06	<1%	5.6E-06	<1%
4,4'-DDE (p,p'-)	---	---	---	---	1.1E-05	<1%	1.1E-05	<1%
4,4'-DDT (p,p'-)	---	---	3.8E-07	<1%	1.7E-05	1.0%	1.8E-05	1.0%
Aldrin	---	---	4.9E-08	<1%	2.1E-05	1.3%	2.1E-05	1.2%
alpha-Chlordane	---	---	---	---	2.7E-06	<1%	2.7E-06	<1%
Arsenic	---	---	1.5E-07	<1%	1.1E-05	<1%	1.1E-05	<1%
Chlordane	---	---	---	---	6.8E-06	<1%	6.8E-06	<1%
Dieldrin	---	---	9.3E-07	1.8%	1.4E-04	8.0%	1.4E-04	7.8%
gamma-Chlordane	---	---	---	---	3.1E-06	<1%	3.1E-06	<1%
N-Nitroso-di-n-propylamine	---	---	1.4E-05	27.8%	---	---	1.4E-05	<1%
Pentachlorophenol	---	---	3.5E-05	69.2%	---	---	3.5E-05	2.0%
Total PCBs	---	---	---	---	1.5E-03	87.3%	1.5E-03	84.8%
trans-Nonachlor	---	---	---	---	9.3E-07	<1%	9.3E-07	<1%
(Total)	**0.0E+00**		**5.1E-05**		**1.7E-03**		**1.8E-03**	

Table 5-3. Summary of Chemical- and Media- Specific Cancer Risks, Central Tendency Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Medium: Sediment	% of Total	Surface Water	% of Total	Fish	% of Total	Exposure Pathways Total	% of Total
Segment 1 (RM 0 to <3.2)								
Recreator								
4,4'-DDT (p,p'-)	---	---	1.2E-07	<1%	---	---	1.2E-07	<1%
Aldrin	2.5E-08	1.2%	6.0E-08	<1%	---	---	8.6E-08	<1%
Arsenic	8.7E-07	42.7%	8.8E-08	<1%	---	---	9.6E-07	5.3%
Benzo[a]anthracene	2.0E-08	<1%	---	---	---	---	2.0E-08	<1%
Benzo[a]pyrene	2.4E-07	11.7%	---	---	---	---	2.4E-07	1.3%
Benzo[b]fluoranthene	2.6E-08	1.3%	---	---	---	---	2.6E-08	<1%
Benzo[k]fluoranthene	4.6E-09	<1%	---	---	---	---	4.6E-09	<1%
bis(2-Ethylhexyl)phthalate	3.2E-09	<1%	---	---	---	---	3.2E-09	<1%
Dibenz[a,h]anthracene	2.5E-07	12.5%	---	---	---	---	2.5E-07	1.4%
Dieldrin	4.6E-08	2.3%	4.6E-07	2.8%	---	---	5.0E-07	2.8%
Heptachlor	---	---	3.0E-08	<1%	---	---	3.0E-08	<1%
Heptachlor epoxide	1.5E-08	<1%	---	---	---	---	1.5E-08	<1%
Indeno[1,2,3-cd]pyrene	1.8E-08	<1%	---	---	---	---	1.8E-08	<1%
N-Nitroso-di-n-propylamine	3.6E-07	17.7%	6.7E-06	41.9%	---	---	7.1E-06	39.2%
Total PCBs	1.5E-07	7.5%	---	---	---	---	1.5E-07	<1%
Pentachlorophenol	---	---	8.6E-06	53.4%	---	---	8.6E-06	47.3%
(Total)	**2.0E-06**		**1.6E-05**		**0.0E+00**		**1.8E-05**	
Angler								
4,4'-DDD (p,p'-)	---		---	---	5.9E-07	<1%	5.9E-07	<1%
4,4'-DDE (p,p'-)	---		---	---	1.4E-06	<1%	1.4E-06	<1%
4,4'-DDT (p,p'-)	---		9.3E-07	<1%	1.8E-06	<1%	2.7E-06	<1%
Aldrin	---		1.4E-07	<1%	2.2E-06	<1%	2.4E-06	<1%
alpha-Chlordane	---		---	---	1.7E-07	<1%	1.7E-07	<1%
Arsenic	---		1.6E-07	<1%	2.0E-06	<1%	2.1E-06	<1%
Chlordane	---		---	---	1.5E-06	<1%	1.5E-06	<1%
Dieldrin	---		2.8E-06	2.8%	8.6E-06	2.6%	1.1E-05	2.6%
gamma-Chlordane	---		---	---	1.2E-06	<1%	1.2E-06	<1%
N-Nitroso-di-n-propylamine	---		3.1E-05	30.8%	---	---	3.1E-05	7.1%
Pentachlorophenol	---		6.5E-05	65.2%	---	---	6.5E-05	15.0%
Total PCBs	---		---	---	3.1E-04	94.2%	3.1E-04	72.6%
trans-Nonachlor	---		---	---	4.6E-08	<1%	4.6E-08	<1%
(Total)	**0.0E+00**		**9.9E-05**		**3.3E-04**		**4.3E-04**	
Segment 2 (RM 3.2 to <4.9)								
Recreator								
4,4'-DDT (p,p'-)	---	---	3.0E-08	<1%	---	---	3.0E-08	<1%
Aldrin	5.7E-08	1.7%	1.3E-08	<1%	---	---	7.0E-08	<1%
Arsenic	1.1E-06	31.3%	1.6E-07	3.3%	---	---	1.2E-06	14.6%
Benzo[a]anthracene	5.7E-08	1.7%	---	---	---	---	5.7E-08	<1%
Benzo[a]pyrene	4.8E-07	14.2%	---	---	---	---	4.8E-07	5.7%
Benzo[b]fluoranthene	8.2E-08	2.4%	---	---	---	---	8.2E-08	<1%
Benzo[k]fluoranthene	4.5E-09	<1%	---	---	---	---	4.5E-09	<1%
bis(2-Ethylhexyl)phthalate	1.7E-08	<1%	---	---	---	---	1.7E-08	<1%
Dibenz[a,h]anthracene	3.8E-07	11.4%	---	---	---	---	3.8E-07	4.6%
Dieldrin	3.6E-08	1.1%	9.0E-08	1.8%	---	---	1.3E-07	1.5%
Heptachlor	---	---	7.3E-09	<1%	---	---	7.3E-09	<1%
Heptachlor epoxide	5.0E-08	1.5%	---	---	---	---	5.0E-08	<1%
Indeno[1,2,3-cd]pyrene	3.7E-08	1.1%	---	---	---	---	3.7E-08	<1%
N-Nitroso-di-n-propylamine	6.7E-07	19.9%	1.9E-06	37.6%	---	---	2.5E-06	30.5%
Total PCBs	4.4E-07	13.1%	---	---	---	---	4.4E-07	5.3%
Pentachlorophenol	---	---	2.8E-06	56.2%	---	---	2.8E-06	33.5%
(Total)	**3.4E-06**		**5.0E-06**		**0.0E+00**		**8.3E-06**	

Table 5-3. Summary of Chemical- and Media- Specific Cancer Risks, Central Tendency Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Medium: Sediment	% of Total	Surface Water	% of Total	Fish	% of Total	Exposure Pathways Total	% of Total
Angler								
4,4'-DDD (p,p'-)	---	---	---	---	2.9E-07	<1%	2.9E-07	<1%
4,4'-DDE (p,p'-)	---	---	---	---	9.6E-07	<1%	9.6E-07	<1%
4,4'-DDT (p,p'-)	---	---	1.4E-07	<1%	6.4E-07	<1%	7.8E-07	<1%
Aldrin	---	---	1.8E-08	<1%	2.2E-06	1.4%	2.3E-06	1.3%
alpha-Chlordane	---	---	---	---	4.6E-08	<1%	4.6E-08	<1%
Arsenic	---	---	1.9E-07	<1%	1.8E-06	1.1%	2.0E-06	1.1%
Chlordane	---	---	---	---	6.0E-07	<1%	6.0E-07	<1%
Dieldrin	---	---	3.5E-07	1.8%	2.2E-06	1.4%	2.5E-06	1.4%
gamma-Chlordane	---	---	---	---	6.0E-07	<1%	6.0E-07	<1%
N-Nitroso-di-n-propylamine	---	---	5.3E-06	27.6%	---	---	5.3E-06	3.0%
Pentachlorophenol	---	---	1.3E-05	68.7%	---	---	1.3E-05	7.4%
Total PCBs	---	---	---	---	1.5E-04	94.1%	1.5E-04	84.0%
trans-Nonachlor	---	---	---	---	4.6E-08	<1%	4.6E-08	<1%
(Total)	**0.0E+00**		**1.9E-05**		**1.6E-04**		**1.8E-04**	
Segment 3 (RM 4.9 to <6.5)								
Recreator								
4,4'-DDT (p,p'-)	---	---	3.0E-08	<1%	---	---	3.0E-08	<1%
Aldrin	6.8E-08	<1%	1.3E-08	<1%	---	---	8.1E-08	<1%
Arsenic	8.4E-07	4.6%	4.9E-08	1.0%	---	---	8.9E-07	3.9%
Benzo[a]anthracene	1.6E-07	<1%	---	---	---	---	1.6E-07	<1%
Benzo[a]pyrene	1.9E-06	10.5%	---	---	---	---	1.9E-06	8.3%
Benzo[b]fluoranthene	2.5E-07	1.4%	---	---	---	---	2.5E-07	1.1%
Benzo[k]fluoranthene	2.2E-08	<1%	---	---	---	---	2.2E-08	<1%
bis(2-Ethylhexyl)phthalate	3.4E-07	1.8%	---	---	---	---	3.4E-07	1.5%
Dibenz[a,h]anthracene	4.1E-06	22.7%	---	---	---	---	4.1E-06	17.9%
Dieldrin	2.0E-08	<1%	9.0E-08	1.9%	---	---	1.1E-07	<1%
Heptachlor	---	---	7.3E-09	<1%	---	---	7.3E-09	<1%
Heptachlor epoxide	2.5E-08	<1%	---	---	---	---	2.5E-08	<1%
Indeno[1,2,3-cd]pyrene	1.7E-07	<1%	---	---	---	---	1.7E-07	<1%
N-Nitroso-di-n-propylamine	4.4E-06	23.8%	1.9E-06	38.5%	---	---	6.2E-06	26.9%
Total PCBs	6.0E-06	32.7%	---	---	---	---	6.0E-06	25.9%
Pentachlorophenol	---	---	2.8E-06	57.6%	---	---	2.8E-06	12.0%
(Total)	**1.8E-05**		**4.8E-06**		**0.0E+00**		**2.3E-05**	
Angler								
4,4'-DDD (p,p'-)	---		---	---	3.3E-07	<1%	3.3E-07	<1%
4,4'-DDE (p,p'-)	---		---	---	7.3E-07	<1%	7.3E-07	<1%
4,4'-DDT (p,p'-)	---		1.4E-07	<1%	3.7E-07	<1%	5.1E-07	<1%
Aldrin	---		1.8E-08	<1%	5.3E-06	1.6%	5.3E-06	1.5%
alpha-Chlordane	---		---	---	5.2E-08	<1%	5.2E-08	<1%
Arsenic	---		5.7E-08	<1%	1.1E-06	<1%	1.1E-06	<1%
Chlordane	---		---	---	2.0E-06	<1%	2.0E-06	<1%
Dieldrin	---		3.5E-07	1.8%	2.1E-06	<1%	2.4E-06	<1%
gamma-Chlordane	---		---	---	1.5E-06	<1%	1.5E-06	<1%
N-Nitroso-di-n-propylamine	---		5.3E-06	27.8%	---	---	5.3E-06	1.6%
Pentachlorophenol	---		1.3E-05	69.2%	---	---	1.3E-05	3.9%
Total PCBs	---		---	---	3.1E-04	95.8%	3.1E-04	90.5%
trans-Nonachlor	---		---	---	4.6E-08	<1%	4.6E-08	<1%
(Total)	**0.0E+00**		**1.9E-05**		**3.2E-04**		**3.4E-04**	

Table 5-3. Summary of Chemical- and Media- Specific Cancer Risks, Central Tendency Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Medium: Sediment	% of Total	Surface Water	% of Total	Fish	% of Total	Exposure Pathways Total	% of Total
Segment 4 (RM 6.5 to 8.8)								
Recreator								
4,4'-DDT (p,p'-)	---	---	3.0E-08	<1%	---	---	3.0E-08	<1%
Aldrin	4.6E-09	<1%	1.3E-08	<1%	---	---	1.8E-08	<1%
Arsenic	7.8E-07	12.4%	4.9E-08	1.0%	---	---	8.3E-07	7.4%
Benzo[a]anthracene	1.5E-07	2.3%	---	---	---	---	1.5E-07	1.3%
Benzo[a]pyrene	1.5E-06	24.5%	---	---	---	---	1.5E-06	13.8%
Benzo[b]fluoranthene	1.9E-07	3.1%	---	---	---	---	1.9E-07	1.7%
Benzo[k]fluoranthene	1.9E-08	<1%	---	---	---	---	1.9E-08	<1%
bis(2-Ethylhexyl)phthalate	3.4E-07	5.4%	---	---	---	---	3.4E-07	3.0%
Dibenz[a,h]anthracene	5.5E-07	8.8%	---	---	---	---	5.5E-07	5.0%
Dieldrin	8.5E-09	<1%	9.0E-08	1.9%	---	---	9.8E-08	<1%
Heptachlor	---	---	7.3E-09	<1%	---	---	7.3E-09	<1%
Heptachlor epoxide	3.3E-09	<1%	---	---	---	---	3.3E-09	<1%
Indeno[1,2,3-cd]pyrene	1.3E-07	2.1%	---	---	---	---	1.3E-07	1.2%
N-Nitroso-di-n-propylamine	2.1E-06	33.2%	1.9E-06	38.5%	---	---	3.9E-06	35.5%
Total PCBs	4.8E-07	7.7%	---	---	---	---	4.8E-07	4.3%
Pentachlorophenol	---	---	2.8E-06	57.6%	---	---	2.8E-06	25.1%
(Total)	**6.3E-06**		**4.8E-06**		**0.0E+00**		**1.1E-05**	
Angler								
4,4'-DDD (p,p'-)	---		---	---	5.8E-07	<1%	5.8E-07	<1%
4,4'-DDE (p,p'-)	---		---	---	1.2E-06	<1%	1.2E-06	<1%
4,4'-DDT (p,p'-)	---		1.4E-07	<1%	1.8E-06	1.0%	2.0E-06	<1%
Aldrin	---		1.8E-08	<1%	2.2E-06	1.3%	2.3E-06	1.1%
alpha-Chlordane	---		---	---	2.9E-07	<1%	2.9E-07	<1%
Arsenic	---		5.7E-08	<1%	1.1E-06	<1%	1.2E-06	<1%
Chlordane	---		---	---	7.1E-07	<1%	7.1E-07	<1%
Dieldrin	---		3.5E-07	1.8%	1.4E-05	8.0%	1.5E-05	7.4%
gamma-Chlordane	---		---	---	3.3E-07	<1%	3.3E-07	<1%
N-Nitroso-di-n-propylamine	---		5.3E-06	27.8%	---	---	5.3E-06	2.7%
Pentachlorophenol	---		1.3E-05	69.2%	---	---	1.3E-05	6.7%
Total PCBs	---		---	---	1.6E-04	87.3%	1.6E-04	78.9%
trans-Nonachlor	---		---	---	9.8E-08	<1%	9.8E-08	<1%
(Total)	**0.0E+00**		**1.9E-05**		**1.8E-04**		**2.0E-04**	

Table 5-4. Summary of Chemical- and Media- Specific Noncancer Hazards, Reasonable Maximum Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Medium: Sediment	% of Total	Surface Water	% of Total	Fish	% of Total	Exposure Pathways Total	% of Total
Segment 1 (RM 0 to <3.2)								
Adult Recreator								
2-Chlorophenol	---	---	5.7E-03	19.1%	---	---	5.7E-03	13.0%
Aldrin	1.4E-04	1.0%	7.0E-04	2.4%	---	---	8.4E-04	1.9%
Arsenic	3.5E-03	25.6%	1.2E-03	4.0%	---	---	4.7E-03	10.9%
Atrazine	---	---	8.6E-05	<1%	---	---	8.6E-05	<1%
bis(2-Ethylhexyl)phthalate	5.2E-05	<1%	---	---	---	---	5.2E-05	<1%
Dieldrin	1.7E-04	1.2%	2.8E-03	9.4%	---	---	3.0E-03	6.8%
Di-n-butylphthalate	---	---	3.4E-05	<1%	---	---	3.4E-05	<1%
gamma-Benzene hexachloride	---	---	1.2E-04	<1%	---	---	1.2E-04	<1%
Heptachlor	---	---	7.0E-05	<1%	---	---	7.0E-05	<1%
Heptachlor epoxide	3.2E-04	2.3%	---	---	---	---	3.2E-04	<1%
PCB Aroclor 1016	2.5E-05	<1%	---	---	---	---	2.5E-05	<1%
PCB Aroclor 1254	1.0E-04	<1%	---	---	---	---	1.0E-04	<1%
Pentachlorophenol	---	---	1.1E-02	36.3%	---	---	1.1E-02	24.7%
Thallium	9.5E-03	68.6%	8.3E-03	27.9%	---	---	1.8E-02	40.8%
(Total)	**0.014**		**0.030**		**0.0**		**0.044**	
Child Recreator								
2-Chlorophenol	---	---	3.8E-02	20.1%	---	---	3.8E-02	11.9%
Aldrin	8.5E-04	<1%	3.6E-03	1.9%	---	---	4.5E-03	1.4%
Arsenic	3.2E-02	24.8%	6.0E-03	3.2%	---	---	3.8E-02	12.0%
Atrazine	0.0E+00	<1%	5.2E-04	<1%	---	---	5.2E-04	<1%
bis(2-Ethylhexyl)phthalate	2.0E-04	<1%	---	---	---	---	2.0E-04	<1%
Dieldrin	1.0E-03	<1%	1.8E-02	9.5%	---	---	1.9E-02	5.9%
Di-n-butylphthalate	---	---	2.2E-04	<1%	---	---	2.2E-04	<1%
gamma-Benzene hexachloride	---	---	7.1E-04	<1%	---	---	7.1E-04	<1%
Heptachlor	---	---	4.2E-04	<1%	---	---	4.2E-04	<1%
Heptachlor epoxide	2.2E-03	1.7%	---	---	---	---	2.2E-03	<1%
PCB Aroclor 1016	2.5E-04	<1%	---	---	---	---	2.5E-04	<1%
PCB Aroclor 1254	9.8E-04	<1%	---	---	---	---	9.8E-04	<1%
Pentachlorophenol	---	---	7.5E-02	39.9%	---	---	7.5E-02	23.6%
Thallium	9.3E-02	71.0%	4.6E-02	24.3%	---	---	1.4E-01	43.5%
(Total)	**0.13**		**0.19**		**0.0**		**0.32**	
Adult Angler								
2-Chlorophenol	---	---	2.4E-02	23.0%	---	---	2.4E-02	<1%
4,4'-DDT (p,p'-)	---	---	---	---	2.3E-01	<1%	2.3E-01	<1%
Aldrin	---	---	7.8E-04	<1%	9.6E-02	<1%	9.7E-02	<1%
alpha-Chlordane	---	---	---	---	2.1E-02	<1%	2.1E-02	<1%
Arsenic	---	---	1.1E-03	1.0%	9.6E-02	<1%	9.8E-02	<1%
Atrazine	---	---	2.5E-04	<1%	---	---	2.5E-04	<1%
Chlordane	---	---	---	---	1.9E-01	<1%	1.9E-01	<1%
Dieldrin	---	---	1.0E-02	9.8%	2.3E-01	<1%	2.5E-01	<1%
Di-n-butylphthalate	---	---	1.3E-04	<1%	---	---	1.3E-04	<1%
gamma-Benzene hexachloride	---	---	3.4E-04	<1%	---	---	3.4E-04	<1%
gamma-Chlordane	---	---	---	---	1.5E-01	<1%	1.5E-01	<1%
Pentachlorophenol	---	---	5.3E-02	50.1%	---	---	5.3E-02	<1%
Thallium	---	---	1.5E-02	14.7%	---	---	1.5E-02	<1%
Total PCBs	---	---	---	---	1.7E+02	99.4%	1.7E+02	99.4%
trans-Nonachlor	---	---	---	---	5.8E-03	<1%	5.8E-03	<1%
(Total)	**0.0**		**0.11**		**173**		**174**	

Table 5-4. Summary of Chemical- and Media- Specific Noncancer Hazards, Reasonable Maximum Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Medium: Sediment	% of Total	Surface Water	% of Total	Fish	% of Total	Exposure Pathways Total	% of Total
Child Angler								
2-Chlorophenol	---	---	4.3E-02	40.5%	---	---	4.3E-02	<1%
4,4'-DDT (p,p'-)	---	---	---	---	2.3E-01	<1%	2.3E-01	<1%
Aldrin	---	---	1.4E-03	1.3%	9.9E-02	<1%	1.0E-01	<1%
alpha-Chlordane	---	---	---	---	2.2E-02	<1%	2.2E-02	<1%
Arsenic	---	---	1.9E-03	1.8%	9.9E-02	<1%	1.0E-01	<1%
Atrazine	---	---	4.4E-04	<1%	---	---	4.4E-04	<1%
Chlordane	---	---	---	---	1.9E-01	<1%	1.9E-01	<1%
Dieldrin	---	---	1.8E-02	17.3%	2.4E-01	<1%	2.6E-01	<1%
Di-n-butylphthalate	---	---	2.3E-04	<1%	---	---	2.3E-04	<1%
gamma-Benzene hexachloride	---	---	5.9E-04	<1%	---	---	5.9E-04	<1%
gamma-Chlordane	---	---	---	---	1.6E-01	<1%	1.6E-01	<1%
Pentachlorophenol	---	---	9.3E-02	88.3%	---	---	9.3E-02	<1%
Thallium	---	---	2.7E-02	25.9%	---	---	2.7E-02	<1%
Total PCBs	---	---	---	---	1.8E+02	101.8%	1.8E+02	101.8%
trans-Nonachlor	---	---	---	---	5.9E-03	<1%	5.9E-03	<1%
(Total)	**0.0**		**0.19**		**178**		**178**	
Segment 2 (RM 3.2 to <4.9)								
Adult Recreator								
2-Chlorophenol	---	---	9.8E-04	7.6%	---	---	9.8E-04	3.4%
Aldrin	3.2E-04	2.1%	1.5E-04	1.2%	---	---	4.8E-04	1.7%
Arsenic	4.3E-03	27.3%	2.2E-03	16.9%	---	---	6.5E-03	22.6%
Atrazine	---	---	4.8E-05	<1%	---	---	4.8E-05	<1%
bis(2-Ethylhexyl)phthalate	2.7E-04	1.7%	---	---	---	---	2.7E-04	<1%
Dieldrin	1.3E-04	<1%	5.5E-04	4.3%	---	---	6.8E-04	2.4%
Di-n-butylphthalate	---	---	2.8E-05	<1%	---	---	2.8E-05	<1%
gamma-Benzene hexachloride	---	---	2.7E-05	<1%	---	---	2.7E-05	<1%
Heptachlor	---	---	1.7E-05	<1%	---	---	1.7E-05	<1%
Heptachlor epoxide	1.0E-03	6.5%	---	---	---	---	1.0E-03	3.6%
PCB Aroclor 1016	5.1E-04	3.2%	---	---	---	---	5.1E-04	1.8%
PCB Aroclor 1254	2.5E-04	1.6%	---	---	---	---	2.5E-04	<1%
Pentachlorophenol	---	---	3.5E-03	27.2%	---	---	3.5E-03	12.2%
Thallium	8.9E-03	56.8%	5.4E-03	41.9%	---	---	1.4E-02	50.1%
(Total)	**0.016**		**0.013**		**0.0**		**0.029**	
Child Recreator								
2-Chlorophenol	---	---	6.6E-03	8.5%	---	---	6.6E-03	2.9%
Aldrin	1.9E-03	1.3%	7.9E-04	1.0%	---	---	2.7E-03	1.2%
Arsenic	3.9E-02	27.1%	1.1E-02	14.3%	---	---	5.0E-02	22.6%
Atrazine	---	---	2.9E-04	<1%	---	---	2.9E-04	<1%
bis(2-Ethylhexyl)phthalate	1.1E-03	<1%	---	---	---	---	1.1E-03	<1%
Dieldrin	7.7E-04	<1%	3.5E-03	4.6%	---	---	4.3E-03	1.9%
Di-n-butylphthalate	---	---	1.8E-04	<1%	---	---	1.8E-04	<1%
gamma-Benzene hexachloride	---	---	1.4E-04	<1%	---	---	1.4E-04	<1%
Heptachlor	---	---	3.4E-04	<1%	---	---	3.4E-04	<1%
Heptachlor epoxide	7.2E-03	5.0%	---	---	---	---	7.2E-03	3.2%
PCB Aroclor 1016	4.9E-03	3.4%	---	---	---	---	4.9E-03	2.2%
PCB Aroclor 1254	2.4E-03	1.7%	---	---	---	---	2.4E-03	1.1%
Pentachlorophenol	---	---	2.4E-02	31.7%	---	---	2.4E-02	11.0%
Thallium	8.8E-02	60.3%	3.0E-02	38.7%	---	---	1.2E-01	52.8%
(Total)	**0.15**		**0.077**		**0.0**		**0.22**	

Table 5-4. Summary of Chemical- and Media- Specific Noncancer Hazards, Reasonable Maximum Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Medium: Sediment	% of Total	Surface Water	% of Total	Fish	% of Total	Exposure Pathways Total	% of Total
Adult Angler								
2-Chlorophenol	---	---	4.2E-03	11.6%	---	---	4.2E-03	<1%
4,4'-DDT (p,p'-)	---	---	---	---	8.2E-02	<1%	8.2E-02	<1%
Aldrin	---	---	1.7E-04	<1%	9.6E-02	<1%	9.7E-02	<1%
alpha-Chlordane	---	---	---	---	5.8E-03	<1%	5.8E-03	<1%
Arsenic	---	---	2.0E-03	5.5%	8.7E-02	<1%	8.9E-02	<1%
Atrazine	---	---	1.4E-04	<1%	---	---	1.4E-04	<1%
Chlordane	---	---	---	---	7.6E-02	<1%	7.6E-02	<1%
Dieldrin	---	---	2.0E-03	5.6%	6.0E-02	<1%	6.2E-02	<1%
Di-n-butylphthalate	---	---	1.0E-04	<1%	---	---	1.0E-04	<1%
gamma-Benzene hexachloride	---	---	7.6E-05	<1%	---	---	7.6E-05	<1%
gamma-Chlordane	---	---	---	---	7.6E-02	<1%	7.6E-02	<1%
Pentachlorophenol	---	---	1.7E-02	47.8%	---	---	1.7E-02	<1%
Thallium	---	---	1.0E-02	28.1%	---	---	1.0E-02	<1%
Total PCBs	---	---	---	---	8.3E+01	99.4%	8.3E+01	99.4%
trans-Nonachlor	---	---	---	---	5.8E-03	<1%	5.8E-03	<1%
(Total)	**0.0**		**0.036**		**83**		**83**	
Child Angler								
2-Chlorophenol	---	---	7.4E-03	11.6%	---	---	7.4E-03	<1%
4,4'-DDT (p,p'-)	---	---	---	---	8.4E-02	<1%	8.4E-02	<1%
Aldrin	---	---	3.0E-04	<1%	9.9E-02	<1%	9.9E-02	<1%
alpha-Chlordane	---	---	---	---	5.9E-03	<1%	5.9E-03	<1%
Arsenic	---	---	3.5E-03	5.5%	8.9E-02	<1%	9.3E-02	<1%
Atrazine	---	---	2.4E-04	<1%	---	---	2.4E-04	<1%
Chlordane	---	---	---	---	7.8E-02	<1%	7.8E-02	<1%
Dieldrin	---	---	3.6E-03	5.6%	6.2E-02	<1%	6.5E-02	<1%
Di-n-butylphthalate	---	---	1.8E-04	<1%	---	---	1.8E-04	<1%
gamma-Benzene hexachloride	---	---	1.3E-04	<1%	---	---	1.3E-04	<1%
gamma-Chlordane	---	---	---	---	7.8E-02	<1%	7.8E-02	<1%
Pentachlorophenol	---	---	3.0E-02	47.8%	---	---	3.0E-02	<1%
Thallium	---	---	1.8E-02	28.1%	---	---	1.8E-02	<1%
Total PCBs	---	---	---	---	8.5E+01	99.4%	8.5E+01	99.3%
trans-Nonachlor	---	---	---	---	5.9E-03	<1%	5.9E-03	<1%
(Total)	**0.0**		**0.063**		**85**		**85**	
Segment 3 (RM 4.9 to <6.5)								
Adult Recreator								
2-Chlorophenol	---	---	9.8E-04	8.6%	---	---	9.8E-04	1.5%
Aldrin	3.9E-04	<1%	1.5E-04	1.3%	---	---	5.4E-04	<1%
Arsenic	3.4E-03	6.1%	6.6E-04	5.8%	---	---	4.1E-03	6.1%
Atrazine	---	---	4.8E-05	<1%	---	---	4.8E-05	<1%
bis(2-Ethylhexyl)phthalate	5.4E-03	9.7%	---	---	---	---	5.4E-03	8.1%
Dieldrin	7.3E-05	<1%	5.5E-04	4.8%	---	---	6.2E-04	<1%
Di-n-butylphthalate	---	---	2.8E-05	<1%	---	---	2.8E-05	<1%
gamma-Benzene hexachloride	---	---	2.7E-05	<1%	---	---	2.7E-05	<1%
Heptachlor	---	---	1.7E-05	<1%	---	---	1.7E-05	<1%
Heptachlor epoxide	5.1E-04	<1%	---	---	---	---	5.1E-04	<1%
PCB Aroclor 1016	3.6E-02	65.3%	---	---	---	---	3.6E-02	54.2%
PCB Aroclor 1254	2.5E-03	4.4%	---	---	---	---	2.5E-03	3.7%
Pentachlorophenol	---	---	3.5E-03	30.8%	---	---	3.5E-03	5.2%
Thallium	7.1E-03	12.7%	5.4E-03	47.5%	---	---	1.2E-02	18.6%
(Total)	**0.056**		**0.011**		**0.0**		**0.067**	

Table 5-4. Summary of Chemical- and Media- Specific Noncancer Hazards, Reasonable Maximum Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Medium: Sediment	% of Total	Surface Water	% of Total	Fish	% of Total	Exposure Pathways Total	% of Total
Child Recreator								
2-Chlorophenol	---	---	6.6E-03	9.5%	---	---	6.6E-03	1.1%
Aldrin	2.3E-03	<1%	7.9E-04	1.1%	---	---	3.1E-03	<1%
Arsenic	3.1E-02	6.2%	3.4E-03	4.8%	---	---	3.5E-02	6.0%
Atrazine	---	---	2.9E-04	<1%	---	---	2.9E-04	<1%
bis(2-Ethylhexyl)phthalate	2.1E-02	4.2%	---	---	---	---	2.1E-02	3.7%
Dieldrin	4.4E-04	<1%	3.5E-03	5.1%	---	---	4.0E-03	<1%
Di-n-butylphthalate	---	---	1.8E-04	<1%	---	---	1.8E-04	<1%
gamma-Benzene hexachloride	---	---	1.6E-04	<1%	---	---	1.6E-04	<1%
Heptachlor	---	---	1.0E-04	<1%	---	---	1.0E-04	<1%
Heptachlor epoxide	3.6E-03	<1%	---	---	---	---	3.6E-03	<1%
PCB Aroclor 1016	3.6E-01	70.0%	---	---	---	---	3.6E-01	61.6%
PCB Aroclor 1254	2.4E-02	4.8%	---	---	---	---	2.4E-02	4.2%
Pentachlorophenol	---	---	2.4E-02	35.3%	---	---	2.4E-02	4.2%
Thallium	7.0E-02	13.7%	3.0E-02	43.1%	---	---	1.0E-01	17.2%
(Total)	**0.51**		**0.069**		**0.0**		**0.58**	
Adult Angler								
2-Chlorophenol	---	---	4.2E-03	12.1%	---	---	4.2E-03	<1%
4,4'-DDT (p,p'-)	---	---	---	---	4.8E-02	<1%	4.8E-02	<1%
Aldrin	---	---	1.7E-04	<1%	2.3E-01	<1%	2.3E-01	<1%
alpha-Chlordane	---	---	---	---	6.5E-03	<1%	6.5E-03	<1%
Arsenic	---	---	5.9E-04	1.7%	5.3E-02	<1%	5.3E-02	<1%
Atrazine	---	---	1.4E-04	<1%	---	---	1.4E-04	<1%
Chlordane	---	---	---	---	2.5E-01	<1%	2.5E-01	<1%
Dieldrin	---	---	2.0E-03	5.9%	5.8E-02	<1%	6.0E-02	<1%
Di-n-butylphthalate	---	---	1.0E-04	<1%	---	---	1.0E-04	<1%
gamma-Benzene hexachloride	---	---	7.6E-05	<1%	---	---	7.6E-05	<1%
gamma-Chlordane	---	---	---	---	1.8E-01	<1%	1.8E-01	<1%
Pentachlorophenol	---	---	1.7E-02	49.7%	---	---	1.7E-02	<1%
Thallium	---	---	1.0E-02	29.2%	---	---	1.0E-02	<1%
Total PCBs	---	---	---	---	1.7E+02	99.5%	1.7E+02	99.5%
trans-Nonachlor	---	---	---	---	5.8E-03	<1%	5.8E-03	<1%
(Total)	**0.0**		**0.035**		**171**		**171**	
Child Angler								
2-Chlorophenol	---	---	7.4E-03	12.1%	---	---	7.4E-03	<1%
4,4'-DDT (p,p'-)	---	---	---	---	4.9E-02	<1%	4.9E-02	<1%
Aldrin	---	---	3.0E-04	<1%	2.3E-01	<1%	2.3E-01	<1%
alpha-Chlordane	---	---	---	---	6.7E-03	<1%	6.7E-03	<1%
Arsenic	---	---	1.0E-03	1.7%	5.4E-02	<1%	5.5E-02	<1%
Atrazine	---	---	2.4E-04	<1%	---	---	2.4E-04	<1%
Chlordane	---	---	---	---	2.5E-01	<1%	2.5E-01	<1%
Dieldrin	---	---	3.6E-03	5.9%	5.9E-02	<1%	6.3E-02	<1%
Di-n-butylphthalate	---	---	1.8E-04	<1%	---	---	1.8E-04	<1%
gamma-Benzene hexachloride	---	---	1.3E-04	<1%	---	---	1.3E-04	<1%
gamma-Chlordane	---	---	---	---	1.9E-01	<1%	1.9E-01	<1%
Pentachlorophenol	---	---	3.0E-02	49.7%	---	---	3.0E-02	<1%
Thallium	---	---	1.8E-02	29.2%	---	---	1.8E-02	<1%
Total PCBs	---	---	---	---	1.7E+02	99.5%	1.7E+02	99.5%
trans-Nonachlor	---	---	---	---	5.9E-03	<1%	5.9E-03	<1%
(Total)	**0.0**		**0.061**		**175**		**175**	

Table 5-4. Summary of Chemical- and Media- Specific Noncancer Hazards, Reasonable Maximum Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Medium: Sediment	% of Total	Surface Water	% of Total	Fish	% of Total	Exposure Pathways Total	% of Total
Segment 4 (RM 6.5 to 8.8)								
Adult Recreator								
2-Chlorophenol	---	---	9.8E-04	8.6%	---	---	9.8E-04	3.8%
Aldrin	2.6E-05	<1%	1.5E-04	1.3%	---	---	1.8E-04	<1%
Arsenic	3.2E-03	21.6%	6.6E-04	5.8%	---	---	3.8E-03	14.7%
Atrazine	---	---	4.8E-05	<1%	---	---	4.8E-05	<1%
bis(2-Ethylhexyl)phthalate	1.8E-04	1.2%	---	---	---	---	1.8E-04	<1%
Dieldrin	3.1E-05	<1%	5.5E-04	4.8%	---	---	5.8E-04	2.2%
Di-n-butylphthalate	---	---	2.8E-05	<1%	---	---	2.8E-05	<1%
gamma-Benzene hexachloride	---	---	2.7E-05	<1%	---	---	2.7E-05	<1%
Heptachlor	---	---	1.7E-05	<1%	---	---	1.7E-05	<1%
Heptachlor epoxide	6.8E-05	<1%	---	---	---	---	6.8E-05	<1%
PCB Aroclor 1016	1.9E-03	13.1%	---	---	---	---	1.9E-03	7.4%
PCB Aroclor 1254	5.0E-03	33.8%	---	---	---	---	5.0E-03	19.0%
Pentachlorophenol	---	---	3.5E-03	30.8%	---	---	3.5E-03	13.4%
Thallium	4.3E-03	29.4%	5.4E-03	47.5%	---	---	9.7E-03	37.3%
(Total)	**0.015**		**0.011**		**0.0**		**0.026**	
Child Recreator								
2-Chlorophenol	---	---	6.6E-03	9.5%	---	---	6.6E-03	3.1%
Aldrin	1.6E-04	<1%	7.9E-04	1.1%	---	---	9.4E-04	<1%
Arsenic	2.9E-02	20.7%	3.4E-03	4.8%	---	---	3.2E-02	15.4%
Atrazine	---	---	2.9E-04	<1%	---	---	2.9E-04	<1%
bis(2-Ethylhexyl)phthalate	7.2E-04	<1%	---	---	---	---	7.2E-04	<1%
Dieldrin	1.8E-04	<1%	3.5E-03	5.1%	---	---	3.7E-03	1.8%
Di-n-butylphthalate	---	---	1.8E-04	<1%	---	---	1.8E-04	<1%
gamma-Benzene hexachloride	---	---	1.6E-04	<1%	---	---	1.6E-04	<1%
Heptachlor	---	---	1.0E-04	<1%	---	---	1.0E-04	<1%
Heptachlor epoxide	4.8E-04	<1%	---	---	---	---	4.8E-04	<1%
PCB Aroclor 1016	1.9E-02	13.5%	---	---	---	---	1.9E-02	9.0%
PCB Aroclor 1254	4.8E-02	34.6%	---	---	---	---	4.8E-02	23.1%
Pentachlorophenol	---	---	2.4E-02	35.3%	---	---	2.4E-02	11.7%
Thallium	4.2E-02	30.2%	3.0E-02	43.1%	---	---	7.2E-02	34.5%
(Total)	**0.14**		**0.069**		**0.0**		**0.21**	
Adult Angler								
2-Chlorophenol	---	---	4.2E-03	12.1%	---	---	4.2E-03	<1%
4,4'-DDT (p,p'-)	---	---	---	---	2.4E-01	<1%	2.4E-01	<1%
Aldrin	---	---	1.7E-04	<1%	9.7E-02	<1%	9.7E-02	<1%
alpha-Chlordane	---	---	---	---	3.6E-02	<1%	3.6E-02	<1%
Arsenic	---	---	5.9E-04	1.7%	5.5E-02	<1%	5.5E-02	<1%
Atrazine	---	---	1.4E-04	<1%	---	---	1.4E-04	<1%
Chlordane	---	---	---	---	8.9E-02	<1%	8.9E-02	<1%
Dieldrin	---	---	2.0E-03	5.9%	3.9E-01	<1%	3.9E-01	<1%
Di-n-butylphthalate	---	---	1.0E-04	<1%	---	---	1.0E-04	<1%
gamma-Benzene hexachloride	---	---	7.6E-05	<1%	---	---	7.6E-05	<1%
gamma-Chlordane	---	---	---	---	4.1E-02	<1%	4.1E-02	<1%
Pentachlorophenol	---	---	1.7E-02	49.7%	---	---	1.7E-02	<1%
Thallium	---	---	1.0E-02	29.2%	---	---	1.0E-02	<1%
Total PCBs	---	---	---	---	8.6E+01	98.9%	8.6E+01	96.5%
trans-Nonachlor	---	---	---	---	1.2E-02	<1%	1.2E-02	<1%
(Total)	**0.0**		**0.035**		**87**		**87**	

Table 5-4. Summary of Chemical- and Media- Specific Noncancer Hazards, Reasonable Maximum Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Medium: Sediment	% of Total	Surface Water	% of Total	Fish	% of Total	Exposure Pathways Total	% of Total
Child Angler								
2-Chlorophenol	---	---	7.4E-03	12.1%	---	---	7.4E-03	<1%
4,4'-DDT (p,p'-)	---	---	---	---	2.4E-01	<1%	2.4E-01	<1%
Aldrin	---	---	3.0E-04	<1%	9.9E-02	<1%	9.9E-02	<1%
alpha-Chlordane	---	---	---	---	3.7E-02	<1%	3.7E-02	<1%
Arsenic	---	---	1.0E-03	1.7%	5.6E-02	<1%	5.7E-02	<1%
Atrazine	---	---	2.4E-04	<1%	---	---	2.4E-04	<1%
Chlordane	---	---	---	---	9.2E-02	<1%	9.2E-02	<1%
Dieldrin	---	---	3.6E-03	5.9%	4.0E-01	<1%	4.1E-01	<1%
Di-n-butylphthalate	---	---	1.8E-04	<1%	---	---	1.8E-04	<1%
gamma-Benzene hexachloride	---	---	1.3E-04	<1%	---	---	1.3E-04	<1%
gamma-Chlordane	---	---	---	---	4.2E-02	<1%	4.2E-02	<1%
Pentachlorophenol	---	---	3.0E-02	49.7%	---	---	3.0E-02	<1%
Thallium	---	---	1.8E-02	29.2%	---	---	1.8E-02	<1%
Total PCBs	---	---	---	---	8.8E+01	98.9%	8.8E+01	98.8%
trans-Nonachlor	---	---	---	---	1.3E-02	<1%	1.3E-02	<1%
(Total)	**0.0**		**0.061**		**89**		**89**	

Table 5-5. Summary of Chemical- and Media- Specific Noncancer Hazards, Central Tendency Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Medium: Sediment	% of Total	Surface Water	% of Total	Fish	% of Total	Exposure Pathways Total	% of Total
Segment 1 (RM 0 to <3.2)								
Adult Recreator								
2-Chlorophenol	---	---	2.8E-03	21.0%	---	---	2.8E-03	13.1%
Aldrin	7.9E-05	<1%	2.1E-04	1.5%	---	---	2.8E-04	1.3%
Arsenic	2.1E-03	25.5%	3.3E-04	2.5%	---	---	2.4E-03	11.1%
Atrazine	---	---	3.5E-05	<1%	---	---	3.5E-05	<1%
bis(2-Ethylhexyl)phthalate	2.8E-05	<1%	---	---	---	---	2.8E-05	<1%
Dieldrin	9.3E-05	1.1%	1.3E-03	9.6%	---	---	1.4E-03	6.4%
Di-n-butylphthalate	---	---	1.6E-05	<1%	---	---	1.6E-05	<1%
gamma-Benzene hexachloride	---	---	4.8E-05	<1%	---	---	4.8E-05	<1%
Heptachlor	---	---	2.8E-05	<1%	---	---	2.8E-05	<1%
Heptachlor epoxide	1.8E-04	2.2%	---	---	---	---	1.8E-04	<1%
PCB Aroclor 1016	1.5E-05	<1%	---	---	---	---	1.5E-05	<1%
PCB Aroclor 1254	5.9E-05	<1%	---	---	---	---	5.9E-05	<1%
Pentachlorophenol	---	---	5.8E-03	43.2%	---	---	5.8E-03	27.0%
Thallium	5.6E-03	69.0%	2.8E-03	21.2%	---	---	8.4E-03	39.2%
(Total)	**0.0081**		**0.013**		**0.0**		**0.021**	
Child Recreator								
2-Chlorophenol	---	---	6.5E-03	19.6%	---	---	6.5E-03	7.0%
Aldrin	4.2E-04	<1%	7.1E-04	2.1%	---	---	1.1E-03	1.2%
Arsenic	1.5E-02	24.9%	1.2E-03	3.6%	---	---	1.6E-02	17.3%
Atrazine	---	---	9.5E-05	<1%	---	---	9.5E-05	<1%
bis(2-Ethylhexyl)phthalate	1.1E-04	<1%	---	---	---	---	1.1E-04	<1%
Dieldrin	4.9E-04	<1%	3.2E-03	9.5%	---	---	3.6E-03	3.9%
Di-n-butylphthalate	---	---	3.9E-05	<1%	---	---	3.9E-05	<1%
gamma-Benzene hexachloride	---	---	1.3E-04	<1%	---	---	1.3E-04	<1%
Heptachlor	---	---	7.6E-05	<1%	---	---	7.6E-05	<1%
Heptachlor epoxide	1.1E-03	1.8%	---	---	---	---	1.1E-03	1.1%
PCB Aroclor 1016	1.1E-04	<1%	---	---	---	---	1.1E-04	<1%
PCB Aroclor 1254	4.5E-04	<1%	---	---	---	---	4.5E-04	<1%
Pentachlorophenol	---	---	1.3E-02	38.1%	---	---	1.3E-02	13.6%
Thallium	4.3E-02	70.8%	8.7E-03	26.1%	---	---	5.1E-02	54.8%
(Total)	**0.060**		**0.033**		**0.0**		**0.094**	
Adult Angler								
2-Chlorophenol	---	---	3.0E-02	23.0%	---	---	3.0E-02	<1%
4,4'-DDT (p,p'-)	---	---	---	---	4.0E-02	<1%	4.0E-02	<1%
Aldrin	---	---	9.6E-04	<1%	1.7E-02	<1%	1.8E-02	<1%
alpha-Chlordane	---	---	---	---	3.8E-03	<1%	3.8E-03	<1%
Arsenic	---	---	1.3E-03	1.0%	1.7E-02	<1%	1.8E-02	<1%
Atrazine	---	---	3.0E-04	<1%	---	---	3.0E-04	<1%
Chlordane	---	---	---	---	3.3E-02	<1%	3.3E-02	<1%
Dieldrin	---	---	1.3E-02	9.8%	4.2E-02	<1%	5.4E-02	<1%
Di-n-butylphthalate	---	---	1.6E-04	<1%	---	---	1.6E-04	<1%
gamma-Benzene hexachloride	---	---	4.1E-04	<1%	---	---	4.1E-04	<1%
gamma-Chlordane	---	---	---	---	2.7E-02	<1%	2.7E-02	<1%
Pentachlorophenol	---	---	6.5E-02	50.1%	---	---	6.5E-02	<1%
Thallium	---	---	1.9E-02	14.7%	---	---	1.9E-02	<1%
Total PCBs	---	---	---	---	3.1E+01	99.4%	3.1E+01	99.0%
trans-Nonachlor	---	---	---	---	1.0E-03	<1%	1.0E-03	<1%
(Total)	**0.0**		**0.13**		**31**		**31**	

Table 5-5. Summary of Chemical- and Media- Specific Noncancer Hazards, Central Tendency Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Medium: Sediment	% of Total	Surface Water	% of Total	Fish	% of Total	Exposure Pathways Total	% of Total
Child Angler								
2-Chlorophenol	---	---	3.5E-02	23.0%	---	---	3.5E-02	<1%
4,4'-DDT (p,p'-)	---	---	---	---	4.0E-02	<1%	4.0E-02	<1%
Aldrin	---	---	1.1E-03	<1%	1.7E-02	<1%	1.8E-02	<1%
alpha-Chlordane	---	---	---	---	3.7E-03	<1%	3.7E-03	<1%
Arsenic	---	---	1.5E-03	1.0%	1.7E-02	<1%	1.9E-02	<1%
Atrazine	---	---	3.6E-04	<1%	---	---	3.6E-04	<1%
Chlordane	---	---	---	---	3.3E-02	<1%	3.3E-02	<1%
Dieldrin	---	---	1.5E-02	9.8%	4.1E-02	<1%	5.6E-02	<1%
Di-n-butylphthalate	---	---	1.8E-04	<1%	---	---	1.8E-04	<1%
gamma-Benzene hexachloride	---	---	4.8E-04	<1%	---	---	4.8E-04	<1%
gamma-Chlordane	---	---	---	---	2.7E-02	<1%	2.7E-02	<1%
Pentachlorophenol	---	---	7.5E-02	50.1%	---	---	7.5E-02	<1%
Thallium	---	---	2.2E-02	14.7%	---	---	2.2E-02	<1%
Total PCBs	---	---	---	---	3.0E+01	99.4%	3.0E+01	98.9%
trans-Nonachlor	---	---	---	---	1.0E-03	<1%	1.0E-03	<1%
(Total)	**0.0**		**0.15**		**31**		**31**	
Segment 2 (RM 3.2 to <4.9)								
Adult Recreator								
2-Chlorophenol	---	---	4.9E-04	9.4%	---	---	4.9E-04	3.4%
Aldrin	1.8E-04	2.0%	4.4E-05	<1%	---	---	2.2E-04	1.6%
Arsenic	2.5E-03	27.2%	6.1E-04	11.8%	---	---	3.1E-03	21.7%
Atrazine	---	---	1.9E-05	<1%	---	---	1.9E-05	<1%
bis(2-Ethylhexyl)phthalate	1.4E-04	1.6%	---	---	---	---	1.4E-04	1.0%
Dieldrin	7.1E-05	<1%	2.5E-04	4.9%	---	---	3.2E-04	2.3%
Di-n-butylphthalate	---	---	1.3E-05	<1%	---	---	1.3E-05	<1%
gamma-Benzene hexachloride	---	---	1.1E-05	<1%	---	---	1.1E-05	<1%
Heptachlor	---	---	6.8E-06	<1%	---	---	6.8E-06	<1%
Heptachlor epoxide	5.7E-04	6.3%	---	---	---	---	5.7E-04	4.0%
PCB Aroclor 1016	3.0E-04	3.2%	---	---	---	---	3.0E-04	2.1%
PCB Aroclor 1254	1.5E-04	1.6%	---	---	---	---	1.5E-04	1.0%
Pentachlorophenol	---	---	1.9E-03	36.4%	---	---	1.9E-03	13.1%
Thallium	5.2E-03	57.3%	1.8E-03	35.7%	---	---	7.1E-03	49.5%
(Total)	**0.0091**		**0.0052**		**0.0**		**0.014**	
Child Recreator								
2-Chlorophenol	---	---	1.1E-03	8.0%	---	---	1.1E-03	1.4%
Aldrin	9.4E-04	1.4%	1.5E-04	1.1%	---	---	1.1E-03	1.3%
Arsenic	1.8E-02	27.1%	2.2E-03	15.6%	---	---	2.0E-02	25.1%
Atrazine	---	---	5.2E-05	<1%	---	---	5.2E-05	<1%
bis(2-Ethylhexyl)phthalate	5.6E-04	<1%	---	---	---	---	5.6E-04	<1%
Dieldrin	3.7E-04	<1%	6.2E-04	4.4%	---	---	9.9E-04	1.2%
Di-n-butylphthalate	---	---	3.2E-05	<1%	---	---	3.2E-05	<1%
gamma-Benzene hexachloride	---	---	2.5E-05	<1%	---	---	2.5E-05	<1%
Heptachlor	---	---	6.9E-05	<1%	---	---	6.9E-05	<1%
Heptachlor epoxide	3.4E-03	5.1%	---	---	---	---	3.4E-03	4.2%
PCB Aroclor 1016	2.3E-03	3.4%	---	---	---	---	2.3E-03	2.8%
PCB Aroclor 1254	1.1E-03	1.7%	---	---	---	---	1.1E-03	1.4%
Pentachlorophenol	---	---	4.1E-03	29.4%	---	---	4.1E-03	5.1%
Thallium	4.0E-02	59.9%	5.7E-03	40.2%	---	---	4.6E-02	56.5%
(Total)	**0.067**		**0.014**		**0.0**		**0.081**	

Table 5-5. Summary of Chemical- and Media- Specific Noncancer Hazards, Central Tendency Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Medium: Sediment	% of Total	Surface Water	% of Total	Fish	% of Total	Exposure Pathways Total	% of Total
Adult Angler								
2-Chlorophenol	---	---	3.2E-03	11.6%	---	---	3.2E-03	<1%
4,4'-DDT (p,p'-)	---	---	---	---	1.5E-02	<1%	1.5E-02	<1%
Aldrin	---	---	1.3E-04	<1%	1.7E-02	<1%	1.7E-02	<1%
alpha-Chlordane	---	---	---	---	1.0E-03	<1%	1.0E-03	<1%
Arsenic	---	---	1.5E-03	5.5%	1.5E-02	<1%	1.7E-02	<1%
Atrazine	---	---	1.1E-04	<1%	---	---	1.1E-04	<1%
Chlordane	---	---	---	---	1.3E-02	<1%	1.3E-02	<1%
Dieldrin	---	---	1.6E-03	5.6%	1.1E-02	<1%	1.2E-02	<1%
Di-n-butylphthalate	---	---	8.0E-05	<1%	---	---	8.0E-05	<1%
gamma-Benzene hexachloride	---	---	5.9E-05	<1%	---	---	5.9E-05	<1%
gamma-Chlordane	---	---	---	---	1.3E-02	<1%	1.3E-02	<1%
Pentachlorophenol	---	---	1.3E-02	47.8%	---	---	1.3E-02	<1%
Thallium	---	---	7.8E-03	28.1%	---	---	7.8E-03	<1%
Total PCBs	---	---	---	---	1.5E+01	99.4%	1.5E+01	99.2%
trans-Nonachlor	---	---	---	---	1.0E-03	<1%	1.0E-03	<1%
(Total)	**0.0**		**0.028**		**15**		**15**	
Child Angler								
2-Chlorophenol	---	---	3.7E-03	11.6%	---	---	3.7E-03	<1%
4,4'-DDT (p,p'-)	---	---	---	---	1.5E-02	<1%	1.5E-02	<1%
Aldrin	---	---	1.5E-04	<1%	1.7E-02	<1%	1.7E-02	<1%
alpha-Chlordane	---	---	---	---	1.0E-03	<1%	1.0E-03	<1%
Arsenic	---	---	1.8E-03	5.5%	1.5E-02	<1%	1.7E-02	<1%
Atrazine	---	---	1.2E-04	<1%	9.7E-04	<1%	1.1E-03	<1%
Chlordane	---	---	---	---	---	---	0.0E+00	<1%
Dieldrin	---	---	1.8E-03	5.6%	1.1E-02	<1%	1.2E-02	<1%
Di-n-butylphthalate	---	---	9.4E-05	<1%	---	---	9.4E-05	<1%
gamma-Benzene hexachloride	---	---	6.8E-05	<1%	---	---	6.8E-05	<1%
gamma-Chlordane	---	---	---	---	1.3E-02	<1%	1.3E-02	<1%
Pentachlorophenol	---	---	1.5E-02	47.8%	---	---	1.5E-02	<1%
Thallium	---	---	9.0E-03	28.1%	---	---	9.0E-03	<1%
Total PCBs	---	---	---	---	1.5E+01	99.5%	1.5E+01	99.3%
trans-Nonachlor	---	---	---	---	1.0E-03	<1%	1.0E-03	<1%
(Total)	**0.0**		**0.032**		**15**		**15**	
Segment 3 (RM 4.9 to <6.5)								
Adult Recreator								
2-Chlorophenol	---	---	4.9E-04	10.3%	---	---	4.9E-04	1.3%
Aldrin	2.1E-04	<1%	4.4E-05	<1%	---	---	2.6E-04	<1%
Arsenic	2.0E-03	6.2%	1.8E-04	3.9%	---	---	2.2E-03	5.9%
Atrazine	---	---	1.9E-05	<1%	---	---	1.9E-05	<1%
bis(2-Ethylhexyl)phthalate	2.9E-03	8.9%	---	---	---	---	2.9E-03	7.8%
Dieldrin	4.0E-05	<1%	2.5E-04	5.3%	---	---	2.9E-04	<1%
Di-n-butylphthalate	---	---	1.3E-05	<1%	---	---	1.3E-05	<1%
gamma-Benzene hexachloride	---	---	1.1E-05	<1%	---	---	1.1E-05	<1%
Heptachlor	---	---	6.8E-06	<1%	---	---	6.8E-06	<1%
Heptachlor epoxide	2.8E-04	<1%	---	---	---	---	2.8E-04	<1%
PCB Aroclor 1016	2.1E-02	65.9%	---	---	---	---	2.1E-02	57.5%
PCB Aroclor 1254	1.5E-03	4.5%	---	---	---	---	1.5E-03	3.9%
Pentachlorophenol	---	---	1.9E-03	39.6%	---	---	1.9E-03	5.1%
Thallium	4.2E-03	12.9%	1.8E-03	38.9%	---	---	6.0E-03	16.2%
(Total)	**0.032**		**0.0047**		**0.0**		**0.037**	

Table 5-5. Summary of Chemical- and Media- Specific Noncancer Hazards, Central Tendency Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Medium: Sediment	% of Total	Surface Water	% of Total	Fish	% of Total	Exposure Pathways Total	% of Total
Child Recreator								
2-Chlorophenol	---	---	1.1E-03	9.0%	---	---	1.1E-03	<1%
Aldrin	1.1E-03	<1%	1.5E-04	1.2%	---	---	1.3E-03	<1%
Arsenic	1.5E-02	6.2%	6.7E-04	5.3%	---	---	1.5E-02	6.1%
Atrazine	---	---	5.2E-05	<1%	---	---	5.2E-05	<1%
bis(2-Ethylhexyl)phthalate	1.1E-02	4.8%	---	---	---	---	1.1E-02	4.5%
Dieldrin	2.1E-04	<1%	6.2E-04	4.9%	---	---	8.3E-04	<1%
Di-n-butylphthalate	---	---	3.2E-05	<1%	---	---	3.2E-05	<1%
gamma-Benzene hexachloride	---	---	3.0E-05	<1%	---	---	3.0E-05	<1%
Heptachlor	---	---	1.8E-05	<1%	---	---	1.8E-05	<1%
Heptachlor epoxide	1.7E-03	<1%	---	---	---	---	1.7E-03	<1%
PCB Aroclor 1016	1.6E-01	69.5%	---	---	---	---	1.6E-01	66.0%
PCB Aroclor 1254	1.1E-02	4.7%	---	---	---	---	1.1E-02	4.5%
Pentachlorophenol	---	---	4.1E-03	33.1%	---	---	4.1E-03	1.7%
Thallium	3.2E-02	13.6%	5.7E-03	45.3%	---	---	3.8E-02	15.2%
(Total)	**0.24**		**0.013**		**0.0**		**0.25**	
Adult Angler								
2-Chlorophenol	---	---	3.2E-03	12.1%	---	---	3.2E-03	<1%
4,4'-DDT (p,p'-)	---	---	---	---	8.5E-03	<1%	8.5E-03	<1%
Aldrin	---	---	1.3E-04	<1%	4.0E-02	<1%	4.1E-02	<1%
alpha-Chlordane	---	---	---	---	1.2E-03	<1%	1.2E-03	<1%
Arsenic	---	---	4.6E-04	1.7%	9.4E-03	<1%	9.8E-03	<1%
Atrazine	---	---	1.1E-04	<1%	---	---	1.1E-04	<1%
Chlordane	---	---	---	---	4.4E-02	<1%	4.4E-02	<1%
Dieldrin	---	---	1.6E-03	5.9%	1.0E-02	<1%	1.2E-02	<1%
Di-n-butylphthalate	---	---	8.0E-05	<1%	---	---	8.0E-05	<1%
gamma-Benzene hexachloride	---	---	5.9E-05	<1%	---	---	5.9E-05	<1%
gamma-Chlordane	---	---	---	---	3.3E-02	<1%	3.3E-02	<1%
Pentachlorophenol	---	---	1.3E-02	49.7%	---	---	1.3E-02	<1%
Thallium	---	---	7.8E-03	29.2%	---	---	7.8E-03	<1%
Total PCBs	---	---	---	---	3.0E+01	99.5%	3.0E+01	99.4%
trans-Nonachlor	---	---	---	---	1.0E-03	<1%	1.0E-03	<1%
(Total)	**0.0**		**0.027**		**30**		**30**	
Child Angler								
2-Chlorophenol	---	---	3.7E-03	12.1%	---	---	3.7E-03	<1%
4,4'-DDT (p,p'-)	---	---	---	---	8.5E-03	<1%	8.5E-03	<1%
Aldrin	---	---	1.5E-04	<1%	4.0E-02	<1%	4.0E-02	<1%
alpha-Chlordane	---	---	---	---	1.2E-03	<1%	1.2E-03	<1%
Arsenic	---	---	5.3E-04	1.7%	9.3E-03	<1%	9.8E-03	<1%
Atrazine	---	---	1.2E-04	<1%	---	---	1.2E-04	<1%
Chlordane	---	---	---	---	4.4E-02	<1%	4.4E-02	<1%
Dieldrin	---	---	1.8E-03	5.9%	1.0E-02	<1%	1.2E-02	<1%
Di-n-butylphthalate	---	---	9.4E-05	<1%	---	---	9.4E-05	<1%
gamma-Benzene hexachloride	---	---	6.8E-05	<1%	---	---	6.8E-05	<1%
gamma-Chlordane	---	---	---	---	3.2E-02	<1%	3.2E-02	<1%
Pentachlorophenol	---	---	1.5E-02	49.7%	---	---	1.5E-02	<1%
Thallium	---	---	9.0E-03	29.2%	---	---	9.0E-03	<1%
Total PCBs	---	---	---	---	3.0E+01	99.5%	3.0E+01	99.4%
trans-Nonachlor	---	---	---	---	1.0E-03	<1%	1.0E-03	<1%
(Total)	**0.0**		**0.031**		**30**		**30**	

Table 5-5. Summary of Chemical- and Media- Specific Noncancer Hazards, Central Tendency Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Medium: Sediment	% of Total	Surface Water	% of Total	Fish	% of Total	Exposure Pathways Total	% of Total
Segment 4 (RM 6.5 to 8.8)								
Adult Recreator								
2-Chlorophenol	---	---	4.9E-04	10.3%	---	---	4.9E-04	3.7%
Aldrin	1.4E-05	<1%	4.4E-05	<1%	---	---	5.9E-05	<1%
Arsenic	1.8E-03	21.4%	1.8E-04	3.9%	---	---	2.0E-03	15.2%
Atrazine	---	---	1.9E-05	<1%	---	---	1.9E-05	<1%
bis(2-Ethylhexyl)phthalate	9.7E-05	1.1%	---	---	---	---	9.7E-05	<1%
Dieldrin	1.7E-05	<1%	2.5E-04	5.3%	---	---	2.7E-04	2.0%
Di-n-butylphthalate	---	---	1.3E-05	<1%	---	---	1.3E-05	<1%
gamma-Benzene hexachloride	---	---	1.1E-05	<1%	---	---	1.1E-05	<1%
Heptachlor	---	---	6.8E-06	<1%	---	---	6.8E-06	<1%
Heptachlor epoxide	3.8E-05	<1%	---	---	---	---	3.8E-05	<1%
PCB Aroclor 1016	1.1E-03	13.2%	---	---	---	---	1.1E-03	8.5%
PCB Aroclor 1254	2.9E-03	33.9%	---	---	---	---	2.9E-03	21.8%
Pentachlorophenol	---	---	1.9E-03	39.6%	---	---	1.9E-03	14.1%
Thallium	2.5E-03	29.5%	1.8E-03	38.9%	---	---	4.4E-03	32.9%
(Total)	**0.0086**		**0.0047**		**0.0**		**0.013**	
Child Recreator								
2-Chlorophenol	---	---	1.1E-03	9.0%	---	---	1.1E-03	1.5%
Aldrin	7.6E-05	<1%	1.5E-04	1.2%	---	---	2.3E-04	<1%
Arsenic	1.3E-02	20.8%	6.7E-04	5.3%	---	---	1.4E-02	18.3%
Atrazine	---	---	5.2E-05	<1%	---	---	5.2E-05	<1%
bis(2-Ethylhexyl)phthalate	3.8E-04	<1%	---	---	---	---	3.8E-04	<1%
Dieldrin	8.9E-05	<1%	6.2E-04	4.9%	---	---	7.1E-04	<1%
Di-n-butylphthalate	---	---	3.2E-05	<1%	---	---	3.2E-05	<1%
gamma-Benzene hexachloride	---	---	3.0E-05	<1%	---	---	3.0E-05	<1%
Heptachlor	---	---	1.8E-05	<1%	---	---	1.8E-05	<1%
Heptachlor epoxide	2.3E-04	<1%	---	---	---	---	2.3E-04	<1%
PCB Aroclor 1016	8.7E-03	13.4%	---	---	---	---	8.7E-03	11.3%
PCB Aroclor 1254	2.2E-02	34.5%	---	---	---	---	2.2E-02	28.9%
Pentachlorophenol	---	---	4.1E-03	33.1%	---	---	4.1E-03	5.4%
Thallium	1.9E-02	30.1%	5.7E-03	45.3%	---	---	2.5E-02	32.6%
(Total)	**0.064**		**0.013**		**0.0**		**0.077**	
Adult Angler								
2-Chlorophenol	---	---	3.2E-03	12.1%	---	---	3.2E-03	<1%
4,4'-DDT (p,p'-)	---	---	---	---	4.2E-02	<1%	4.2E-02	<1%
Aldrin	---	---	1.3E-04	<1%	1.7E-02	<1%	1.7E-02	<1%
alpha-Chlordane	---	---	---	---	6.4E-03	<1%	6.4E-03	<1%
Arsenic	---	---	4.6E-04	1.7%	9.8E-03	<1%	1.0E-02	<1%
Atrazine	---	---	1.1E-04	<1%	---	---	1.1E-04	<1%
Chlordane	---	---	---	---	1.6E-02	<1%	1.6E-02	<1%
Dieldrin	---	---	1.6E-03	5.9%	7.0E-02	<1%	7.1E-02	<1%
Di-n-butylphthalate	---	---	8.0E-05	<1%	---	---	8.0E-05	<1%
gamma-Benzene hexachloride	---	---	5.9E-05	<1%	---	---	5.9E-05	<1%
gamma-Chlordane	---	---	---	---	7.3E-03	<1%	7.3E-03	<1%
Pentachlorophenol	---	---	1.3E-02	49.7%	---	---	1.3E-02	<1%
Thallium	---	---	7.8E-03	29.2%	---	---	7.8E-03	<1%
Total PCBs	---	---	---	---	1.5E+01	98.9%	1.5E+01	98.7%
trans-Nonachlor	---	---	---	---	2.2E-03	<1%	2.2E-03	<1%
(Total)	**0.0**		**0.027**		**15**		**15**	

Table 5-5. Summary of Chemical- and Media- Specific Noncancer Hazards, Central Tendency Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Medium: Sediment	% of Total	Surface Water	% of Total	Fish	% of Total	Exposure Pathways Total	% of Total
Child Angler								
2-Chlorophenol	---	---	3.7E-03	12.1%	---	---	3.7E-03	<1%
4,4'-DDT (p,p'-)	---	---	---	---	4.2E-02	<1%	4.2E-02	<1%
Aldrin	---	---	1.5E-04	<1%	1.7E-02	<1%	1.7E-02	<1%
alpha-Chlordane	---	---	---	---	6.3E-03	<1%	6.3E-03	<1%
Arsenic	---	---	5.3E-04	1.7%	9.7E-03	<1%	1.0E-02	<1%
Atrazine	---	---	1.2E-04	<1%	---	---	1.2E-04	<1%
Chlordane	---	---	---	---	1.6E-02	<1%	1.6E-02	<1%
Dieldrin	---	---	1.8E-03	5.9%	6.9E-02	<1%	7.1E-02	<1%
Di-n-butylphthalate	---	---	9.4E-05	<1%	---	---	9.4E-05	<1%
gamma-Benzene hexachloride	---	---	6.8E-05	<1%	---	---	6.8E-05	<1%
gamma-Chlordane	---	---	---	---	7.2E-03	<1%	7.2E-03	<1%
Pentachlorophenol	---	---	1.5E-02	49.7%	---	---	1.5E-02	<1%
Thallium	---	---	9.0E-03	29.2%	---	---	9.0E-03	<1%
Total PCBs	---	---	---	---	1.5E+01	98.9%	1.5E+01	98.7%
trans-Nonachlor	---	---	---	---	2.2E-03	<1%	2.2E-03	<1%
(Total)	**0.0**		**0.031**		**15**		**15**	

Table 5-6. Summary of Cancer Risks, RME Scenario
Lower Ottawa River Human Health Risk Assessment

	Segment 1		Segment 2		Segment 3		Segment 4	
	Risk	**%**	**Risk**	**%**	**Risk**	**%**	**Risk**	**%**
Recreator								
4,4'-DDT (p,p'-)	8.6E-07	0.7%	2.1E-07	0.4%	2.1E-07	0.2%	2.1E-07	0.4%
Aldrin	5.3E-07	0.4%	3.2E-07	0.7%	3.6E-07	0.3%	1.1E-07	0.2%
Arsenic	3.7E-06	3.1%	4.9E-06	10.3%	3.5E-06	3.3%	3.1E-06	5.3%
Benzo(a)anthracene	8.1E-08	<0.1%	2.3E-07	0.5%	6.6E-07	0.6%	6.1E-07	1.0%
Benzo(a)pyrene	9.9E-07	0.8%	2.0E-06	4.1%	7.9E-06	7.5%	6.3E-06	10.7%
Benzo(b)fluoranthene	1.1E-07	<0.1%	3.4E-07	0.7%	1.0E-06	1.0%	7.9E-07	1.3%
Benzo(k)fluoranthene	1.9E-08	<0.1%	1.9E-08	<0.1%	9.0E-08	<0.1%	7.9E-08	0.1%
bis(2-Ethylhexyl)phthalate	1.4E-08	<0.1%	7.4E-08	0.2%	1.5E-06	1.4%	1.5E-06	2.5%
Dibenz(a,h)anthracene	1.1E-06	0.9%	1.6E-06	3.3%	1.7E-05	16.2%	2.3E-06	3.8%
Dieldrin	3.4E-06	2.8%	7.7E-07	1.6%	7.1E-07	0.7%	6.6E-07	1.1%
Heptachlor	2.1E-07	0.2%	5.1E-08	0.1%	5.1E-08	<0.1%	5.1E-08	<0.1%
Heptachlor epoxide	5.8E-08	<0.1%	1.9E-07	0.4%	9.3E-08	<0.1%	1.3E-08	<0.1%
Indeno(1,2,3-cd)pyrene	7.5E-08	<0.1%	1.5E-07	0.3%	6.9E-07	0.6%	5.5E-07	0.9%
N-Nitroso-di-n-propylamine	4.9E-05	40.8%	1.6E-05	33.5%	3.2E-05	29.8%	2.2E-05	37.0%
Total PCBs	5.4E-07	0.4%	1.6E-06	3.3%	2.1E-05	19.9%	1.7E-06	2.8%
Pentachlorophenol	6.0E-05	49.6%	1.9E-05	40.6%	1.9E-05	18.3%	1.9E-05	32.7%
(Total)	**1.2E-04**		**4.8E-05**		**1.1E-04**		**5.9E-05**	
Angler/ Fish Consumer								
4,4'-DDD (p,p'-)	5.6E-06	0.2%	2.8E-06	0.2%	3.2E-06	0.1%	5.6E-06	0.3%
4,4'-DDE (p,p'-)	1.4E-05	0.4%	9.1E-06	0.6%	7.0E-06	0.2%	1.1E-05	0.6%
4,4'-DDT (p,p'-)	1.8E-05	0.5%	6.4E-06	0.4%	3.9E-06	0.1%	1.8E-05	1.0%
Aldrin	2.2E-05	0.6%	2.1E-05	1.4%	5.0E-05	1.6%	2.1E-05	1.2%
alpha-Chlordane	1.4E-05	0.4%	4.4E-07	<0.1%	5.0E-07	<0.1%	2.7E-06	0.2%
Arsenic	1.9E-05	0.6%	1.7E-05	1.1%	1.0E-05	0.3%	1.1E-05	0.6%
Chlordane	1.4E-05	0.4%	5.7E-06	0.4%	1.9E-05	0.6%	6.8E-06	0.4%
Dieldrin	8.6E-05	2.6%	2.2E-05	1.4%	2.1E-05	0.7%	1.4E-04	7.8%
gamma-Chlordane	1.2E-05	0.3%	5.7E-06	0.4%	1.4E-05	0.4%	3.1E-06	0.2%
N-Nitroso-di-n-propylamine	5.1E-05	1.5%	1.4E-05	0.9%	1.4E-05	0.5%	1.4E-05	0.8%
Pentachlorophenol	1.1E-04	3.2%	3.5E-05	2.2%	3.5E-05	1.1%	3.5E-05	2.0%
Total PCBs	3.0E-03	89.1%	1.4E-03	91.1%	2.9E-03	94.3%	1.5E-03	84.8%
trans-Nonachlor	4.4E-07	<0.1%	4.4E-07	<0.1%	4.4E-07	<0.1%	9.3E-07	<0.1%
(Total)	**3.4E-03**		**1.6E-03**		**3.1E-03**		**1.8E-03**	

Table 5-7. Summary of Cancer Risks, CT Scenario
Lower Ottawa River Human Health Risk Assessment

	Segment 1		Segment 2		Segment 3		Segment 4	
	Risk	**%**	**Risk**	**%**	**Risk**	**%**	**Risk**	**%**
Recreator								
4,4'-DDT (p,p'-)	1.2E-07	0.7%	3.0E-08	0.4%	3.0E-08	0.1%	3.0E-08	0.3%
Aldrin	8.6E-08	0.5%	7.0E-08	0.8%	8.1E-08	0.4%	1.8E-08	0.2%
Arsenic	9.6E-07	5.3%	1.2E-06	14.6%	8.9E-07	3.9%	8.3E-07	7.4%
Benzo(a)anthracene	2.0E-08	0.1%	5.7E-08	0.7%	1.6E-07	0.7%	1.5E-07	1.3%
Benzo(a)pyrene	2.4E-07	1.3%	4.8E-07	5.7%	1.9E-06	8.3%	1.5E-06	13.8%
Benzo(b)fluoranthene	2.6E-08	0.1%	8.2E-08	1.0%	2.5E-07	1.1%	1.9E-07	1.7%
Benzo(k)fluoranthene	4.6E-09	<0.1%	4.5E-09	<0.1%	2.2E-08	<0.1%	1.9E-08	0.2%
bis(2-Ethylhexyl)phthalate	3.2E-09	<0.1%	1.7E-08	0.2%	3.4E-07	1.5%	3.4E-07	3.0%
Dibenz(a,h)anthracene	2.5E-07	1.4%	3.8E-07	4.6%	4.1E-06	17.9%	5.5E-07	5.0%
Dieldrin	5.0E-07	2.8%	1.3E-07	1.5%	1.1E-07	0.5%	9.8E-08	0.9%
Heptachlor	3.0E-08	0.2%	7.3E-09	<0.1%	7.3E-09	<0.1%	7.3E-09	<0.1%
Heptachlor epoxide	1.5E-08	<0.1%	5.0E-08	0.6%	2.5E-08	0.1%	3.3E-09	<0.1%
Indeno(1,2,3-cd)pyrene	1.8E-08	0.1%	3.7E-08	0.4%	1.7E-07	0.7%	1.3E-07	1.2%
N-Nitroso-di-n-propylamine	7.1E-06	39.2%	2.5E-06	30.5%	6.2E-06	26.9%	3.9E-06	35.5%
Total PCBs	1.5E-07	0.8%	4.4E-07	5.3%	6.0E-06	25.9%	4.8E-07	4.3%
Pentachlorophenol	8.6E-06	47.3%	2.8E-06	33.5%	2.8E-06	12.0%	2.8E-06	25.1%
(Total)	**1.8E-05**		**8.3E-06**		**2.3E-05**		**1.1E-05**	
Angler/ Fish Consumer								
4,4'-DDD (p,p'-)	5.9E-07	0.1%	2.9E-07	0.2%	3.3E-07	0.1%	5.8E-07	0.3%
4,4'-DDE (p,p'-)	1.4E-06	0.3%	9.6E-07	0.5%	7.3E-07	0.2%	1.2E-06	0.6%
4,4'-DDT (p,p'-)	2.7E-06	0.6%	7.8E-07	0.4%	5.1E-07	0.2%	2.0E-06	1.0%
Aldrin	2.4E-06	0.5%	2.3E-06	1.3%	5.3E-06	1.6%	2.3E-06	1.1%
alpha-Chlordane	1.7E-07	<0.1%	4.6E-08	<0.1%	5.2E-08	<0.1%	2.9E-07	0.1%
Arsenic	2.1E-06	0.5%	2.0E-06	1.1%	1.1E-06	0.3%	1.2E-06	0.6%
Chlordane	1.5E-06	0.3%	6.0E-07	0.3%	2.0E-06	0.6%	7.1E-07	0.4%
Dieldrin	1.1E-05	2.6%	2.5E-06	1.4%	2.4E-06	0.7%	1.5E-05	7.4%
gamma-Chlordane	1.2E-06	0.3%	6.0E-07	0.3%	1.5E-06	0.4%	3.3E-07	0.2%
N-Nitroso-di-n-propylamine	3.1E-05	7.1%	5.3E-06	3.0%	1.1E-06	0.3%	5.3E-06	2.7%
Pentachlorophenol	6.5E-05	15.0%	1.3E-05	7.4%	2.8E-06	0.8%	1.3E-05	6.7%
Total PCBs	3.1E-04	72.6%	1.5E-04	84.0%	3.1E-04	94.6%	1.6E-04	78.9%
trans-Nonachlor	4.6E-08	<0.1%	4.6E-08	<0.1%	4.6E-08	<0.1%	9.8E-08	<0.1%
(Total)	**4.3E-04**		**1.8E-04**		**3.3E-04**		**2.0E-04**	

Table 5-8. Summary of Noncancer Hazards, RME Scenario
Lower Ottawa River Human Health Risk Assessment

	Segment 1		Segment 2		Segment 3		Segment 4	
	HI	%	HI	%	HI	%	HI	%
Adult Recreator								
2-Chlorophenol	5.7E-03	13.0%	9.8E-04	3.4%	9.8E-04	1.5%	9.8E-04	3.8%
Aldrin	8.4E-04	1.9%	4.8E-04	1.7%	5.4E-04	0.8%	1.8E-04	0.7%
Arsenic	4.7E-03	10.9%	6.5E-03	22.6%	4.1E-03	6.1%	3.8E-03	14.7%
Atrazine	8.6E-05	0.2%	4.8E-05	0.2%	4.8E-05	<0.1%	4.8E-05	0.2%
bis(2-Ethylhexyl)phthalate	5.2E-05	0.1%	2.7E-04	0.9%	5.4E-03	8.1%	1.8E-04	0.7%
Dieldrin	3.0E-03	6.8%	6.8E-04	2.4%	6.2E-04	0.9%	5.8E-04	2.2%
Di-n-butylphthalate	3.4E-05	<0.1%	2.8E-05	<0.1%	2.8E-05	<0.1%	2.8E-05	0.1%
gamma-Benzene hexachloride	1.2E-04	0.3%	2.7E-05	<0.1%	2.7E-05	<0.1%	2.7E-05	0.1%
Heptachlor	7.0E-05	0.2%	1.7E-05	<0.1%	1.7E-05	<0.1%	1.7E-05	<0.1%
Heptachlor epoxide	3.2E-04	0.7%	1.0E-03	3.6%	5.1E-04	0.8%	6.8E-05	0.3%
PCB Aroclor 1016	2.5E-05	<0.1%	5.1E-04	1.8%	3.6E-02	54.2%	1.9E-03	7.4%
PCB Aroclor 1254	1.0E-04	0.2%	2.5E-04	0.9%	2.5E-03	3.7%	5.0E-03	19.0%
Pentachlorophenol	1.1E-02	24.7%	3.5E-03	12.2%	3.5E-03	5.2%	3.5E-03	13.4%
Thallium	1.8E-02	40.8%	1.4E-02	50.1%	1.2E-02	18.6%	9.7E-03	37.3%
(Total)	**0.044**		**0.029**		**0.067**		**0.026**	
Child Recreator								
2-Chlorophenol	3.8E-02	11.9%	6.6E-03	2.9%	6.6E-03	1.1%	6.6E-03	3.1%
Aldrin	4.5E-03	1.4%	2.7E-03	1.2%	3.1E-03	0.5%	9.4E-04	0.4%
Arsenic	3.8E-02	12.0%	5.0E-02	22.6%	3.5E-02	6.0%	3.2E-02	15.4%
Atrazine	5.2E-04	0.2%	2.9E-04	0.1%	2.9E-04	<0.1%	2.9E-04	0.1%
bis(2-Ethylhexyl)phthalate	2.0E-04	<0.1%	1.1E-03	0.5%	2.1E-02	3.7%	7.2E-04	0.3%
Dieldrin	1.9E-02	5.9%	4.3E-03	1.9%	4.0E-03	0.7%	3.7E-03	1.8%
Di-n-butylphthalate	2.2E-04	<0.1%	1.8E-04	<0.1%	1.8E-04	<0.1%	1.8E-04	<0.1%
gamma-Benzene hexachloride	7.1E-04	0.2%	1.4E-04	<0.1%	1.6E-04	<0.1%	1.6E-04	<0.1%
Heptachlor	4.2E-04	0.1%	3.4E-04	0.2%	1.0E-04	<0.1%	1.0E-04	<0.1%
Heptachlor epoxide	2.2E-03	0.7%	7.2E-03	3.2%	3.6E-03	0.6%	4.8E-04	0.2%
PCB Aroclor 1016	2.5E-04	<0.1%	4.9E-03	2.2%	3.6E-01	61.6%	1.9E-02	9.0%
PCB Aroclor 1254	9.8E-04	0.3%	2.4E-03	1.1%	2.4E-02	4.2%	4.8E-02	23.1%
Pentachlorophenol	7.5E-02	23.6%	2.4E-02	11.0%	2.4E-02	4.2%	2.4E-02	11.7%
Thallium	1.4E-01	43.5%	1.2E-01	52.8%	1.0E-01	17.2%	7.2E-02	34.5%
(Total)	**0.32**		**0.22**		**0.58**		**0.21**	

Table 5-8. Summary of Noncancer Hazards, RME Scenario
Lower Ottawa River Human Health Risk Assessment

	Segment 1		Segment 2		Segment 3		Segment 4	
	HI	%	HI	%	HI	%	HI	%
Adult Angler/ Fish Consumer								
2-Chlorophenol	2.4E-02	<0.1%	4.2E-03	<0.1%	4.2E-03	<0.1%	4.2E-03	<0.1%
4,4'-DDT (p,p'-)	2.3E-01	0.1%	8.2E-02	<0.1%	4.8E-02	<0.1%	2.4E-01	0.3%
Aldrin	9.7E-02	<0.1%	9.7E-02	0.1%	2.3E-01	0.1%	9.7E-02	0.1%
alpha-Chlordane	2.1E-02	<0.1%	5.8E-03	<0.1%	6.5E-03	<0.1%	3.6E-02	<0.1%
Arsenic	9.8E-02	<0.1%	8.9E-02	0.1%	5.3E-02	<0.1%	5.5E-02	<0.1%
Atrazine	2.5E-04	<0.1%	1.4E-04	<0.1%	1.4E-04	<0.1%	1.4E-04	<0.1%
Chlordane	1.9E-01	0.1%	7.6E-02	<0.1%	2.5E-01	0.1%	8.9E-02	0.1%
Dieldrin	2.5E-01	0.1%	6.2E-02	<0.1%	6.0E-02	<0.1%	3.9E-01	0.5%
Di-n-butylphthalate	1.1E-01	<0.1%	1.0E-04	<0.1%	1.0E-04	<0.1%	1.0E-04	<0.1%
gamma-Benzene hexachloride	3.4E-04	<0.1%	7.6E-05	<0.1%	7.6E-05	<0.1%	7.6E-05	<0.1%
gamma-Chlordane	1.5E-01	<0.1%	7.6E-02	<0.1%	1.8E-01	0.1%	4.1E-02	<0.1%
Pentachlorophenol	5.3E-02	<0.1%	1.7E-02	<0.1%	1.7E-02	<0.1%	1.7E-02	<0.1%
Thallium	1.5E-02	<0.1%	1.0E-02	<0.1%	1.0E-02	<0.1%	1.0E-02	<0.1%
Total PCBs	1.7E+02	99.3%	8.3E+01	99.4%	1.7E+02	99.5%	8.6E+01	98.9%
trans-Nonachlor	5.8E-03	<0.1%	5.8E-03	<0.1%	5.8E-03	<0.1%	1.2E-02	<0.1%
(Total)	**174**		**83**		**171**		**87**	
Child Angler/ Fish Consumer								
2-Chlorophenol	4.3E-02	<0.1%	7.4E-03	<0.1%	7.4E-03	<0.1%	7.4E-03	<0.1%
4,4'-DDT (p,p'-)	2.3E-01	0.1%	8.4E-02	<0.1%	4.9E-02	<0.1%	2.4E-01	0.3%
Aldrin	1.0E-01	<0.1%	9.9E-02	0.1%	2.3E-01	0.1%	9.9E-02	0.1%
alpha-Chlordane	2.2E-02	<0.1%	5.9E-03	<0.1%	6.7E-03	<0.1%	3.7E-02	<0.1%
Arsenic	1.0E-01	<0.1%	9.3E-02	0.1%	5.5E-02	<0.1%	5.7E-02	<0.1%
Atrazine	4.4E-04	<0.1%	2.4E-04	<0.1%	2.4E-04	<0.1%	2.4E-04	<0.1%
Chlordane	1.9E-01	0.1%	7.8E-02	<0.1%	2.5E-01	0.1%	9.2E-02	0.1%
Dieldrin	2.6E-01	0.1%	6.5E-02	<0.1%	6.3E-02	<0.1%	4.1E-01	0.5%
Di-n-butylphthalate	2.3E-04	<0.1%	1.8E-04	<0.1%	1.8E-04	<0.1%	1.8E-04	<0.1%
gamma-Benzene hexachloride	5.9E-04	<0.1%	1.3E-04	<0.1%	1.3E-04	<0.1%	1.3E-04	<0.1%
gamma-Chlordane	1.6E-01	<0.1%	7.8E-02	<0.1%	1.9E-01	0.1%	4.2E-02	<0.1%
Pentachlorophenol	9.3E-02	<0.1%	3.0E-02	<0.1%	3.0E-02	<0.1%	3.0E-02	<0.1%
Thallium	2.7E-02	<0.1%	1.8E-02	<0.1%	1.8E-02	<0.1%	1.8E-02	<0.1%
Total PCBs	1.8E+02	99.3%	8.5E+01	99.3%	1.7E+02	99.5%	8.8E+01	98.8%
trans-Nonachlor	5.9E-03	<0.1%	5.9E-03	<0.1%	5.9E-03	<0.1%	1.3E-02	<0.1%
(Total)	**178**		**85**		**175**		**89**	

Table 5-9. Summary of Noncancer Hazards, CT Scenario
Lower Ottawa River Human Health Risk Assessment

	Segment 1		Segment 2		Segment 3		Segment 4	
	HI	**%**	**HI**	**%**	**HI**	**%**	**HI**	**%**
Adult Recreator								
2-Chlorophenol	2.8E-03	13.1%	4.9E-04	3.4%	4.9E-04	1.3%	4.9E-04	3.7%
Aldrin	2.8E-04	1.3%	2.2E-04	1.6%	2.6E-04	0.7%	5.9E-05	0.4%
Arsenic	2.4E-03	11.1%	3.1E-03	21.7%	2.2E-03	5.9%	2.0E-03	15.2%
Atrazine	3.5E-05	0.2%	1.9E-05	0.1%	1.9E-05	<0.1%	1.9E-05	0.1%
bis(2-Ethylhexyl)phthalate	2.8E-05	0.1%	1.4E-04	1.0%	2.9E-03	7.8%	9.7E-05	0.7%
Dieldrin	1.4E-03	6.4%	3.2E-04	2.3%	2.9E-04	0.8%	2.7E-04	2.0%
Di-n-butylphthalate	1.6E-05	<0.1%	1.3E-05	<0.1%	1.3E-05	<0.1%	1.3E-05	<0.1%
gamma-Benzene hexachloride	4.8E-05	0.2%	1.1E-05	<0.1%	1.1E-05	<0.1%	1.1E-05	<0.1%
Heptachlor	2.8E-05	0.1%	6.8E-06	<0.1%	6.8E-06	<0.1%	6.8E-06	<0.1%
Heptachlor epoxide	1.8E-04	0.8%	5.7E-04	4.0%	2.8E-04	0.8%	3.8E-05	0.3%
PCB Aroclor 1016	1.5E-05	<0.1%	3.0E-04	2.1%	2.1E-02	57.5%	1.1E-03	8.5%
PCB Aroclor 1254	5.9E-05	0.3%	1.5E-04	1.0%	1.5E-03	3.9%	2.9E-03	21.8%
Pentachlorophenol	5.8E-03	27.0%	1.9E-03	13.1%	1.9E-03	5.1%	1.9E-03	14.1%
Thallium	8.4E-03	39.2%	7.1E-03	49.5%	6.0E-03	16.2%	4.4E-03	32.9%
(Total)	**0.021**		**0.014**		**0.037**		**0.013**	
Child Recreator								
2-Chlorophenol	6.5E-03	7.0%	1.1E-03	1.4%	1.1E-03	0.5%	1.1E-03	1.5%
Aldrin	1.1E-03	1.2%	1.1E-03	1.3%	1.3E-03	0.5%	2.3E-04	0.3%
Arsenic	1.6E-02	17.3%	2.0E-02	25.1%	1.5E-02	6.1%	1.4E-02	18.3%
Atrazine	9.5E-05	0.1%	5.2E-05	<0.1%	5.2E-05	<0.1%	5.2E-05	<0.1%
bis(2-Ethylhexyl)phthalate	1.1E-04	0.1%	5.6E-04	0.7%	1.1E-02	4.5%	3.8E-04	0.5%
Dieldrin	3.6E-03	3.9%	9.9E-04	1.2%	8.3E-04	0.3%	7.1E-04	0.9%
Di-n-butylphthalate	3.9E-05	<0.1%	3.2E-05	<0.1%	3.2E-05	<0.1%	3.2E-05	<0.1%
gamma-Benzene hexachloride	1.3E-04	0.1%	2.5E-05	<0.1%	3.0E-05	<0.1%	3.0E-05	<0.1%
Heptachlor	7.6E-05	<0.1%	6.9E-05	<0.1%	1.8E-05	<0.1%	1.8E-05	<0.1%
Heptachlor epoxide	1.1E-03	1.1%	3.4E-03	4.2%	1.7E-03	0.7%	2.3E-04	0.3%
PCB Aroclor 1016	1.1E-04	0.1%	2.3E-03	2.8%	1.6E-01	66.0%	8.7E-03	11.3%
PCB Aroclor 1254	4.5E-04	0.5%	1.1E-03	1.4%	1.1E-02	4.5%	2.2E-02	28.9%
Pentachlorophenol	1.3E-02	13.6%	4.1E-03	5.1%	4.1E-03	1.7%	4.1E-03	5.4%
Thallium	5.1E-02	54.8%	4.6E-02	56.5%	3.8E-02	15.2%	2.5E-02	32.6%
(Total)	**0.094**		**0.081**		**0.25**		**0.077**	

Table 5-9. Summary of Noncancer Hazards, CT Scenario
Lower Ottawa River Human Health Risk Assessment

	Segment 1		Segment 2		Segment 3		Segment 4	
	HI	**%**	**HI**	**%**	**HI**	**%**	**HI**	**%**
Adult Angler/ Fish Consumer								
2-Chlorophenol	3.0E-02	<0.1%	3.2E-03	<0.1%	3.2E-03	<0.1%	3.2E-03	<0.1%
4,4'-DDT (p,p'-)	4.0E-02	0.1%	1.5E-02	<0.1%	8.5E-03	<0.1%	4.2E-02	0.3%
Aldrin	1.8E-02	<0.1%	1.7E-02	0.1%	4.1E-02	0.1%	1.7E-02	0.1%
alpha-Chlordane	3.8E-03	<0.1%	1.0E-03	<0.1%	1.2E-03	<0.1%	6.4E-03	<0.1%
Arsenic	1.8E-02	<0.1%	1.7E-02	0.1%	9.8E-03	<0.1%	1.0E-02	<0.1%
Atrazine	3.0E-04	<0.1%	1.1E-04	<0.1%	1.1E-04	<0.1%	1.1E-04	<0.1%
Chlordane	3.3E-02	0.1%	1.3E-02	<0.1%	4.4E-02	0.1%	1.6E-02	0.1%
Dieldrin	5.4E-02	0.2%	1.2E-02	<0.1%	1.2E-02	<0.1%	7.1E-02	0.5%
Di-n-butylphthalate	1.6E-04	<0.1%	8.0E-05	<0.1%	8.0E-05	<0.1%	8.0E-05	<0.1%
gamma-Benzene hexachloride	4.1E-04	<0.1%	5.9E-05	<0.1%	5.9E-05	<0.1%	5.9E-05	<0.1%
gamma-Chlordane	2.7E-02	<0.1%	1.3E-02	<0.1%	3.3E-02	0.1%	7.3E-03	<0.1%
Pentachlorophenol	6.5E-02	0.2%	1.3E-02	<0.1%	1.3E-02	<0.1%	1.3E-02	<0.1%
Thallium	1.9E-02	<0.1%	7.8E-03	<0.1%	7.8E-03	<0.1%	7.8E-03	<0.1%
Total PCBs	3.1E+01	99.0%	1.5E+01	99.2%	3.0E+01	99.4%	1.5E+01	98.7%
trans-Nonachlor	1.0E-03	<0.1%	1.0E-03	<0.1%	1.0E-03	<0.1%	2.2E-03	<0.1%
(Total)	**31**		**15**		**30**		**15**	
Child Angler/ Fish Consumer								
2-Chlorophenol	3.5E-02	0.1%	3.7E-03	<0.1%	3.7E-03	<0.1%	3.7E-03	<0.1%
4,4'-DDT (p,p'-)	4.0E-02	0.1%	1.5E-02	<0.1%	8.5E-03	<0.1%	4.2E-02	0.3%
Aldrin	1.8E-02	<0.1%	1.7E-02	0.1%	4.0E-02	0.1%	1.7E-02	0.1%
alpha-Chlordane	3.7E-03	<0.1%	1.0E-03	<0.1%	1.2E-03	<0.1%	6.3E-03	<0.1%
Arsenic	1.9E-02	<0.1%	1.7E-02	0.1%	9.8E-03	<0.1%	1.0E-02	<0.1%
Atrazine	3.6E-04	<0.1%	1.2E-04	<0.1%	1.2E-04	<0.1%	1.2E-04	<0.1%
Chlordane	3.3E-02	0.1%	1.3E-02	<0.1%	4.4E-02	0.1%	1.6E-02	0.1%
Dieldrin	5.6E-02	0.2%	1.2E-02	<0.1%	1.2E-02	<0.1%	7.1E-02	0.5%
Di-n-butylphthalate	1.8E-04	<0.1%	9.4E-05	<0.1%	9.4E-05	<0.1%	9.4E-05	<0.1%
gamma-Benzene hexachloride	4.8E-04	<0.1%	6.8E-05	<0.1%	6.8E-05	<0.1%	6.8E-05	<0.1%
gamma-Chlordane	2.7E-02	<0.1%	1.3E-02	<0.1%	3.2E-02	0.1%	7.2E-03	<0.1%
Pentachlorophenol	7.5E-02	0.2%	1.5E-02	0.1%	1.5E-02	<0.1%	1.5E-02	0.1%
Thallium	2.2E-02	<0.1%	9.0E-03	<0.1%	9.0E-03	<0.1%	9.0E-03	<0.1%
Total PCBs	3.0E+01	98.9%	1.5E+01	99.2%	3.0E+01	99.4%	1.5E+01	98.7%
trans-Nonachlor	1.0E-03	<0.1%	1.0E-03	<0.1%	1.0E-03	<0.1%	2.2E-03	<0.1%
(Total)	**31**		**15**		**30**		**15**	

Table 5-10. IEUBK Model Output, Lower Ottawa River Human Health Risk Assessment

Scenario	Sediment EPC (mg/kg)	Surface Water EPC (µg/L)	GM Blood Lead Concentration, 0-84 months (µg/L)	Blood Lead Concentration, Percent <10 µg/dL
Segment 1 (RM 0 to <3.2)				
RME Child Recreator	113	7.8	3.445	98.906
CT Child Recreator	113	7.8	3.414	98.968
Segment 2 (RM 3.2 to <4.9)				
RME Child Recreator	363	7.3	4.811	94.342
CT Child Recreator	363	7.3	4.796	94.342
Segment 3 (RM 4.9 to <6.5)				
RME Child Recreator	287	5.9	4.178	96.956
CT Child Recreator	287	5.9	4.162	97.137
Segment 4 (RM 6.5 to 8.8)				
RME Child Recreator	189	2.4	3.420	98.968
CT Child Recreator	189	2.4	3.410	98.968

Table 5-11. Summary of Cancer Risks for Consumption of Fish Containing COIs at Concentrations Estimated Based from BAFs, RME Angler Scenario Lower Ottawa River Human Health Risk Assessment

Chemical of Interest	Estimated EPC in Fish (mg/kg)	Cancer Risk Fish Consumption
Segment 1 (RM 0 to <3.2)		
N-Nitroso-di-n-propylamine	0.12	2.2E-04
Pentachlorophenol	183	5.6E-03
Segment 2 (RM 3.2 to <4.9)		
N-Nitroso-di-n-propylamine	0.034	6.0E-05
Pentachlorophenol	60	1.8E-03
Segment 3 (RM 4.9 to <6.5)		
N-Nitroso-di-n-propylamine	0.034	6.0E-05
Pentachlorophenol	60	1.8E-03
Segment 4 (RM 6.5 to 8.8)		
N-Nitroso-di-n-propylamine	0.034	6.0E-05
Pentachlorophenol	60	1.8E-03

Table 5-12. Estimated PCB Hazards Assuming Consumption of Fish at Quantities Consistent with Great Lakes Sport Fish Advisory Consumption Categories, Lower Ottawa River Human Health Risk Assessment

Segment	Total PCBs EPC (mg/kg)	Noncancer HI
Category 1 (Unrestricted consumption)		
1 (RM 0 to <3.2)	5.9	240
2 (RM 3.2 to <4.9)	2.8	110
3 (RM 4.9 to <6.5)	5.8	230
4 (RM 6.5 to 8.8)	2.9	120
Category 2 (One meal per week)		
1 (RM 0 to <3.2)	5.9	67
2 (RM 3.2 to <4.9)	2.8	32
3 (RM 4.9 to <6.5)	5.8	66
4 (RM 6.5 to 8.8)	2.9	33
Category 3 (One meal per month)		
1 (RM 0 to <3.2)	5.9	13
2 (RM 3.2 to <4.9)	2.8	6.1
3 (RM 4.9 to <6.5)	5.8	12
4 (RM 6.5 to 8.8)	2.9	6.3
Category 4 (One meal every two months)		
1 (RM 0 to <3.2)	5.9	6.2
2 (RM 3.2 to <4.9)	2.8	3.0
3 (RM 4.9 to <6.5)	5.8	6.1
4 (RM 6.5 to 8.8)	2.9	3.1

Table 5-13. Percent of Fish Caught in the Lower Ottawa River with Fish Tissue Concentrations within Great Lakes Sport Fish Advisory Acceptable Concentration Ranges for Fish Consumption Categories

Category	Great Lakes Sport Fish Advisory Acceptable PCB Concentration Range	Percent of Fish Collected in Lower Ottawa River within PCB Concentration Range
Category 1 (unrestricted consumption)	0-0.05 ppm	0%
Category 2 (1 meal/week)	>0.05-0.2 ppm	12%
Category 3 (1 meal/month)	>0.2-1.0 ppm	40%
Category 4 (6 meals/year)	>1-1.9 ppm	14%
Category 5 (no consumption)	>1.9 ppm	33%

Table 5-14. Summary of Sample-Specific Estimated Cancer Risks for Surface Water, Recreator Scenario (Including Nondetected COIs)

River Mile and Sample No.	Segment No.	Recreator Cancer Risk	Rank	4,4'-DDT	Aldrin	Arsenic	Dieldrin	Heptachlor	N-Nitroso-di -n-propylamine	PCP
RM 0.5 #ENW03MSD Left side	1	2.3E-04	1	0.7%	0.4%	NA	2.6%	0.2%	43%	54%
RM 0.5 #ENW03MS Left side	1	1.9E-04	2	0.8%	0.4%	NA	3.0%	0.2%	43%	53%
RM 4.8 #ENW31 Right side	2	3.5E-05	3	0.6%	0.3%	3.4%	1.8%	0.1%	38%	56%
RM 0.5 #ENW03 Left side	1	3.5E-05	4	0.6%	0.3%	2.9%	1.8%	0.1%	38%	56%
RM 2.5 #ENW17 Left side	1	3.4E-05	5	0.6%	0.3%	2.1%	1.8%	0.1%	38%	57%
RM 0.5 #ENW05 Right side	1	3.4E-05	5	0.6%	0.3%	1.0%	1.9%	0.2%	39%	57%
RM 1.3 #ENW07 Left side	1	3.4E-05	5	0.6%	0.3%	1.0%	1.9%	0.2%	39%	57%
RM 1.3 #ENW11 Right side	1	3.4E-05	5	0.6%	0.3%	1.0%	1.9%	0.2%	39%	57%
RM 2 #ENW13 Left side	1	3.4E-05	5	0.6%	0.3%	1.0%	1.9%	0.2%	39%	57%
RM 2 #ENW15 Right side	1	3.4E-05	5	0.6%	0.3%	1.0%	1.9%	0.2%	39%	57%
RM 2.5 #ENW19 Right side	1	3.4E-05	5	0.6%	0.3%	1.0%	1.9%	0.2%	39%	57%
RM 2.8 #ENW21 Right side	1	3.4E-05	5	0.6%	0.3%	1.0%	1.9%	0.2%	39%	57%
RM 3.6 #ENW25 Right side	2	3.4E-05	5	0.6%	0.3%	1.0%	1.9%	0.2%	39%	57%
RM 3.6 #ENW50 Right side	2	3.4E-05	5	0.6%	0.3%	1.0%	1.9%	0.2%	39%	57%
RM 4.2 #ENW28 Left side	2	3.4E-05	5	0.6%	0.3%	1.0%	1.9%	0.2%	39%	57%
RM 5.5 #ENW34 Left side	3	3.4E-05	5	0.6%	0.3%	1.0%	1.9%	0.2%	39%	57%
RM 5.8 #ENW38 Right side	3	3.4E-05	5	0.6%	0.3%	1.0%	1.9%	0.2%	39%	57%
RM 6.1 #ENW41 Right side	3	3.4E-05	5	0.6%	0.3%	1.0%	1.9%	0.2%	39%	57%
RM 7.2 #ENW43	4	3.4E-05	5	0.6%	0.3%	1.0%	1.9%	0.2%	39%	57%
RM 8.3 #ENW48 Right side	4	3.4E-05	5	0.6%	0.3%	1.0%	1.9%	0.2%	39%	57%
RM 5.8 #ENW53 Right side	3	3.4E-05	5	0.6%	0.3%	NA	1.9%	0.2%	39%	58%

NA Not analyzed

Table 5-15. Summary of Sample-Specific Estimated Cancer Risks for Surface Water, Recreator Scenario (Including Detected COIs Only)

River Mile and Sample No.	Segment No.	Recreator Cancer Risk	Rank	4,4'-DDT	Aldrin	Arsenic	Dieldrin	Heptachlor	N-Nitroso-di -n-propylamine	PCP
RM 0.5 #ENW03MSD Left side	1	2.3E-04	1	0.7%	0.4%	NA	2.6%	0.2%	43%	54%
RM 0.5 #ENW03MS Left side	1	1.9E-04	2	0.8%	0.4%	NA	3.0%	0.2%	43%	53%
RM 4.8 #ENW31 Right side	2	1.2E-06	3	ND	ND	100%	ND	ND	ND	ND
RM 0.5 #ENW03 Left side	1	1.0E-06	4	ND	ND	100%	ND	ND	ND	ND
RM 2.5 #ENW17 Left side	1	7.4E-07	5	ND	ND	100%	ND	ND	ND	ND

NA Not analyzed
ND Not detected

Table 5-16. Summary of Sample-Specific Estimated Cancer Risks for Sediment, Recreator Scenario (Including Nondetected COIs)- Sorted by Estimated Cancer Risk

River Mile and Sample No.	Segment No.	Recreator Cancer Risk	Rank	Arsenic	BaP Equivalent	N-Nitroso-di -n-propylamine	Total PCBs
RM 5.86 #ADJ. UT WALL 0-24	3	8.8E-05	1	4%	15%	5%	75%
RM 1.3 # ENW09	1	5.9E-05	2	NA	67%	31%	0%
RM 5.5 # ENW33	3	4.2E-05	3	NA	54%	44%	0%
RM 1.3 # ENW10	1	3.7E-05	4	NA	91%	8%	0%
RM 2.8 # ENW20	1	3.5E-05	5	NA	62%	35%	1%
RM 6.1 # ENW39	3	2.8E-05	6	NA	59%	37%	3%
RM 3.6 # ENW22	2	2.8E-05	7	NA	65%	32%	1%
RM 3.6 # ENW23	2	2.7E-05	8	NA	64%	30%	4%
RM 8.3 # ENW45	4	2.4E-05	9	NA	66%	33%	0%
RM 4.8 # ENW29	2	2.4E-05	10	NA	47%	43%	7%
RM 5.8 # ENW37	3	2.3E-05	11	NA	56%	40%	2%
RM 5.8 # ENW54	3	2.2E-05	12	NA	57%	37%	5%
RM 3.6 # ENW51	2	2.2E-05	13	NA	54%	40%	4%
RM 5.8 # ENW35	3	2.1E-05	14	NA	58%	35%	6%
RM 5.1 # ENW32	3	2.1E-05	15	NA	59%	37%	2%
RM 2 # ENW12	1	2.0E-05	16	NA	65%	32%	1%
RM 7.6 # ENW44	4	1.8E-05	17	NA	51%	48%	1%
RM 1.3 # ENW06	1	1.7E-05	18	NA	63%	32%	2%
RM 1.3 # ENW08	1	1.6E-05	19	NA	54%	43%	2%
RM 2.5 # ENW16	1	1.5E-05	20	NA	53%	42%	2%
RM 2 # ENW14	1	1.5E-05	21	NA	57%	37%	2%
RM 0.5 # ENW04	1	1.4E-05	22	NA	54%	42%	2%
RM 0.5 # ENW01MS	1	1.4E-05	23	NA	34%	62%	1%
RM 4.2 # ENW26	2	1.3E-05	24	NA	57%	35%	5%
RM 4.8 # ENW30	2	1.3E-05	25	NA	44%	48%	4%
RM 5.7 # ENW49	3	1.2E-05	26	NA	49%	37%	13%
RM 0.5 # ENW01MSD	1	1.2E-05	27	NA	28%	68%	2%
RM 8.3 # ENW47	4	1.1E-05	28	NA	68%	30%	2%
RM 1.3 # ENW10MSD	1	9.9E-06	29	NA	64%	31%	1%
RM 5.5 # MENW33	3	9.9E-06	30	100%	NA	NA	NA
RM 2.4 #OR 2.4M 0-24	1	9.5E-06	31	33%	60%	4%	3%
RM 8.3 #OR 8.3 0-19	4	9.5E-06	32	25%	21%	1%	53%
RM 2.5 # ENW18	1	8.7E-06	33	NA	51%	44%	2%
RM 6.6 #OR 6.6 0-12	4	8.1E-06	34	50%	33%	10%	7%
RM 4 #OR 4.0M 0-24	2	8.0E-06	35	33%	57%	2%	8%
RM 8.5 #OR 8.5	4	7.5E-06	36	92%	3%	1%	4%
RM 1.3 # ENW10MS	1	7.4E-06	37	NA	52%	43%	1%
RM 7.2 # ENW42	4	7.3E-06	38	NA	52%	43%	5%
RM 8.4 #OR 8.4	4	7.2E-06	39	35%	61%	1%	3%
RM 2.2 #OR 2.2M 0-22	1	7.2E-06	40	44%	47%	3%	6%
RM 4.7 #OR 4.7M 0-24	2	7.1E-06	41	41%	14%	4%	40%
RM 3.1 #OR 3.1R 0-24	1	6.9E-06	42	53%	15%	5%	27%
RM 2 #OR 2.0L 0-20	1	6.4E-06	43	46%	12%	12%	29%
RM 0.5 # ENW01	1	6.3E-06	44	NA	55%	38%	3%
RM 3.2 #OR 3.2M 0-23	2	6.2E-06	45	65%	24%	7%	4%
RM 4.6 #OR 4.6R 0-24	2	6.1E-06	46	76%	18%	5%	1%
RM 4.8 #OR 4.8M 0-24	2	6.1E-06	47	51%	13%	4%	31%
RM 3.4 #OR 3.4R 0-24	2	6.0E-06	48	61%	22%	7%	10%
RM 8.7 #OR 8.7	4	5.8E-06	49	24%	71%	1%	3%
RM 2.3 #OR 2.3R 0-24	1	5.7E-06	50	70%	16%	6%	7%
RM 2.1 #OR 2.1M 0-24	1	5.6E-06	51	70%	16%	7%	8%
RM 3.4 #OR 3.4L 0-24	2	5.5E-06	52	64%	18%	5%	12%
RM 3 #OR 3.0L 0-24	1	5.5E-06	53	63%	26%	7%	3%
RM 3.8 #OR 3.8L 0-24	2	5.5E-06	54	55%	17%	3%	25%
RM 3 #OR 3.0M 0-24	1	5.5E-06	55	59%	27%	8%	7%
RM 2.2 #OR 2.2L 0-24	1	5.5E-06	56	70%	7%	7%	15%
RM 1.8 #OR 1.8M 0-16	1	5.4E-06	57	63%	7%	7%	23%
RM 4 #OR 4.0L 0-21	2	5.4E-06	58	73%	12%	4%	10%
RM 1.3 # MENW10	1	5.4E-06	59	100%	NA	NA	NA
RM 2.5 #OR 2.5M 0-24	1	5.4E-06	60	71%	8%	7%	14%

Table 5-16. Summary of Sample-Specific Estimated Cancer Risks for Sediment, Recreator Scenario (Including Nondetected COIs)- Sorted by Estimated Cancer Risk

River Mile and Sample No.	Segment No.	Recreator Cancer Risk	Rank	Arsenic	BaP Equivalent	N-Nitroso-di -n-propylamine	Total PCBs
RM 0.8 #OR 0.8R 0-24	1	5.4E-06	61	80%	7%	7%	5%
RM 8.6 #OR 8.6	4	5.4E-06	62	20%	77%	2%	1%
RM 3.3 #OR 3.3R 0-24	2	5.4E-06	63	61%	19%	6%	14%
RM 2.9 #OR 2.9L 0-24	1	5.3E-06	64	66%	21%	6%	7%
RM 5.77 #RR UPST R 2-26	3	5.2E-06	65	45%	42%	13%	1%
RM 1.5 #OR 1.5R 0-18	1	5.2E-06	66	67%	8%	8%	18%
RM 2.8 #OR 2.8M 0-24	1	5.2E-06	67	54%	43%	1%	2%
RM 7.7 #OR 7.7 0-23	4	5.1E-06	68	42%	41%	12%	5%
RM 4.6 #OR 4.6L 0-24	2	5.1E-06	69	51%	7%	1%	40%
RM 2.5 #OR 2.5R 0-24	1	5.1E-06	70	68%	9%	7%	15%
RM 1.1 #OR 1.1R 0-20	1	5.1E-06	71	68%	8%	8%	17%
RM 1.5 #OR 1.5M 0-18	1	5.0E-06	72	65%	8%	8%	18%
RM 3.8 #OR 3.8R 0-20	2	5.0E-06	73	71%	14%	4%	11%
RM 2.8 #OR 2.8L 0-24	1	5.0E-06	74	66%	24%	7%	3%
RM 1.8 #OR 1.8L 0-24	1	4.9E-06	75	67%	8%	8%	17%
RM 3.2 #OR 3.2R 0-24	2	4.9E-06	76	70%	14%	4%	12%
RM 0.8 #OR 0.8M 0-10	1	4.9E-06	77	68%	8%	8%	15%
RM 0.7 #OR 0.7M 0-11	1	4.9E-06	78	70%	8%	8%	13%
RM 1.7 #OR 1.7R 0-24	1	4.8E-06	79	74%	10%	8%	8%
RM 1.8 #OR 1.8R 0-14	1	4.7E-06	80	70%	8%	8%	14%
RM 1.4 #OR 1.4M 0-13	1	4.7E-06	81	63%	8%	8%	21%
RM 3.7 #OR 3.7R 0-24	2	4.7E-06	82	71%	14%	4%	10%
RM 3 #OR 3.0R 0-24	1	4.7E-06	83	NA	76%	6%	6%
RM 4.5 #OR 4.5L 0-24	2	4.6E-06	84	60%	15%	3%	22%
RM 1.7 #OR 1.7L 0-23	1	4.6E-06	85	79%	9%	8%	4%
RM 0.9 #OR 0.9M 0-9	1	4.6E-06	86	62%	9%	9%	19%
RM 0.8 #OR 0.8L 0-10	1	4.6E-06	87	72%	9%	9%	10%
RM 1.2 #OR 1.2R 0-12	1	4.6E-06	88	61%	8%	8%	22%
RM 1.1 #OR 1.1L 0-23	1	4.5E-06	89	69%	8%	8%	15%
RM 2.2 #OR 2.2R 0-24	1	4.5E-06	90	72%	5%	4%	17%
RM 3.3 #OR 3.3L 0-21	2	4.4E-06	91	71%	14%	4%	11%
RM 0.7 #OR 0.7L 0-13	1	4.4E-06	92	73%	9%	9%	9%
RM 1.4 #OR 1.4L 0-19	1	4.4E-06	93	68%	9%	9%	14%
RM 0.5 #OR 0.5R 0-22	1	4.3E-06	94	71%	9%	9%	10%
RM 0.9 #OR 0.9L 0-14	1	4.3E-06	95	72%	9%	9%	10%
RM 1 #OR 1.0M 0-18	1	4.3E-06	96	63%	9%	9%	19%
RM 0.6 #OR 0.6M 0-10	1	4.3E-06	97	70%	10%	10%	10%
RM 1 #OR 1.0L 0-22	1	4.3E-06	98	74%	8%	8%	10%
RM 1.1 #OR 1.1M 0-24	1	4.2E-06	99	65%	9%	9%	16%
RM 1.7 #OR 1.7M 0-15	1	4.2E-06	100	72%	9%	9%	10%
RM 0.4 #OR 0.4M 0-10	1	4.1E-06	101	73%	9%	9%	8%
RM 2.4 #OR 2.4L 0-24	1	4.1E-06	102	71%	6%	5%	18%
RM 1.2 #OR 1.2L 0-12	1	4.1E-06	103	61%	9%	9%	21%
RM 0.6 #OR 0.6R 0-24	1	4.1E-06	104	68%	10%	10%	12%
RM 0.5 # MENW04	1	4.0E-06	105	100%	NA	NA	NA
RM 0.4 #OR 0.4R 0-24	1	3.9E-06	106	87%	8%	2%	2%
RM 7.5 #OR 7.5 0-24	4	3.9E-06	107	59%	19%	6%	16%
RM 3.9 #OR 3.9R 0-22	2	3.8E-06	108	77%	11%	2%	9%
RM 0.3 #OR 0.3R 0-24	1	3.8E-06	109	86%	8%	2%	3%
RM 0.5 #OR 0.5M 0-10	1	3.8E-06	110	68%	10%	10%	12%
RM 0.5 #OR 0.5L 0-24	1	3.8E-06	111	73%	9%	9%	8%
RM 2.9 #OR 2.9M 0-24	1	3.7E-06	112	70%	21%	6%	3%
RM 4.1 #OR 4.1M 0-17	2	3.6E-06	113	72%	7%	2%	19%
RM 3.5 #OR 3.5L 0-22	2	3.5E-06	114	71%	19%	6%	4%
RM 1 #OR 1.0R 0-22	1	3.5E-06	115	76%	10%	10%	5%
RM 3.9 #OR 3.9M 0-20	2	3.5E-06	116	69%	17%	5%	8%
RM 0.4 #OR 0.4L 0-12	1	3.5E-06	117	76%	10%	10%	4%
RM 2.7 #OR 2.7M 0-24	1	3.4E-06	118	84%	9%	3%	3%
RM 0.2 #OR 0.2M 0-11	1	3.4E-06	119	84%	10%	3%	3%
RM 2.3 #OR 2.3L 0-24	1	3.4E-06	120	77%	6%	6%	10%

Table 5-16. Summary of Sample-Specific Estimated Cancer Risks for Sediment, Recreator Scenario (Including Nondetected COIs)- Sorted by Estimated Cancer Risk

River Mile and Sample No.	Segment No.	Recreator Cancer Risk	Rank	Arsenic	BaP Equivalent	N-Nitroso-di -n-propylamine	Total PCBs
RM 4 #OR 4.0R 0-10	2	3.4E-06	121	68%	14%	2%	16%
RM 0.1 #OR 0.1R 0-24	1	3.4E-06	122	85%	8%	2%	4%
RM 1.3 # MENW09	1	3.4E-06	123	100%	NA	NA	NA
RM 2.8 # MENW20	1	3.3E-06	124	100%	NA	NA	NA
RM 2.7 #OR 2.7L 0-24	1	3.3E-06	125	85%	8%	2%	4%
RM 6.9 #OR 6.9 0-20	4	3.3E-06	126	40%	21%	7%	32%
RM 0.1 #OR 0.1L 0-12	1	3.2E-06	127	84%	9%	3%	4%
RM 4.2 # ENW27	2	3.2E-06	128	NA	47%	41%	5%
RM 3.1 #OR 3.1L 0-24	1	3.1E-06	129	85%	10%	3%	1%
RM 1.9 #OR 1.9L 0-24	1	3.1E-06	130	80%	6%	5%	8%
RM 5.9 #OR 5.9 0-24	3	3.1E-06	131	88%	6%	2%	4%
RM 2.5 # MENW01	1	2.8E-06	132	100%	NA	NA	NA
RM 5 #OR 5.0M 0-12	3	2.7E-06	133	49%	29%	8%	13%
RM 6.1 # MENW27	3	2.7E-06	134	100%	NA	NA	NA
RM 3.6 #OR 3.6L 0-24	2	2.6E-06	135	81%	13%	4%	2%
RM 5.8 # MENW37	3	2.6E-06	136	100%	NA	NA	NA
RM 5.1 #OR 5.1 0-18	3	2.5E-06	137	53%	30%	9%	7%
RM 2.6 #OR 2.6L 0-24	1	2.5E-06	138	53%	30%	9%	7%
RM 2.5 #OR 2.5L 0-24	1	2.5E-06	139	64%	7%	6%	22%
RM 3.5 #OR 3.5M 0-24	2	2.4E-06	140	90%	7%	2%	1%
RM 2.9 #OR 2.9R 0-24	1	2.4E-06	141	79%	11%	3%	6%
RM 7.1 #OR 7.1 0-23	4	2.4E-06	142	88%	8%	2%	1%
RM 5.5 #OR 5.5 0-16	3	2.3E-06	143	50%	33%	10%	8%
RM 5.1 # MENW32	3	2.3E-06	144	100%	NA	NA	NA
RM 2 # MENW14	1	2.3E-06	145	100%	NA	NA	NA
RM 4.8 # MENW30	2	2.3E-06	146	100%	NA	NA	NA
RM 7.6 # MENW44	4	2.2E-06	147	100%	NA	NA	NA
RM 2.5 # MENW18	1	2.2E-06	148	100%	NA	NA	NA
RM 2.6 #OR 2.6R 0-24	1	2.2E-06	149	46%	32%	10%	12%
RM 6.1 # MENW39	3	2.2E-06	150	100%	NA	NA	NA
RM 1.3 #OR 1.3L 0-10	1	2.2E-06	151	68%	14%	14%	3%
RM 4.8 # MENW29	2	2.1E-06	152	100%	NA	NA	NA
RM 8.8 #OR 8.8	4	2.1E-06	153	NA	90%	3%	1%
RM 1.3 # MENW06	1	2.1E-06	154	100%	NA	NA	NA
RM 2 # MENW12	1	2.0E-06	155	100%	NA	NA	NA
RM 3.6 # MENW22	2	2.0E-06	156	100%	NA	NA	NA
RM 3.4 #OR 3.4M 0-24	2	2.0E-06	157	87%	9%	3%	1%
RM 2.6 #OR 2.6M 0-24	1	1.9E-06	158	62%	16%	5%	17%
RM 4.2 #OR 4.2L 0-24	2	1.9E-06	159	76%	15%	4%	4%
RM 0.2 #OR 0.2L 0-24	1	1.9E-06	160	75%	18%	5%	2%
RM 2.5 # MENW16	1	1.9E-06	161	100%	NA	NA	NA
RM 3.6 # MENW51	2	1.9E-06	162	100%	NA	NA	NA
RM 4.2 # MENW26	2	1.9E-06	163	100%	NA	NA	NA
RM 3.6 # ENW52	2	1.9E-06	164	NA	64%	30%	4%
RM 3.6 # ENW24	2	1.9E-06	165	NA	64%	30%	4%
RM 7.3 #OR 7.3 0-24	4	1.8E-06	166	61%	19%	6%	15%
RM 5.8 #OR 5.8 0-24	3	1.8E-06	167	86%	10%	3%	1%
RM 5.8 # MENW35	3	1.8E-06	168	100%	NA	NA	NA
RM 5.7 # MENW49	3	1.8E-06	169	100%	NA	NA	NA
RM 5.6 #OR 5.6 0-24	3	1.8E-06	170	80%	14%	4%	2%
RM 7 #OR 7.0 0-24	4	1.8E-06	171	86%	10%	3%	1%
RM 2.5 # ENW55	1	1.7E-06	172	NA	52%	37%	8%
RM 0.3 #OR 0.3L 0-24	1	1.7E-06	173	72%	20%	6%	3%
RM 3.6 # MENW23	2	1.6E-06	174	100%	NA	NA	NA
RM 5.8 # MENW54	3	1.6E-06	175	100%	NA	NA	NA
RM 6.1 #OR 6.1 0-24	3	1.6E-06	176	84%	11%	3%	1%
RM 8.3 # MENW45	4	1.5E-06	177	100%	NA	NA	NA
RM 3.3 #OR 3.3M 0-24	2	1.5E-06	178	83%	12%	3%	2%
RM 1.3 # MENW08	1	1.4E-06	179	100%	NA	NA	NA
RM 4.3 #OR 4.3L 0-20	2	1.4E-06	180	78%	13%	4%	5%
RM 2.8 #OR 2.8R 0-24	1	1.4E-06	181	69%	17%	5%	9%

Table 5-16. Summary of Sample-Specific Estimated Cancer Risks for Sediment, Recreator Scenario (Including Nondetected COIs)- Sorted by Estimated Cancer Risk

River Mile and Sample No.	Segment No.	Recreator Cancer Risk	Rank	Arsenic	BaP Equivalent	N-Nitroso-di -n-propylamine	Total PCBs
RM 8.3 # MENW47	4	1.2E-06	182	100%	NA	NA	NA
RM 2.7 #OR 2.7R 0-24	1	1.2E-06	183	59%	23%	7%	11%
RM 3.1 #OR 3.1M 0-24	1	1.1E-06	184	71%	21%	6%	3%
RM 5.85 #UT DST R 0-24	3	1.0E-06	185	72%	20%	6%	3%
RM 7.2 # MENW42	4	8.2E-07	186	100%	NA	NA	NA
RM 2.5 # MENW55	1	7.2E-07	187	100%	NA	NA	NA
RM 3.6 # MENW52	2	2.5E-07	188	100%	NA	NA	NA
RM 3.6 # MENW24	2	9.4E-08	189	100%	NA	NA	NA

NA Not analyzed
ND Not detected

Table 5-17. Summary of Sample-Specific Estimated Cancer Risks for Sediment, Recreator Scenario (Including Nondetected COIs)- Sorted by River Mile

River Mile and Sample No.	Segment No.	Recreator Cancer Risk	Rank	Arsenic	BaP Equivalent	N-Nitroso-di -n-propylamine	Total PCBs
RM 0.1 #OR 0.1L 0-12	1	3.2E-06	127	84%	9%	3%	4%
RM 0.1 #OR 0.1R 0-24	1	3.4E-06	122	85%	8%	2%	4%
RM 0.2 #OR 0.2L 0-24	1	1.9E-06	160	75%	18%	5%	2%
RM 0.2 #OR 0.2M 0-11	1	3.4E-06	119	84%	10%	3%	3%
RM 0.3 #OR 0.3L 0-24	1	1.7E-06	173	72%	20%	6%	3%
RM 0.3 #OR 0.3R 0-24	1	3.8E-06	109	86%	8%	2%	3%
RM 0.4 #OR 0.4L 0-12	1	3.5E-06	117	76%	10%	10%	4%
RM 0.4 #OR 0.4M 0-10	1	4.1E-06	101	73%	9%	9%	8%
RM 0.4 #OR 0.4R 0-24	1	3.9E-06	106	87%	8%	2%	2%
RM 0.5 # ENW01	1	6.3E-06	44	NA	55%	38%	3%
RM 0.5 # ENW01MS	1	1.4E-05	23	NA	34%	62%	1%
RM 0.5 # ENW01MSD	1	1.2E-05	27	NA	28%	68%	2%
RM 0.5 # ENW04	1	1.4E-05	22	NA	54%	42%	2%
RM 0.5 # MENW04	1	4.0E-06	105	100%	NA	NA	NA
RM 0.5 #OR 0.5L 0-24	1	3.8E-06	111	73%	9%	9%	8%
RM 0.5 #OR 0.5M 0-10	1	3.8E-06	110	68%	10%	10%	12%
RM 0.5 #OR 0.5R 0-22	1	4.3E-06	94	71%	9%	9%	10%
RM 0.6 #OR 0.6M 0-10	1	4.3E-06	97	70%	10%	10%	10%
RM 0.6 #OR 0.6R 0-24	1	4.1E-06	104	68%	10%	10%	12%
RM 0.7 #OR 0.7L 0-13	1	4.4E-06	92	73%	9%	9%	9%
RM 0.7 #OR 0.7M 0-11	1	4.9E-06	78	70%	8%	8%	13%
RM 0.8 #OR 0.8L 0-10	1	4.6E-06	87	72%	9%	9%	10%
RM 0.8 #OR 0.8M 0-10	1	4.9E-06	77	68%	8%	8%	15%
RM 0.8 #OR 0.8R 0-24	1	5.4E-06	61	80%	7%	7%	5%
RM 0.9 #OR 0.9L 0-14	1	4.3E-06	95	72%	9%	9%	10%
RM 0.9 #OR 0.9M 0-9	1	4.6E-06	86	62%	9%	9%	19%
RM 1 #OR 1.0L 0-22	1	4.3E-06	98	74%	8%	8%	10%
RM 1 #OR 1.0M 0-18	1	4.3E-06	96	63%	9%	9%	19%
RM 1 #OR 1.0R 0-22	1	3.5E-06	115	76%	10%	10%	5%
RM 1.1 #OR 1.1L 0-23	1	4.5E-06	89	69%	8%	8%	15%
RM 1.1 #OR 1.1M 0-24	1	4.2E-06	99	65%	9%	9%	16%
RM 1.1 #OR 1.1R 0-20	1	5.1E-06	71	68%	8%	8%	17%
RM 1.2 #OR 1.2L 0-12	1	4.1E-06	103	61%	9%	9%	21%
RM 1.2 #OR 1.2R 0-12	1	4.6E-06	88	61%	8%	8%	22%
RM 1.3 # ENW06	1	1.7E-05	18	NA	63%	32%	2%
RM 1.3 # ENW08	1	1.6E-05	19	NA	54%	43%	2%
RM 1.3 # ENW09	1	5.9E-05	2	NA	67%	31%	0%
RM 1.3 # ENW10	1	3.7E-05	4	NA	91%	8%	0%
RM 1.3 # ENW10MS	1	7.4E-06	37	NA	52%	43%	1%
RM 1.3 # ENW10MSD	1	9.9E-06	29	NA	64%	31%	1%
RM 1.3 # MENW06	1	2.1E-06	154	100%	NA	NA	NA
RM 1.3 # MENW08	1	1.4E-06	179	100%	NA	NA	NA
RM 1.3 # MENW09	1	3.4E-06	123	100%	NA	NA	NA
RM 1.3 # MENW10	1	5.4E-06	59	100%	NA	NA	NA
RM 1.3 #OR 1.3L 0-10	1	2.2E-06	151	68%	14%	14%	3%
RM 1.4 #OR 1.4L 0-19	1	4.4E-06	93	68%	9%	9%	14%
RM 1.4 #OR 1.4M 0-13	1	4.7E-06	81	63%	8%	8%	21%
RM 1.5 #OR 1.5M 0-18	1	5.0E-06	72	65%	8%	8%	18%
RM 1.5 #OR 1.5R 0-18	1	5.2E-06	66	67%	8%	8%	18%
RM 1.7 #OR 1.7L 0-23	1	4.6E-06	85	79%	9%	8%	4%
RM 1.7 #OR 1.7M 0-15	1	4.2E-06	100	72%	9%	9%	10%
RM 1.7 #OR 1.7R 0-24	1	4.8E-06	79	74%	10%	8%	8%
RM 1.8 #OR 1.8L 0-24	1	4.9E-06	75	67%	8%	8%	17%
RM 1.8 #OR 1.8M 0-16	1	5.4E-06	57	63%	7%	7%	23%
RM 1.8 #OR 1.8R 0-14	1	4.7E-06	80	70%	8%	8%	14%
RM 1.9 #OR 1.9L 0-24	1	3.1E-06	130	80%	6%	5%	8%
RM 2 # ENW12	1	2.0E-05	16	NA	65%	32%	1%
RM 2 # ENW14	1	1.5E-05	21	NA	57%	37%	2%
RM 2 # MENW12	1	2.0E-06	155	100%	NA	NA	NA
RM 2 # MENW14	1	2.3E-06	145	100%	NA	NA	NA

Table 5-17. Summary of Sample-Specific Estimated Cancer Risks for Sediment, Recreator Scenario (Including Nondetected COIs)- Sorted by River Mile

River Mile and Sample No.	Segment No.	Recreator Cancer Risk	Rank	Arsenic	BaP Equivalent	N-Nitroso-di -n-propylamine	Total PCBs
RM 2 #OR 2.0L 0-20	1	6.4E-06	43	46%	12%	12%	29%
RM 2.1 #OR 2.1M 0-24	1	5.6E-06	51	70%	16%	7%	8%
RM 2.2 #OR 2.2L 0-24	1	5.5E-06	56	70%	7%	7%	15%
RM 2.2 #OR 2.2M 0-22	1	7.2E-06	40	44%	47%	3%	6%
RM 2.2 #OR 2.2R 0-24	1	4.5E-06	90	72%	5%	4%	17%
RM 2.3 #OR 2.3L 0-24	1	3.4E-06	120	77%	6%	6%	10%
RM 2.3 #OR 2.3R 0-24	1	5.7E-06	50	70%	16%	6%	7%
RM 2.4 #OR 2.4L 0-24	1	4.1E-06	102	71%	6%	5%	18%
RM 2.4 #OR 2.4M 0-24	1	9.5E-06	31	33%	60%	4%	3%
RM 2.5 # ENW16	1	1.5E-05	20	NA	53%	42%	2%
RM 2.5 # ENW18	1	8.7E-06	33	NA	51%	44%	2%
RM 2.5 # ENW55	1	1.7E-06	172	NA	52%	37%	8%
RM 2.5 # MENW01	1	2.8E-06	132	100%	NA	NA	NA
RM 2.5 # MENW16	1	1.9E-06	161	100%	NA	NA	NA
RM 2.5 # MENW18	1	2.2E-06	148	100%	NA	NA	NA
RM 2.5 # MENW55	1	7.2E-07	187	100%	NA	NA	NA
RM 2.5 #OR 2.5L 0-24	1	2.5E-06	139	64%	7%	6%	22%
RM 2.5 #OR 2.5M 0-24	1	5.4E-06	60	71%	8%	7%	14%
RM 2.5 #OR 2.5R 0-24	1	5.1E-06	70	68%	9%	7%	15%
RM 2.6 #OR 2.6L 0-24	1	2.5E-06	138	53%	30%	9%	7%
RM 2.6 #OR 2.6M 0-24	1	1.9E-06	158	62%	16%	5%	17%
RM 2.6 #OR 2.6R 0-24	1	2.2E-06	149	46%	32%	10%	12%
RM 2.7 #OR 2.7L 0-24	1	3.3E-06	125	85%	8%	2%	4%
RM 2.7 #OR 2.7M 0-24	1	3.4E-06	118	84%	9%	3%	3%
RM 2.7 #OR 2.7R 0-24	1	1.2E-06	183	59%	23%	7%	11%
RM 2.8 # ENW20	1	3.5E-05	5	NA	62%	35%	1%
RM 2.8 # MENW20	1	3.3E-06	124	100%	NA	NA	NA
RM 2.8 #OR 2.8L 0-24	1	5.0E-06	74	66%	24%	7%	3%
RM 2.8 #OR 2.8M 0-24	1	5.2E-06	67	54%	43%	1%	2%
RM 2.8 #OR 2.8R 0-24	1	1.4E-06	181	69%	17%	5%	9%
RM 2.9 #OR 2.9L 0-24	1	5.3E-06	64	66%	21%	6%	7%
RM 2.9 #OR 2.9M 0-24	1	3.7E-06	112	70%	21%	6%	3%
RM 2.9 #OR 2.9R 0-24	1	2.4E-06	141	79%	11%	3%	6%
RM 3 #OR 3.0L 0-24	1	5.5E-06	53	63%	26%	7%	3%
RM 3 #OR 3.0M 0-24	1	5.5E-06	55	59%	27%	8%	7%
RM 3 #OR 3.0R 0-24	1	4.7E-06	83	NA	76%	6%	6%
RM 3.1 #OR 3.1L 0-24	1	3.1E-06	129	85%	10%	3%	1%
RM 3.1 #OR 3.1M 0-24	1	1.1E-06	184	71%	21%	6%	3%
RM 3.1 #OR 3.1R 0-24	1	6.9E-06	42	53%	15%	5%	27%
RM 3.2 #OR 3.2M 0-23	2	6.2E-06	45	65%	24%	7%	4%
RM 3.2 #OR 3.2R 0-24	2	4.9E-06	76	70%	14%	4%	12%
RM 3.3 #OR 3.3L 0-21	2	4.4E-06	91	71%	14%	4%	11%
RM 3.3 #OR 3.3M 0-24	2	1.5E-06	178	83%	12%	3%	2%
RM 3.3 #OR 3.3R 0-24	2	5.4E-06	63	61%	19%	6%	14%
RM 3.4 #OR 3.4L 0-24	2	5.5E-06	52	64%	18%	5%	12%
RM 3.4 #OR 3.4M 0-24	2	2.0E-06	157	87%	9%	3%	1%
RM 3.4 #OR 3.4R 0-24	2	6.0E-06	48	61%	22%	7%	10%
RM 3.5 #OR 3.5L 0-22	2	3.5E-06	114	71%	19%	6%	4%
RM 3.5 #OR 3.5M 0-24	2	2.4E-06	140	90%	7%	2%	1%
RM 3.6 # ENW22	2	2.8E-05	7	NA	65%	32%	1%
RM 3.6 # ENW23	2	2.7E-05	8	NA	64%	30%	4%
RM 3.6 # ENW24	2	1.9E-06	165	NA	64%	30%	4%
RM 3.6 # ENW51	2	2.2E-05	13	NA	54%	40%	4%
RM 3.6 # ENW52	2	1.9E-06	164	NA	64%	30%	4%
RM 3.6 # MENW22	2	2.0E-06	156	100%	NA	NA	NA
RM 3.6 # MENW23	2	1.6E-06	174	100%	NA	NA	NA
RM 3.6 # MENW24	2	9.4E-08	189	100%	NA	NA	NA
RM 3.6 # MENW51	2	1.9E-06	162	100%	NA	NA	NA
RM 3.6 # MENW52	2	2.5E-07	188	100%	NA	NA	NA
RM 3.6 #OR 3.6L 0-24	2	2.6E-06	135	81%	13%	4%	2%

Table 5-17. Summary of Sample-Specific Estimated Cancer Risks for Sediment, Recreator Scenario (Including Nondetected COIs)- Sorted by River Mile

River Mile and Sample No.	Segment No.	Recreator Cancer Risk	Rank	Arsenic	BaP Equivalent	N-Nitroso-di -n-propylamine	Total PCBs
RM 3.7 #OR 3.7R 0-24	2	4.7E-06	82	71%	14%	4%	10%
RM 3.8 #OR 3.8L 0-24	2	5.5E-06	54	55%	17%	3%	25%
RM 3.8 #OR 3.8R 0-20	2	5.0E-06	73	71%	14%	4%	11%
RM 3.9 #OR 3.9M 0-20	2	3.5E-06	116	69%	17%	5%	8%
RM 3.9 #OR 3.9R 0-22	2	3.8E-06	108	77%	11%	2%	9%
RM 4 #OR 4.0L 0-21	2	5.4E-06	58	73%	12%	4%	10%
RM 4 #OR 4.0M 0-24	2	8.0E-06	35	33%	57%	2%	8%
RM 4 #OR 4.0R 0-10	2	3.4E-06	121	68%	14%	2%	16%
RM 4.1 #OR 4.1M 0-17	2	3.6E-06	113	72%	7%	2%	19%
RM 4.2 # ENW26	2	1.3E-05	24	NA	57%	35%	5%
RM 4.2 # ENW27	2	3.2E-06	128	NA	47%	41%	5%
RM 4.2 # MENW26	2	1.9E-06	163	100%	NA	NA	NA
RM 4.2 #OR 4.2L 0-24	2	1.9E-06	159	76%	15%	4%	4%
RM 4.3 #OR 4.3L 0-20	2	1.4E-06	180	78%	13%	4%	5%
RM 4.5 #OR 4.5L 0-24	2	4.6E-06	84	60%	15%	3%	22%
RM 4.6 #OR 4.6L 0-24	2	5.1E-06	69	51%	7%	1%	40%
RM 4.6 #OR 4.6R 0-24	2	6.1E-06	46	76%	18%	5%	1%
RM 4.7 #OR 4.7M 0-24	2	7.1E-06	41	41%	14%	4%	40%
RM 4.8 # ENW29	2	2.4E-05	10	NA	47%	43%	7%
RM 4.8 # ENW30	2	1.3E-05	25	NA	44%	48%	4%
RM 4.8 # MENW29	2	2.1E-06	152	100%	NA	NA	NA
RM 4.8 # MENW30	2	2.3E-06	146	100%	NA	NA	NA
RM 4.8 #OR 4.8M 0-24	2	6.1E-06	47	51%	13%	4%	31%
RM 5 #OR 5.0M 0-12	3	2.7E-06	133	49%	29%	8%	13%
RM 5.1 # ENW32	3	2.1E-05	15	NA	59%	37%	2%
RM 5.1 # MENW32	3	2.3E-06	144	100%	NA	NA	NA
RM 5.1 #OR 5.1 0-18	3	2.5E-06	137	53%	30%	9%	7%
RM 5.5 # ENW33	3	4.2E-05	3	NA	54%	44%	0%
RM 5.5 # MENW33	3	9.9E-06	30	100%	NA	NA	NA
RM 5.5 #OR 5.5 0-16	3	2.3E-06	143	50%	33%	10%	8%
RM 5.6 #OR 5.6 0-24	3	1.8E-06	170	80%	14%	4%	2%
RM 5.7 # ENW49	3	1.2E-05	26	NA	49%	37%	13%
RM 5.7 # MENW49	3	1.8E-06	169	100%	NA	NA	NA
RM 5.77 #RR UPST R 2-26	3	5.2E-06	65	45%	42%	13%	1%
RM 5.8 # ENW35	3	2.1E-05	14	NA	58%	35%	6%
RM 5.8 # ENW37	3	2.3E-05	11	NA	56%	40%	2%
RM 5.8 # ENW54	3	2.2E-05	12	NA	57%	37%	5%
RM 5.8 # MENW35	3	1.8E-06	168	100%	NA	NA	NA
RM 5.8 # MENW37	3	2.6E-06	136	100%	NA	NA	NA
RM 5.8 # MENW54	3	1.6E-06	175	100%	NA	NA	NA
RM 5.8 #OR 5.8 0-24	3	1.8E-06	167	86%	10%	3%	1%
RM 5.85 #UT DST R 0-24	3	1.0E-06	185	72%	20%	6%	3%
RM 5.86 #ADJ. UT WALL 0-24	3	8.8E-05	1	4%	15%	5%	75%
RM 5.9 #OR 5.9 0-24	3	3.1E-06	131	88%	6%	2%	4%
RM 6.1 # ENW39	3	2.8E-05	6	NA	59%	37%	3%
RM 6.1 # MENW27	3	2.7E-06	134	100%	NA	NA	NA
RM 6.1 # MENW39	3	2.2E-06	150	100%	NA	NA	NA
RM 6.1 #OR 6.1 0-24	3	1.6E-06	176	84%	11%	3%	1%
RM 6.6 #OR 6.6 0-12	4	8.1E-06	34	50%	33%	10%	7%
RM 6.9 #OR 6.9 0-20	4	3.3E-06	126	40%	21%	7%	32%
RM 7 #OR 7.0 0-24	4	1.8E-06	171	86%	10%	3%	1%
RM 7.1 #OR 7.1 0-23	4	2.4E-06	142	88%	8%	2%	1%
RM 7.2 # ENW42	4	7.3E-06	38	NA	52%	43%	5%
RM 7.2 # MENW42	4	8.2E-07	186	100%	NA	NA	NA
RM 7.3 #OR 7.3 0-24	4	1.8E-06	166	61%	19%	6%	15%
RM 7.5 #OR 7.5 0-24	4	3.9E-06	107	59%	19%	6%	16%
RM 7.6 # ENW44	4	1.8E-05	17	NA	51%	48%	1%
RM 7.6 # MENW44	4	2.2E-06	147	100%	NA	NA	NA
RM 7.7 #OR 7.7 0-23	4	5.1E-06	68	42%	41%	12%	5%
RM 8.3 # ENW45	4	2.4E-05	9	NA	66%	33%	0%

Table 5-17. Summary of Sample-Specific Estimated Cancer Risks for Sediment, Recreator Scenario (Including Nondetected COIs)- Sorted by River Mile

River Mile and Sample No.	Segment No.	Recreator Cancer Risk	Rank	Arsenic	BaP Equivalent	N-Nitroso-di -n-propylamine	Total PCBs
RM 8.3 # ENW47	4	1.1E-05	28	NA	68%	30%	2%
RM 8.3 # MENW45	4	1.5E-06	177	100%	NA	NA	NA
RM 8.3 # MENW47	4	1.2E-06	182	100%	NA	NA	NA
RM 8.3 #OR 8.3 0-19	4	9.5E-06	32	25%	21%	1%	53%
RM 8.4 #OR 8.4	4	7.2E-06	39	35%	61%	1%	3%
RM 8.5 #OR 8.5	4	7.5E-06	36	92%	3%	1%	4%
RM 8.6 #OR 8.6	4	5.4E-06	62	20%	77%	2%	1%
RM 8.7 #OR 8.7	4	5.8E-06	49	24%	71%	1%	3%
RM 8.8 #OR 8.8	4	2.1E-06	153	NA	90%	3%	1%

NA Not analyzed
ND Not detected

6.0 CONCLUSIONS AND RECOMMENDATIONS

The results of this screening-level human health risk assessment for the Lower Ottawa River provide information to address questions regarding possible health hazards to individuals who recreate in the Lower Ottawa River or who catch and consume fish from the river. Based on the methods and assumptions described in this report, the following observations and recommendations can be made:

- Based on detected concentrations of chemicals in surface sediments and surface water in the Lower Ottawa River, upperbound lifetime excess cancer risks to individuals who swim, wade, or engage in other recreational activities in the Lower Ottawa River may approach 1×10^{-4} for individuals who come in contact with the river frequently (*e.g.*, 24 to 48 times per year, for several hours per event). However, cancer risks to individuals who come in contact with the river less frequently may not be significant. Estimated cancer risks are dominated by N-nitroso-di-n-propylamine, pentachlorophenol, and PAHs.
- Based on detected concentrations of chemicals in surface sediments and surface water in the Lower Ottawa River, noncarcinogenic health effects from exposure to these contaminants to individuals who swim, wade, or engage in other recreational activities in the Lower Ottawa River are not expected.
- Many of the COIs in surface water and sediment, including N-nitroso-di-n-propylamine, pentachlorophenol, and PAHs, were detected infrequently. Consequently, a substantial fraction of the estimated risks to recreators associated with exposure to surface water and sediment is based on concentrations estimated from one-half of these chemicals' limits of detection. Further, several other chemicals, particularly in surface water, were not detected but had limits of detection that exceeded risk based concentrations. Therefore, significant uncertainties about the estimated risks associated with exposure to sediments and surface water in the Lower Ottawa River exist, due to uncertainties about the actual concentrations of chemicals in sediment and surface water.
- Based on detected concentrations of chemicals in fish in the Lower Ottawa River used in this HHRA, lifetime excess cancer risks to individuals who catch and consume a moderate amount of fish from the Lower Ottawa River (*e.g.*, 10 half-pound meals per year, year after year) may be significant. For those who consume fish from the river frequently (*e.g.*, 60 half-pound meals per year, year after year), the lifetime excess cancer risks are estimated to exceed 1×10^{-3}. Noncarcinogenic health effects of fish consumption were estimated to be significant for both the frequent and moderate levels of consumption.
- Based on detected concentrations of PCBs in fish in the Lower Ottawa River used in this HHRA, most fish in the river of the size and species likely to be caught for human consumption have concentrations of PCBs exceeding Great Lakes Fish Advisory Task Force advisories for limited consumption (*e.g.*, one meal every two months).

- For all scenarios, estimated cancer risks and noncancer hazards were highest in river Segments 1 and 3 (RM 0 to <3.2 and RM 4.9 to <6.5). Estimated cancer risks and noncancer hazards for the other two river segments were slightly lower.
- It is recommended that frequent and prolonged contact with Lower Ottawa River surface water and sediment (*e.g.*, more than 24 to 48 3-hour contacts per year, year after year) be avoided.
- Continuing measures to discourage or prohibit consumption of fish from the Lower Ottawa River are recommended.
- Surface water COIs were detected at only five of the 21 surface water sample locations—at RM 0.5, 2.5, and 4.8. The highest estimated cancer risks for surface water for the recreator scenario were associated with samples collected at RM 0.5. Eight of the surface water COIs (2-chlorophenol, 4,4'-DDT, aldrin, dieldrin, gamma-BHC, heptachlor, N-nitroso-di-n-propylamine, and pentachlorophenol) were only detected in surface water at this location and of these, seven were also detected at their highest sediment concentrations at this location. Consequently, RM 0.5 may represent a hot spot for these compounds.
- The highest estimated cancer risks for sediment for the recreator scenario were associated with a sample collected at RM 5.86 (in Segment 3), in the vicinity of the mouth of the former Unnamed Tributary. The highest PCB sediment concentrations were measured at this location (156 mg/kg total PCBs in the 0"-24" layer). Examination of data for nearby locations suggests that these elevated PCB concentrations are extremely localized, since total PCB concentrations at nearby locations are much lower. Surface sediment PCB concentrations at other locations in the river are considerably lower (less than 10 mg/kg, and in most cases less than 5 mg/kg).

7.0 REFERENCES

ATSDR , 1992a. *Toxicological Profile for Chlordane* . Agency for Toxic Substances and Disease Registry. ATSDR/U.S. Public Health Service.

ATSDR , 1992b. *Toxicological Profile for p,p'-DDT, DDE, DDD*. Agency for Toxic Substances and Disease Registry). ATSDR/U.S. Public Health Service.

ATSDR , 1993a. *Toxicological Profile for Aldrin/Dieldrin* . Agency for Toxic Substances and Disease Registry. ATSDR/U.S. Public Health Service.

ATSDR , 1993b. *Toxicological Profile for Heptachlor/ Heptachlor Expoxide*. Agency for Toxic Substances and Disease Registry. ATSDR/U.S. Public Health Service.

ATSDR, 2000. *Public Health Implications of Exposure to Polychlorinated Biphenyls (PCBs).* Agency for Toxic Substances and Disease Registry. Online at www.atsdr.cdc.gov.

ATSDR, 2001. *Minimal Risk Levels for Hazardous Substances*. Agency for Toxic Substances and Disease Registry. April. Online at http://www.atsdr.cdc.gov/mrls.html.

Bettley, F.R., O'Shea, J.A. 1975. The absorption of arsenic and its relation to carcinoma. *Br. J. Dermatology*. 92:563.

CalEPA, 1997. *Consumption of Fish and Shellfish in California and the United States, Final Draft Report*. Office of Environmental Health Hazard Assessment, California Environmental Protection Agency. July.

Goyer, R.A. 1991. Toxic Effects of Metals. In: *Casarett and Doull's Toxicology: The Basic Science of Poisons*, fourth edition. M. O. Ammdur, J. Doull, and C.D. Klaassen, eds. pp. 623-680.

Great Lakes Sport Fish Advisory Task Force, 1993. *Protocol for a Uniform Great Lakes Sports Fish Consumption Advisory*. September.

Hushak, L., 2000. *Final Report: Survey of Recreational Boater Safety in Ohio during 1999*. Submitted to Division of Watercraft, Ohio Department of Natural Resources. The Ohio Sea Grant College Program.

OEPA, 1993. *Phase I Ottawa River Fish and Macroinvertebrates Data*. Ohio Environmental Protection Agency.

OEPA, 1994. *Phase I Ottawa River Surface Sediment Screening Data*. Ohio Environmental Protection Agency.

OEPA, 1998. *Sediment Data for the Lower Ottawa River*. Ohio Environmental Protection Agency.

OEPA, 1999. *Lake Erie Basin Aquatic Life and Human Health Tier I Criteria, Tier II Values and Screening Values (SV) contained in and developed pursuant to Chapters 3745-1 and 3745-2 of the Ohio Administrative Code*. Ohio Environmental Protection Agency. Online at http://www.epa.state.oh.us/dsw/wqs/erieval6.pdf

OEPA, 2000. *Sediment, Surface Water, and Fish Tissue of the Ottawa River 1999*. Ecological Assessment, Division of Surface Water, Ohio Environmental Protection Agency. OEPA Technical Report MAS/2000-2-1. February.

RAIS, 2001. *Chemical Specific Factors*. Oak Ridge National Laboratory, Risk Assessment Information System. June. Obtained at http://risk.lsd.ornl.gov/

Rahman, A., J.A. Barrowman and A. Rahimtula. 1986. The influence of bile on the bioavailability of polynuclear aromatic hydrocarbons from the rat intestine. *Can. J. Physiol. Pharmacol.* 64:1214-1218.

Sabourin, P.J., B.T. Chen, G. Lucier, *et al.* 1987. Effects of dose on the absorption and excretion of [14C]benzene administered orally or by inhalation in rats and mice. *Toxicol. Appl. Pharmacol.* 87:325-336.

Taylor, J.K. 1987. *Quality Assurance of Chemical Measurements*. Lewis Publishers, Chelsea, MI.

Teirlynck, O.A. and J. Belpaire. 1985. Disposition of orally administered di(2-ethylhexyl)phthalate and mono(2-ethylhexyl)phthalate in the rat. *Arch. Toxicol.* 57(4):226-230.

U.S. EPA, 1989. *Risk Assessment Guidance for Superfund (RAGS), Volume I. Human Health Evaluation Manual, Part A. Interim Final.* Office of Solid Waste and Emergency Response, United States Environmental Protection Agency. Washington, D.C. EPA/540/1-89/002. December.

U.S. EPA, 1990. *National Contingency Plan*. United States Environmental Protection Agency. Washington, D.C.

U.S. EPA, 1991a. *Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Parameters*. Office of Solid Waste and Emergency Response, United States Environmental Protection Agency. Washington, D.C. June.

U.S. EPA, 1991b. *Role of the Baseline Risk Assessment in Superfund Remedy Selection Decisions*. Office of Solid Waste and Emergency Response, United States Environmental Protection Agency. Washington, D.C. OSWER Directive 9355.0-30. April 22. http://www.epa.gov/oerrpage/superfund/programs/risk/baseline.pdf

U.S. EPA, 1992a. *Dermal Exposure Assessment: Principles and Applications*. Office of Research and Development, United States Environmental Protection Agency. Washington, D.C. EPA/600/8-91/011B. January.

U.S. EPA, 1992b. *Guidance for Data Useability in Risk Assessment.* Part A, Final. Office of Emergency and Remedial Response, United States Environmental Protection Agency. Washington, D.C. April.

U.S. EPA, 1992c. *Supplemental Guidance to RAGS: Calculating the Concentration Term.* Office of Solid Waste and Emergency Response. Washington, D.C. May.

U.S. EPA, 1993. *Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons.* United States Environmental Protection Agency. EPA/600/R93/089, July.

U.S. EPA, 1995. *Final Water Quality Guidance for the Great Lakes System.* United States Environmental Protection Agency. Federal Register, March 23. Online at http://www.epa.gov/fedrgstr/EPA-WATER/1995/March/Day-23/pr-82.html

U.S. EPA, 1996. *PCBs: Cancer Dose-Response Assessment and Application to Environmental Mixtures*. National Center for Environmental Assessment, Office of Research and Development, United States Environmental Protection Agency. Washington, D.C. September.

U.S. EPA, 1997a. *Exposure Factors Handbook*. Office of Research and Development, United States Environmental Protection Agency. Washington, D.C. EPA/600/P-95/002/Fa. August.

U.S. EPA, 1997b. *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories. Volume 2: Risk Assessment and Fish Consumption Limits*. United States Environmental Protection Agency, Washington, D.C. EPA/823-B-97-009. July.

U.S. EPA, 1999. *National Recommended Water Quality Criteria—Correction*. Office of Water, United States Environmental Protection Agency. EPA 822-Z-99-001. April.

U.S. EPA, 2000. *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Interim Guidance*. Office of Emergency and Remedial Response, United States Environmental Protection Agency. Washington, D.C.

U.S. EPA, 2001a. *The Integrated Risk Information System (IRIS)*. United States Environmental Protection Agency, Washington, D.C. Online at http:/www.epa.gov/iris/intro.htm

U.S. EPA, 2001b. *Integrated Exposure Uptake Biokinetic Model for Lead in Children*. Technical Review Workgroup for Lead. United States Environmental Protection Agency.

U.S. EPA, 2001c. *National Primary Drinking Water Standards (40CFR141)*. Office of Water, United States Environmental Protection Agency, Washington, D.C. Online at http://www.epa.gov/safewater/mcl.html

U.S. EPA Region III, 1995. *Assessing Dermal Exposure from Soil*. Hazardous Waste Management Division, United States Environmental Protection Agency. EPA/903-K-95-003. Obtained online at http://www.epa.gov/reg3hwmd/risk/solabsg2.htm

U.S. EPA Region III, 2000. *EPA Region III Risk Based Concentration Table*. Philadelphia, PA. Updated October 5. Online at http://www.epa.gov/reg3hwmd/risk/riskmenu.htm.

U.S. EPA Region IV, 2000. *Region 4 Human Health Risk Assessment Bulletins—Supplement to RAGS*. United States Environmental Protection Agency. Updated May 30.

U.S. EPA Region VI, 1998. *Region 6 Interim Strategy: Arsenic- Freshwater Human Health Criterion for Fish Consumption*. United States Environmental Protection Agency.

U.S. EPA Region IX, 2000. *EPA Region IX Preliminary Remediation Goals*. San Francisco, CA. Updated Aug. 28. Online at http://www.epa.gov/region09/waste/sfund/prg/index.html

U.S. FDA, 1998. *Action Levels For Poisonous Or Deletrious Substances In Human Food and Animal Feed*. United States Food and Drug Administration. Obtained at http://vm.cfsan.fda.gov/~lrd/fdaact.html#merc

West, P.C., Fly, J.M., Larkin, F., and Marans, R. 1992. Minority anglers and toxic fish consumption- evidence from a statewide survey of Michigan. In: Bryant, B., Mohai, P. (eds.) *Race and the Incidence of Environmental Hazards: A Time for Discourse.* Boulder CO: Westview Press. p 100-113.

West, P.C., Fly, J.M., Marans, R., Larkin, F., and Rosenblatt, D. 1993. *1991-1992 Michigan Sport Anglers Fish Consumption Study: Final Report to the Michigan Department of Natural Resources*. University of Michigan School of Natural Resources, Natural Resource Sociology Research Lab. Ann Arbor, MI: Technical Report No. 6. May.

APPENDIX A

SELECTION OF CHEMICALS OF INTEREST FOR THE LOWER OTTAWA RIVER HUMAN HEALTH RISK ASSESSMENT

Table A-1. Chemical Data and COI Selection Criteria for Analytes in Sediment, Lower Ottawa River Human Health Risk Assessment

Chemical	CAS No.	Frequency of Detection	Minimum (mg/kg)	Maximum mg/kg)	Range of Detection Limits (mg/kg)	Risk-Based Concentration (mg/kg) (a,b)	Select as COI?
1,1'-Biphenyl	92-52-4	0/36	ND	ND	0.4-13	350	No (not detected)
1,2,4-Trichlorobenzene	120-82-1	0/121	ND	ND	0.021 - 1.6	650	No (not detected)
1,2-Dichlorobenzene	95-50-1	0/121	ND	ND	0.03 - 2.3	370	No (not detected)
1,3-Dichlorobenzene	541-73-1	0/121	ND	ND	0.035 - 2.7	13.0	No (not detected)
1,4-Dichlorobenzene	106-46-7	0/121	ND	ND	0.022 - 1.7	3.4	No (not detected)
2,2'-Oxybis(1-Chloropropane)	540-54-5	0/157	ND	ND	0.022 - 13	2.9	No (not detected)
2,4,5-Trichlorophenol	95-95-4	0/157	ND	ND	0.031 - 34	6100	No (not detected)
2,4,6-Tribromophenol	118-79-6	120/121	ND	8.5	NA	NA	No (no tox criteria)
2,4,6-Trichlorophenol	88-06-2	0/157	ND	ND	0.022 - 13	44	No (not detected)
2,4-Dichlorophenol	120-83-2	0/157	ND	ND	0.032 - 13	180	No (not detected)
2,4-Dimethylphenol	105-67-9	0/157	ND	ND	0.05 - 13	1200	No (not detected)
2,4-Dinitrophenol	51-28-5	0/157	ND	ND	0.057 - 34	120	No (not detected)
2,4-Dinitrotoluene	121-14-2	4/157	ND	3.2	0.039 - 13	120	No (less than RBC)
2,6-Dinitrotoluene	606-20-2	0/157	ND	ND	0.04 - 13	61	No (not detected)
2-Chloronaphthalene	91-58-7	0/157	ND	ND	0.016 - 13	390	No (not detected)
2-Chlorophenol	95-57-8	4/157	ND	4.5	0.036 - 13	63	No (less than RBC)
2-Fluorobiphenyl	321-60-8	120/121	ND	4.3	NA	NA	No (no tox criteria)
2-Fluorophenol	367-12-4	120/121	ND	5.4	NA	NA	No (no tox criteria)
2-Methylnaphthalene	91-57-6	0/157	ND	ND	0.02 - 13	NA	No (not detected)
2-Methylphenol	95-48-7	0/157	ND	ND	0.039 - 13	3100	No (not detected)
2-Nitroaniline	88-74-4	0/157	ND	ND	0.032 - 34	3.5	No (not detected)
2-Nitrophenol	88-75-5	0/157	ND	ND	0.032 - 13	490	No (not detected)
3,3'-Dichlorobenzidine	91-94-1	0/157	ND	ND	0.036 - 13	1.1	No (not detected)
3-Methylphenol & 4-Methylphenol	108-39-4 & 106-44-5	0/30	ND	ND	0.24 - 0.7	310	No (not detected)
3-Nitroaniline	99-09-2	0/157	ND	ND	0.039 - 34	3.5	No (not detected)
4,4'-DDD (p,p'-)	72-54-8	20/36	ND	0.04	0.004 - 0.01	2.4	No (less than RBC)
4,4'-DDE (p,p'-)	72-55-9	28/36	ND	0.055	0.004 - 0.01	1.7	No (less than RBC)
4,4'-DDT (p,p'-)	50-29-3	12/39	ND	0.04	0.002 - 0.01	1.7	No (less than RBC)
4,6-Dinitro-2-methylphenol (DNOC)	534-52-1	0/157	ND	ND	0.032 - 34	7.8	No (not detected)
4-Bromophenyl phenyl ether	101-55-3	0/157	ND	ND	0.029 - 13	NA	No (not detected)
4-Chloro-3-methylphenol	59-50-7	4/157	ND	5.1	0.032 - 13	3100	No (less than RBC)
4-Chloroaniline	106-47-8	0/157	ND	ND	0.035 - 13	240	No (not detected)
4-Chlorophenyl-phenylether	7005-72-3	0/157	ND	ND	0.021 - 13	NA	No (not detected)

Table A-1. Chemical Data and COI Selection Criteria for Analytes in Sediment, Lower Ottawa River Human Health Risk Assessment

Chemical	CAS No.	Frequency of Detection	Minimum (mg/kg)	Maximum mg/kg)	Range of Detection Limits (mg/kg)	Risk-Based Concentration (mg/kg) (a,b)	Select as COI?
4-Methylphenol	106-44-5	4/132	ND	2.6	0.039 - 13	310	No (less than RBC)
4-Nitroaniline	100-01-6	0/157	ND	ND	0.065 - 34	3.5	No (not detected)
4-Nitrophenol	100-02-7	4/157	ND	5.1	0.048 - 34	490	No (less than RBC)
Acenaphthene	83-32-9	5/157	ND	3.4	0.022 - 13	3700	No (less than RBC)
Acenaphthylene	208-96-8	0/157	ND	ND	0.02 - 13	2300	No (not detected)
Acetophenone	98-86-2	0/36	ND	ND	0.4 - 13	0.49	No (not detected)
Aldrin	309-00-2	25/39	ND	0.054	0.00085 - 0.0033	0.029	**Yes**
alpha-Benzene hexachloride (a-BHC)	319-84-6	1/36	ND	0.0039	0.0021 - 0.0052	0.09	No (less than RBC)
alpha-Chlordane	5103-71-9	22/36	ND	0.019	0.0021 - 0.0052	1.6	No (less than RBC)
Aluminum	7429-90-5	32/32	1030	21100	NA	76000	No (less than RBC)
Anthracene	120-12-7	6/157	ND	4.1	0.027 - 13	22000	No (less than RBC)
Antimony	7440-36-0	9/32	ND	2.3	0.52 - 1.4	31	No (less than RBC)
Arsenic	7440-38-2	151/153	ND	30.1	0.57 - 1.5	0.39	**Yes**
Atrazine	1912-24-9	0/36	ND	ND	0.4 - 13	2.2	No (not detected)
Barium	7440-39-3	150/153	ND	252	0.35 - 0.43	5400	No (less than RBC)
Benzaldehyde	100-52-7	0/36	ND	ND	0.4 - 13	6100	No (not detected)
Benzo(a)anthracene	56-55-3	37/157	ND	9	0.043 - 13	0.62	**Yes**
Benzo(a)pyrene	50-32-8	35/157	ND	8.1	0.043 - 13	0.062	**Yes**
Benzo(b)fluoranthene	205-99-2	45/157	ND	6.6	0.059 - 13	0.62	**Yes**
Benzo(g,h,i)perylene	191-24-2	28/157	ND	6.5	0.05 - 13	2300	No (less than RBC)
Benzo(k)fluoranthene	207-08-9	38/157	ND	7.2	0.049 - 0.13	6.2	**Yes**
Beryllium	7440-41-7	30/32	ND	1.2	0.049 - 0.13	150	No (less than RBC)
beta-Benzene hexachloride (b-BHC)	319-85-7	1/41	ND	0.0034	0.0021 - 0.036	0.32	No (less than RBC)
bis(2-Chloroethoxy) methane	111-91-1	0/157	ND	ND	0.026 - 13	0.21	No (not detected)
bis(2-Chloroethyl) ether	111-44-4	0/157	ND	ND	0.041 - 13	0.21	No (not detected)
bis(2-Ethylhexyl)phthalate	117-81-7	83/157	ND	220	0.046 - 13	34	**Yes**
Butylbenzylphthalate	85-68-7	1/157	ND	0.71	0.042 - 13	12000	No (less than RBC)
Cadmium	7440-43-9	121/153	ND	13.9	0.049 - 0.13	37	No (less than RBC)
Calcium	7440-70-2	32/32	2200	109000	NA	500000	No (less than RBC)
Caprolactam	105-60-2	0/36	ND	ND	0.4 - 13	31000	No (not detected)
Carbazole	86-74-8	2/157	ND	0.62	0.03 - 13	24	No (less than RBC)
Chromium	7440-47-3	153/153	2.7	403	NA	100000	No (less than RBC)
Chrysene	218-01-9	47/157	ND	9.1	0.036 - 13	62	No (less than RBC)

Table A-1. Chemical Data and COI Selection Criteria for Analytes in Sediment, Lower Ottawa River Human Health Risk Assessment

Chemical	CAS No.	Frequency of Detection	Minimum (mg/kg)	Maximum mg/kg)	Range of Detection Limits (mg/kg)	Risk-Based Concentration (mg/kg) (a,b)	Select as COI?
Cobalt	7440-48-4	32/32	0.62	18.8	NA	4700	No (less than RBC)
Copper	7440-50-8	32/32	1.1	172	NA	2900	No (less than RBC)
Cyanide	57-12-5	32/32	0.06	1.8	NA	11	No (less than RBC)
Decachlorobiphenyl	2051-24-3	121/122	ND	0.15	NA	NA	No (no tox criteria)
delta-Benzene hexachloride (d-BHC)	319-86-8	4/36	ND	0.019	0.0021 - 0.0052	0.09	No (less than RBC)
Dibenz(a,h)anthracene	53-70-3	11/157	ND	2.3	0.052 - 13	0.062	**Yes**
Dibenzofuran (C12H80)	132-64-9	1/157	ND	0.68	0.031 - 13	290	No (less than RBC)
Dieldrin	60-57-1	24/39	ND	0.039	0.0012 - 0.01	0.030	**Yes**
Diethylphthalate	84-66-2	1/157	ND	1.3	0.025 - 13	49000	No (less than RBC)
Dimethyl phthalate	131-11-3	0/157	ND	ND	0.02 - 13	100000	No (not detected)
Di-n-butylphthalate	84-74-2	0/157	ND	ND	0.024 - 13	6100	No (not detected)
Di-n-octylphthalate	117-84-0	11/157	ND	230	0.059 - 13	1200	No (less than RBC)
Endosulfan I	115-29-7	1/36	ND	0.013	0.0021 - 0.0052	370	No (less than RBC)
Endosulfan II	33213-65-9	6/36	ND	0.041	0.004 - 0.01	370	No (less than RBC)
Endosulfan sulfate	1031-07-8	0/36	ND	ND	0.004 - 0.01	370	No (not detected)
Endrin	72-20-8	4/39	ND	0.034	0.00099 - 0.01	18	No (less than RBC)
Endrin aldehyde	7421-93-4	0/36	ND	ND	0.004 - 0.01	18	No (not detected)
Endrin ketone	53494-70-5	9/36	ND	0.014	0.004 - 0.01	18	No (less than RBC)
Fluoranthene	206-44-0	69/157	ND	15	0.032 - 13	2300	No (less than RBC)
Fluorene	86-73-7	1/157	ND	1.5	0.025 - 13	2600	No (less than RBC)
gamma-Benzene hexachloride (g-BHC; Lindane)	58-89-9	4/39	ND	0.018	0.00049 - 0.0052	0.44	No (less than RBC)
gamma-Chlordane	12789-03-6	21/36	ND	0.024	0.0021 - 0.0052	1.6	No (less than RBC)
Heptachlor	76-44-8	12/39	ND	0.02	0.00053 - 0.0052	0.11	No (less than RBC)
Heptachlor epoxide	1024-57-3	21/36	ND	0.081	0.0021 - 0.0037	0.053	**Yes**
Hexachlorobenzene (HCB)	118-74-1	0/157	ND	ND	0.042 - 13	0.30	No (not detected)
Hexachlorobutadiene	87-68-3	0/157	ND	ND	0.05 - 13	6.2	No (not detected)
Hexachlorocyclopentadiene	77-47-4	0/157	ND	ND	0.032 - 13	420	No (not detected)
Hexachloroethane	67-72-1	0/157	ND	ND	0.027 - 13	35	No (not detected)
Indeno(1,2,3-cd)pyrene	193-39-5	29/157	ND	6.2	0.05 - 13	0.62	**Yes**
Isophorone	78-59-1	0/157	ND	ND	0.017 - 13	510	No (not detected)
Lead	7439-92-1	153/153	2.4	427	NA	400	**Yes**
Magnesium	7439-95-4	32/32	680	34400	NA	100000	No (less than RBC)
Manganese	7439-96-5	32/32	30.6	854	NA	1800	No (less than RBC)

Table A-1. Chemical Data and COI Selection Criteria for Analytes in Sediment, Lower Ottawa River Human Health Risk Assessment

Chemical	CAS No.	Frequency of Detection	Minimum (mg/kg)	Maximum mg/kg)	Range of Detection Limits (mg/kg)	Risk-Based Concentration (mg/kg) (a,b)	Select as COI?
Mercury	7439-97-6	110/153	ND	2.4	0.017 - 0.15	23	No (less than RBC)
Methoxychlor	72-43-5	1/36	ND	0.035	0.021 - 0.37	310	No (less than RBC)
Naphthalene	91-20-3	0/157	ND	ND	0.017 - 13	56	No (not detected)
Nickel	7440-02-0	32/32	2.1	62.3	NA	1600	No (less than RBC)
Nitrobenzene	98-95-3	0/157	ND	ND	0.05 - 13	20	No (not detected)
Nitrobenzene-d5	4165-60-0	120/121	ND	3.9	NA	NA	No (no tox criteria)
N-Nitroso-di-n-propylamine	621-64-7	4/157	ND	3.0	0.036 - 13	0.069	**Yes**
N-Nitrosodiphenylamine	86-30-6	0/157	ND	ND	0.035 - 13	99	No (not detected)
PCB Aroclor 1016	12674-11-2	12/157	ND	120	0.007 - 0.23	3.9	**Yes**
PCB Aroclor 1221	11104-28-2	0/157	ND	ND	0.014 - 28	3.9	No (not detected)
PCB Aroclor 1232	11141-16-5	0/157	ND	ND	0.01 - 7.7	3.9	No (not detected)
PCB Aroclor 1242	53469-21-9	118/157	ND	10	0.022 - 17	0.22	**Yes**
PCB Aroclor 1248	12672-29-6	4/157	ND	0.95	0.0049 - 3.8	0.22	**Yes**
PCB Aroclor 1254	11097-69-1	11/157	ND	1.4	0.01 - 7.8	0.22	**Yes**
PCB Aroclor 1260	11096-82-5	14/157	ND	0.19	0.0091 - 7	0.22	No (less than RBC)
Pentachlorophenol	87-86-5	2/155	ND	0.54	0.034 - 34	3.0	No (less than RBC)
Phenanthrene	85-01-8	31/157	ND	12	0.024 - 13	2300	No (less than RBC)
Phenol	108-95-2	4/157	ND	4.6	0.031 - 13	37000	No (less than RBC)
Phenol-d5	4165-62-2	120/121	ND	6.3	NA	NA	No (no tox criteria)
Pyrene	129-00-0	61/157	ND	14	0.037 - 13	2300	No (less than RBC)
Pyridine	110-86-1	0/57	ND	ND	NA	61	No (not detected)
Selenium	7782-49-2	93/153	ND	4.6	0.36 - 1.2	390	No (less than RBC)
Silver	7440-22-4	40/153	ND	3.9	0.15 - 1.1	390	No (less than RBC)
Terphenyl-d14	NA	120/121	ND	4.1	NA	NA	No (no tox criteria)
Tetrachloro-m-xylene	877-09-8	120/121	ND	1.5	NA	NA	No (no tox criteria)
Thallium	7440-28-0	30/32	ND	9.6	0.79 - 2.1	5.2	**Yes**
Toxaphene	8001-35-2	0/96	ND	ND	0.012 - 0.52	0.44	No (not detected)
Vanadium	7440-62-2	32/32	3	53.7	NA	55	No (less than RBC)
Zinc	7440-66-6	32/32	5.2	373	NA	23000	No (less than RBC)

(a) 4,6-Dinitro-2-methylphenol (DNOC) value from Region III RBC Tables (U.S. EPA Region III, 2000). All other values are from U.S. EPA Region IX (2000) except as indicated.

(b) Magnesium value calculated based on U.S. FDA Reference Daily Intake (RDI) of 400 mg/day and U.S. EPA Region 9 equations for calculation of PRGs

NA Not available

ND Not detected

Table A-2. Chemical Data and COI Selection Criteria for Analytes in Surface Water, Lower Ottawa River Human Health Risk Assessment

Chemical	CAS No.	Frequency of Detection	Minimum (µg/L)	Maximum (µg/L)	Range of Detection Limits (µg/L)	Risk-Based Concentration (µg/L)[a,b,c,d]	Select as COI?
1,1'-Biphenyl	92-52-4	1/21	ND	10	10 - 20	304	No (less than RBC)
2,2'-Oxybis(1-Chloropropane)	540-54-5	0/21	ND	ND	10 - 20	NA	No (not detected)
2,4,5-Trichlorophenol	95-95-4	0/21	ND	ND	25 - 50	3600	No (not detected)
2,4,6-Trichlorophenol	88-06-2	0/21	ND	ND	10 - 20	6.1	No (not detected)
2,4-Dichlorophenol	120-83-2	0/21	ND	ND	10 - 20	110	No (not detected)
2,4-Dimethylphenol	105-67-9	0/21	ND	ND	10 - 20	730	No (not detected)
2,4-Dinitrophenol	51-28-5	0/21	ND	ND	25 - 50	73	No (not detected)
2,4-Dinitrotoluene	121-14-2	2/21	ND	43	10	73	No (less than RBC)
2,6-Dinitrotoluene	606-20-2	0/21	ND	ND	10 - 20	36	No (not detected)
2-Chloronaphthalene	91-58-7	0/21	ND	ND	10 - 20	490	No (not detected)
2-Chlorophenol	95-57-8	2/21 (e)	ND	56	10	30	**Yes**
2-Methylnaphthalene	91-57-6	0/21	ND	ND	10 - 20	6.2	No (not detected)
2-Methylphenol	95-48-7	0/21	ND	ND	10 - 20	1800	No (not detected)
2-Nitroaniline	88-74-4	0/21	ND	ND	25 - 50	2.1	No (not detected)
2-Nitrophenol	88-75-5	0/21	ND	ND	10 - 20	290	No (not detected)
3,3'-Dichlorobenzidine	91-94-1	0/20	ND	ND	10 - 20	0.15	No (not detected)
3-Nitroaniline	99-09-2	0/21	ND	ND	25 - 50	2.1	No (not detected)
4,4'-DDD (p,p'-)	72-54-8	0/21	ND	ND	0.1	0.28	No (not detected)
4,4'-DDE (p.p'-)	72-55-9	0/21	ND	ND	0.1	0.2	No (not detected)
4,4'-DDT (p,p'-)	50-29-3	2/21 (e)	ND	0.39	0.1	0.20	**Yes**
4,6-Dinitro-2-methylphenol (DNOC)	534-52-1	0/21	ND	ND	25 - 50	NA	No (not detected)
4-Bromophenyl phenyl ether	101-55-3	0/21	ND	ND	10 - 20	NA	No (not detected)
4-Chloro-3-methylphenol	59-50-7	2/21 (e)	ND	65	10	1800	No (less than RBC)
4-Chloroaniline	106-47-8	0/21	ND	ND	10 - 20	150	No (not detected)
4-Chlorophenyl-phenylether	7005-72-3	0/21	ND	ND	10 - 20	NA	No (not detected)
4-Methylphenol	106-44-5	0/21	ND	ND	10 - 20	180	No (not detected)
4-Nitroaniline	100-01-6	0/21	ND	ND	25 - 50	2.1	No (not detected)
4-Nitrophenol	100-02-7	2/21	ND	67	25	290	No (less than RBC)
Acenaphthene	83-32-9	2/21	ND	41	10	370	No (less than RBC)
Acenaphthylene	208-96-8	0/21	ND	ND	10 - 20	180	No (not detected)
Acetophenone	98-86-2	0/21	ND	ND	10 - 20	0.042	No (not detected)
Aldrin	309-00-2	2/21 (e)	ND	0.22	0.05	0.0040	**Yes**
alpha-Benzene hexachloride (a-BHC)	319-84-6	0/21	ND	ND	0.05	0.011	No (not detected)

Table A-2. Chemical Data and COI Selection Criteria for Analytes in Surface Water, Lower Ottawa River Human Health Risk Assessment

Chemical	CAS No.	Frequency of Detection	Minimum (µg/L)	Maximum (µg/L)	Range of Detection Limits (µg/L)	Risk-Based Concentration (µg/L)[a,b,c,d]	Select as COI?
alpha-Chlordane	5103-71-9	0/21	ND	ND	0.05	0.1900	No (not detected)
Aluminum	7429-90-5	19/19	889	2790	NA	36000	No (less than RBC)
Ammonia	7664-41-7	18/18	ND	3700	NA	210	**Yes**
Anthracene	120-12-7	0/21	ND	ND	10 - 20	1800	No (not detected)
Arsenic	7440-38-2	3/19	ND	3.8	2.3	0.045	**Yes**
Atrazine	1912-24-9	1/21 (e)	ND	1	10 - 20	0.30	**Yes**
Barium	7440-39-3	19/19	54.2	90.6	NA	2600	No (less than RBC)
Benzaldehyde	100-52-7	0/20	ND	ND	10 - 20	3600	No (not detected)
Benzo[a]anthracene	56-55-3	0/19	ND	ND	10 - 20	0.092	No (not detected)
Benzo[a]pyrene	50-32-8	0/19	ND	ND	10 - 20	0.0092	No (not detected)
Benzo[b]fluoranthene	205-99-2	0/19	ND	ND	10 - 20	0.092	No (not detected)
Benzo[g,h,i]perylene	191-24-2	0/19	ND	ND	10 - 20	180	No (not detected)
Benzo[k]fluoranthene	207-08-9	0/19	ND	ND	10 - 20	0.92	No (not detected)
Beryllium	7440-41-7	0/19	ND	ND	0.2	73	No (not detected)
beta-Benzene hexachloride (b-BHC)	319-85-7	0/21	ND	ND	0.05	0.037	No (not detected)
bis(2-Chloroethoxy) methane	111-91-1	0/21	ND	ND	10 - 20	0.0098	No (not detected)
bis(2-Chloroethyl) ether	111-44-4	0/21	ND	ND	10 - 20	0.0098	No (not detected)
bis(2-Ethylhexyl)phthalate	117-81-7	3/20	ND	3	10 - 20	4.8	No (less than RBC)
Butylbenzylphthalate	85-68-7	0/20	ND	ND	10 - 20	7300	No (not detected)
Cadmium	7440-43-9	3/19	ND	0.3	0.2	18	No (less than RBC)
Calcium	7440-70-2	38/38	62000	123000	NA	500000	No (less than RBC)
Caprolactam	105-60-2	0/21	ND	ND	10 - 20	18000	No (not detected)
Carbazole	86-74-8	0/21	ND	ND	10 - 20	3.4	No (not detected)
Chromium	7440-47-3	19/19	1.5	5.4	NA	55000	No (less than RBC)
Chrysene	218-01-9	0/20	ND	ND	10 - 20	9.2	No (not detected)
Cobalt	7440-48-4	17/19	ND	1.7	0.5	2200	No (less than RBC)
Copper	7440-50-8	19/19	7.2	13.2	NA	1400	No (less than RBC)
delta-Benzene hexachloride (d-BHC)	319-86-8	0/21	ND	ND	0.05	0.011	No (not detected)
Dibenz[a,h]anthracene	53-70-3	0/19	ND	ND	10 - 20	0.0092	No (not detected)
Dibenzofuran (C12H80)	132-64-9	0/21	ND	ND	10 - 20	24	No (not detected)
Dieldrin	60-57-1	2/21 (e)	ND	0.48	0.1	0.0042	**Yes**
Diethylphthalate	84-66-2	0/21	ND	ND	10 - 20	29000	No (not detected)

Table A-2. Chemical Data and COI Selection Criteria for Analytes in Surface Water, Lower Ottawa River Human Health Risk Assessment

Chemical	CAS No.	Frequency of Detection	Minimum (µg/L)	Maximum (µg/L)	Range of Detection Limits (µg/L)	Risk-Based Concentration (µg/L)[a,b,c,d]	Select as COI?
Dimethyl phthalate	131-11-3	0/20	ND	ND	10 - 20	360000	No (not detected)
Di-n-butylphthalate	84-74-2	1/21 (e)	ND	4	10 - 20	3600	No (less than RBC)
Di-n-octylphthalate	117-84-0	0/19	ND	ND	10 - 20	730	No (not detected)
Endosulfan I	115-29-7	0/21	ND	ND	0.05	220	No (not detected)
Endosulfan II	33213-65-9	0/21	ND	ND	0.1	220	No (not detected)
Endosulfan sulfate	1031-07-8	0/21	ND	ND	0.1	220	No (not detected)
Endrin	72-20-8	2/21	ND	0.5	0.1	11	No (less than RBC)
Endrin aldehyde	7421-93-4	0/21	ND	ND	0	11	No (not detected)
Endrin ketone	53494-70-5	0/21	ND	ND	0.1	11	No (not detected)
Fluoranthene	206-44-0	0/21	ND	ND	10 - 20	1500	No (not detected)
Fluorene	86-73-7	0/21	ND	ND	10 - 20	240	No (not detected)
gamma-Benzene hexachloride (g-BHC; Lindane)	58-89-9	2/21 (e)	ND	0.21	0.05	0.052	**Yes**
gamma-Chlordane	12789-03-6	0/21	ND	ND	0.05	0.19	No (not detected)
Heptachlor	76-44-8	2/21 (e)	ND	0.2	0.05	0.015	**Yes**
Heptachlor epoxide	1024-57-3	0/21	ND	ND	0.05	0.0074	No (not detected)
Hexachlorobenzene (HCB)	118-74-1	0/21	ND	ND	10 - 20	0.042	No (not detected)
Hexachlorobutadiene	87-68-3	0/21	ND	ND	10 - 20	0.86	No (not detected)
Hexachlorocyclopentadiene	77-47-4	0/21	ND	ND	10 - 20	260	No (not detected)
Hexachloroethane	67-72-1	0/21	ND	ND	10 - 20	4.8	No (not detected)
Indeno[1,2,3-cd]pyrene	193-39-5	0/19	ND	ND	10 - 20	0.092	No (not detected)
Iron	7439-89-6	19/19	1470	4640	0	11000	No (less than RBC)
Isophorone	78-59-1	0/21	ND	ND	10 - 20	71	No (not detected)
Lead	7439-92-1	19/19	1.3	7.8	NA	15	No (less than RBC)
Magnesium	7439-95-4	38/38	13000	37000	NA	200000	No (less than RBC)
Manganese	7439-96-5	19/19	41.8	415	NA	880	No (less than RBC)
Mercury	7439-97-6	19/19	0.12	0.18	NA	11	No (less than RBC)
Methoxychlor	72-43-5	0/21	ND	ND	0.5	180	No (not detected)
Naphthalene	91-20-3	0/21	ND	ND	10 - 20	6.2	No (not detected)
Nickel	7440-02-0	19/19	4.1	9.2	NA	730	No (less than RBC)
Nitrobenzene	98-95-3	0/21	ND	ND	10 - 20	3.4	No (not detected)
Nitrate plus Nitrite		19/19	4580	10700	10 - 20	10000	**Yes**
N-Nitroso-di-n-propylamine	621-64-7	2/21 (e)	ND	37	10	0.0096	**Yes**

Table A-2. Chemical Data and COI Selection Criteria for Analytes in Surface Water, Lower Ottawa River Human Health Risk Assessment

Chemical	CAS No.	Frequency of Detection	Minimum (µg/L)	Maximum (µg/L)	Range of Detection Limits (µg/L)	Risk-Based Concentration (µg/L)[a,b,c,d]	Select as COI?
N-Nitrosodiphenylamine	86-30-6	0/21	ND	ND	10 - 20	14	No (not detected)
PCB Aroclor 1016	12674-11-2	0/21	ND	ND	1	0.96	No (not detected)
PCB Aroclor 1221	11104-28-2	0/21	ND	ND	2	0.034	No (not detected)
PCB Aroclor 1232	11141-16-5	0/21	ND	ND	1	0.034	No (not detected)
PCB Aroclor 1242	53469-21-9	0/21	ND	ND	1	0.034	No (not detected)
PCB Aroclor 1248	12672-29-6	0/21	ND	ND	1	0.034	No (not detected)
PCB Aroclor 1254	11097-69-1	0/21	ND	ND	1	0.034	No (not detected)
PCB Aroclor 1260	11096-82-5	0/21	ND	ND	1	0.034	No (not detected)
Pentachlorophenol	87-86-5	2/21 (e)	ND	79	25	0.56	**Yes**
Phenanthrene	85-01-8	0/21	ND	ND	10 - 20	180	No (not detected)
Phenol	108-95-2	2/21	ND	57	10	22000	No (less than RBC)
Phosphorus	7723-14-0	19/19	80	180	NA	500000	No (less than RBC)
Potassium	7440-09-7	19/19	4000	9950	NA	100000	No (less than RBC)
Pyrene	129-00-0	2/20	ND	41	10	180	No (less than RBC)
Selenium	7782-49-2	16/19	ND	8	2.2	180	No (less than RBC)
Silver	7440-22-4	0/19	ND	ND	0.6	180	No (not detected)
Sodium	7440-23-5	19/19	17000	73300	NA	100000	No (less than RBC)
Thallium	7440-28-0	1/19	ND	4.5	3.2	2.4	**Yes**
Toxaphene	8001-35-2	0/21	ND	ND	5	0.061	No (not detected)
Vanadium	7440-62-2	19/19	2.7	7.4	NA	260	No (less than RBC)
Zinc	7440-66-6	19/19	6.7	30.5	NA	11000	No (less than RBC)

(a) Ammonia value from Region III RBC Tables (U.S. EPA Region III, 2000). All other values are from U.S. EPA Region IX (2000) except as indicated.

(b) Calcium, Magnesium, and Potassium values calculated based on U.S. FDA Recommended Daily Intakes and Sodium value calculated based on U.S. FDA Daily Value, using U.S. EPA Region 9 PRG equations

(c) Nitrate value equivalent to U.S. EPA Ambient Water Quality Criteria for human health consumption of water + organism (U.S. EPA, 1999)

(d) Lead value equivalent to U.S. EPA lead action level (U.S. EPA, 2001c).

(e) All detected concentrations are estimated ("J" qualified) values

Table A-3. Chemical Data and COI Selection Criteria for Analytes in Fish, Lower Ottawa River Human Health Risk Assessment

Chemical	CAS No.	Frequency of Detection	Minimum (mg/kg)	Maximum (mg/kg)	Range of Detection Limits (mg/kg)	Background Maximum (mg/kg)	Risk-Based Concentration (mg/kg) [(a)]	Select as COI?
4,4'-DDD (p,p'-)	72-54-8	21/42	ND	0.18	0.00935-0.0104	0.0956	0.013	**Yes**
4,4'-DDE (p,p'-)	72-55-9	24/42	ND	0.175	0.00935-0.0104	0.222	0.093	**Yes**
4,4'-DDT (p,p'-)	50-29-3	27/84	ND	0.242	0.00935-0.0104	0.2965	0.093	**Yes**
Aldrin	309-00-2	1/42	ND	0.033	0.00935-0.0987	0.0261	0.00019	**Yes**
alpha-Benzene hexachloride (a-BHC)	319-84-6	0/42	ND	ND	0.00935-0.0104	ND	0.00050	No (not detected)
alpha-Chlordane	5103-71-9	6/42	ND	0.0307	0.00935-0.0104	ND	0.0090	**Yes**
Arsenic	7440-38-2	2/41	ND	0.255	0.159-0.196	ND	0.0021	**Yes**
beta-Benzene hexachloride (b-BHC)	319-85-7	0/42	ND	ND	0.00935-0.0104	ND	0.0018	No (not detected)
Cadmium	7440-43-9	0/41	ND	ND	0.0159-0.0196	0.0193	104	No (not detected)
Chlordane	12789-03-6	24/42	ND	0.455	NA	0.0759	0.0090	**Yes**
Chromium	7440-47-3	0/41	ND	ND	2.38-2.94	ND	2000	No (not detected)
cis-Nonachlor	5103-73-1	0/42	ND	ND	0.00935-0.0104	0.00888	0.009	No (not detected)
delta-Benzene hexachloride (d-BHC)	319-86-8	0/42	ND	ND	0.00935-0.0104	ND	0.0005	No (not detected)
Dieldrin	60-57-1	6/42	ND	0.0335	0.00935-0.0104	0.067	0.0002	**Yes**
Endosulfan I	115-29-7	0/42	ND	ND	0.00935-0.0104	ND	8.1	No (not detected)
Endosulfan II	33213-65-9	0/42	ND	ND	0.00935-0.0104	ND	8.1	No (not detected)
Endosulfan sulfate	1031-07-8	0/42	ND	ND	0.00935-0.0104	ND	8.1	No (not detected)
Endrin	72-20-8	0/42	ND	ND	0.00935-0.0104	ND	0.41	No (not detected)
gamma-Benzene hexachloride (g-BHC; Lindane)	58-89-9	0/42	ND	ND	0.00935-0.0104	ND	0.0024	No (not detected)
gamma-Chlordane	5103-74-2	24/42	ND	0.455	0.00935-0.0104	0.037	0.0090	**Yes**
Heptachlor	76-44-8	0/42	ND	ND	0.00935-0.0987	ND	0.00070	No (not detected)
Heptachlor epoxide	1024-57-3	0/42	ND	ND	0.00935-0.0104	0.00567	0.00035	No (not detected)
Hexachlorobenzene (HCB)	118-74-1	0/42	ND	ND	0.00935-0.0104	ND	0.002	No (not detected)
Lead	7439-92-1	0/41	ND	ND	0.159-0.196	ND	NA	No (not detected)
Mercury	7439-97-6	37/42	ND	0.123	0.0194-0.0239	0.112	0.14	No (less than RBC)
Methoxychlor	72-43-5	0/42	ND	ND	0.00935-0.0104	ND	6.8	No (not detected)
Mirex	2385-85-5	0/42	ND	ND	0.00935-0.0104	ND	0.27	No (not detected)
Oxychlordane	27304-13-8	0/42	ND	ND	0.00935-0.0104	0.00805	0.0090	No (not detected)
PCB Aroclor 1016	12674-11-2	0/42	ND	ND	0.0468-0.0518	ND	0.045	No (not detected)
PCB Aroclor 1221	11104-28-2	0/42	ND	ND	0.0468-0.0518	ND	0.0016	No (not detected)
PCB Aroclor 1232	11141-16-5	0/42	ND	ND	0.0468-0.0518	ND	0.0016	No (not detected)

Table A-3. Chemical Data and COI Selection Criteria for Analytes in Fish, Lower Ottawa River Human Health Risk Assessment

Chemical	CAS No.	Frequency of Detection	Minimum (mg/kg)	Maximum (mg/kg)	Range of Detection Limits (mg/kg)	Background Maximum (mg/kg)	Risk-Based Concentration (mg/kg) [(a)]	Select as COI?
PCB Aroclor 1242	53469-21-9	42/42	0.0649	22.5	NA	ND	0.0016	**Yes**
PCB Aroclor 1248	12672-29-6	0/42	ND	ND	0.0468-0.0518	ND	0.0016	No (not detected)
PCB Aroclor 1254	11097-69-1	0/42	ND	ND	0.0468-0.0518	1.85	0.0016	No (not detected)
PCB Aroclor 1260	11096-82-5	20/42	ND	0.666	0.0468-0.0518	2.34	0.0016	**Yes**
Selenium	7782-49-2	41/42	ND	0.688	NA	0.684	6.8	No (less than RBC)
Toxaphene	8001-35-2	0/42	ND	ND	0.0187-0.0207	ND	0.0029	No (not detected)
trans-Nonachlor	39765-80-5	2/42	ND	0.0134	0.00935-0.0104	0.0225	0.0090	**Yes**

(a) U.S. EPA Region III (2000)
NA Not available
ND Not detected

APPENDIX B

EXPOSURE POINT CONCENTRATION CALCULATIONS FOR THE LOWER OTTAWA RIVER HUMAN HEALTH RISK ASSESSMENT

Table B-1. Exposure Point Concentrations for Chemicals in Sediment
Lower Ottawa River Human Health Risk Assessment

Chemical	CAS No.	Frequency of Detection	Maximum Detect (mg/kg)	Maximum including Nondetects (mg/kg)	Arith Mean (mg/kg)	95% UCL (mg/kg)	RME/CT EPC (mg/kg)
Segment 1 (RM 0 to <3.2)							
Aldrin	309-00-2	14/18	0.020	0.020	0.011	0.037	0.020
Arsenic	7440-38-2	83/83	17	17	8.5	9.4	9.4
Benzo(a)anthracene	56-55-3	17/87	9.0	9.0	0.38	0.31	0.31
Benzo(a)pyrene	50-32-8	14/87	8.1	8.1	0.42	0.37	0.37
Benzo(b)fluoranthene	205-99-2	18/87	6.6	6.6	0.42	0.42	0.42
Benzo(k)fluoranthene	207-08-9	22/87	7.2	7.2	0.63	0.72	0.72
bis(2-Ethylhexyl)phthalate	117-81-7	40/87	4.7	6.5	0.85	2.1	2.1
Dibenz(a,h)anthracene	53-70-3	3/87	2.3	6.5	0.42	0.40	0.40
Dieldrin	60-57-1	11/18	0.039	0.039	0.014	0.046	0.039
Heptachlor epoxide	1024-57-3	12/16	0.025	0.025	0.012	0.040	0.025
Indeno(1,2,3-cd)pyrene	193-39-5	11/87	6.2	6.5	0.35	0.29	0.29
Lead	7439-92-1	83/83	189	189	91	113	113
N-Nitroso-di-n-propylamine	621-64-7	4/87	3.0	6.5	0.49	0.54	0.54
PCB Aroclor 1016	12674-11-2	0/87	ND	0.12	0.015	0.017	0.017
PCB Aroclor 1242	53469-21-9	78/87	4.1	4.1	0.87	1.8	1.8
PCB Aroclor 1248	12672-29-6	2/87	0.24	0.24	0.021	0.024	0.024
PCB Aroclor 1254	11097-69-1	0/87	ND	0.080	0.018	0.019	0.019
Total PCBs		80/87	4.5	4.5	0.99	1.3	1.3
Thallium	7440-28-0	12/12	9.6	9.6	4.5	6.2	6.2
Segment 2 (RM 3.2 to <4.9)							
Aldrin	309-00-2	6/9	0.045	0.045	0.016	0.28	0.045
Arsenic	7440-38-2	33/35	14	14	7.7	11	11
Benzo(a)anthracene	56-55-3	5/36	2.9	3.2	0.49	0.89	0.89
Benzo(a)pyrene	50-32-8	6/36	2.7	3.2	0.44	0.75	0.75
Benzo(b)fluoranthene	205-99-2	12/36	2.9	2.9	0.54	1.3	1.3
Benzo(k)fluoranthene	207-08-9	5/36	3.6	3.6	0.45	0.71	0.71
bis(2-Ethylhexyl)phthalate	117-81-7	26/36	11	11	2.5	20	11
Dibenz(a,h)anthracene	53-70-3	3/36	0.75	3.15	0.43	0.60	0.60
Dieldrin	60-57-1	5/9	0.030	0.030	0.013	0.064	0.030
Heptachlor epoxide	1024-57-3	6/9	0.081	0.081	0.023	0.65	0.081
Indeno(1,2,3-cd)pyrene	193-39-5	5/36	2.0	3.1	0.38	0.58	0.58
Lead	7439-92-1	35/35	427	427	141	363	363
N-Nitroso-di-n-propylamine	621-64-7	0/36	ND	3.6	0.53	1.0	1.0
PCB Aroclor 1016	12674-11-2	3/36	6.0	6.0	0.42	0.34	0.34
PCB Aroclor 1242	53469-21-9	25/36	3.4	3.4	0.81	4.4	3.4
PCB Aroclor 1248	12672-29-6	1/36	0.95	0.95	0.044	0.046	0.046
PCB Aroclor 1254	11097-69-1	1/36	0.23	0.23	0.035	0.048	0.048
Total PCBs		29/36	6.7	6.7	1.5	3.7	3.7
Thallium	7440-28-0	6/8	5.8	5.8	3.4	13	5.8

Table B-1. Exposure Point Concentrations for Chemicals in Sediment
Lower Ottawa River Human Health Risk Assessment

Chemical	CAS No.	Frequency of Detection	Maximum Detect (mg/kg)	Maximum including Nondetects (mg/kg)	Arith Mean (mg/kg)	95% UCL (mg/kg)	RME/CT EPC (mg/kg)
Segment 3 (RM 4.9 to <6.5)							
Aldrin	309-00-2	4/7	0.054	0.054	0.017	0.89	0.054
Arsenic	7440-38-2	18/18	30	30	7.1	9.1	9.1
Benzo(a)anthracene	56-55-3	7/17	2.5	2.5	0.82	12	2.5
Benzo(a)pyrene	50-32-8	7/17	3.0	3.0	0.90	12	3.0
Benzo(b)fluoranthene	205-99-2	7/17	3.9	3.9	1.1	23	3.9
Benzo(k)fluoranthene	207-08-9	7/17	3.4	3.4	1.0	17	3.4
bis(2-Ethylhexyl)phthalate	117-81-7	9/17	220	220	15	559	220
Dibenz(a,h)anthracene	53-70-3	2/17	0.89	6.5	1.4	18	6.5
Dieldrin	60-57-1	5/7	0.017	0.017	0.0086	0.020	0.017
Heptachlor epoxide	1024-57-3	2/7	0.040	0.040	0.0077	0.062	0.040
Indeno(1,2,3-cd)pyrene	193-39-5	7/17	2.6	2.6	0.84	9.9	2.6
Lead	7439-92-1	18/18	357	357	93	287	287
N-Nitroso-di-n-propylamine	621-64-7	17/17	6.5	6.5	1.5	66	6.5
PCB Aroclor 1016	12674-11-2	5/17	120	120	7.2	25	25
PCB Aroclor 1242	53469-21-9	7/17	3.4	8.5	1.2	115	8.5
PCB Aroclor 1248	12672-29-6	0/17	ND	1.9	0.13	0.33	0.33
PCB Aroclor 1254	11097-69-1	3/17	0.11	3.9	0.26	0.48	0.48
Total PCBs		12/17	156	156	10	50	50
Thallium	7440-28-0	8/8	4.9	4.9	3.6	4.6	4.6
Segment 4 (RM 6.5 to 8.8)							
Aldrin	309-00-2	1/5	0.0037	0.0037	0.0018	0.0037	0.0037
Arsenic	7440-38-2	17/17	21	21	6.5	8.4	8.4
Benzo(a)anthracene	56-55-3	8/17	2.3	2.3	0.66	5.9	2.3
Benzo(a)pyrene	50-32-8	8/17	2.4	2.4	0.74	6.1	2.4
Benzo(b)fluoranthene	205-99-2	8/17	3.0	3.0	0.98	14	3.0
Benzo(k)fluoranthene	207-08-9	4/17	3.0	3.0	0.55	3.1	3.0
bis(2-Ethylhexyl)phthalate	117-81-7	8/17	7.4	7.4	1.2	17	7.4
Dibenz(a,h)anthracene	53-70-3	3/17	0.64	2.8	0.34	0.87	0.87
Dieldrin	60-57-1	3/5	0.0071	0.0071	0.0047	0.015	0.0071
Heptachlor epoxide	1024-57-3	1/4	0.0054	0.0054	0.0023	0.039	0.0054
Indeno(1,2,3-cd)pyrene	193-39-5	6/17	2.1	2.1	0.53	3.3	2.1
Lead	7439-92-1	17/17	351	351	90	189	189
N-Nitroso-di-n-propylamine	621-64-7	0/17	ND	3.1	0.54	3.6	3.1
PCB Aroclor 1016	12674-11-2	4/17	2.0	2.0	0.23	1.3	1.3
PCB Aroclor 1242	53469-21-9	8/17	10	10	0.73	3.0	3.0
PCB Aroclor 1248	12672-29-6	1/17	0.63	0.63	0.050	0.11	0.11
PCB Aroclor 1254	11097-69-1	7/17	1.4	1.4	0.19	0.96	0.96
Total PCBs		13/17	12	12	1.3	4.0	4.0
Thallium	7440-28-0	4/4	2.8	2.8	2.3	4.1	2.8

Table B-2. Exposure Point Concentrations for Chemicals in Surface Water
Lower Ottawa River Human Health Risk Assessment

Chemical	CAS No.	Frequency of Detection	Maximum Detect (mg/L)	Maximum including Nondetects (mg/L)	Arith Mean (mg/L)	95% UCL (mg/kg)	RME/ CT EPC (mg/L)
Segment 1 (RM 0 to <3.2)							
2-Chlorophenol	95-57-8	2/11	0.056	0.056	0.014	0.029	0.029
4,4'-DDT (p,p'-)	50-29-3	2/11	0.00039	0.00039	0.00011	0.00021	0.00021
Aldrin	309-00-2	2/11	0.00022	0.00022	0.000060	0.00012	0.00012
Ammonia	7664-41-7	9/9	0.30	0.30	0.21	0.24	0.24
Arsenic	7440-38-2	2/9	0.0033	0.0033	0.0015	0.0021	0.0021
Atrazine	1912-24-9	1/11	0.001	0.010	0.0055	0.0090	0.0090
Dieldrin	60-57-1	2/11	0.00048	0.00048	0.00013	0.00026	0.00026
Di-n-butylphthalate	84-74-2	1/11	0.0040	0.010	0.0054	0.0061	0.0061
gamma-Benzene hexachloride	58-89-9	2/11	0.00021	0.00021	0.000058	0.00011	0.00011
Heptachlor	76-44-8	2/11	0.00020	0.00020	0.000056	0.00010	0.00010
Lead	7439-92-1	9/9	0.0078	0.0078	0.0064	0.0092	0.0078
N-Nitroso-di-n-propylamine	621-64-7	2/11	0.037	0.037	0.010	0.018	0.018
Pentachlorophenol	87-86-5	2/11	0.079	0.079	0.023	0.038	0.038
Thallium	7440-28-0	1/9	0.0045	0.0045	0.0019	0.0025	0.0025
Segment 2 (RM 3.2 to <4.9)							
2-Chlorophenol	95-57-8	0/4	ND	0.0050	0.0050	NA	0.0050
4,4'-DDT (p,p'-)	50-29-3	0/4	ND	0.000050	0.000050	NA	0.000050
Aldrin	309-00-2	0/4	ND	0.000025	0.000025	NA	0.000025
Ammonia	7664-41-7	4/4	0.30	0.30	0.21	0.35	0.30
Arsenic	7440-38-2	1/4	0.0038	0.0038	0.0018	0.012	0.0038
Atrazine	1912-24-9	0/4	ND	0.0050	0.0050	NA	0.0050
Dieldrin	60-57-1	0/4	ND	0.000050	0.000050	NA	0.000050
Di-n-butylphthalate	84-74-2	0/4	ND	0.0050	0.0050	NA	0.0050
gamma-Benzene hexachloride	58-89-9	0/4	ND	0.000025	0.000025	NA	0.000025
Heptachlor	76-44-8	0/4	ND	0.000025	0.000025	NA	0.000025
Lead	7439-92-1	4/4	0.0073	0.0073	0.0049	0.014	0.0073
N-Nitroso-di-n-propylamine	621-64-7	0/4	ND	0.0050	0.0050	NA	0.0050
Pentachlorophenol	87-86-5	0/4	ND	0.013	0.013	NA	0.013
Thallium	7440-28-0	0/4	ND	0.0016	0.0016	NA	0.0016

Table B-2. Exposure Point Concentrations for Chemicals in Surface Water
Lower Ottawa River Human Health Risk Assessment

Chemical	CAS No.	Frequency of Detection	Maximum Detect (mg/L)	Maximum including Nondetects (mg/L)	Arith Mean (mg/L)	95% UCL (mg/kg)	RME/ CT EPC (mg/L)
Segment 3 (RM 4.9 to <6.5)							
2-Chlorophenol	95-57-8	0/4	ND	0.0050	0.0050	NA	0.0050
4,4'-DDT (p,p'-)	50-29-3	0/4	ND	0.000050	0.000050	NA	0.000050
Aldrin	309-00-2	0/4	ND	0.000025	0.000025	NA	0.000025
Ammonia	7664-41-7	4/4	37	3.7	1.0	NA	3.7
Arsenic	7440-38-2	0/4	ND	0.0012	0.0012	NA	0.0012
Atrazine	1912-24-9	0/4	ND	0.0050	0.0050	NA	0.0050
Dieldrin	60-57-1	0/4	ND	0.000050	0.000050	NA	0.000050
Di-n-butylphthalate	84-74-2	0/4	ND	0.0050	0.0050	NA	0.0050
gamma-Benzene hexachloride	58-89-9	0/4	ND	0.000025	0.000025	NA	0.000025
Heptachlor	76-44-8	0/4	ND	0.000025	0.000025	NA	0.000025
Lead	7439-92-1	4/4	0.0059	0.0059	0.0039	0.034	0.0059
N-Nitroso-di-n-propylamine	621-64-7	0/4	ND	0.0050	0.0050	NA	0.0050
Pentachlorophenol	87-86-5	0/4	ND	0.013	0.013	NA	0.013
Thallium	7440-28-0	0/4	ND	0.0016	0.0016	NA	0.0016
Segment 4 (RM 6.5 to 8.8)							
2-Chlorophenol	95-57-8	0/2	ND	0.0050	0.0050	0.0050	0.0050
4,4'-DDT (p,p'-)	50-29-3	0/2	ND	0.000050	0.000050	0.000050	0.000050
Aldrin	309-00-2	0/2	ND	0.000025	0.000025	0.000025	0.000025
Arsenic	7440-38-2	0/2	ND	0.0012	0.0012	0.0012	0.0012
Atrazine	1912-24-9	0/2	ND	0.0050	0.0050	0.0050	0.0050
Dieldrin	60-57-1	0/2	ND	0.000050	0.000050	0.000050	0.000050
Di-n-butylphthalate	84-74-2	0/2	ND	0.0050	0.0050	0.0050	0.0050
gamma-Benzene hexachloride	58-89-9	0/2	ND	0.000025	0.000025	0.000025	0.000025
Heptachlor	76-44-8	0/2	ND	0.000025	0.000025	0.000025	0.000025
Lead	7439-92-1	2/2	ND	0.0024	0.0019	0.0024	0.0024
N-Nitroso-di-n-propylamine	621-64-7	0/2	ND	0.0050	0.0050	0.0050	0.0050
Pentachlorophenol	87-86-5	0/2	ND	0.013	0.013	0.013	0.013
Thallium	7440-28-0	0/2	ND	0.0016	0.0016	0.0016	0.0016

Table B-3. Exposure Point Concentrations for Chemicals in Fish
Lower Ottawa River Human Health Risk Assessment

Chemical	CAS No.	Frequency of Detection	Maximum Detect (mg/kg)	Maximum including Nondetects (mg/kg)	Arith Mean (mg/kg)	RME/CT EPC (mg/kg)
Segment 1 (RM 0 to <3.2)						
4,4'-DDD (p,p'-)	72-54-8	3/7	0.092	0.092	0.029	0.092
4,4'-DDE (p,p'-)	72-55-9	4/7	0.16	0.16	0.061	0.16
4,4'-DDT (p,p'-)	50-29-3	4/14	0.24	0.24	0.046	0.19
Aldrin	309-00-2	0/7	ND	0.0050	0.0048	0.0049
alpha-Chlordane	5103-71-9	1/7	0.030	0.030	0.0085	0.018
Arsenic	7440-38-2	1/7	0.26	0.26	0.12	0.049
Chlordane	12789-03-6	4/7	0.16	0.16	0.077	0.16
Dieldrin	60-57-1	1/7	0.033	0.033	0.0089	0.020
gamma-Chlordane	5103-74-2	4/7	0.13	0.13	0.042	0.13
PCB Aroclor 1242	53469-21-9	7/7	5.4	5.4	1.6	5.4
PCB Aroclor 1260	11096-82-5	3/7	0.40	0.40	0.17	0.40
Total PCBs		7/7	5.9	5.9	1.9	5.9
trans-Nonachlor	39765-80-5	0/7	ND	0.0050	0.0048	0.0049
Atrazine*	1912-24-9	NA	NA	NA	NA	0.60
Di-n-butylphthalate*	84-74-2	NA	NA	NA	NA	19
Thallium*	7440-28-0	NA	NA	NA	NA	0.25
2-Chlorophenol*	95-57-8	NA	NA	NA	NA	0.81
N-Nitroso-di-n-propylamine*	621-64-7	NA	NA	NA	NA	0.12
Pentachlorophenol*	87-86-5	NA	NA	NA	NA	183
Segment 2 (RM 3.2 to <4.9)						
4,4'-DDD (p,p'-)	72-54-8	3/7	0.046	0.046	0.016	0.046
4,4'-DDE (p,p'-)	72-55-9	5/7	0.11	0.11	0.035	0.11
4,4'-DDT (p,p'-)	50-29-3	4/14	0.15	0.15	0.026	0.070
Aldrin	309-00-2	0/7	ND	0.0050	0.0049	0.0049
alpha-Chlordane	5103-71-9	0/7	ND	0.0050	0.0049	0.0049
Arsenic	7440-38-2	1/7	0.22	0.22	0.11	0.045
Chlordane	12789-03-6	4/7	0.065	0.065	0.030	0.065
Dieldrin	60-57-1	0/14	0.0052	0.0052	0.0050	0.0051
gamma-Chlordane	5103-74-2	4/7	0.065	0.065	0.019	0.065
PCB Aroclor 1242	53469-21-9	7/7	2.6	2.6	1.0	2.6
PCB Aroclor 1260	11096-82-5	3/7	0.32	0.32	0.091	0.32
Total PCBs		7/7	2.8	2.8	1.2	2.8
trans-Nonachlor	39765-80-5	0/7	0.0050	0.0050	0.0049	0.0049
Atrazine*	1912-24-9	NA	NA	NA	NA	0.33
Di-n-butylphthalate*	84-74-2	NA	NA	NA	NA	16
Thallium*	7440-28-0	NA	NA	NA	NA	0.16
2-Chlorophenol*	95-57-8	NA	NA	NA	NA	16
N-Nitroso-di-n-propylamine*	621-64-7	NA	NA	NA	NA	0.034
Pentachlorophenol*	87-86-5	NA	NA	NA	NA	60

Table B-3. Exposure Point Concentrations for Chemicals in Fish
Lower Ottawa River Human Health Risk Assessment

Chemical	CAS No.	Frequency of Detection	Maximum Detect (mg/kg)	Maximum including Nondetects (mg/kg)	Arith Mean (mg/kg)	RME/CT EPC (mg/kg)
Segment 3 (RM 4.9 to <6.5)						
4,4'-DDD (p,p'-)	72-54-8	10/21	0.18	0.18	0.027	0.052
4,4'-DDE (p,p'-)	72-55-9	11/21	0.18	0.18	0.036	0.081
4,4'-DDT (p,p'-)	50-29-3	14/42	0.24	0.24	0.032	0.041
Aldrin	309-00-2	1/21	0.033	0.049	0.0092	0.012
alpha-Chlordane	5103-71-9	1/21	0.012	0.012	0.0052	0.0056
Arsenic	7440-38-2	0/20	ND	0.096	0.088	0.027
Chlordane	12789-03-6	11/21	0.46	0.46	0.10	0.21
Dieldrin	60-57-1	0/21	ND	0.0052	0.0049	0.0049
gamma-Chlordane	5103-74-2	11/21	0.46	0.46	0.056	0.16
PCB Aroclor 1242	53469-21-9	21/21	23	23	2.6	6.7
PCB Aroclor 1260	11096-82-5	9/21	0.67	0.67	0.16	0.38
Total PCBs		21/21	23	23	2.9	5.8
trans-Nonachlor	39765-80-5	0/21	ND	0.0052	0.0049	0.0049
Atrazine*	1912-24-9	NA	NA	NA	NA	0.33
Di-n-butylphthalate*	84-74-2	NA	NA	NA	NA	16
Thallium*	7440-28-0	NA	NA	NA	NA	0.16
2-Chlorophenol*	95-57-8	NA	NA	NA	NA	0.14
N-Nitroso-di-n-propylamine*	621-64-7	NA	NA	NA	NA	0.034
Pentachlorophenol*	87-86-5	NA	NA	NA	NA	60
Segment 4 (RM 6.5 to 8.8)						
4,4'-DDD (p,p'-)	72-54-8	5/7	0.091	0.091	0.041	0.091
4,4'-DDE (p,p'-)	72-55-9	5/7	0.13	0.13	0.060	0.13
4,4'-DDT (p,p'-)	50-29-3	5/14	0.20	0.20	0.052	0.20
Aldrin	309-00-2	0/7	ND	0.0050	0.0049	0.0050
alpha-Chlordane	5103-71-9	4/7	0.031	0.031	0.018	0.031
Arsenic	7440-38-2	0/7	ND	0.096	0.090	0.028
Chlordane	12789-03-6	5/7	0.076	0.076	0.052	0.076
Dieldrin	60-57-1	5/7	0.034	0.034	0.016	0.034
gamma-Chlordane	5103-74-2	5/7	0.035	0.035	0.019	0.035
PCB Aroclor 1242	53469-21-9	7/7	2.5	2.5	1.1	2.5
PCB Aroclor 1260	11096-82-5	5/7	0.45	0.45	0.19	0.45
Total PCBs		7/7	2.9	2.9	1.4	2.9
trans-Nonachlor	39765-80-5	2/7	0.013	0.013	0.0069	0.011
Atrazine*	1912-24-9	NA	NA	NA	NA	0.33
Di-n-butylphthalate*	84-74-2	NA	NA	NA	NA	16
Thallium*	7440-28-0	NA	NA	NA	NA	0.16
2-Chlorophenol*	95-57-8	NA	NA	NA	NA	0.14
N-Nitroso-di-n-propylamine*	621-64-7	NA	NA	NA	NA	0.034
Pentachlorophenol*	87-86-5	NA	NA	NA	NA	60

NA Not applicable

* Not analyzed in fish; Calculated from water concentration and BAF

APPENDIX C

EXPOSURE PARAMETERS USED IN THE LOWER OTTAWA RIVER HUMAN HEALTH RISK ASSESSMENT

Table C-1. Exposure Parameters Used in the Lower Ottawa River HHRA

Scenario: RME
Exposure Population: Adult recreator
Exposure Medium: Sediment

Parameter Code	Parameter Definition	Value	Units	Rationale	Reference
IR_{sed}	Sediment ingestion rate, adult recreator	50	mg/d	Average adult soil ingestion rate	U.S. EPA, 1991; 1997a
FI	Fraction of sediment ingested from a contaminated source	1	unitless	Assume 100%	Professional judgment
Sased	Skin surface area available for sediment contact during swimming or wading, adult recreator	4500	cm^2/event	Annual average: assume hands, forearms, feet, and lower legs for 50% of events and hands and forearms for 50% of events, based on upperbound total body surface area	U.S. EPA, 1997a (Tables 6-4 and 6-14)
AF	Sediment to skin adherence factor	0.2	mg/cm^2	Reasonable upper-bound adherence factor for all exposed skin	U.S. EPA, 2000
ABS	Dermal absorption factor for skin surface contact with sediment	chemical-specific	unitless	Chemical-specific	Chemical-specific
EF	Exposure frequency, adult recreator	24	events/yr	4 d/month for 4 months and 1 d/month for 8 months	Professional judgment
ED	Exposure duration, adult recreator	17	yr	National upper-bound time (95th percentile) at one residence (30 years less child exposure)	U.S. EPA, 1997a
AT_{ncar}	Averaging time, noncarcinogens	6205	d	Equal to exposure duration for noncarcinogens	U.S. EPA, 1989
AT_{car}	Averaging time, carcinogens	25550	d	Equal to 70 years (lifetime) for carcinogens	U.S. EPA, 1989
BW	Body weight, adult recreator	70	kg	General adult population average	U.S. EPA, 1991a; 1997a

Table C-2. Exposure Parameters Used in the Lower Ottawa River HHRA

Scenario: RME
Exposure Population: Adult recreator
Exposure Medium: Surface Water

Parameter Code	Parameter Definition	Value	Units	Rationale	Reference
IR_{water}	Surface water ingestion rate, adult recreator	0.05	L/hr	Default incidental water ingestion rate	U.S. EPA, 1989
FI	Fraction of surface water ingested from a contaminated source	1	unitless	Assume 100%	Professional judgment
SA_{water}	Skin surface area available for surface water contact during swimming or wading, adult recreator	12700	cm^2/event	Annual average: assume total body surface area for 50% of the events (swimming/ wading) and hands and forearms only for 50 % of the events; based on upperbound adult body surface area	U.S. EPA, 1997a (Tables 6-4 and 6-14)
K_p	Percutaneous absorption rate for skin surface contact with water	chemical-specific	cm/hour	Chemical-specific	Chemical-specific
ET	Exposure time to surface water during swimming or wading, adult recreator	3	hr/event	Based on mean 24-hour cumulative time spent outdoors at pool, river, lake by 18-64 yr olds and 95%ile time per swimming event	U.S. EPA, 1997a (Table 15-110 and p. 15-17)
EF	Exposure frequency, adult recreator	24	events/yr	4 d/month for 4 months and 1 d/month for 8 months	Professional judgment
ED	Exposure duration, adult recreator	17	yr	National upper-bound time (95th percentile) at one residence (30 years less child exposure)	U.S. EPA, 1997a
AT_{ncar}	Averaging time, noncarcinogens	6205	d	Equal to exposure duration for noncarcinogens	U.S. EPA, 1989
AT_{car}	Averaging time, carcinogens	25550	d	Equal to 70 years (lifetime) for carcinogens	U.S. EPA, 1989
BW	Body weight, adult recreator	70	kg	General adult population average	U.S. EPA, 1991; 1997a

Table C-3. Exposure Parameters Used in the Lower Ottawa River HHRA

Scenario: RME
Exposure Population: Adult boater/angler
Exposure Medium: Surface water

Parameter Code	Parameter Definition	Value	Units	Rationale	Reference
SA_{water}	Skin surface area available for surface water contact during boating	4500	cm^2/event	Annual average: assume hands, forearms, feet, and lower legs for 50% of events and hands and forearms for 50% of events, based on upperbound total body surface area	U.S. EPA, 1997a (Tables 6-4 and 6-14)
K_p	Percutaneous absorption rate for skin surface contact with water	chemical-specific	cm/hour	Chemical-specific	Chemical-specific
ET	Exposure time to surface water during swimming or wading, adult boater/angler	6	hr/event	Based on upper bounds from Ohio Boating Survey (Tables 5a and 5b)	Hushak, 2000
EF	Exposure frequency to surface water, adult boater/angler	60	events/yr	Based on upper bounds from Ohio Boating Survey (Tables 5a and 5b)	Hushak, 2000
ED	Exposure duration, adult boater/ angler	17	yr	National upper-bound time (95th percentile) at one residence (30 years less child exposure)	U.S. EPA, 1997a
AT_{ncar}	Averaging time, noncarcinogens	6205	d	Equal to exposure duration for noncarcinogens	U.S. EPA, 1989
AT_{car}	Averaging time, carcinogens	25550	d	Equal to 70 years (lifetime) for carcinogens	U.S. EPA, 1989
BW	Body weight, adult boater/angler	70	kg	General adult population average	U.S. EPA, 1991; 1997a

Table C-4. Exposure Parameters Used in the Lower Ottawa River HHRA

Scenario: RME
Exposure Population: Child recreator
Exposure Medium: Sediment

Parameter Code	Parameter Definition	Value	Units	Rationale	Reference
IR_{sed}	Sediment ingestion rate, child recreator	200	mg/d	Standard default soil ingestion rate for child age 1-6	U.S. EPA, 1991
FI	Fraction of sediment ngested from a contaminated source	1	unitless	Assume 100%	Professional judgment
SA_{sed}	Skin surface area available for sediment contact during swimming or wading, child recreator	2300	cm^2/event	Annual average: assume hands, forearms, feet, and lower legs for 50% of events and hands and forearms for 50% of events, based on upperbound total body surface area	U.S. EPA, 1997a (Tables 6-4 and 6-14)
AF	Sediment to skin adherence factor	0.2	mg/cm^2	Reasonable upper-bound adherence factor for all exposed skin	U.S. EPA, 2000
ABS	Dermal absorption factor for skin surface contact with sediment	chemical-specific	unitless	Chemical-specific	Chemical-specific
EF	Exposure frequency to sediment, child recreator	48	event/yr	8 days/month for 4 months and 2 days/month for 8 months	Professional judgment
ED	Exposure duration, child recreator	13	yr	Total exposure duration, child 1 to 14 years	Professional judgment
AT_{ncar}	Averaging time, noncarcinogens	4745	d	Equal to exposure duration for noncarcinogens	U.S. EPA, 1989
AT_{car}	Averaging time, carcinogens	25550	d	Equal to 70 years (lifetime) for carcinogens	U.S. EPA, 1989
BW	Body weight, child recreator	30	kg	Population mean for children (1 to 14 years), NHANES III	U.S. EPA, 1997a

Table C-5. Exposure Parameters Used in the Lower Ottawa River HHRA

Scenario: RME
Exposure Population: Child recreator
Exposure Medium: Surface water

Parameter Code	Parameter Definition	Value	Units	Rationale	Reference
IR_{water}	Surface water incidental ingestion rate, child recreator	0.05	L/hr	Default incidental water ingestion rate	U.S. EPA, 1989
FI	Fraction of sediment or surface water ingested from a contaminated source	1	unitless	Assume 100%	Professional judgment
SA_{water}	Skin surface area available for surface water contact during swimming or wading, child recreator	6800	cm^2/event	Annual average: assume total body surface area for 50% of the events (swimming/ wading) and hands and forearms only for 50% of the events; based on upperbound child 2-14 yrs old surface area	U.S. EPA, 1997a (Tables 6-4 and 6-14)
K_p	Percutaneous absorption rate for skin surface contact with water	chemical-specific	cm/hour	Chemical-specific	Chemical-specific
ET	Exposure time to surface water, child recreator	3	hr/event	Based on mean 24-hour cumulative time spent outdoors at pool, river, lake by 1 -17 yr olds and 95%ile time per swimming event	U.S. EPA, 1997a (Table 15-110 and p. 15-17)
EF	Exposure frequency to surface water, child recreator	48	event/yr	8 days/month for 4 months and 2 days/month for 8 months	Professional judgment
ED	Exposure duration, child recreator	13	yr	Total exposure duration, child 1 to 14 years	Professional judgment
AT_{ncar}	Averaging time, noncarcinogens	4745	d	Equal to exposure duration for noncarcinogens	U.S. EPA, 1989
AT_{car}	Averaging time, carcinogens	25550	d	Equal to 70 years (lifetime) for carcinogens	U.S. EPA, 1989
BW	Body weight, child recreator	30	kg	Population mean for children (1 to 14 years), NHANES III	U.S. EPA, 1997a

Table C-6. Exposure Parameters Used in the Lower Ottawa River HHRA

Scenario: RME
Exposure Population: Child boater/ angler
Exposure Medium: Surface water

Parameter Code	Parameter Definition	Value	Units	Rationale	Reference
SA_{water}	Skin surface area available for surface water contact during boating	2300	cm^2/event	Annual average: assume hands, forearms, feet, and lower legs for 50% of events and hands and forearms for 50% of events, based on upperbound total body surface area	Professional judgment
K_p	Percutaneous absorption rate for skin surface contact with water	chemical-specific	cm/hour	Chemical-specific	Chemical-specific
ET	Exposure time to surface water during boating, adult recreator	6	hr/event	Based on upper bounds from Ohio Boating Survey (Tables 5a and 5b)	Hushak, 2000
EF	Exposure frequency to surface water during boating, child recreator	30	events/yr	Based on upper bounds from Ohio Boating Survey (Tables 5a and 5b)	Hushak, 2000
ED	Exposure duration, child recreator	13	yr	Total exposure duration, child 1 to 14 years	Professional judgment
AT_{ncar}	Averaging time, noncarcinogens	4745	d	Equal to exposure duration for noncarcinogens	U.S. EPA, 1989
AT_{car}	Averaging time, carcinogens	25550	d	Equal to 70 years (lifetime) for carcinogens	U.S. EPA, 1989
BW	Body weight, child recreator	30	kg	Population mean for children (1 to 14 years), NHANES III	U.S. EPA, 1997a

Table C-7. Exposure Parameters Used in the Lower Ottawa River HHRA

Scenario: RME
Exposure Population: Adult Fish Consumer
Exposure Medium: Fish

Parameter Code	Parameter Definition	Value	Units	Rationale	Reference
IR_{fish}	Sport fish consumption rate, adult	41	g/d	Upper bound sport fish consumption rate for Michigan survey (appx equal to 60 8oz fish meals per year)	West *et al*., 1992 in CalEPA, 1997
FI	Fraction of fish consumed from a contaminated source	1	unitless	Assume 100% since ingestion rate is based on sport fish consumption	Professional judgment
EF	Exposure frequency to locally caught fish	365	d/yr	Consumption rates are based on annual average	---
ED	Exposure duration, adult fish consumer	17	yr	National upper-bound time (95th percentile) at one residence	U.S. EPA, 1997a
AT_{ncar}	Averaging time, noncarcinogens	10950	d	Equal to exposure duration for noncarcinogens	U.S. EPA, 1989
AT_{car}	Averaging time, carcinogens	25550	d	Equal to 70 years (lifetime) for carcinogens	U.S. EPA, 1989
$BW_{adult\text{-}male}$	Body weight, adult male fish consumer	70	kg	General adult population average	U.S. EPA, 1991a; 1997a

Table C-8. Exposure Parameters Used in the Lower Ottawa River HHRA

Scenario: RME
Exposure Population: Child Fish Consumer
Exposure Medium: Fish

Parameter Code	Parameter Definition	Value	Units	Rationale	Reference
IR_{fish}	Sport fish consumption rate, child	18	g/d	Upper bound sport fish consumption rate for Michigan survey, adjusted for body weight-- weighted by age group and number of respondents	West *et al*., 1992 in CalEPA, 1997
FI	Fraction of fish consumed from a contaminated source	1	unitless	Assume 100% since ingestion rate is based on sport fish consumption	Professional judgment
EF	Exposure frequency to locally caught fish	365	d/yr	Consumption rates are based on annual average	---
ED	Exposure duration, child fish consumer	13	yr	Total exposure duration, child 1 to 14 years	Professional judgment
AT_{ncar}	Averaging time, noncarcinogens	4745	d	Equal to exposure duration for noncarcinogens	U.S. EPA, 1989
AT_{car}	Averaging time, carcinogens	25550	d	Equal to 70 years (lifetime) for carcinogens	U.S. EPA, 1989
BW	Body weight, child fish consumer	30	kg	Population mean for children (1 to 14 years), NHANES III	U.S. EPA, 1997a

Table C-9. Exposure Parameters Used in the Lower Ottawa River HHRA

Scenario: CT
Exposure Population: Adult recreator
Exposure Medium: Sediment

Parameter Code	Parameter Definition	Value	Units	Rationale	Reference
IR_{sed}	Sediment ingestion rate, adult recreator	50	mg/d	Average adult soil ingestion rate	U.S. EPA, 1991; 1997a
FI	Fraction of sediment ingested from a contaminated source	0.5	unitless	Assume 50%	Professional judgment
SA_{sed}	Skin surface area available for sediment contact during swimming or wading, adult recreator	3500	cm^2/event	Annual average: assume hands, forearms, feet, and lower legs for 50% of events and hands and forearms for 50% of events, based on upperbound total body surface area	U.S. EPA, 1997a (Tables 6-4 and 6-14)
AF	Sediment to skin adherence factor	0.1	mg/cm^2	Reasonable average adherence factor for all exposed skin	U.S. EPA, 2000
ABS	Dermal absorption factor for skin surface contact with sediment	chemical-specific	unitless	Chemical-specific	Chemical-specific
EF	Exposure frequency, adult recreator	16	events/yr	Approximately 2 d/month for 4 months + 1 d/month for 8 months	Professional judgment
ED	Exposure duration, adult recreator	9	yr	Average time at one residence	U.S. EPA, 1997a
AT_{ncar}	Averaging time, noncarcinogens	3285	d	Equal to exposure duration for noncarcinogens	U.S. EPA, 1989
AT_{car}	Averaging time, carcinogens	25550	d	Equal to 70 years (lifetime) for carcinogens	U.S. EPA, 1989
BW	Body weight, adult recreator	70	kg	General adult population average	U.S. EPA, 1991; 1997a

Table C-10. Exposure Parameters Used in the Lower Ottawa River HHRA

Scenario: CT
Exposure Population: Adult recreator
Exposure Medium: Surface Water

Parameter Code	Parameter Definition	Value	Units	Rationale	Reference
IR_{water}	Surface water ingestion rate, adult recreator	0.05	L/hr	Default incidental water ingestion rate	U.S. EPA, 1989
FI	Fraction of surface water ingested from a contaminated source	0.5	unitless	Assume 50%	Professional judgment
SA_{water}	Skin surface area available for surface water contact during swimming or wading, adult recreator	11000	cm^2/event	Annual average: assume total body surface area for 50% of the events (swimming/ wading) and hands and forearms only for 50% of the events; based on mean adult body surface area	U.S. EPA, 1997a (Tables 6-4 and 6-14)
K_p	Percutaneous absorption rate for skin surface contact with water	chemical-specific	cm/hour	Chemical-specific	Chemical-specific
ET	Exposure time to surface water during swimming or wading, adult recreator	1	hr/event	Based on 50%ile time per swimming event	U.S. EPA, 1997a (Table 15-110 and p. 15-17)
EF	Exposure frequency, adult recreator	16	events/yr	Approximately 2 d/month for 4 months + 1 d/month for 8 months	Professional judgment
ED	Exposure duration, adult recreator	9	yr	Average time at one residence	U.S. EPA, 1997a
AT_{ncar}	Averaging time, noncarcinogens	3285	d	Equal to exposure duration for noncarcinogens	U.S. EPA, 1989
AT_{car}	Averaging time, carcinogens	25550	d	Equal to 70 years (lifetime) for carcinogens	U.S. EPA, 1989
BW	Body weight, adult recreator	70	kg	General adult population average	U.S. EPA, 1991; 1997a

Table C-11. Exposure Parameters Used in the Lower Ottawa River HHRA

Scenario: CT
Exposure Population: Adult boater/angler
Exposure Medium: Surface water

Parameter Code	Parameter Definition	Value	Units	Rationale	Reference
SA_{water}	Skin surface area available for surface water contact during boating	3500	cm^2/event	Annual average: assume hands, forearms, feet, and lower legs for 50% of events and hands and forearms for 50% of events, based on upperbound total body surface area	U.S. EPA, 1997a (Tables 6-4 and 6-14)
K_p	Percutaneous absorption rate for skin surface contact with water	chemical-specific	cm/hour	Chemical-specific	Chemical-specific
ET	Exposure time to surface water during swimming or wading, adult boater/angler	4.3	hr/event	Based on weighted arithmetic mean from Ohio Boating Survey (Table 5a and 5b)	Hushak, 2000
EF	Exposure frequency to surface water, adult boater/angler	26.3	events/yr	Based on weighted arithmetic mean from Ohio Boating Survey (Table 5a and 5b)	Hushak, 2000
ED	Exposure duration, adult boater/ angler	9	yr	Average time at one residence	U.S. EPA, 1997a
AT_{ncar}	Averaging time, noncarcinogens	3285	d	Equal to exposure duration for noncarcinogens	U.S. EPA, 1989
AT_{car}	Averaging time, carcinogens	25550	d	Equal to 70 years (lifetime) for carcinogens	U.S. EPA, 1989
BW	Body weight, adult boater/angler	70	kg	General adult population average	U.S. EPA, 1991; 1997a

Table C-12. Exposure Parameters Used in the Lower Ottawa River HHRA

Scenario: CT
Exposure Population: Child recreator
Exposure Medium: Sediment

Parameter Code	Parameter Definition	Value	Units	Rationale	Reference
IR_{sed}	Sediment ingestion rate, child recreator	140	mg/d	Average standard default soil ingestion rates for child age 1-6 and 7-14	U.S. EPA, 1991; Professional judgment
FI	Fraction of sediment ngested from a contaminated source	0.5	unitless	Assume 50%	Professional judgment
SA_{sed}	Skin surface area available for sediment contact during swimming or wading, child recreator	2200	cm^2/event	Annual average: assume total body surface area for 50% of the events (swimming/ wading) and hands and forearms only for 50% of the events; based on median child 2-14 yrs old surface area	U.S. EPA, 1997a (Tables 6-4 and 6-14)
AF	Sediment to skin adherence factor	0.1	mg/cm^2	Reasonable average adherence factor for all exposed skin	U.S. EPA, 2000
ABS	Dermal absorption factor for skin surface contact with sediment	chemical-specific	unitless	Chemical-specific	Chemical-specific
EF	Exposure frequency to sediment, child recreator	30	events/yr	Approximately 4 d/mth for 4 months + 2 d/mth for 4 months + 1 d/mth for 4 months	Professional judgment
ED	Exposure duration, child recreator	9	yr	Average time at one residence	U.S. EPA, 1997a
AT_{ncar}	Averaging time, noncarcinogens	3285	d	Equal to exposure duration for noncarcinogens	U.S. EPA, 1989
AT_{car}	Averaging time, carcinogens	25550	d	Equal to 70 years (lifetime) for carcinogens	U.S. EPA, 1989
BW	Body weight, child recreator	30	kg	Population mean for children (1 to 14 years), NHANES III	U.S. EPA, 1997a

Table C-13. Exposure Parameters Used in the Lower Ottawa River HHRA

Scenario: CT
Exposure Population: Child recreator
Exposure Medium: Surface water

Parameter Code	Parameter Definition	Value	Units	Rationale	Reference
IR_{water}	Surface water incidental ingestion rate, child recreator	0.05	L/hr	Default incidental water ingestion rate	U.S. EPA, 1989
FI	Fraction of sediment or surface water ingested from a contaminated source	0.5	unitless	Assume 50%	Professional judgment
SA_{water}	Skin surface area available for surface water contact during swimming or wading, child recreator	5500	cm^2/event	Annual average: assume total body surface area for 50% of the events (swimming/ wading) and hands and forearms only for 50% of the events; based on upperbound child 2-14 yrs old surface area	U.S. EPA, 1997a (Tables 6-4 and 6-14)
K_p	Percutaneous absorption rate for skin surface contact with water	chemical-specific	cm/hour	Chemical-specific	Chemical-specific
ET	Exposure time to surface water, child recreator	1	hr/event	Based on 50%ile time per swimming event	U.S. EPA, 1997a (Table p. 15-17 and Table 15-18)
EF	Exposure frequency to surface water, child recreator	30	events/yr	Approximately 4 d/mth for 4 months + 2 d/mth for 4 months + 1 d/mth for 4 months	Professional judgment
ED	Exposure duration, child recreator	9	yr	Average time at one residence	U.S. EPA, 1997a
AT_{ncar}	Averaging time, noncarcinogens	3285	d	Equal to exposure duration for noncarcinogens	U.S. EPA, 1989
AT_{car}	Averaging time, carcinogens	25550	d	Equal to 70 years (lifetime) for carcinogens	U.S. EPA, 1989
BW	Body weight, child recreator	30	kg	Population mean for children (1 to 14 years), NHANES III	U.S. EPA, 1997a

Table C-14. Exposure Parameters Used in the Lower Ottawa River HHRA

Scenario: CT
Exposure Population: Child boater/ angler
Exposure Medium: Surface water

Parameter Code	Parameter Definition	Value	Units	Rationale	Reference
SA_{water}	Skin surface area available for surface water contact during boating	2200	cm^2/event	Annual average: assume hands, forearms, feet, and lower legs for 50% of events and hands and forearms for 50% of events, based on median child 2-14 years old total body surface area	Professional judgment
K_p	Percutaneous absorption rate for skin surface contact with water	chemical-specific	cm/hour	Chemical-specific	Chemical-specific
ET	Exposure time to surface water during boating, adult recreator	6	hr/event	Based on upper bounds from Ohio Boating Survey (Tables 5a and 5b)	Hushak, 2000
EF	Exposure frequency to surface water during boating, child recreator	30	events/yr	Based on upper bounds from Ohio Boating Survey (Tables 5a and 5b)	Hushak, 2000
ED	Exposure duration, child recreator	9	yr	Average time at one residence	U.S. EPA, 1997a
AT_{ncar}	Averaging time, noncarcinogens	3285	d	Equal to exposure duration for noncarcinogens	U.S. EPA, 1989
AT_{car}	Averaging time, carcinogens	25550	d	Equal to 70 years (lifetime) for carcinogens	U.S. EPA, 1989
BW	Body weight, child recreator	30	kg	Population mean for children (1 to 14 years), NHANES III	U.S. EPA, 1997a

Table C-15. Exposure Parameters Used in the Lower Ottawa River HHRA

Scenario: CT
Exposure Population: Adult Fish Consumer
Exposure Medium: Fish

Parameter Code	Parameter Definition	Value	Units	Rationale	Reference
IR_{fish}	Sport fish consumption rate, adult	7.3	g/d	Mean sport fish consumption rate for Michigan survey (appx equal to 10 8 oz. fish meals per year)	West *et al*., 1992 in CalEPA, 1997
FI	Fraction of fish consumed from a contaminated source	1	unitless	Assume 100% since ingestion rate is based on sport fish consumption	Professional judgment
EF	Exposure frequency to locally caught fish	365	d/yr	Consumption rates are based on annual average	---
ED	Exposure duration, adult fish consumer	9	yr	Average time at one residence	U.S. EPA, 1997a
AT_{ncar}	Averaging time, noncarcinogens	3285	d	Equal to exposure duration for noncarcinogens	U.S. EPA, 1989
AT_{car}	Averaging time, carcinogens	25550	d	Equal to 70 years (lifetime) for carcinogens	U.S. EPA, 1989
$BW_{adult\text{-}male}$	Body weight, adult male fish consumer	70	kg	Population mean for males (18-74 years), NHANES III	U.S. EPA, 1997a

Table C-16. Exposure Parameters Used in the Lower Ottawa River HHRA

Scenario: CT
Exposure Population: Child Fish Consumer
Exposure Medium: Fish

Parameter Code	Parameter Definition	Value	Units	Rationale	Reference
IR_{fish}	Sport fish consumption rate, child	3.1	g/d	Mean sport fish consumption rate for Michigan survey, adjusted for body weight-- *population specific values will be used to present a range of exposure estimates*	West *et al*., 1992 in CalEPA, 1997
FI	Fraction of fish consumed from a contaminated source	1	unitless	Assume 100% since ingestion rate is based on sport fish consumption	Professional judgment
EF	Exposure frequency to locally caught fish	365	d/yr	Consumption rates are based on annual average	---
ED	Exposure duration, child fish consumer	9	yr	Average time at one residence	U.S. EPA, 1997a
AT_{ncar}	Averaging time, noncarcinogens	3285	d	Equal to exposure duration for noncarcinogens	U.S. EPA, 1989
AT_{car}	Averaging time, carcinogens	25550	d	Equal to 70 years (lifetime) for carcinogens	U.S. EPA, 1989
BW	Body weight, child fish consumer	30	kg	Population mean for children (1 to 14 years), NHANES III	U.S. EPA, 1997a

APPENDIX D

RISK CALCULATIONS AND PATHWAY-SPECIFIC RISK SUMMARIES
LOWER OTTAWA RIVER HUMAN HEALTH RISK ASSESSMENT

Table D-1. Cancer Risk Calculations for Sediment Contact Scenarios

Segment 1 (RM 0 to <3.2)

RME Scenario: Risk for Incidental Ingestion of Sediment, Recreator

Chemical	Receptor	C (mg/kg)	x	IR (mg/d)	x	CF (kg/mg)	x	fi (unitless)	x	B (unitless)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	´	Ingestion SF $(mg/kg\text{-}d)^{-1}$	=	Cancer Risk
Aldrin	Child	0.02		200		1.0E-06		1		1		48		13		30		25550		3.3E-09					
	Adult	0.02		50		1.0E-06		1		1		24		17		70		25550		2.3E-10	3.5E-09		1.7E+01		5.9E-08
Arsenic	Child	9.42		200		1.0E-06		1		1		48		13		30		25550		1.5E-06					
	Adult	9.42		50		1.0E-06		1		1		24		17		70		25550		1.1E-07	1.6E-06		1.5E+00		2.5E-06
Benzo[a]anthracene	Child	0.31		200		1.0E-06		1		1		48		13		30		25550		5.0E-08					
	Adult	0.31		50		1.0E-06		1		1		24		17		70		25550		3.5E-09	5.4E-08		7.3E-01		3.9E-08
Benzo[a]pyrene	Child	0.37		200		1.0E-06		1		1		48		13		30		25550		6.1E-08					
	Adult	0.37		50		1.0E-06		1		1		24		17		70		25550		4.3E-09	6.5E-08		7.3E+00		4.8E-07
Benzo[b]fluoranthene	Child	0.42		200		1.0E-06		1		1		48		13		30		25550		6.8E-08					
	Adult	0.42		50		1.0E-06		1		1		24		17		70		25550		4.7E-09	7.2E-08		7.3E-01		5.3E-08
Benzo[k]fluoranthene	Child	0.72		200		1.0E-06		1		1		48		13		30		25550		1.2E-07					
	Adult	0.72		50		1.0E-06		1		1		24		17		70		25550		8.2E-09	1.3E-07		7.3E-02		9.1E-09
bis(2-Ethylhexyl)phthalate	Child	2.11		200		1.0E-06		1		1		48		13		30		25550		3.4E-07					
	Adult	2.11		50		1.0E-06		1		1		24		17		70		25550		2.4E-08	3.7E-07		1.4E-02		5.1E-09
Dibenz[a,h]anthracene	Child	0.40		200		1.0E-06		1		1		48		13		30		25550		6.5E-08					
	Adult	0.40		50		1.0E-06		1		1		24		17		70		25550		4.6E-09	7.0E-08		7.3E+00		5.1E-07
Dieldrin	Child	0.04		200		1.0E-06		1		1		48		13		30		25550		6.3E-09					
	Adult	0.04		50		1.0E-06		1		1		24		17		70		25550		4.4E-10	6.8E-09		1.6E+01		1.1E-07
Heptachlor epoxide	Child	0.03		200		1.0E-06		1		1		48		13		30		25550		4.1E-09					
	Adult	0.03		50		1.0E-06		1		1		24		17		70		25550		2.9E-10	4.4E-09		9.1E+00		4.0E-08
Indeno[1,2,3-cd]pyrene	Child	0.29		200		1.0E-06		1		1		48		13		30		25550		4.6E-08					
	Adult	0.29		50		1.0E-06		1		1		24		17		70		25550		3.3E-09	5.0E-08		7.3E-01		3.6E-08
N-Nitroso-di-n-propylamine	Child	0.54		200		1.0E-06		1		1		48		13		30		25550		8.8E-08					
	Adult	0.54		50		1.0E-06		1		1		24		17		70		25550		6.2E-09	9.4E-08		7.0E+00		6.6E-07
Total PCBs	Child	1.27		200		1.0E-06		1		1		48		13		30		25550		2.1E-07					
	Adult	1.27		50		1.0E-06		1		1		24		17		70		25550		1.5E-08	2.2E-07		2.0E+00		4.4E-07
																									4.9E-06

Table D-1. Cancer Risk Calculations for Sediment Contact Scenarios

RME Scenario: Risk for Incidental Dermal Contact with Sediment, Recreator

Chemical	Receptor	C (mg/kg)	x	SA (cm^2/event)	x	AF (mg/cm^2)	x	ABS (unitless)	x	CF (kg/mg)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	´	Dermal SF (mg/kg-d)$^{-1}$	=	Cancer Risk
Aldrin	Child	0.02		2300		0.2		0.1		1.0E-06		48		13		30		25550		7.5E-10					
	Adult	0.02		4500		0.2		0.1		1.0E-06		24		17		70		25550		4.1E-10	1.2E-09		3.4E+01		3.9E-08
Arsenic	Child	9.42		2300		0.2		0.032		1.0E-06		48		13		30		25550		1.1E-07					
	Adult	9.42		4500		0.2		0.032		1.0E-06		24		17		70		25550		6.2E-08	1.7E-07		3.7E+00		6.4E-07
Benzo[a]anthracene	Child	0.31		2300		0.2		0.1		1.0E-06		48		13		30		25550		1.2E-08					
	Adult	0.31		4500		0.2		0.1		1.0E-06		24		17		70		25550		6.3E-09	1.8E-08		2.4E+00		4.2E-08
Benzo[a]pyrene	Child	0.37		2300		0.2		0.1		1.0E-06		48		13		30		25550		1.4E-08					
	Adult	0.37		4500		0.2		0.1		1.0E-06		24		17		70		25550		7.7E-09	2.2E-08		2.4E+01		5.1E-07
Benzo[b]fluoranthene	Child	0.42		2300		0.2		0.1		1.0E-06		48		13		30		25550		1.6E-08					
	Adult	0.42		4500		0.2		0.1		1.0E-06		24		17		70		25550		8.5E-09	2.4E-08		2.4E+00		5.7E-08
Benzo[k]fluoranthene	Child	0.72		2300		0.2		0.1		1.0E-06		48		13		30		25550		2.7E-08					
	Adult	0.72		4500		0.2		0.1		1.0E-06		24		17		70		25550		1.5E-08	4.2E-08		2.4E-01		9.8E-09
bis(2-Ethylhexyl)phthalate	Child	2.11		2300		0.2		0.1		1.0E-06		48		13		30		25550		7.9E-08					
	Adult	2.11		4500		0.2		0.1		1.0E-06		24		17		70		25550		4.3E-08	1.2E-07		7.4E-02		9.0E-09
Dibenz[a,h]anthracene	Child	0.40		2300		0.2		0.1		1.0E-06		48		13		30		25550		1.5E-08					
	Adult	0.40		4500		0.2		0.1		1.0E-06		24		17		70		25550		8.2E-09	2.3E-08		2.4E+01		5.5E-07
Dieldrin	Child	0.04		2300		0.2		0.1		1.0E-06		48		13		30		25550		1.5E-09					
	Adult	0.04		4500		0.2		0.1		1.0E-06		24		17		70		25550		8.0E-10	2.3E-09		3.2E+01		7.2E-08
Heptachlor epoxide	Child	0.03		2300		0.2		0.1		1.0E-06		48		13		30		25550		9.4E-10					
	Adult	0.03		4500		0.2		0.1		1.0E-06		24		17		70		25550		5.1E-10	1.4E-09		1.3E+01		1.8E-08
Indeno[1,2,3-cd]pyrene	Child	0.29		2300		0.2		0.1		1.0E-06		48		13		30		25550		1.1E-08					
	Adult	0.29		4500		0.2		0.1		1.0E-06		24		17		70		25550		5.9E-09	1.7E-08		2.4E+00		3.9E-08
N-Nitroso-di-n-propylamine	Child	0.54		2300		0.2		0.1		1.0E-06		48		13		30		25550		2.0E-08					
	Adult	0.54		4500		0.2		0.1		1.0E-06		24		17		70		25550		1.1E-08	3.1E-08		2.8E+01		8.8E-07
Total PCBs	Child	1.27		2300		0.2		0.06		1.0E-06		48		13		30		25550		2.9E-08					
	Adult	1.27		4500		0.2		0.06		1.0E-06		24		17		70		25550		1.6E-08	4.4E-08		2.2E+00		9.8E-08
																									3.0E-06

Table D-1. Cancer Risk Calculations for Sediment Contact Scenarios

CT Scenario: Risk for Incidental Ingestion of Sediment, Recreator

Chemical	Receptor	C (mg/kg)	x	IR (mg/d)	x	CF (kg/mg)	fi (unitless)	x	B (unitless)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d)	=	LADD (mg/kg-d)	LADD (mg/kg-d)	´	Ingestion SF $(mg/kg\text{-}d)^{-1}$	=	Cancer Risk
Aldrin	Child	0.02		140		1.0E-06	1		1		30		9		30		25550		9.9E-10					
	Adult	0.02		50		1.0E-06	1		1		16		9		70		25550		8.1E-11	1.1E-09		1.7E+01		1.8E-08
Arsenic	Child	9.42		140		1.0E-06	1		1		30		9		30		25550		4.6E-07					
	Adult	9.42		50		1.0E-06	1		1		16		9		70		25550		3.8E-08	5.0E-07		1.5E+00		7.5E-07
Benzo[a]anthracene	Child	0.31		140		1.0E-06	1		1		30		9		30		25550		1.5E-08					
	Adult	0.31		50		1.0E-06	1		1		16		9		70		25550		1.2E-09	1.6E-08		7.3E-01		1.2E-08
Benzo[a]pyrene	Child	0.37		140		1.0E-06	1		1		30		9		30		25550		1.8E-08					
	Adult	0.37		50		1.0E-06	1		1		16		9		70		25550		1.5E-09	2.0E-08		7.3E+00		1.5E-07
Benzo[b]fluoranthene	Child	0.42		140		1.0E-06	1		1		30		9		30		25550		2.0E-08					
	Adult	0.42		50		1.0E-06	1		1		16		9		70		25550		1.7E-09	2.2E-08		7.3E-01		1.6E-08
Benzo[k]fluoranthene	Child	0.72		140		1.0E-06	1		1		30		9		30		25550		3.5E-08					
	Adult	0.72		50		1.0E-06	1		1		16		9		70		25550		2.9E-09	3.8E-08		7.3E-02		2.8E-09
bis(2-Ethylhexyl)phthalate	Child	2.11		140		1.0E-06	1		1		30		9		30		25550		1.0E-07					
	Adult	2.11		50		1.0E-06	1		1		16		9		70		25550		8.5E-09	1.1E-07		1.4E-02		1.6E-09
Dibenz[a,h]anthracene	Child	0.40		140		1.0E-06	1		1		30		9		30		25550		2.0E-08					
	Adult	0.40		50		1.0E-06	1		1		16		9		70		25550		1.6E-09	2.1E-08		7.3E+00		1.6E-07
Dieldrin	Child	0.04		140		1.0E-06	1		1		30		9		30		25550		1.9E-09					
	Adult	0.04		50		1.0E-06	1		1		16		9		70		25550		1.6E-10	2.1E-09		1.6E+01		3.3E-08
Heptachlor epoxide	Child	0.03		140		1.0E-06	1		1		30		9		30		25550		1.2E-09					
	Adult	0.03		50		1.0E-06	1		1		16		9		70		25550		1.0E-10	1.3E-09		9.1E+00		1.2E-08
Indeno[1,2,3-cd]pyrene	Child	0.29		140		1.0E-06	1		1		30		9		30		25550		1.4E-08					
	Adult	0.29		50		1.0E-06	1		1		16		9		70		25550		1.1E-09	1.5E-08		7.3E-01		1.1E-08
N-Nitroso-di-n-propylamine	Child	0.54		140		1.0E-06	1		1		30		9		30		25550		2.7E-08					
	Adult	0.54		50		1.0E-06	1		1		16		9		70		25550		2.2E-09	2.9E-08		7.0E+00		2.0E-07
Total PCBs	Child	1.27		140		1.0E-06	1		1		30		9		30		25550		6.3E-08					
	Adult	1.27		50		1.0E-06	1		1		16		9		70		25550		5.1E-09	6.8E-08		2.0E+00		1.4E-07
																								1.5E-06

Table D-1. Cancer Risk Calculations for Sediment Contact Scenarios

CT Scenario: Risk for Incidental Dermal Contact with Sediment, Recreator

Chemical	Receptor	C (mg/kg)	x	SA (cm^2/event)	x	AF (mg/cm^2)	x	ABS (unitless)	x	CF (kg/mg)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	´	Dermal SF (mg/kg-d)$^{-1}$	=	Cancer Risk
Aldrin	Child	0.02		2200		0.1		0.1		1.0E-06		30		9		30		25550		1.5E-10					
	Adult	0.02		3500		0.1		0.1		1.0E-06		16		9		70		25550		5.6E-11	2.1E-10		3.4E+01		7.2E-09
Arsenic	Child	9.42		2200		0.1		0.032		1.0E-06		30		9		30		25550		2.3E-08					
	Adult	9.42		3500		0.1		0.032		1.0E-06		16		9		70		25550		8.5E-09	3.2E-08		3.7E+00		1.2E-07
Benzo[a]anthracene	Child	0.31		2200		0.1		0.1		1.0E-06		30		9		30		25550		2.4E-09					
	Adult	0.31		3500		0.1		0.1		1.0E-06		16		9		70		25550		8.7E-10	3.2E-09		2.4E+00		7.7E-09
Benzo[a]pyrene	Child	0.37		2200		0.1		0.1		1.0E-06		30		9		30		25550		2.9E-09					
	Adult	0.37		3500		0.1		0.1		1.0E-06		16		9		70		25550		1.1E-09	4.0E-09		2.4E+01		9.3E-08
Benzo[b]fluoranthene	Child	0.42		2200		0.1		0.1		1.0E-06		30		9		30		25550		3.2E-09					
	Adult	0.42		3500		0.1		0.1		1.0E-06		16		9		70		25550		1.2E-09	4.4E-09		2.4E+00		1.0E-08
Benzo[k]fluoranthene	Child	0.72		2200		0.1		0.1		1.0E-06		30		9		30		25550		5.6E-09					
	Adult	0.72		3500		0.1		0.1		1.0E-06		16		9		70		25550		2.0E-09	7.6E-09		2.4E-01		1.8E-09
bis(2-Ethylhexyl)phthalate	Child	2.11		2200		0.1		0.1		1.0E-06		30		9		30		25550		1.6E-08					
	Adult	2.11		3500		0.1		0.1		1.0E-06		16		9		70		25550		5.9E-09	2.2E-08		7.4E-02		1.6E-09
Dibenz[a,h]anthracene	Child	0.40		2200		0.1		0.1		1.0E-06		30		9		30		25550		3.1E-09					
	Adult	0.40		3500		0.1		0.1		1.0E-06		16		9		70		25550		1.1E-09	4.2E-09		2.4E+01		9.9E-08
Dieldrin	Child	0.04		2200		0.1		0.1		1.0E-06		30		9		30		25550		3.0E-10					
	Adult	0.04		3500		0.1		0.1		1.0E-06		16		9		70		25550		1.1E-10	4.1E-10		3.2E+01		1.3E-08
Heptachlor epoxide	Child	0.03		2200		0.1		0.1		1.0E-06		30		9		30		25550		1.9E-10					
	Adult	0.03		3500		0.1		0.1		1.0E-06		16		9		70		25550		7.0E-11	2.6E-10		1.3E+01		3.3E-09
Indeno[1,2,3-cd]pyrene	Child	0.29		2200		0.1		0.1		1.0E-06		30		9		30		25550		2.2E-09					
	Adult	0.29		3500		0.1		0.1		1.0E-06		16		9		70		25550		8.0E-10	3.0E-09		2.4E+00		7.1E-09
N-Nitroso-di-n-propylamine	Child	0.54		2200		0.1		0.1		1.0E-06		30		9		30		25550		4.2E-09					
	Adult	0.54		3500		0.1		0.1		1.0E-06		16		9		70		25550		1.5E-09	5.7E-09		2.8E+01		1.6E-07
Total PCBs	Child	1.27		2200		0.1		0.06		1.0E-06		30		9		30		25550		5.9E-09					
	Adult	1.27		3500		0.1		0.06		1.0E-06		16		9		70		25550		2.2E-09	8.1E-09		2.2E+00		1.8E-08
																									5.4E-07

Table D-1. Cancer Risk Calculations for Sediment Contact Scenarios

Segment 2 (RM 3.2 to <4.9)

RME Scenario: Risk for Incidental Ingestion of Sediment, Recreator

Chemical	Receptor	C (mg/kg)	x	IR (mg/d)	x	CF (kg/mg)	fi (unitless)	x	B (unitless)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	x	Ingestion SF $(mg/kg\text{-}d)^{-1}$	=	Cancer Risk
Aldrin	Child	0.05		200		1.0E-06	1		1		48		13		30		25550		7.3E-09					
	Adult	0.05		50		1.0E-06	1		1		24		17		70		25550		5.1E-10	7.8E-09		1.7E+01		1.3E-07
Arsenic	Child	11.40		200		1.0E-06	1		1		48		13		30		25550		1.9E-06					
	Adult	11.40		50		1.0E-06	1		1		24		17		70		25550		1.3E-07	2.0E-06		1.5E+00		3.0E-06
Benzo[a]anthracene	Child	0.89		200		1.0E-06	1		1		48		13		30		25550		1.4E-07					
	Adult	0.89		50		1.0E-06	1		1		24		17		70		25550		1.0E-08	1.5E-07		7.3E-01		1.1E-07
Benzo[a]pyrene	Child	0.75		200		1.0E-06	1		1		48		13		30		25550		1.2E-07					
	Adult	0.75		50		1.0E-06	1		1		24		17		70		25550		8.5E-09	1.3E-07		7.3E+00		9.5E-07
Benzo[b]fluoranthene	Child	1.28		200		1.0E-06	1		1		48		13		30		25550		2.1E-07					
	Adult	1.28		50		1.0E-06	1		1		24		17		70		25550		1.5E-08	2.2E-07		7.3E-01		1.6E-07
Benzo[k]fluoranthene	Child	0.71		200		1.0E-06	1		1		48		13		30		25550		1.2E-07					
	Adult	0.71		50		1.0E-06	1		1		24		17		70		25550		8.1E-09	1.2E-07		7.3E-02		9.0E-09
bis(2-Ethylhexyl)phthalate	Child	11.00		200		1.0E-06	1		1		48		13		30		25550		1.8E-06					
	Adult	11.00		50		1.0E-06	1		1		24		17		70		25550		1.3E-07	1.9E-06		1.4E-02		2.7E-08
Dibenz[a,h]anthracene	Child	0.60		200		1.0E-06	1		1		48		13		30		25550		9.8E-08					
	Adult	0.60		50		1.0E-06	1		1		24		17		70		25550		6.8E-09	1.0E-07		7.3E+00		7.6E-07
Dieldrin	Child	0.03		200		1.0E-06	1		1		48		13		30		25550		4.9E-09					
	Adult	0.03		50		1.0E-06	1		1		24		17		70		25550		3.4E-10	5.2E-09		1.6E+01		8.4E-08
Heptachlor epoxide	Child	0.08		200		1.0E-06	1		1		48		13		30		25550		1.3E-08					
	Adult	0.08		50		1.0E-06	1		1		24		17		70		25550		9.2E-10	1.4E-08		9.1E+00		1.3E-07
Indeno[1,2,3-cd]pyrene	Child	0.58		200		1.0E-06	1		1		48		13		30		25550		9.4E-08					
	Adult	0.58		50		1.0E-06	1		1		24		17		70		25550		6.6E-09	1.0E-07		7.3E-01		7.4E-08
N-Nitroso-di-n-propylamine	Child	1.00		200		1.0E-06	1		1		48		13		30		25550		1.6E-07					
	Adult	1.00		50		1.0E-06	1		1		24		17		70		25550		1.1E-08	1.7E-07		7.0E+00		1.2E-06
Total PCBs	Child	3.66		200		1.0E-06	1		1		48		13		30		25550		6.0E-07					
	Adult	3.66		50		1.0E-06	1		1		24		17		70		25550		4.2E-08	6.4E-07		2.0E+00		1.3E-06
																								7.9E-06

Table D-1. Cancer Risk Calculations for Sediment Contact Scenarios

RME Scenario: Risk for Incidental Dermal Contact with Sediment, Recreator

Chemical	Receptor	C (mg/kg)	x	SA (cm^2/event)	x	AF (mg/cm^2)	x	ABS (unitless)	x	CF (kg/mg)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	´	Dermal SF (mg/kg-d)$^{-1}$	=	Cancer Risk
Aldrin	Child	0.05		2300		0.2		0.1		1.0E-06		48		13		30		25550		1.7E-09					
	Adult	0.05		4500		0.2		0.1		1.0E-06		24		17		70		25550		9.2E-10	2.6E-09		3.4E+01		8.9E-08
Arsenic	Child	11.40		2300		0.2		0.032		1.0E-06		48		13		30		25550		1.4E-07					
	Adult	11.40		4500		0.2		0.032		1.0E-06		24		17		70		25550		7.5E-08	2.1E-07		3.7E+00		7.7E-07
Benzo[a]anthracene	Child	0.89		2300		0.2		0.1		1.0E-06		48		13		30		25550		3.3E-08					
	Adult	0.89		4500		0.2		0.1		1.0E-06		24		17		70		25550		1.8E-08	5.1E-08		2.4E+00		1.2E-07
Benzo[a]pyrene	Child	0.75		2300		0.2		0.1		1.0E-06		48		13		30		25550		2.8E-08					
	Adult	0.75		4500		0.2		0.1		1.0E-06		24		17		70		25550		1.5E-08	4.3E-08		2.4E+01		1.0E-06
Benzo[b]fluoranthene	Child	1.28		2300		0.2		0.1		1.0E-06		48		13		30		25550		4.8E-08					
	Adult	1.28		4500		0.2		0.1		1.0E-06		24		17		70		25550		2.6E-08	7.4E-08		2.4E+00		1.7E-07
Benzo[k]fluoranthene	Child	0.71		2300		0.2		0.1		1.0E-06		48		13		30		25550		2.6E-08					
	Adult	0.71		4500		0.2		0.1		1.0E-06		24		17		70		25550		1.5E-08	4.1E-08		2.4E-01		9.6E-09
bis(2-Ethylhexyl)phthalate	Child	11.00		2300		0.2		0.1		1.0E-06		48		13		30		25550		4.1E-07					
	Adult	11.00		4500		0.2		0.1		1.0E-06		24		17		70		25550		2.3E-07	6.4E-07		7.4E-02		4.7E-08
Dibenz[a,h]anthracene	Child	0.60		2300		0.2		0.1		1.0E-06		48		13		30		25550		2.2E-08					
	Adult	0.60		4500		0.2		0.1		1.0E-06		24		17		70		25550		1.2E-08	3.5E-08		2.4E+01		8.2E-07
Dieldrin	Child	0.03		2300		0.2		0.1		1.0E-06		48		13		30		25550		1.1E-09					
	Adult	0.03		4500		0.2		0.1		1.0E-06		24		17		70		25550		6.2E-10	1.7E-09		3.2E+01		5.6E-08
Heptachlor epoxide	Child	0.08		2300		0.2		0.1		1.0E-06		48		13		30		25550		3.0E-09					
	Adult	0.08		4500		0.2		0.1		1.0E-06		24		17		70		25550		1.7E-09	4.7E-09		1.3E+01		5.9E-08
Indeno[1,2,3-cd]pyrene	Child	0.58		2300		0.2		0.1		1.0E-06		48		13		30		25550		2.2E-08					
	Adult	0.58		4500		0.2		0.1		1.0E-06		24		17		70		25550		1.2E-08	3.4E-08		2.4E+00		7.9E-08
N-Nitroso-di-n-propylamine	Child	1.00		2300		0.2		0.1		1.0E-06		48		13		30		25550		3.7E-08					
	Adult	1.00		4500		0.2		0.1		1.0E-06		24		17		70		25550		2.1E-08	5.8E-08		2.8E+01		1.6E-06
Total PCBs	Child	3.66		2300		0.2		0.06		1.0E-06		48		13		30		25550		8.2E-08					
	Adult	3.66		4500		0.2		0.06		1.0E-06		24		17		70		25550		4.5E-08	1.3E-07		2.2E+00		2.8E-07
																									5.2E-06

Table D-1. Cancer Risk Calculations for Sediment Contact Scenarios

CT Scenario: Risk for Incidental Ingestion of Sediment, Recreator

Chemical	Receptor	C (mg/kg)	x	IR (mg/d)	x	CF (kg/mg)	fi (unitless)	x	B (unitless)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	´	Ingestion SF $(mg/kg\text{-}d)^{-1}$	=	Cancer Risk
Aldrin	Child	0.05		140		1.0E-06	1		1		30		9		30		25550		2.2E-09					
	Adult	0.05		50		1.0E-06	1		1		16		9		70		25550		1.8E-10	2.4E-09		1.7E+01		4.1E-08
Arsenic	Child	11.40		140		1.0E-06	1		1		30		9		30		25550		5.6E-07					
	Adult	11.40		50		1.0E-06	1		1		16		9		70		25550		4.6E-08	6.1E-07		1.5E+00		9.1E-07
Benzo[a]anthracene	Child	0.89		140		1.0E-06	1		1		30		9		30		25550		4.4E-08					
	Adult	0.89		50		1.0E-06	1		1		16		9		70		25550		3.6E-09	4.7E-08		7.3E-01		3.5E-08
Benzo[a]pyrene	Child	0.75		140		1.0E-06	1		1		30		9		30		25550		3.7E-08					
	Adult	0.75		50		1.0E-06	1		1		16		9		70		25550		3.0E-09	4.0E-08		7.3E+00		2.9E-07
Benzo[b]fluoranthene	Child	1.28		140		1.0E-06	1		1		30		9		30		25550		6.3E-08					
	Adult	1.28		50		1.0E-06	1		1		16		9		70		25550		5.2E-09	6.8E-08		7.3E-01		5.0E-08
Benzo[k]fluoranthene	Child	0.71		140		1.0E-06	1		1		30		9		30		25550		3.5E-08					
	Adult	0.71		50		1.0E-06	1		1		16		9		70		25550		2.8E-09	3.8E-08		7.3E-02		2.8E-09
bis(2-Ethylhexyl)phthalate	Child	11.00		140		1.0E-06	1		1		30		9		30		25550		5.4E-07					
	Adult	11.00		50		1.0E-06	1		1		16		9		70		25550		4.4E-08	5.9E-07		1.4E-02		8.2E-09
Dibenz[a,h]anthracene	Child	0.60		140		1.0E-06	1		1		30		9		30		25550		3.0E-08					
	Adult	0.60		50		1.0E-06	1		1		16		9		70		25550		2.4E-09	3.2E-08		7.3E+00		2.3E-07
Dieldrin	Child	0.03		140		1.0E-06	1		1		30		9		30		25550		1.5E-09					
	Adult	0.03		50		1.0E-06	1		1		16		9		70		25550		1.2E-10	1.6E-09		1.6E+01		2.6E-08
Heptachlor epoxide	Child	0.08		140		1.0E-06	1		1		30		9		30		25550		4.0E-09					
	Adult	0.08		50		1.0E-06	1		1		16		9		70		25550		3.3E-10	4.3E-09		9.1E+00		3.9E-08
Indeno[1,2,3-cd]pyrene	Child	0.58		140		1.0E-06	1		1		30		9		30		25550		2.9E-08					
	Adult	0.58		50		1.0E-06	1		1		16		9		70		25550		2.3E-09	3.1E-08		7.3E-01		2.3E-08
N-Nitroso-di-n-propylamine	Child	1.00		140		1.0E-06	1		1		30		9		30		25550		4.9E-08					
	Adult	1.00		50		1.0E-06	1		1		16		9		70		25550		4.0E-09	5.3E-08		7.0E+00		3.7E-07
Total PCBs	Child	3.66		140		1.0E-06	1		1		30		9		30		25550		1.8E-07					
	Adult	3.66		50		1.0E-06	1		1		16		9		70		25550		1.5E-08	2.0E-07		2.0E+00		3.9E-07
																								2.4E-06

Table D-1. Cancer Risk Calculations for Sediment Contact Scenarios

CT Scenario: Risk for Incidental Dermal Contact with Sediment, Recreator

Chemical	Receptor	C (mg/kg)	x	SA (cm^2/event)	x	AF (mg/cm^2)	x	ABS (unitless)	x	CF (kg/mg)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	´	Dermal SF (mg/kg-d)$^{-1}$	=	Cancer Risk
Aldrin	Child	0.05		2200		0.1		0.1		1.0E-06		30		9		30		25550		3.5E-10					
	Adult	0.05		3500		0.1		0.1		1.0E-06		16		9		70		25550		1.3E-10	4.8E-10		3.4E+01		1.6E-08
Arsenic	Child	11.40		2200		0.1		0.032		1.0E-06		30		9		30		25550		2.8E-08					
	Adult	11.40		3500		0.1		0.032		1.0E-06		16		9		70		25550		1.0E-08	3.9E-08		3.7E+00		1.4E-07
Benzo[a]anthracene	Child	0.89		2200		0.1		0.1		1.0E-06		30		9		30		25550		6.9E-09					
	Adult	0.89		3500		0.1		0.1		1.0E-06		16		9		70		25550		2.5E-09	9.4E-09		2.4E+00		2.2E-08
Benzo[a]pyrene	Child	0.75		2200		0.1		0.1		1.0E-06		30		9		30		25550		5.8E-09					
	Adult	0.75		3500		0.1		0.1		1.0E-06		16		9		70		25550		2.1E-09	7.9E-09		2.4E+01		1.9E-07
Benzo[b]fluoranthene	Child	1.28		2200		0.1		0.1		1.0E-06		30		9		30		25550		9.9E-09					
	Adult	1.28		3500		0.1		0.1		1.0E-06		16		9		70		25550		3.6E-09	1.4E-08		2.4E+00		3.2E-08
Benzo[k]fluoranthene	Child	0.71		2200		0.1		0.1		1.0E-06		30		9		30		25550		5.5E-09					
	Adult	0.71		3500		0.1		0.1		1.0E-06		16		9		70		25550		2.0E-09	7.5E-09		2.4E-01		1.8E-09
bis(2-Ethylhexyl)phthalate	Child	11.00		2200		0.1		0.1		1.0E-06		30		9		30		25550		8.5E-08					
	Adult	11.00		3500		0.1		0.1		1.0E-06		16		9		70		25550		3.1E-08	1.2E-07		7.4E-02		8.6E-09
Dibenz[a,h]anthracene	Child	0.60		2200		0.1		0.1		1.0E-06		30		9		30		25550		4.6E-09					
	Adult	0.60		3500		0.1		0.1		1.0E-06		16		9		70		25550		1.7E-09	6.3E-09		2.4E+01		1.5E-07
Dieldrin	Child	0.03		2200		0.1		0.1		1.0E-06		30		9		30		25550		2.3E-10					
	Adult	0.03		3500		0.1		0.1		1.0E-06		16		9		70		25550		8.5E-11	3.2E-10		3.2E+01		1.0E-08
Heptachlor epoxide	Child	0.08		2200		0.1		0.1		1.0E-06		30		9		30		25550		6.3E-10					
	Adult	0.08		3500		0.1		0.1		1.0E-06		16		9		70		25550		2.3E-10	8.6E-10		1.3E+01		1.1E-08
Indeno[1,2,3-cd]pyrene	Child	0.58		2200		0.1		0.1		1.0E-06		30		9		30		25550		4.5E-09					
	Adult	0.58		3500		0.1		0.1		1.0E-06		16		9		70		25550		1.6E-09	6.1E-09		2.4E+00		1.4E-08
N-Nitroso-di-n-propylamine	Child	1.00		2200		0.1		0.1		1.0E-06		30		9		30		25550		7.8E-09					
	Adult	1.00		3500		0.1		0.1		1.0E-06		16		9		70		25550		2.8E-09	1.1E-08		2.8E+01		3.0E-07
Total PCBs	Child	3.66		2200		0.1		0.06		1.0E-06		30		9		30		25550		1.7E-08					
	Adult	3.66		3500		0.1		0.06		1.0E-06		16		9		70		25550		6.2E-09	2.3E-08		2.2E+00		5.2E-08
																									9.4E-07

Table D-1. Cancer Risk Calculations for Sediment Contact Scenarios

Segment 3 (RM 4.9 to <6.5)

RME Scenario: Risk for Incidental Ingestion of Sediment, Recreator

Chemical	Receptor	C (mg/kg)	x	IR (mg/d)	x	CF (kg/mg)	fi (unitless)	x	B (unitless)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	´	Ingestion SF $(mg/kg\text{-}d)^{-1}$	=	Cancer Risk
Aldrin	Child	0.05		200		1.0E-06	1		1		48		13		30		25550		8.8E-09					
	Adult	0.05		50		1.0E-06	1		1		24		17		70		25550		6.2E-10	9.4E-09		1.7E+01		1.6E-07
Arsenic	Child	9.12		200		1.0E-06	1		1		48		13		30		25550		1.5E-06					
	Adult	9.12		50		1.0E-06	1		1		24		17		70		25550		1.0E-07	1.6E-06		1.5E+00		2.4E-06
Benzo[a]anthracene	Child	2.50		200		1.0E-06	1		1		48		13		30		25550		4.1E-07					
	Adult	2.50		50		1.0E-06	1		1		24		17		70		25550		2.9E-08	4.4E-07		7.3E-01		3.2E-07
Benzo[a]pyrene	Child	3.00		200		1.0E-06	1		1		48		13		30		25550		4.9E-07					
	Adult	3.00		50		1.0E-06	1		1		24		17		70		25550		3.4E-08	5.2E-07		7.3E+00		3.8E-06
Benzo[b]fluoranthene	Child	3.90		200		1.0E-06	1		1		48		13		30		25550		6.3E-07					
	Adult	3.90		50		1.0E-06	1		1		24		17		70		25550		4.4E-08	6.8E-07		7.3E-01		5.0E-07
Benzo[k]fluoranthene	Child	3.40		200		1.0E-06	1		1		48		13		30		25550		5.5E-07					
	Adult	3.40		50		1.0E-06	1		1		24		17		70		25550		3.9E-08	5.9E-07		7.3E-02		4.3E-08
bis(2-Ethylhexyl)phthalate	Child	220		200		1.0E-06	1		1		48		13		30		25550		3.6E-05					
	Adult	220		50		1.0E-06	1		1		24		17		70		25550		2.5E-06	3.8E-05		1.4E-02		5.4E-07
Dibenz[a,h]anthracene	Child	6.50		200		1.0E-06	1		1		48		13		30		25550		1.1E-06					
	Adult	6.50		50		1.0E-06	1		1		24		17		70		25550		7.4E-08	1.1E-06		7.3E+00		8.3E-06
Dieldrin	Child	0.02		200		1.0E-06	1		1		48		13		30		25550		2.8E-09					
	Adult	0.02		50		1.0E-06	1		1		24		17		70		25550		1.9E-10	3.0E-09		1.6E+01		4.7E-08
Heptachlor epoxide	Child	0.04		200		1.0E-06	1		1		48		13		30		25550		6.5E-09					
	Adult	0.04		50		1.0E-06	1		1		24		17		70		25550		4.6E-10	7.0E-09		9.1E+00		6.3E-08
Indeno[1,2,3-cd]pyrene	Child	2.60		200		1.0E-06	1		1		48		13		30		25550		4.2E-07					
	Adult	2.60		50		1.0E-06	1		1		24		17		70		25550		3.0E-08	4.5E-07		7.3E-01		3.3E-07
N-Nitroso-di-n-propylamine	Child	6.50		200		1.0E-06	1		1		48		13		30		25550		1.1E-06					
	Adult	6.50		50		1.0E-06	1		1		24		17		70		25550		7.4E-08	1.1E-06		7.0E+00		7.9E-06
Total PCBs	Child	49.57		200		1.0E-06	1		1		48		13		30		25550		8.1E-06					
	Adult	49.57		50		1.0E-06	1		1		24		17		70		25550		5.7E-07	8.6E-06		2.0E+00		1.7E-05
																								4.2E-05

Table D-1. Cancer Risk Calculations for Sediment Contact Scenarios

RME Scenario: Risk for Incidental Dermal Contact with Sediment, Recreator

Chemical	Receptor	C (mg/kg)	x	SA (cm^2/event)	x	AF (mg/cm^2)	x	ABS (unitless)	x	CF (kg/mg)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	´	Dermal SF (mg/kg-d)$^{-1}$	=	Cancer Risk
Aldrin	Child	0.05		2300		0.2		0.1		1.0E-06		48		13		30		25550		2.0E-09					
	Adult	0.05		4500		0.2		0.1		1.0E-06		24		17		70		25550		1.1E-09	3.1E-09		3.4E+01		1.1E-07
Arsenic	Child	9.12		2300		0.2		0.032		1.0E-06		48		13		30		25550		1.1E-07					
	Adult	9.12		4500		0.2		0.032		1.0E-06		24		17		70		25550		6.0E-08	1.7E-07		3.7E+00		6.2E-07
Benzo[a]anthracene	Child	2.50		2300		0.2		0.1		1.0E-06		48		13		30		25550		9.4E-08					
	Adult	2.50		4500		0.2		0.1		1.0E-06		24		17		70		25550		5.1E-08	1.4E-07		2.4E+00		3.4E-07
Benzo[a]pyrene	Child	3.00		2300		0.2		0.1		1.0E-06		48		13		30		25550		1.1E-07					
	Adult	3.00		4500		0.2		0.1		1.0E-06		24		17		70		25550		6.2E-08	1.7E-07		2.4E+01		4.1E-06
Benzo[b]fluoranthene	Child	3.90		2300		0.2		0.1		1.0E-06		48		13		30		25550		1.5E-07					
	Adult	3.90		4500		0.2		0.1		1.0E-06		24		17		70		25550		8.0E-08	2.3E-07		2.4E+00		5.3E-07
Benzo[k]fluoranthene	Child	3.40		2300		0.2		0.1		1.0E-06		48		13		30		25550		1.3E-07					
	Adult	3.40		4500		0.2		0.1		1.0E-06		24		17		70		25550		7.0E-08	2.0E-07		2.4E-01		4.6E-08
bis(2-Ethylhexyl)phthalate	Child	220		2300		0.2		0.1		1.0E-06		48		13		30		25550		8.2E-06					
	Adult	220		4500		0.2		0.1		1.0E-06		24		17		70		25550		4.5E-06	1.3E-05		7.4E-02		9.4E-07
Dibenz[a,h]anthracene	Child	6.50		2300		0.2		0.1		1.0E-06		48		13		30		25550		2.4E-07					
	Adult	6.50		4500		0.2		0.1		1.0E-06		24		17		70		25550		1.3E-07	3.8E-07		2.4E+01		8.9E-06
Dieldrin	Child	0.02		2300		0.2		0.1		1.0E-06		48		13		30		25550		6.4E-10					
	Adult	0.02		4500		0.2		0.1		1.0E-06		24		17		70		25550		3.5E-10	9.9E-10		3.2E+01		3.2E-08
Heptachlor epoxide	Child	0.04		2300		0.2		0.1		1.0E-06		48		13		30		25550		1.5E-09					
	Adult	0.04		4500		0.2		0.1		1.0E-06		24		17		70		25550		8.2E-10	2.3E-09		1.3E+01		2.9E-08
Indeno[1,2,3-cd]pyrene	Child	2.60		2300		0.2		0.1		1.0E-06		48		13		30		25550		9.7E-08					
	Adult	2.60		4500		0.2		0.1		1.0E-06		24		17		70		25550		5.3E-08	1.5E-07		2.4E+00		3.5E-07
N-Nitroso-di-n-propylamine	Child	6.50		2300		0.2		0.1		1.0E-06		48		13		30		25550		2.4E-07					
	Adult	6.50		4500		0.2		0.1		1.0E-06		24		17		70		25550		1.3E-07	3.8E-07		2.8E+01		1.1E-05
Total PCBs	Child	49.57		2300		0.2		0.06		1.0E-06		48		13		30		25550		1.1E-06					
	Adult	49.57		4500		0.2		0.06		1.0E-06		24		17		70		25550		6.1E-07	1.7E-06		2.2E+00		3.8E-06
																									3.0E-05

Table D-1. Cancer Risk Calculations for Sediment Contact Scenarios

CT Scenario: Risk for Incidental Ingestion of Sediment, Recreator

Chemical	Receptor	C (mg/kg)	x	IR (mg/d)	x	CF (kg/mg)	fi (unitless)	x	B (unitless)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d)	LADD =	LADD (mg/kg-d)	LADD (mg/kg-d)	Ingestion SF (mg/kg-d)$^{-1}$	=	Cancer Risk
Aldrin	Child	0.05		140		1.0E-06	1		1		30		9		30		25550		2.7E-09				
	Adult	0.05		50		1.0E-06	1		1		16		9		70		25550		2.2E-10	2.9E-09	1.7E+01		4.9E-08
Arsenic	Child	9.12		140		1.0E-06	1		1		30		9		30		25550		4.5E-07				
	Adult	9.12		50		1.0E-06	1		1		16		9		70		25550		3.7E-08	4.9E-07	1.5E+00		7.3E-07
Benzo[a]anthracene	Child	2.50		140		1.0E-06	1		1		30		9		30		25550		1.2E-07				
	Adult	2.50		50		1.0E-06	1		1		16		9		70		25550		1.0E-08	1.3E-07	7.3E-01		9.7E-08
Benzo[a]pyrene	Child	3.00		140		1.0E-06	1		1		30		9		30		25550		1.5E-07				
	Adult	3.00		50		1.0E-06	1		1		16		9		70		25550		1.2E-08	1.6E-07	7.3E+00		1.2E-06
Benzo[b]fluoranthene	Child	3.90		140		1.0E-06	1		1		30		9		30		25550		1.9E-07				
	Adult	3.90		50		1.0E-06	1		1		16		9		70		25550		1.6E-08	2.1E-07	7.3E-01		1.5E-07
Benzo[k]fluoranthene	Child	3.40		140		1.0E-06	1		1		30		9		30		25550		1.7E-07				
	Adult	3.40		50		1.0E-06	1		1		16		9		70		25550		1.4E-08	1.8E-07	7.3E-02		1.3E-08
bis(2-Ethylhexyl)phthalate	Child	220		140		1.0E-06	1		1		30		9		30		25550		1.1E-05				
	Adult	220		50		1.0E-06	1		1		16		9		70		25550		8.9E-07	1.2E-05	1.4E-02		1.6E-07
Dibenz[a,h]anthracene	Child	6.50		140		1.0E-06	1		1		30		9		30		25550		3.2E-07				
	Adult	6.50		50		1.0E-06	1		1		16		9		70		25550		2.6E-08	3.5E-07	7.3E+00		2.5E-06
Dieldrin	Child	0.02		140		1.0E-06	1		1		30		9		30		25550		8.4E-10				
	Adult	0.02		50		1.0E-06	1		1		16		9		70		25550		6.8E-11	9.1E-10	1.6E+01		1.5E-08
Heptachlor epoxide	Child	0.04		140		1.0E-06	1		1		30		9		30		25550		2.0E-09				
	Adult	0.04		50		1.0E-06	1		1		16		9		70		25550		1.6E-10	2.1E-09	9.1E+00		1.9E-08
Indeno[1,2,3-cd]pyrene	Child	2.60		140		1.0E-06	1		1		30		9		30		25550		1.3E-07				
	Adult	2.60		50		1.0E-06	1		1		16		9		70		25550		1.0E-08	1.4E-07	7.3E-01		1.0E-07
N-Nitroso-di-n-propylamine	Child	6.50		140		1.0E-06	1		1		30		9		30		25550		3.2E-07				
	Adult	6.50		50		1.0E-06	1		1		16		9		70		25550		2.6E-08	3.5E-07	7.0E+00		2.4E-06
Total PCBs	Child	49.57		140		1.0E-06	1		1		30		9		30		25550		2.4E-06				
	Adult	49.57		50		1.0E-06	1		1		16		9		70		25550		2.0E-07	2.6E-06	2.0E+00		5.3E-06
																							1.3E-05

Table D-1. Cancer Risk Calculations for Sediment Contact Scenarios

CT Scenario: Risk for Incidental Dermal Contact with Sediment, Recreator

Chemical	Receptor	C (mg/kg)	x	SA (cm^2/event)	x	AF (mg/cm^2)	x	ABS (unitless)	x	CF (kg/mg)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	´	Dermal SF (mg/kg-d)$^{-1}$	=	Cancer Risk
Aldrin	Child	0.05		2200		0.1		0.1		1.0E-06		30		9		30		25550		4.2E-10					
	Adult	0.05		3500		0.1		0.1		1.0E-06		16		9		70		25550		1.5E-10	5.7E-10		3.4E+01		1.9E-08
Arsenic	Child	9.12		2200		0.1		0.032		1.0E-06		30		9		30		25550		2.3E-08					
	Adult	9.12		3500		0.1		0.032		1.0E-06		16		9		70		25550		8.2E-09	3.1E-08		3.7E+00		1.1E-07
Benzo[a]anthracene	Child	2.50		2200		0.1		0.1		1.0E-06		30		9		30		25550		1.9E-08					
	Adult	2.50		3500		0.1		0.1		1.0E-06		16		9		70		25550		7.0E-09	2.6E-08		2.4E+00		6.2E-08
Benzo[a]pyrene	Child	3.00		2200		0.1		0.1		1.0E-06		30		9		30		25550		2.3E-08					
	Adult	3.00		3500		0.1		0.1		1.0E-06		16		9		70		25550		8.5E-09	3.2E-08		2.4E+01		7.5E-07
Benzo[b]fluoranthene	Child	3.90		2200		0.1		0.1		1.0E-06		30		9		30		25550		3.0E-08					
	Adult	3.90		3500		0.1		0.1		1.0E-06		16		9		70		25550		1.1E-08	4.1E-08		2.4E+00		9.7E-08
Benzo[k]fluoranthene	Child	3.40		2200		0.1		0.1		1.0E-06		30		9		30		25550		2.6E-08					
	Adult	3.40		3500		0.1		0.1		1.0E-06		16		9		70		25550		9.6E-09	3.6E-08		2.4E-01		8.5E-09
bis(2-Ethylhexyl)phthalate	Child	220		2200		0.1		0.1		1.0E-06		30		9		30		25550		1.7E-06					
	Adult	220		3500		0.1		0.1		1.0E-06		16		9		70		25550		6.2E-07	2.3E-06		7.4E-02		1.7E-07
Dibenz[a,h]anthracene	Child	6.50		2200		0.1		0.1		1.0E-06		30		9		30		25550		5.0E-08					
	Adult	6.50		3500		0.1		0.1		1.0E-06		16		9		70		25550		1.8E-08	6.9E-08		2.4E+01		1.6E-06
Dieldrin	Child	0.02		2200		0.1		0.1		1.0E-06		30		9		30		25550		1.3E-10					
	Adult	0.02		3500		0.1		0.1		1.0E-06		16		9		70		25550		4.8E-11	1.8E-10		3.2E+01		5.7E-09
Heptachlor epoxide	Child	0.04		2200		0.1		0.1		1.0E-06		30		9		30		25550		3.1E-10					
	Adult	0.04		3500		0.1		0.1		1.0E-06		16		9		70		25550		1.1E-10	4.2E-10		1.3E+01		5.3E-09
Indeno[1,2,3-cd]pyrene	Child	2.60		2200		0.1		0.1		1.0E-06		30		9		30		25550		2.0E-08					
	Adult	2.60		3500		0.1		0.1		1.0E-06		16		9		70		25550		7.3E-09	2.7E-08		2.4E+00		6.5E-08
N-Nitroso-di-n-propylamine	Child	6.50		2200		0.1		0.1		1.0E-06		30		9		30		25550		5.0E-08					
	Adult	6.50		3500		0.1		0.1		1.0E-06		16		9		70		25550		1.8E-08	6.9E-08		2.8E+01		1.9E-06
Total PCBs	Child	49.57		2200		0.1		0.06		1.0E-06		30		9		30		25550		2.3E-07					
	Adult	49.57		3500		0.1		0.06		1.0E-06		16		9		70		25550		8.4E-08	3.1E-07		2.2E+00		7.0E-07
																									5.5E-06

Table D-1. Cancer Risk Calculations for Sediment Contact Scenarios

Segment 4 (RM 6.5 to 8.8)

RME Scenario: Risk for Incidental Ingestion of Sediment, Recreator

Chemical	Receptor	C (mg/kg)	x	IR (mg/d)	x	CF (kg/mg)	fi (unitless)	x	B (unitless)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	´	Ingestion SF $(mg/kg\text{-}d)^{-1}$	=	Cancer Risk
Aldrin	Child	0.00		200		1.0E-06	1		1		48		13		30		25550		5.9E-10					
	Adult	0.00		50		1.0E-06	1		1		24		17		70		25550		4.2E-11	6.4E-10		1.7E+01		1.1E-08
Arsenic	Child	8.40		200		1.0E-06	1		1		48		13		30		25550		1.4E-06					
	Adult	8.40		50		1.0E-06	1		1		24		17		70		25550		9.6E-08	1.5E-06		1.5E+00		2.2E-06
Benzo[a]anthracene	Child	2.30		200		1.0E-06	1		1		48		13		30		25550		3.7E-07					
	Adult	2.30		50		1.0E-06	1		1		24		17		70		25550		2.6E-08	4.0E-07		7.3E-01		2.9E-07
Benzo[a]pyrene	Child	2.40		200		1.0E-06	1		1		48		13		30		25550		3.9E-07					
	Adult	2.40		50		1.0E-06	1		1		24		17		70		25550		2.7E-08	4.2E-07		7.3E+00		3.1E-06
Benzo[b]fluoranthene	Child	3.00		200		1.0E-06	1		1		48		13		30		25550		4.9E-07					
	Adult	3.00		50		1.0E-06	1		1		24		17		70		25550		3.4E-08	5.2E-07		7.3E-01		3.8E-07
Benzo[k]fluoranthene	Child	3.00		200		1.0E-06	1		1		48		13		30		25550		4.9E-07					
	Adult	3.00		50		1.0E-06	1		1		24		17		70		25550		3.4E-08	5.2E-07		7.3E-02		3.8E-08
bis(2-Ethylhexyl)phthalate	Child	220		200		1.0E-06	1		1		48		13		30		25550		3.6E-05					
	Adult	220		50		1.0E-06	1		1		24		17		70		25550		2.5E-06	3.8E-05		1.4E-02		5.4E-07
Dibenz[a,h]anthracene	Child	0.87		200		1.0E-06	1		1		48		13		30		25550		1.4E-07					
	Adult	0.87		50		1.0E-06	1		1		24		17		70		25550		9.9E-09	1.5E-07		7.3E+00		1.1E-06
Dieldrin	Child	0.01		200		1.0E-06	1		1		48		13		30		25550		1.2E-09					
	Adult	0.01		50		1.0E-06	1		1		24		17		70		25550		8.1E-11	1.2E-09		1.6E+01		2.0E-08
Heptachlor epoxide	Child	0.01		200		1.0E-06	1		1		48		13		30		25550		8.8E-10					
	Adult	0.01		50		1.0E-06	1		1		24		17		70		25550		6.2E-11	9.4E-10		9.1E+00		8.6E-09
Indeno[1,2,3-cd]pyrene	Child	2.10		200		1.0E-06	1		1		48		13		30		25550		3.4E-07					
	Adult	2.10		50		1.0E-06	1		1		24		17		70		25550		2.4E-08	3.7E-07		7.3E-01		2.7E-07
N-Nitroso-di-n-propylamine	Child	3.10		200		1.0E-06	1		1		48		13		30		25550		5.0E-07					
	Adult	3.10		50		1.0E-06	1		1		24		17		70		25550		3.5E-08	5.4E-07		7.0E+00		3.8E-06
Total PCBs	Child	3.97		200		1.0E-06	1		1		48		13		30		25550		6.5E-07					
	Adult	3.97		50		1.0E-06	1		1		24		17		70		25550		4.5E-08	6.9E-07		2.0E+00		1.4E-06
																								1.3E-05

Table D-1. Cancer Risk Calculations for Sediment Contact Scenarios

RME Scenario: Risk for Incidental Dermal Contact with Sediment, Recreator

Chemical	Receptor	C (mg/kg)	x	SA (cm^2/event)	x	AF (mg/cm^2)	x	ABS (unitless)	x	CF (kg/mg)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	´	Dermal SF (mg/kg-d)$^{-1}$	=	Cancer Risk
Aldrin	Child	0.00		2300		0.2		0.1		1.0E-06		48		13		30		25550		1.4E-10					
	Adult	0.00		4500		0.2		0.1		1.0E-06		24		17		70		25550		7.5E-11	2.1E-10		3.4E+01		7.2E-09
Arsenic	Child	8.40		2300		0.2		0.032		1.0E-06		48		13		30		25550		1.0E-07					
	Adult	8.40		4500		0.2		0.032		1.0E-06		24		17		70		25550		5.5E-08	1.6E-07		3.7E+00		5.7E-07
Benzo[a]anthracene	Child	2.30		2300		0.2		0.1		1.0E-06		48		13		30		25550		8.6E-08					
	Adult	2.30		4500		0.2		0.1		1.0E-06		24		17		70		25550		4.7E-08	1.3E-07		2.4E+00		3.1E-07
Benzo[a]pyrene	Child	2.40		2300		0.2		0.1		1.0E-06		48		13		30		25550		9.0E-08					
	Adult	2.40		4500		0.2		0.1		1.0E-06		24		17		70		25550		4.9E-08	1.4E-07		2.4E+01		3.3E-06
Benzo[b]fluoranthene	Child	3.00		2300		0.2		0.1		1.0E-06		48		13		30		25550		1.1E-07					
	Adult	3.00		4500		0.2		0.1		1.0E-06		24		17		70		25550		6.2E-08	1.7E-07		2.4E+00		4.1E-07
Benzo[k]fluoranthene	Child	3.00		2300		0.2		0.1		1.0E-06		48		13		30		25550		1.1E-07					
	Adult	3.00		4500		0.2		0.1		1.0E-06		24		17		70		25550		6.2E-08	1.7E-07		2.4E-01		4.1E-08
bis(2-Ethylhexyl)phthalate	Child	220		2300		0.2		0.1		1.0E-06		48		13		30		25550		8.2E-06					
	Adult	220		4500		0.2		0.1		1.0E-06		24		17		70		25550		4.5E-06	1.3E-05		7.4E-02		9.4E-07
Dibenz[a,h]anthracene	Child	0.87		2300		0.2		0.1		1.0E-06		48		13		30		25550		3.2E-08					
	Adult	0.87		4500		0.2		0.1		1.0E-06		24		17		70		25550		1.8E-08	5.0E-08		2.4E+01		1.2E-06
Dieldrin	Child	0.01		2300		0.2		0.1		1.0E-06		48		13		30		25550		2.7E-10					
	Adult	0.01		4500		0.2		0.1		1.0E-06		24		17		70		25550		1.5E-10	4.1E-10		3.2E+01		1.3E-08
Heptachlor epoxide	Child	0.01		2300		0.2		0.1		1.0E-06		48		13		30		25550		2.0E-10					
	Adult	0.01		4500		0.2		0.1		1.0E-06		24		17		70		25550		1.1E-10	3.1E-10		1.3E+01		4.0E-09
Indeno[1,2,3-cd]pyrene	Child	2.10		2300		0.2		0.1		1.0E-06		48		13		30		25550		7.9E-08					
	Adult	2.10		4500		0.2		0.1		1.0E-06		24		17		70		25550		4.3E-08	1.2E-07		2.4E+00		2.9E-07
N-Nitroso-di-n-propylamine	Child	3.10		2300		0.2		0.1		1.0E-06		48		13		30		25550		1.2E-07					
	Adult	3.10		4500		0.2		0.1		1.0E-06		24		17		70		25550		6.4E-08	1.8E-07		2.8E+01		5.0E-06
Total PCBs	Child	3.97		2300		0.2		0.06		1.0E-06		48		13		30		25550		8.9E-08					
	Adult	3.97		4500		0.2		0.06		1.0E-06		24		17		70		25550		4.9E-08	1.4E-07		2.2E+00		3.1E-07
																									1.2E-05

Table D-1. Cancer Risk Calculations for Sediment Contact Scenarios

CT Scenario: Risk for Incidental Ingestion of Sediment, Recreator

Chemical	Receptor	C (mg/kg)	x	IR (mg/d)	x	CF (kg/mg)	fi (unitless)	x	B (unitless)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	´	Ingestion SF $(mg/kg\text{-}d)^{-1}$	=	Cancer Risk
Aldrin	Child	0.00		140		1.0E-06	1		1		30		9		30		25550		1.8E-10					
	Adult	0.00		50		1.0E-06	1		1		16		9		70		25550		1.5E-11	1.9E-10		1.7E+01		3.3E-09
Arsenic	Child	8.40		140		1.0E-06	1		1		30		9		30		25550		4.1E-07					
	Adult	8.40		50		1.0E-06	1		1		16		9		70		25550		3.4E-08	4.5E-07		1.5E+00		6.7E-07
Benzo[a]anthracene	Child	2.30		140		1.0E-06	1		1		30		9		30		25550		1.1E-07					
	Adult	2.30		50		1.0E-06	1		1		16		9		70		25550		9.3E-09	1.2E-07		7.3E-01		9.0E-08
Benzo[a]pyrene	Child	2.40		140		1.0E-06	1		1		30		9		30		25550		1.2E-07					
	Adult	2.40		50		1.0E-06	1		1		16		9		70		25550		9.7E-09	1.3E-07		7.3E+00		9.3E-07
Benzo[b]fluoranthene	Child	3.00		140		1.0E-06	1		1		30		9		30		25550		1.5E-07					
	Adult	3.00		50		1.0E-06	1		1		16		9		70		25550		1.2E-08	1.6E-07		7.3E-01		1.2E-07
Benzo[k]fluoranthene	Child	3.00		140		1.0E-06	1		1		30		9		30		25550		1.5E-07					
	Adult	3.00		50		1.0E-06	1		1		16		9		70		25550		1.2E-08	1.6E-07		7.3E-02		1.2E-08
bis(2-Ethylhexyl)phthalate	Child	220		140		1.0E-06	1		1		30		9		30		25550		1.1E-05					
	Adult	220		50		1.0E-06	1		1		16		9		70		25550		8.9E-07	1.2E-05		1.4E-02		1.6E-07
Dibenz[a,h]anthracene	Child	0.87		140		1.0E-06	1		1		30		9		30		25550		4.3E-08					
	Adult	0.87		50		1.0E-06	1		1		16		9		70		25550		3.5E-09	4.6E-08		7.3E+00		3.4E-07
Dieldrin	Child	0.01		140		1.0E-06	1		1		30		9		30		25550		3.5E-10					
	Adult	0.01		50		1.0E-06	1		1		16		9		70		25550		2.9E-11	3.8E-10		1.6E+01		6.1E-09
Heptachlor epoxide	Child	0.01		140		1.0E-06	1		1		30		9		30		25550		2.7E-10					
	Adult	0.01		50		1.0E-06	1		1		16		9		70		25550		2.2E-11	2.9E-10		9.1E+00		2.6E-09
Indeno[1,2,3-cd]pyrene	Child	2.10		140		1.0E-06	1		1		30		9		30		25550		1.0E-07					
	Adult	2.10		50		1.0E-06	1		1		16		9		70		25550		8.5E-09	1.1E-07		7.3E-01		8.2E-08
N-Nitroso-di-n-propylamine	Child	3.10		140		1.0E-06	1		1		30		9		30		25550		1.5E-07					
	Adult	3.10		50		1.0E-06	1		1		16		9		70		25550		1.2E-08	1.7E-07		7.0E+00		1.2E-06
Total PCBs	Child	3.97		140		1.0E-06	1		1		30		9		30		25550		2.0E-07					
	Adult	3.97		50		1.0E-06	1		1		16		9		70		25550		1.6E-08	2.1E-07		2.0E+00		4.2E-07
																								4.0E-06

Table D-1. Cancer Risk Calculations for Sediment Contact Scenarios

CT Scenario: Risk for Incidental Dermal Contact with Sediment, Recreator

Chemical	Receptor	C (mg/kg)	x	SA (cm^2/event)	x	AF (mg/cm^2)	x	ABS (unitless)	x	CF (kg/mg)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	´	Dermal SF (mg/kg-d)$^{-1}$	=	Cancer Risk
Aldrin	Child	0.00		2200		0.1		0.1		1.0E-06		30		9		30		25550		2.8E-11					
	Adult	0.00		3500		0.1		0.1		1.0E-06		16		9		70		25550		1.0E-11	3.9E-11		3.4E+01		1.3E-09
Arsenic	Child	8.40		2200		0.1		0.032		1.0E-06		30		9		30		25550		2.1E-08					
	Adult	8.40		3500		0.1		0.032		1.0E-06		16		9		70		25550		7.6E-09	2.8E-08		3.7E+00		1.0E-07
Benzo[a]anthracene	Child	2.30		2200		0.1		0.1		1.0E-06		30		9		30		25550		1.8E-08					
	Adult	2.30		3500		0.1		0.1		1.0E-06		16		9		70		25550		6.5E-09	2.4E-08		2.4E+00		5.7E-08
Benzo[a]pyrene	Child	2.40		2200		0.1		0.1		1.0E-06		30		9		30		25550		1.9E-08					
	Adult	2.40		3500		0.1		0.1		1.0E-06		16		9		70		25550		6.8E-09	2.5E-08		2.4E+01		6.0E-07
Benzo[b]fluoranthene	Child	3.00		2200		0.1		0.1		1.0E-06		30		9		30		25550		2.3E-08					
	Adult	3.00		3500		0.1		0.1		1.0E-06		16		9		70		25550		8.5E-09	3.2E-08		2.4E+00		7.5E-08
Benzo[k]fluoranthene	Child	3.00		2200		0.1		0.1		1.0E-06		30		9		30		25550		2.3E-08					
	Adult	3.00		3500		0.1		0.1		1.0E-06		16		9		70		25550		8.5E-09	3.2E-08		2.4E-01		7.5E-09
bis(2-Ethylhexyl)phthalate	Child	220		2200		0.1		0.1		1.0E-06		30		9		30		25550		1.7E-06					
	Adult	220		3500		0.1		0.1		1.0E-06		16		9		70		25550		6.2E-07	2.3E-06		7.4E-02		1.7E-07
Dibenz[a,h]anthracene	Child	0.87		2200		0.1		0.1		1.0E-06		30		9		30		25550		6.7E-09					
	Adult	0.87		3500		0.1		0.1		1.0E-06		16		9		70		25550		2.4E-09	9.2E-09		2.4E+01		2.2E-07
Dieldrin	Child	0.01		2200		0.1		0.1		1.0E-06		30		9		30		25550		5.5E-11					
	Adult	0.01		3500		0.1		0.1		1.0E-06		16		9		70		25550		2.0E-11	7.5E-11		3.2E+01		2.4E-09
Heptachlor epoxide	Child	0.01		2200		0.1		0.1		1.0E-06		30		9		30		25550		4.2E-11					
	Adult	0.01		3500		0.1		0.1		1.0E-06		16		9		70		25550		1.5E-11	5.7E-11		1.3E+01		7.2E-10
Indeno[1,2,3-cd]pyrene	Child	2.10		2200		0.1		0.1		1.0E-06		30		9		30		25550		1.6E-08					
	Adult	2.10		3500		0.1		0.1		1.0E-06		16		9		70		25550		5.9E-09	2.2E-08		2.4E+00		5.2E-08
N-Nitroso-di-n-propylamine	Child	3.10		2200		0.1		0.1		1.0E-06		30		9		30		25550		2.4E-08					
	Adult	3.10		3500		0.1		0.1		1.0E-06		16		9		70		25550		8.7E-09	3.3E-08		2.8E+01		9.2E-07
Total PCBs	Child	3.97		2200		0.1		0.06		1.0E-06		30		9		30		25550		1.8E-08					
	Adult	3.97		3500		0.1		0.06		1.0E-06		16		9		70		25550		6.7E-09	2.5E-08		2.2E+00		5.6E-08
																									2.3E-06

Table D-2. Cancer Risk Calculations for Surface Water Contact Scenarios

Segment 1 (RM 0 to <3.2)

RME Scenario: Risk for Incidental Ingestion of Surface Water, Recreator

Chemical	Receptor	C (mg/L)	x	IR (L/hr)	x	ET (hr/event)	x	EF (events/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	´	Ingestion SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDT (p,p'-)	Child	0.0002		0.05		3		48		13		30		25550		2.5E-08					
	Adult	0.0002		0.05		3		24		17		70		25550		7.0E-09	3.2E-08		3.4E-01		1.1E-08
Aldrin	Child	0.0001		0.05		3		48		13		30		25550		1.4E-08					
	Adult	0.0001		0.05		3		24		17		70		25550		4.0E-09	1.8E-08		1.7E+01		3.1E-07
Arsenic	Child	0.0021		0.05		3		48		13		30		25550		2.5E-07					
	Adult	0.0021		0.05		3		24		17		70		25550		7.1E-08	3.2E-07		1.5E+00		4.9E-07
Dieldrin	Child	0.0003		0.05		3		48		13		30		25550		3.1E-08					
	Adult	0.0003		0.05		3		24		17		70		25550		8.7E-09	4.0E-08		1.6E+01		6.4E-07
Heptachlor	Child	0.0001		0.05		3		48		13		30		25550		1.3E-08					
	Adult	0.0001		0.05		3		24		17		70		25550		3.6E-09	1.6E-08		4.5E+00		7.3E-08
N-Nitroso-di-n-propylamine	Child	0.0181		0.05		3		48		13		30		25550		2.2E-06					
	Adult	0.0181		0.05		3		24		17		70		25550		6.2E-07	2.8E-06		7.0E+00		2.0E-05
Pentachlorophenol (PCP)	Child	0.0385		0.05		3		48		13		30		25550		4.7E-06					
	Adult	0.0385		0.05		3		24		17		70		25550		1.3E-06	6.0E-06		1.2E-01		7.2E-07
																					2.2E-05

RME Scenario: Risk for Incidental Dermal Contact with Surface Water, Recreator

Chemical	Receptor	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT(d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	x	Dermal SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDT (p,p'-)	Child	0.0002		6800		0.430		0.001		3		48		13		30		25550		1.5E-06					
	Adult	0.0002		4500		0.430		0.001		3		24		17		70		25550		2.7E-07	1.7E-06		4.9E-01		8.4E-07
Aldrin	Child	0.0001		6800		0.002		0.001		3		48		13		30		25550		3.1E-09					
	Adult	0.0001		4500		0.002		0.001		3		24		17		70		25550		5.7E-10	3.6E-09		3.4E+01		1.2E-07
Arsenic	Child	0.0021		6800		0.001		0.001		3		48		13		30		25550		3.4E-08					
	Adult	0.0021		4500		0.001		0.001		3		24		17		70		25550		6.4E-09	4.1E-08		3.7E+00		1.5E-07
Dieldrin	Child	0.0003		6800		0.016		0.001		3		48		13		30		25550		6.8E-08					
	Adult	0.0003		4500		0.016		0.001		3		24		17		70		25550		1.3E-08	8.0E-08		3.2E+01		2.6E-06
Heptachlor	Child	0.0001		6800		0.011		0.001		3		48		13		30		25550		1.9E-08					
	Adult	0.0001		4500		0.011		0.001		3		24		17		70		25550		3.5E-09	2.3E-08		6.3E+00		1.4E-07
N-Nitroso-di-n-propylamine	Child	0.0181		6800		0.003		0.001		3		48		13		30		25550		8.4E-07					
	Adult	0.0181		4500		0.003		0.001		3		24		17		70		25550		1.6E-07	1.0E-06		2.8E+01		2.8E-05
Pentachlorophenol (PCP)	Child	0.0385		6800		0.650		0.001		3		48		13		30		25550		4.2E-04					
	Adult	0.0385		4500		0.650		0.001		3		24		17		70		25550		7.7E-05	4.9E-04		1.2E-01		5.9E-05
																									9.1E-05

RME Scenario: Risk for Incidental Dermal Contact with Surface Water, Boater

Chemical	Receptor	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT(d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	x	Dermal SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDT (p,p'-)	Child	0.0002		6800		0.430		0.001		6		30		13		30		25550		1.8E-06					
	Adult	0.0002		4500		0.430		0.001		6		60		17		70		25550		1.4E-06	3.2E-06		4.9E-01		1.6E-06
Aldrin	Child	0.0001		6800		0.002		0.001		6		30		13		30		25550		3.8E-09					
	Adult	0.0001		4500		0.002		0.001		6		60		17		70		25550		2.8E-09	6.7E-09		3.4E+01		2.3E-07
Arsenic	Child	0.0021		6800		0.001		0.001		6		30		13		30		25550		4.3E-08					
	Adult	0.0021		4500		0.001		0.001		6		60		17		70		25550		3.2E-08	7.5E-08		3.7E+00		2.7E-07
Dieldrin	Child	0.0003		6800		0.016		0.001		6		30		13		30		25550		8.5E-08					
	Adult	0.0003		4500		0.016		0.001		6		60		17		70		25550		6.3E-08	1.5E-07		3.2E+01		4.7E-06
Heptachlor	Child	0.0001		6800		0.011		0.001		6		30		13		30		25550		2.4E-08					
	Adult	0.00010		4500		0.011		0.001		6		60		17		70		25550		1.8E-08	4.1E-08		6.3E+00		2.6E-07
N-Nitroso-di-n-propylamine	Child	0.0181		6800		0.003		0.001		6		30		13		30		25550		1.1E-06					
	Adult	0.0181		4500		0.003		0.001		6		60		17		70		25550		7.8E-07	1.8E-06		2.8E+01		5.1E-05
Pentachlorophenol (PCP)	Child	0.0385		6800		0.650		0.001		6		30		13		30		25550		5.2E-04					
	Adult	0.0385		4500		0.650		0.001		6		60		17		70		25550		3.9E-04	9.0E-04		1.2E-01		1.1E-04
																									1.7E-04

Table D-2. Cancer Risk Calculations for Surface Water Contact Scenarios

CT Scenario: Risk for Incidental Ingestion of Surface Water, Recreator

Chemical	Receptor	C (mg/L)	x	IR (L/hr)	x	ET (hr/event)	x	EF (events/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	x	Ingestion SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDT (p,p'-)	Child	0.0002	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	3.6E-09					
	Adult	0.0002	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	8.3E-10	4.4E-09	x	3.4E-01	=	1.5E-09
Aldrin	Child	0.0001	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	2.0E-09					
	Adult	0.0001	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	4.7E-10	2.5E-09	x	1.7E+01	=	4.3E-08
Arsenic	Child	0.0021	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	3.6E-08					
	Adult	0.0021	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	8.3E-09	4.5E-08	x	1.5E+00	=	6.7E-08
Dieldrin	Child	0.0003	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	4.5E-09					
	Adult	0.0003	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	1.0E-09	5.5E-09	x	1.6E+01	=	8.8E-08
Heptachlor	Child	0.0001	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	1.8E-09					
	Adult	0.0001	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	4.2E-10	2.3E-09	x	4.5E+00	=	1.0E-08
N-Nitroso-di-n-propylamine	Child	0.0181	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	3.2E-07					
	Adult	0.0181	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	7.3E-08	3.9E-07	x	7.0E+00	=	2.7E-06
Pentachlorophenol (PCP)	Child	0.0385	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	6.8E-07					
	Adult	0.0385	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	1.5E-07	8.3E-07	x	1.2E-01	=	1.0E-07
																					3.0E-06

CT Scenario: Risk for Incidental Dermal Contact with Surface Water for Adult Recreator, Recreator

Chemical	Receptor	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT(d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	x	Dermal SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDT (p,p'-)	Child	0.0002	x	5500	x	0.430	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	1.7E-07					
	Adult	0.0002	x	11000	x	0.430	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	7.8E-08	2.5E-07	x	4.9E-01	=	1.2E-07
Aldrin	Child	0.0001	x	5500	x	0.002	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	3.6E-10					
	Adult	0.0001	x	11000	x	0.002	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	1.6E-10	5.2E-10	x	3.4E+01	=	1.8E-08
Arsenic	Child	0.0021	x	5500	x	0.001	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	4.0E-09					
	Adult	0.0021	x	11000	x	0.001	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	1.8E-09	5.8E-09	x	3.7E+00	=	2.1E-08
Dieldrin	Child	0.0003	x	5500	x	0.016	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	7.9E-09					
	Adult	0.0003	x	11000	x	0.016	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	3.6E-09	1.2E-08	x	3.2E+01	=	3.7E-07
Heptachlor	Child	0.0001	x	5500	x	0.011	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	2.2E-09					
	Adult	0.0001	x	11000	x	0.011	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	1.0E-09	3.2E-09	x	6.3E+00	=	2.0E-08
N-Nitroso-di-n-propylamine	Child	0.0181	x	5500	x	0.003	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	9.8E-08					
	Adult	0.0181	x	11000	x	0.003	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	4.5E-08	1.4E-07	x	2.8E+01	=	4.0E-06
Pentachlorophenol (PCP)	Child	0.0385	x	5500	x	0.650	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	4.8E-05					
	Adult	0.0385	x	11000	x	0.650	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	2.2E-05	7.1E-05	x	1.2E-01	=	8.5E-06
																									1.3E-05

CT Scenario: Risk for Incidental Dermal Contact with Surface Water, Boater

Chemical	Receptor	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT(d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	x	Dermal SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDT (p,p'-)	Child	0.0002	x	5500	x	0.430	x	0.001	x	6	x	30	x	9	/	30	x	25550	=	1.0E-06					
	Adult	0.0002	x	11000	x	0.430	x	0.001	x	6	x	30	x	9	/	70	x	25550	=	8.8E-07	1.9E-06	x	4.9E-01	=	9.3E-07
Aldrin	Child	0.0001	x	5500	x	0.002	x	0.001	x	6	x	30	x	9	/	30	x	25550	=	2.2E-09					
	Adult	0.0001	x	11000	x	0.002	x	0.001	x	6	x	30	x	9	/	70	x	25550	=	1.8E-09	4.0E-09	x	3.4E+01	=	1.4E-07
Arsenic	Child	0.0021	x	5500	x	0.001	x	0.001	x	6	x	30	x	9	/	30	x	25550	=	2.4E-08					
	Adult	0.0021	x	11000	x	0.001	x	0.001	x	6	x	30	x	9	/	70	x	25550	=	2.1E-08	4.5E-08	x	3.7E+00	=	1.6E-07
Dieldrin	Child	0.0003	x	5500	x	0.016	x	0.001	x	6	x	30	x	9	/	30	x	25550	=	4.7E-08					
	Adult	0.0003	x	11000	x	0.016	x	0.001	x	6	x	30	x	9	/	70	x	25550	=	4.1E-08	8.8E-08	x	3.2E+01	=	2.8E-06
Heptachlor	Child	0.0001	x	5500	x	0.011	x	0.001	x	6	x	30	x	9	/	30	x	25550	=	1.3E-08					
	Adult	0.0001	x	11000	x	0.011	x	0.001	x	6	x	30	x	9	/	70	x	25550	=	1.1E-08	2.5E-08	x	6.3E+00	=	1.5E-07
N-Nitroso-di-n-propylamine	Child	0.0181	x	5500	x	0.003	x	0.001	x	6	x	30	x	9	/	30	x	25550	=	5.9E-07					
	Adult	0.0181	x	11000	x	0.003	x	0.001	x	6	x	30	x	9	/	70	x	25550	=	5.0E-07	1.1E-06	x	2.8E+01	=	3.1E-05
Pentachlorophenol (PCP)	Child	0.0385	x	5500	x	0.650	x	0.001	x	6	x	30	x	9	/	30	x	25550	=	2.9E-04					
	Adult	0.0385	x	11000	x	0.650	x	0.001	x	6	x	30	x	9	/	70	x	25550	=	2.5E-04	5.4E-04	x	1.2E-01	=	6.5E-05
																									1.0E-04

Table D-2. Cancer Risk Calculations for Surface Water Contact Scenarios

Segment 2 (RM 3.2 to <4.9)

RME Scenario: Risk for Incidental Ingestion of Surface Water, Recreator

Chemical	Receptor	C (mg/L)	x	IR (L/hr)	x	ET (hr/event)	x	EF (events/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	Ingestion SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDT (p,p'-)	Child	0.0001		0.05		3		48		13		30		25550		6.1E-09				
	Adult	0.0001		0.05		3		24		17		70		25550		1.7E-09	7.8E-09	3.4E-01		2.7E-09
Aldrin	Child	0.0000		0.05		3		48		13		30		25550		3.1E-09				
	Adult	0.0000		0.05		3		24		17		70		25550		8.6E-10	3.9E-09	1.7E+01		6.6E-08
Arsenic	Child	0.0038		0.05		3		48		13		30		25550		4.6E-07				
	Adult	0.0038		0.05		3		24		17		70		25550		1.3E-07	5.9E-07	1.5E+00		8.9E-07
Dieldrin	Child	0.0001		0.05		3		48		13		30		25550		6.1E-09				
	Adult	0.0001		0.05		3		24		17		70		25550		1.7E-09	7.8E-09	1.6E+01		1.3E-07
Heptachlor	Child	0.0000		0.05		3		48		13		30		25550		3.1E-09				
	Adult	0.0000		0.05		3		24		17		70		25550		8.6E-10	3.9E-09	4.5E+00		1.8E-08
N-Nitroso-di-n-propylamine	Child	0.0050		0.05		3		48		13		30		25550		6.1E-07				
	Adult	0.0050		0.05		3		24		17		70		25550		1.7E-07	7.8E-07	7.0E+00		5.5E-06
Pentachlorophenol (PCP)	Child	0.0125		0.05		3		48		13		30		25550		1.5E-06				
	Adult	0.0125		0.05		3		24		17		70		25550		4.3E-07	2.0E-06	1.2E-01		2.3E-07
																				6.8E-06

RME Scenario: Risk for Incidental Dermal Contact with Surface Water, Recreator

Chemical	Receptor	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT(d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	x	Dermal SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDT (p,p'-)	Child	0.0001		6800		0.430		0.001		3		48		13		30		25550		3.6E-07					
	Adult	0.0001		4500		0.430		0.001		3		24		17		70		25550		6.6E-08	4.2E-07		4.9E-01		2.1E-07
Aldrin	Child	0.0000		6800		0.002		0.001		3		48		13		30		25550		6.6E-10					
	Adult	0.0000		4500		0.002		0.001		3		24		17		70		25550		1.2E-10	7.9E-10		3.4E+01		2.7E-08
Arsenic	Child	0.0038		6800		0.001		0.001		3		48		13		30		25550		6.3E-08					
	Adult	0.0038		4500		0.001		0.001		3		24		17		70		25550		1.2E-08	7.5E-08		3.7E+00		2.7E-07
Dieldrin	Child	0.0001		6800		0.016		0.001		3		48		13		30		25550		1.3E-08					
	Adult	0.0001		4500		0.016		0.001		3		24		17		70		25550		2.5E-09	1.6E-08		3.2E+01		5.0E-07
Heptachlor	Child	0.0000		6800		0.011		0.001		3		48		13		30		25550		4.6E-09					
	Adult	0.0000		4500		0.011		0.001		3		24		17		70		25550		8.5E-10	5.4E-09		6.3E+00		3.4E-08
N-Nitroso-di-n-propylamine	Child	0.0050		6800		0.003		0.001		3		48		13		30		25550		2.3E-07					
	Adult	0.0050		4500		0.003		0.001		3		24		17		70		25550		4.3E-08	2.8E-07		2.8E+01		7.7E-06
Pentachlorophenol (PCP)	Child	0.0125		6800		0.650		0.001		3		48		13		30		25550		1.3E-04					
	Adult	0.0125		4500		0.650		0.001		3		24		17		70		25550		2.5E-05	1.6E-04		1.2E-01		1.9E-05
																									2.8E-05

RME Scenario: Risk for Incidental Dermal Contact with Surface Water, Boater

Chemical	Receptor	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT(d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	x	Dermal SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDT (p,p'-)	Child	0.0001		6800		0.430		0.001		6		30		13		30		25550		4.5E-07					
	Adult	0.0001		4500		0.430		0.001		6		60		17		70		25550		3.3E-07	7.8E-07		4.9E-01		3.8E-07
Aldrin	Child	0.0000		6800		0.002		0.001		6		30		13		30		25550		8.3E-10					
	Adult	0.0000		4500		0.002		0.001		6		60		17		70		25550		6.2E-10	1.4E-09		3.4E+01		4.9E-08
Arsenic	Child	0.0038		6800		0.001		0.001		6		30		13		30		25550		7.9E-08					
	Adult	0.0038		4500		0.001		0.001		6		60		17		70		25550		5.9E-08	1.4E-07		3.7E+00		5.0E-07
Dieldrin	Child	0.0001		6800		0.016		0.001		6		30		13		30		25550		1.7E-08					
	Adult	0.0001		4500		0.016		0.001		6		60		17		70		25550		1.2E-08	2.9E-08		3.2E+01		9.3E-07
Heptachlor	Child	0.0000		6800		0.011		0.001		6		30		13		30		25550		5.7E-09					
	Adult	0.0000		4500		0.011		0.001		6		60		17		70		25550		4.2E-09	9.9E-09		6.3E+00		6.2E-08
N-Nitroso-di-n-propylamine	Child	0.0050		6800		0.003		0.001		6		30		13		30		25550		2.9E-07					
	Adult	0.0050		4500		0.003		0.001		6		60		17		70		25550		2.2E-07	5.1E-07		2.8E+01		1.4E-05
Pentachlorophenol (PCP)	Child	0.0125		6800		0.650		0.001		6		30		13		30		25550		1.7E-04					
	Adult	0.0125		4500		0.650		0.001		6		60		17		70		25550		1.3E-04	2.9E-04		1.2E-01		3.5E-05
																									5.1E-05

Table D-2. Cancer Risk Calculations for Surface Water Contact Scenarios

CT Scenario: Risk for Incidental Ingestion of Surface Water, Recreator

Chemical	Receptor	C (mg/L)	x	IR (L/hr)	x	ET (hr/event)	x	EF (events/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	x	Ingestion SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDT (p,p'-)	Child	0.0001	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	8.8E-10					
	Adult	0.0001	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	2.0E-10	1.1E-09	x	3.4E-01	=	3.7E-10
Aldrin	Child	0.0000	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	4.4E-10					
	Adult	0.0000	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	1.0E-10	5.4E-10	x	1.7E+01	=	9.2E-09
Arsenic	Child	0.0038	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	6.7E-08					
	Adult	0.0038	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	1.5E-08	8.2E-08	x	1.5E+00	=	1.2E-07
Dieldrin	Child	0.0001	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	8.8E-10					
	Adult	0.0001	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	2.0E-10	1.1E-09	x	1.6E+01	=	1.7E-08
Heptachlor	Child	0.0000	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	4.4E-10					
	Adult	0.0000	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	1.0E-10	5.4E-10	x	4.5E+00	=	2.4E-09
N-Nitroso-di-n-propylamine	Child	0.0050	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	8.8E-08					
	Adult	0.0050	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	2.0E-08	1.1E-07	x	7.0E+00	=	7.6E-07
Pentachlorophenol (PCP)	Child	0.0125	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	2.2E-07					
	Adult	0.0125	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	5.0E-08	2.7E-07	x	1.2E-01	=	3.2E-08
																					9.4E-07

CT Scenario: Risk for Incidental Dermal Contact with Surface Water, Recreator

Chemical	Receptor	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT(d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	x	Dermal SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDT (p,p'-)	Child	0.0001	x	5500	x	0.430	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	4.2E-08					
	Adult	0.0001	x	11000	x	0.430	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	1.9E-08	6.1E-08	x	4.9E-01	=	2.9E-08
Aldrin	Child	0.0000	x	5500	x	0.002	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	7.7E-11					
	Adult	0.0000	x	11000	x	0.002	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	3.5E-11	1.1E-10	x	3.4E+01	=	3.8E-09
Arsenic	Child	0.0038	x	5500	x	0.001	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	7.4E-09					
	Adult	0.0038	x	11000	x	0.001	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	3.4E-09	1.1E-08	x	3.7E+00	=	3.9E-08
Dieldrin	Child	0.0001	x	5500	x	0.016	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	1.5E-09					
	Adult	0.0001	x	11000	x	0.016	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	7.1E-10	2.3E-09	x	3.2E+01	=	7.2E-08
Heptachlor	Child	0.0000	x	5500	x	0.011	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	5.3E-10					
	Adult	0.0000	x	11000	x	0.011	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	2.4E-10	7.8E-10	x	6.3E+00	=	4.9E-09
N-Nitroso-di-n-propylamine	Child	0.0050	x	5500	x	0.003	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	2.7E-08					
	Adult	0.0050	x	11000	x	0.003	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	1.2E-08	4.0E-08	x	2.8E+01	=	1.1E-06
Pentachlorophenol (PCP)	Child	0.0125	x	5500	x	0.650	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	1.6E-05					
	Adult	0.0125	x	11000	x	0.650	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	7.2E-06	2.3E-05	x	1.2E-01	=	2.8E-06
																									4.0E-06

CT Scenario: Risk for Incidental Dermal Contact with Surface Water, Boater

Chemical	Receptor	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT(d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	x	Dermal SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDT (p,p'-)	Child	0.0001	x	5500	x	0.430	x	0.001	x	4.3	x	26.3	x	9	/	30	x	25550	=	1.6E-07					
	Adult	0.0001	x	11000	x	0.430	x	0.001	x	4.3	x	26.3	x	9	/	70	x	25550	=	1.3E-07	2.9E-07	x	4.9E-01	=	1.4E-07
Aldrin	Child	0.0000	x	5500	x	0.002	x	0.001	x	4.3	x	26.3	x	9	/	30	x	25550	=	2.9E-10					
	Adult	0.0000	x	11000	x	0.002	x	0.001	x	4.3	x	26.3	x	9	/	70	x	25550	=	2.5E-10	5.4E-10	x	3.4E+01	=	1.8E-08
Arsenic	Child	0.0038	x	5500	x	0.001	x	0.001	x	4.3	x	26.3	x	9	/	30	x	25550	=	2.8E-08					
	Adult	0.0038	x	11000	x	0.001	x	0.001	x	4.3	x	26.3	x	9	/	70	x	25550	=	2.4E-08	5.2E-08	x	3.7E+00	=	1.9E-07
Dieldrin	Child	0.0001	x	5500	x	0.016	x	0.001	x	4.3	x	26.3	x	9	/	30	x	25550	=	5.8E-09					
	Adult	0.0001	x	11000	x	0.016	x	0.001	x	4.3	x	26.3	x	9	/	70	x	25550	=	5.0E-09	1.1E-08	x	3.2E+01	=	3.5E-07
Heptachlor	Child	0.0000	x	5500	x	0.011	x	0.001	x	4.3	x	26.3	x	9	/	30	x	25550	=	2.0E-09					
	Adult	0.0000	x	11000	x	0.011	x	0.001	x	4.3	x	26.3	x	9	/	70	x	25550	=	1.7E-09	3.7E-09	x	6.3E+00	=	2.3E-08
N-Nitroso-di-n-propylamine	Child	0.0050	x	5500	x	0.003	x	0.001	x	4.3	x	26.3	x	9	/	30	x	25550	=	1.0E-07					
	Adult	0.0050	x	11000	x	0.003	x	0.001	x	4.3	x	26.3	x	9	/	70	x	25550	=	8.8E-08	1.9E-07	x	2.8E+01	=	5.3E-06
Pentachlorophenol (PCP)	Child	0.0125	x	5500	x	0.650	x	0.001	x	4.3	x	26.3	x	9	/	30	x	25550	=	5.9E-05					
	Adult	0.0125	x	11000	x	0.650	x	0.001	x	4.3	x	26.3	x	9	/	70	x	25550	=	5.1E-05	1.1E-04	x	1.2E-01	=	1.3E-05
																									1.9E-05

Table D-2. Cancer Risk Calculations for Surface Water Contact Scenarios

Segment 3 (RM 4.9 to <6.5)

RME Scenario: Risk for Incidental Ingestion of Surface Water, Recreator

Chemical	Receptor	C (mg/L)	x	IR (L/hr)	x	ET (hr/event)	x	EF (events/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	´	Ingestion SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDT (p,p'-)	Child	0.0001		0.05		3		48		13		30		25550		6.1E-09					
	Adult	0.0001		0.05		3		24		17		70		25550		1.7E-09	7.8E-09		3.4E-01		2.7E-09
Aldrin	Child	0.0000		0.05		3		48		13		30		25550		3.1E-09					
	Adult	0.0000		0.05		3		24		17		70		25550		8.6E-10	3.9E-09		1.7E+01		6.6E-08
Arsenic	Child	0.0012		0.05		3		48		13		30		25550		1.4E-07					
	Adult	0.0038		0.05		3		24		17		70		25550		1.3E-07	2.7E-07		1.5E+00		4.1E-07
Dieldrin	Child	0.0001		0.05		3		48		13		30		25550		6.1E-09					
	Adult	0.0001		0.05		3		24		17		70		25550		1.7E-09	7.8E-09		1.6E+01		1.3E-07
Heptachlor	Child	0.0000		0.05		3		48		13		30		25550		3.1E-09					
	Adult	0.0000		0.05		3		24		17		70		25550		8.6E-10	3.9E-09		4.5E+00		1.8E-08
N-Nitroso-di-n-propylamine	Child	0.0050		0.05		3		48		13		30		25550		6.1E-07					
	Adult	0.0050		0.05		3		24		17		70		25550		1.7E-07	7.8E-07		7.0E+00		5.5E-06
Pentachlorophenol (PCP)	Child	0.0125		0.05		3		48		13		30		25550		1.5E-06					
	Adult	0.0125		0.05		3		24		17		70		25550		4.3E-07	2.0E-06		1.2E-01		2.3E-07
																					6.3E-06

RME Scenario: Risk for Incidental Dermal Contact with Surface Water, Recreator

Chemical	Receptor	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT(d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	x	Dermal SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDT (p,p'-)	Child	0.0001		6800		0.430		0.001		3		48		13		30		25550		3.6E-07					
	Adult	0.0001		4500		0.430		0.001		3		24		17		70		25550		6.6E-08	4.2E-07		4.9E-01		2.1E-07
Aldrin	Child	0.0000		6800		0.002		0.001		3		48		13		30		25550		6.6E-10					
	Adult	0.0000		4500		0.002		0.001		3		24		17		70		25550		1.2E-10	7.9E-10		3.4E+01		2.7E-08
Arsenic	Child	0.0012		6800		0.001		0.001		3		48		13		30		25550		1.9E-08					
	Adult	0.0012		4500		0.001		0.001		3		24		17		70		25550		3.5E-09	2.3E-08		3.7E+00		8.3E-08
Dieldrin	Child	0.0001		6800		0.016		0.001		3		48		13		30		25550		1.3E-08					
	Adult	0.0001		4500		0.016		0.001		3		24		17		70		25550		2.5E-09	1.6E-08		3.2E+01		5.0E-07
Heptachlor	Child	0.0000		6800		0.011		0.001		3		48		13		30		25550		4.6E-09					
	Adult	0.0000		4500		0.011		0.001		3		24		17		70		25550		8.5E-10	5.4E-09		6.3E+00		3.4E-08
N-Nitroso-di-n-propylamine	Child	0.0050		6800		0.003		0.001		3		48		13		30		25550		2.3E-07					
	Adult	0.0050		4500		0.003		0.001		3		24		17		70		25550		4.3E-08	2.8E-07		2.8E+01		7.7E-06
Pentachlorophenol (PCP)	Child	0.0125		6800		0.650		0.001		3		48		13		30		25550		1.3E-04					
	Adult	0.0125		4500		0.650		0.001		3		24		17		70		25550		2.5E-05	1.6E-04		1.2E-01		1.9E-05
																									2.8E-05

RME Scenario: Risk for Incidental Dermal Contact with Surface Water, Boater

Chemical	Receptor	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT(d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	x	Dermal SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDT (p,p'-)	Child	0.0001		6800		0.430		0.001		6		30		13		30		25550		4.5E-07					
	Adult	0.0001		4500		0.430		0.001		6		60		17		70		25550		3.3E-07	7.8E-07		4.9E-01		3.8E-07
Aldrin	Child	0.0000		6800		0.002		0.001		6		30		13		30		25550		8.3E-10					
	Adult	0.0000		4500		0.002		0.001		6		60		17		70		25550		6.2E-10	1.4E-09		3.4E+01		4.9E-08
Arsenic	Child	0.0012		6800		0.001		0.001		6		30		13		30		25550		2.4E-08					
	Adult	0.0012		4500		0.001		0.001		6		60		17		70		25550		1.8E-08	4.2E-08		3.7E+00		1.5E-07
Dieldrin	Child	0.0001		6800		0.016		0.001		6		30		13		30		25550		1.7E-08					
	Adult	0.0001		4500		0.016		0.001		6		60		17		70		25550		1.2E-08	2.9E-08		3.2E+01		9.3E-07
Heptachlor	Child	0.0000		6800		0.011		0.001		6		30		13		30		25550		5.7E-09					
	Adult	0.0000		4500		0.011		0.001		6		60		17		70		25550		4.2E-09	9.9E-09		6.3E+00		6.2E-08
N-Nitroso-di-n-propylamine	Child	0.0050		6800		0.003		0.001		6		30		13		30		25550		2.9E-07					
	Adult	0.0050		4500		0.003		0.001		6		60		17		70		25550		2.2E-07	5.1E-07		2.8E+01		1.4E-05
Pentachlorophenol (PCP)	Child	0.0125		6800		0.650		0.001		6		30		13		30		25550		1.7E-04					
	Adult	0.0125		4500		0.650		0.001		6		60		17		70		25550		1.3E-04	2.9E-04		1.2E-01		3.5E-05
																									5.1E-05

Table D-2. Cancer Risk Calculations for Surface Water Contact Scenarios

CT Scenario: Risk for Incidental Ingestion of Surface Water, Recreator

Chemical	Receptor	C (mg/L)	x	IR (L/hr)	x	ET (hr/event)	x	EF (events/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	x	Ingestion SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDT (p,p'-)	Child	0.0001	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	8.8E-10					
4,4'-DDT (p,p'-)	Adult	0.0001	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	2.0E-10	1.1E-09	x	3.4E-01	=	3.7E-10
Aldrin	Child	0.0000	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	4.4E-10					
Aldrin	Adult	0.0000	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	1.0E-10	5.4E-10	x	1.7E+01	=	9.2E-09
Arsenic	Child	0.0012	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	2.0E-08					
Arsenic	Adult	0.0012	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	4.6E-09	2.5E-08	x	1.5E+00	=	3.7E-08
Dieldrin	Child	0.0001	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	8.8E-10					
Dieldrin	Adult	0.0001	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	2.0E-10	1.1E-09	x	1.6E+01	=	1.7E-08
Heptachlor	Child	0.0000	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	4.4E-10					
Heptachlor	Adult	0.0000	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	1.0E-10	5.4E-10	x	4.5E+00	=	2.4E-09
N-Nitroso-di-n-propylamine	Child	0.0050	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	8.8E-08					
N-Nitroso-di-n-propylamine	Adult	0.0050	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	2.0E-08	1.1E-07	x	7.0E+00	=	7.6E-07
Pentachlorophenol (PCP)	Child	0.0125	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	2.2E-07					
Pentachlorophenol (PCP)	Adult	0.0125	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	5.0E-08	2.7E-07	x	1.2E-01	=	3.2E-08
																					8.6E-07

CT Scenario: Risk for Incidental Dermal Contact with Surface Water, Recreator

Chemical	Receptor	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT(d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	x	Dermal SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDT (p,p'-)	Child	0.0001	x	5500	x	0.430	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	4.2E-08					
	Adult	0.0001	x	11000	x	0.430	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	1.9E-08	6.1E-08	x	4.9E-01	=	2.9E-08
Aldrin	Child	0.0000	x	5500	x	0.002	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	7.7E-11					
	Adult	0.0000	x	11000	x	0.002	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	3.5E-11	1.1E-10	x	3.4E+01	=	3.8E-09
Arsenic	Child	0.0012	x	5500	x	0.001	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	2.2E-09					
	Adult	0.0012	x	11000	x	0.001	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	1.0E-09	3.2E-09	x	3.7E+00	=	1.2E-08
Dieldrin	Child	0.0001	x	5500	x	0.016	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	1.5E-09					
	Adult	0.0001	x	11000	x	0.016	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	7.1E-10	2.3E-09	x	3.2E+01	=	7.2E-08
Heptachlor	Child	0.0000	x	5500	x	0.011	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	5.3E-10					
	Adult	0.0000	x	11000	x	0.011	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	2.4E-10	7.8E-10	x	6.3E+00	=	4.9E-09
N-Nitroso-di-n-propylamine	Child	0.0050	x	5500	x	0.003	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	2.7E-08					
	Adult	0.0050	x	11000	x	0.003	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	1.2E-08	4.0E-08	x	2.8E+01	=	1.1E-06
Pentachlorophenol (PCP)	Child	0.0125	x	5500	x	0.650	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	1.6E-05					
	Adult	0.0125	x	11000	x	0.650	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	7.2E-06	2.3E-05	x	1.2E-01	=	2.8E-06
																									4.0E-06

CT Scenario: Risk for Incidental Dermal Contact with Surface Water, Boater

Chemical	Receptor	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT(d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	x	Dermal SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDT (p,p'-)	Child	0.0001	x	5500	x	0.430	x	0.001	x	4.3	x	26.3	x	9	/	30	x	25550	=	1.6E-07					
	Adult	0.0001	x	11000	x	0.430	x	0.001	x	4.3	x	26.3	x	9	/	70	x	25550	=	1.3E-07	2.9E-07	x	4.9E-01	=	1.4E-07
Aldrin	Child	0.0000	x	5500	x	0.002	x	0.001	x	4.3	x	26.3	x	9	/	30	x	25550	=	2.9E-10					
	Adult	0.0000	x	11000	x	0.002	x	0.001	x	4.3	x	26.3	x	9	/	70	x	25550	=	2.5E-10	5.4E-10	x	3.4E+01	=	1.8E-08
Arsenic	Child	0.0012	x	5500	x	0.001	x	0.001	x	4.3	x	26.3	x	9	/	30	x	25550	=	8.4E-09					
	Adult	0.0012	x	11000	x	0.001	x	0.001	x	4.3	x	26.3	x	9	/	70	x	25550	=	7.2E-09	1.6E-08	x	3.7E+00	=	5.7E-08
Dieldrin	Child	0.0001	x	5500	x	0.016	x	0.001	x	4.3	x	26.3	x	9	/	30	x	25550	=	5.8E-09					
	Adult	0.0001	x	11000	x	0.016	x	0.001	x	4.3	x	26.3	x	9	/	70	x	25550	=	5.0E-09	1.1E-08	x	3.2E+01	=	3.5E-07
Heptachlor	Child	0.0000	x	5500	x	0.011	x	0.001	x	4.3	x	26.3	x	9	/	30	x	25550	=	2.0E-09					
	Adult	0.0000	x	11000	x	0.011	x	0.001	x	4.3	x	26.3	x	9	/	70	x	25550	=	1.7E-09	3.7E-09	x	6.3E+00	=	2.3E-08
N-Nitroso-di-n-propylamine	Child	0.0050	x	5500	x	0.003	x	0.001	x	4.3	x	26.3	x	9	/	30	x	25550	=	1.0E-07					
	Adult	0.0050	x	11000	x	0.003	x	0.001	x	4.3	x	26.3	x	9	/	70	x	25550	=	8.8E-08	1.9E-07	x	2.8E+01	=	5.3E-06
Pentachlorophenol (PCP)	Child	0.0125	x	5500	x	0.650	x	0.001	x	4.3	x	26.3	x	9	/	30	x	25550	=	5.9E-05					
	Adult	0.0125	x	11000	x	0.650	x	0.001	x	4.3	x	26.3	x	9	/	70	x	25550	=	5.1E-05	1.1E-04	x	1.2E-01	=	1.3E-05
																									1.9E-05

Table D-2. Cancer Risk Calculations for Surface Water Contact Scenarios

Segment 4 (RM 6.5 to 8.8)

RME Scenario: Risk for Incidental Ingestion of Surface Water, Recreator

Chemical	Receptor	C (mg/L)	x	IR (L/hr)	x	ET (hr/event)	x	EF (events/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	´	Ingestion SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDT (p,p'-)	Child	0.0001		0.05		3		48		13		30		25550		6.1E-09					
	Adult	0.0001		0.05		3		24		17		70		25550		1.7E-09	7.8E-09		3.4E-01		2.7E-09
Aldrin	Child	0.0000		0.05		3		48		13		30		25550		3.1E-09					
	Adult	0.0000		0.05		3		24		17		70		25550		8.6E-10	3.9E-09		1.7E+01		6.6E-08
Arsenic	Child	0.0012		0.05		3		48		13		30		25550		1.4E-07					
	Adult	0.0012		0.05		3		24		17		70		25550		3.9E-08	1.8E-07		1.5E+00		2.7E-07
Dieldrin	Child	0.0001		0.05		3		48		13		30		25550		6.1E-09					
	Adult	0.0001		0.05		3		24		17		70		25550		1.7E-09	7.8E-09		1.6E+01		1.3E-07
Heptachlor	Child	0.0000		0.05		3		48		13		30		25550		3.1E-09					
	Adult	0.0000		0.05		3		24		17		70		25550		8.6E-10	3.9E-09		4.5E+00		1.8E-08
N-Nitroso-di-n-propylamine	Child	0.0050		0.05		3		48		13		30		25550		6.1E-07					
	Adult	0.0050		0.05		3		24		17		70		25550		1.7E-07	7.8E-07		7.0E+00		5.5E-06
Pentachlorophenol (PCP)	Child	0.0125		0.05		3		48		13		30		25550		1.5E-06					
	Adult	0.0125		0.05		3		24		17		70		25550		4.3E-07	2.0E-06		1.2E-01		2.3E-07
																					6.2E-06

RME Scenario: Risk for Incidental Dermal Contact with Surface Water, Recreator

Chemical	Receptor	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT(d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	x	Dermal SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDT (p,p'-)	Child	0.0001		6800		0.430		0.001		3		48		13		30		25550		3.6E-07					
	Adult	0.0001		4500		0.430		0.001		3		24		17		70		25550		6.6E-08	4.2E-07		4.9E-01		2.1E-07
Aldrin	Child	0.0000		6800		0.002		0.001		3		48		13		30		25550		6.6E-10					
	Adult	0.0000		4500		0.002		0.001		3		24		17		70		25550		1.2E-10	7.9E-10		3.4E+01		2.7E-08
Arsenic	Child	0.0012		6800		0.001		0.001		3		48		13		30		25550		1.9E-08					
	Adult	0.0012		4500		0.001		0.001		3		24		17		70		25550		3.5E-09	2.3E-08		3.7E+00		8.3E-08
Dieldrin	Child	0.0001		6800		0.016		0.001		3		48		13		30		25550		1.3E-08					
	Adult	0.0001		4500		0.016		0.001		3		24		17		70		25550		2.5E-09	1.6E-08		3.2E+01		5.0E-07
Heptachlor	Child	0.0000		6800		0.011		0.001		3		48		13		30		25550		4.6E-09					
	Adult	0.0000		4500		0.011		0.001		3		24		17		70		25550		8.5E-10	5.4E-09		6.3E+00		3.4E-08
N-Nitroso-di-n-propylamine	Child	0.0050		6800		0.003		0.001		3		48		13		30		25550		2.3E-07					
	Adult	0.0050		4500		0.003		0.001		3		24		17		70		25550		4.3E-08	2.8E-07		2.8E+01		7.7E-06
Pentachlorophenol (PCP)	Child	0.0125		6800		0.650		0.001		3		48		13		30		25550		1.3E-04					
	Adult	0.0125		4500		0.650		0.001		3		24		17		70		25550		2.5E-05	1.6E-04		1.2E-01		1.9E-05
																									2.8E-05

RME Scenario: Risk for Incidental Dermal Contact with Surface Water, Boater

Chemical	Receptor	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	x	Dermal SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDT (p,p'-)	Child	0.0001		6800		0.430		0.001		6		30		13		30		25550		4.5E-07					
	Adult	0.0001		4500		0.430		0.001		6		60		17		70		25550		3.3E-07	7.8E-07		4.9E-01		3.8E-07
Aldrin	Child	0.0000		6800		0.002		0.001		6		30		13		30		25550		8.3E-10					
	Adult	0.0000		4500		0.002		0.001		6		60		17		70		25550		6.2E-10	1.4E-09		3.4E+01		4.9E-08
Arsenic	Child	0.0012		6800		0.001		0.001		6		30		13		30		25550		2.4E-08					
	Adult	0.0012		4500		0.001		0.001		6		60		17		70		25550		1.8E-08	4.2E-08		3.7E+00		1.5E-07
Dieldrin	Child	0.0001		6800		0.016		0.001		6		30		13		30		25550		1.7E-08					
	Adult	0.0001		4500		0.016		0.001		6		60		17		70		25550		1.2E-08	2.9E-08		3.2E+01		9.3E-07
Heptachlor	Child	0.0000		6800		0.011		0.001		6		30		13		30		25550		5.7E-09					
	Adult	0.0000		4500		0.011		0.001		6		60		17		70		25550		4.2E-09	9.9E-09		6.3E+00		6.2E-08
N-Nitroso-di-n-propylamine	Child	0.0050		6800		0.003		0.001		6		30		13		30		25550		2.9E-07					
	Adult	0.0050		4500		0.003		0.001		6		60		17		70		25550		2.2E-07	5.1E-07		2.8E+01		1.4E-05
Pentachlorophenol (PCP)	Child	0.0125		6800		0.650		0.001		6		30		13		30		25550		1.7E-04					
	Adult	0.0125		4500		0.650		0.001		6		60		17		70		25550		1.3E-04	2.9E-04		1.2E-01		3.5E-05
																									5.1E-05

Table D-2. Cancer Risk Calculations for Surface Water Contact Scenarios

CT Scenario: Risk for Incidental Ingestion of Surface Water, Recreator

Chemical	Receptor	C (mg/L)	x	IR (L/hr)	x	ET (hr/event)	x	EF (events/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	x	Ingestion SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDT (p,p'-)	Child	0.0001	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	8.8E-10					
	Adult	0.0001	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	2.0E-10	1.1E-09	x	3.4E-01	=	3.7E-10
Aldrin	Child	0.0000	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	4.4E-10					
	Adult	0.0000	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	1.0E-10	5.4E-10	x	1.7E+01	=	9.2E-09
Arsenic	Child	0.0012	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	2.0E-08					
	Adult	0.0012	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	4.6E-09	2.5E-08	x	1.5E+00	=	3.7E-08
Dieldrin	Child	0.0001	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	8.8E-10					
	Adult	0.0001	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	2.0E-10	1.1E-09	x	1.6E+01	=	1.7E-08
Heptachlor	Child	0.0000	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	4.4E-10					
	Adult	0.0000	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	1.0E-10	5.4E-10	x	4.5E+00	=	2.4E-09
N-Nitroso-di-n-propylamine	Child	0.0050	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	8.8E-08					
	Adult	0.0050	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	2.0E-08	1.1E-07	x	7.0E+00	=	7.6E-07
Pentachlorophenol (PCP)	Child	0.0125	x	0.05	x	1	x	30	x	9	/	30	x	25550	=	2.2E-07					
	Adult	0.0125	x	0.05	x	1	x	16	x	9	/	70	x	25550	=	5.0E-08	2.7E-07	x	1.2E-01	=	3.2E-08
																					8.6E-07

CT Scenario: Risk for Incidental Dermal Contact with Surface Water, Recreator

Chemical	Receptor	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT(d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	x	Dermal SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDT (p,p'-)	Child	0.0001	x	5500	x	0.430	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	4.2E-08					
	Adult	0.0001	x	11000	x	0.430	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	1.9E-08	6.1E-08	x	4.9E-01	=	2.9E-08
Aldrin	Child	0.0000	x	5500	x	0.002	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	7.7E-11					
	Adult	0.0000	x	11000	x	0.002	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	3.5E-11	1.1E-10	x	3.4E+01	=	3.8E-09
Arsenic	Child	0.0012	x	5500	x	0.001	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	2.2E-09					
	Adult	0.0012	x	11000	x	0.001	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	1.0E-09	3.2E-09	x	3.7E+00	=	1.2E-08
Dieldrin	Child	0.0001	x	5500	x	0.016	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	1.5E-09					
	Adult	0.0001	x	11000	x	0.016	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	7.1E-10	2.3E-09	x	3.2E+01	=	7.2E-08
Heptachlor	Child	0.0000	x	5500	x	0.011	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	5.3E-10					
	Adult	0.0000	x	11000	x	0.011	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	2.4E-10	7.8E-10	x	6.3E+00	=	4.9E-09
N-Nitroso-di-n-propylamine	Child	0.0050	x	5500	x	0.003	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	2.7E-08					
	Adult	0.0050	x	11000	x	0.003	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	1.2E-08	4.0E-08	x	2.8E+01	=	1.1E-06
Pentachlorophenol (PCP)	Child	0.0125	x	5500	x	0.650	x	0.001	x	1	x	30	x	9	/	30	x	25550	=	1.6E-05					
	Adult	0.0125	x	11000	x	0.650	x	0.001	x	1	x	16	x	9	/	70	x	25550	=	7.2E-06	2.3E-05	x	1.2E-01	=	2.8E-06
																									4.0E-06

CT Scenario: Risk for Incidental Dermal Contact with Surface Water, Boater

Chemical	Receptor	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT(d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	x	Dermal SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDT (p,p'-)	Child	0.0001	x	5500	x	0.430	x	0.001	x	4.3	x	26.3	x	9	/	30	x	25550	=	1.6E-07					
	Adult	0.0001	x	11000	x	0.430	x	0.001	x	4.3	x	26.3	x	9	/	70	x	25550	=	1.3E-07	2.9E-07	x	4.9E-01	=	1.4E-07
Aldrin	Child	0.0000	x	5500	x	0.002	x	0.001	x	4.3	x	26.3	x	9	/	30	x	25550	=	2.9E-10					
	Adult	0.0000	x	11000	x	0.002	x	0.001	x	4.3	x	26.3	x	9	/	70	x	25550	=	2.5E-10	5.4E-10	x	3.4E+01	=	1.8E-08
Arsenic	Child	0.0012	x	5500	x	0.001	x	0.001	x	4.3	x	26.3	x	9	/	30	x	25550	=	8.4E-09					
	Adult	0.0012	x	11000	x	0.001	x	0.001	x	4.3	x	26.3	x	9	/	70	x	25550	=	7.2E-09	1.6E-08	x	3.7E+00	=	5.7E-08
Dieldrin	Child	0.0001	x	5500	x	0.016	x	0.001	x	4.3	x	26.3	x	9	/	30	x	25550	=	5.8E-09					
	Adult	0.0001	x	11000	x	0.016	x	0.001	x	4.3	x	26.3	x	9	/	70	x	25550	=	5.0E-09	1.1E-08	x	3.2E+01	=	3.5E-07
Heptachlor	Child	0.0000	x	5500	x	0.011	x	0.001	x	4.3	x	26.3	x	9	/	30	x	25550	=	2.0E-09					
	Adult	0.0000	x	11000	x	0.011	x	0.001	x	4.3	x	26.3	x	9	/	70	x	25550	=	1.7E-09	3.7E-09	x	6.3E+00	=	2.3E-08
N-Nitroso-di-n-propylamine	Child	0.0050	x	5500	x	0.003	x	0.001	x	4.3	x	26.3	x	9	/	30	x	25550	=	1.0E-07					
	Adult	0.0050	x	11000	x	0.003	x	0.001	x	4.3	x	26.3	x	9	/	70	x	25550	=	8.8E-08	1.9E-07	x	2.8E+01	=	5.3E-06
Pentachlorophenol (PCP)	Child	0.0125	x	5500	x	0.650	x	0.001	x	4.3	x	26.3	x	9	/	30	x	25550	=	5.9E-05					
	Adult	0.0125	x	11000	x	0.650	x	0.001	x	4.3	x	26.3	x	9	/	70	x	25550	=	5.1E-05	1.1E-04	x	1.2E-01	=	1.3E-05
																									1.9E-05

Table D-3. Cancer Risk Calculations for Fish Consumption Scenarios

Segment 1 (RM 0 to <3.2)

RME Scenario: Risk for Consumption of Fish

Chemical	Receptor	C (mg/kg)	x	IR (g/d)	x	fi (unitless)	x	CF (kg/g)	x	EF (d/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	Ingestion SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDD (p,p'-)	Child	0.092		18		1		0.001		365		13		30		25550		1.0E-05				
	Adult	0.092		41		1		0.001		365		17		70		25550		1.3E-05	2.3E-05	2.4E-01		5.6E-06
4,4'-DDE (p,p'-)	Child	0.157		18		1		0.001		365		13		30		25550		1.7E-05				
	Adult	0.157		41		1		0.001		365		17		70		25550		2.2E-05	4.0E-05	3.4E-01		1.4E-05
4,4'-DDT (p,p'-)	Child	0.193		18		1		0.001		365		13		30		25550		2.2E-05				
	Adult	0.193		41		1		0.001		365		17		70		25550		2.7E-05	4.9E-05	3.4E-01		1.7E-05
Aldrin	Child	0.005		18		1		0.001		365		13		30		25550		5.5E-07				
	Adult	0.005		41		1		0.001		365		17		70		25550		7.0E-07	1.3E-06	1.7E+01		2.1E-05
alpha-Chlordane	Child	0.160		18		1		0.001		365		13		30		25550		1.8E-05				
	Adult	0.160		41		1		0.001		365		17		70		25550		2.3E-05	4.1E-05	3.5E-01		1.4E-05
Arsenic	Child	0.049		18		1		0.001		365		13		30		25550		5.5E-06				
	Adult	0.049		41		1		0.001		365		17		70		25550		7.0E-06	1.3E-05	1.5E+00		1.9E-05
Chlordane	Child	0.160		18		1		0.001		365		13		30		25550		1.8E-05				
	Adult	0.160		41		1		0.001		365		17		70		25550		2.3E-05	4.1E-05	3.5E-01		1.4E-05
Dieldrin	Child	0.020		18		1		0.001		365		13		30		25550		2.2E-06				
	Adult	0.020		41		1		0.001		365		17		70		25550		2.9E-06	5.1E-06	1.6E+01		8.1E-05
gamma-Chlordane	Child	0.130		18		1		0.001		365		13		30		25550		1.4E-05				
	Adult	0.130		41		1		0.001		365		17		70		25550		1.8E-05	3.3E-05	3.5E-01		1.2E-05
N-Nitroso-di-n-propylamine	Child	0.123		18		1		0.001		365		13		30		25550		1.4E-05				
	Adult	0.123		41		1		0.001		365		17		70		25550		1.7E-05	3.1E-05	7.0E+00		2.2E-04
Pentachlorophenol (PCP)	Child	183.136		18		1		0.001		365		13		30		25550		2.0E-02				
	Adult	183.136		41		1		0.001		365		17		70		25550		2.6E-02	4.6E-02	1.2E-01		5.6E-03
Total PCBs	Child	5.890		18		1		0.001		365		13		30		25550		6.6E-04				
	Adult	5.890		41		1		0.001		365		17		70		25550		8.4E-04	1.5E-03	2.0E+00		3.0E-03
trans-Nonachlor	Child	0.005		18		1		0.001		365		13		30		25550		5.5E-07				
	Adult	0.005		41		1		0.001		365		17		70		25550		7.0E-07	1.3E-06	3.5E-01		4.4E-07
																						9.0E-03

Table D-3. Cancer Risk Calculations for Fish Consumption Scenarios

CT Scenario: Risk for Consumption of Fish

Chemical	Receptor	C (mg/kg)	x	IR (g/d)	x fi (unitless)	x	CF (kg/g)	x	EF (d/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	Ingestion SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDD (p,p'-)	Child	0.092		3.1	1		0.001		365		9		30		25550		1.2E-06				
	Adult	0.092		7.3	1		0.001		365		9		70		25550		1.2E-06	2.5E-06	2.4E-01		5.9E-07
4,4'-DDE (p,p'-)	Child	0.157		3.1	1		0.001		365		9		30		25550		2.1E-06				
	Adult	0.157		7.3	1		0.001		365		9		70		25550		2.1E-06	4.2E-06	3.4E-01		1.4E-06
4,4'-DDT (p,p'-)	Child	0.193		3.1	1		0.001		365		9		30		25550		2.6E-06				
	Adult	0.193		7.3	1		0.001		365		9		70		25550		2.6E-06	5.2E-06	3.4E-01		1.8E-06
Aldrin	Child	0.005		3.1	1		0.001		365		9		30		25550		6.6E-08				
	Adult	0.005		7.3	1		0.001		365		9		70		25550		6.6E-08	1.3E-07	1.7E+01		2.2E-06
alpha-Chlordane	Child	0.018		3.1	1		0.001		365		9		30		25550		2.4E-07				
	Adult	0.018		7.3	1		0.001		365		9		70		25550		2.4E-07	4.8E-07	3.5E-01		1.7E-07
Arsenic	Child	0.049		3.1	1		0.001		365		9		30		25550		6.6E-07				
	Adult	0.049		7.3	1		0.001		365		9		70		25550		6.6E-07	1.3E-06	1.5E+00		2.0E-06
Chlordane	Child	0.160		3.1	1		0.001		365		9		30		25550		2.1E-06				
	Adult	0.160		7.3	1		0.001		365		9		70		25550		2.1E-06	4.3E-06	3.5E-01		1.5E-06
Dieldrin	Child	0.020		3.1	1		0.001		365		9		30		25550		2.7E-07				
	Adult	0.020		7.3	1		0.001		365		9		70		25550		2.7E-07	5.4E-07	1.6E+01		8.6E-06
gamma-Chlordane	Child	0.130		3.1	1		0.001		365		9		30		25550		1.7E-06				
	Adult	0.130		7.3	1		0.001		365		9		70		25550		1.7E-06	3.5E-06	3.5E-01		1.2E-06
N-Nitroso-di-n-propylamine	Child	0.123		3.1	1		0.001		365		9		30		25550		1.6E-06				
	Adult	0.123		7.3	1		0.001		365		9		70		25550		1.6E-06	3.3E-06	7.0E+00		2.3E-05
Pentachlorophenol (PCP)	Child	183.136		3.1	1		0.001		365		9		30		25550		2.4E-03				
	Adult	183.136		7.3	1		0.001		365		9		70		25550		2.5E-03	4.9E-03	1.2E-01		5.9E-04
Total PCBs	Child	5.890		3.1	1		0.001		365		9		30		25550		7.8E-05				
	Adult	5.890		7.3	1		0.001		365		9		70		25550		7.9E-05	1.6E-04	2.0E+00		3.1E-04
trans-Nonachlor	Child	0.005		3.1	1		0.001		365		9		30		25550		6.6E-08				
	Adult	0.005		7.3	1		0.001		365		9		70		25550		6.6E-08	1.3E-07	3.5E-01		4.6E-08
																					9.4E-04

Table D-3. Cancer Risk Calculations for Fish Consumption Scenarios

Segment 2 (RM 3.2 to <4.9)

RME Scenario: Risk for Consumption of Fish

Chemical	Receptor	C (mg/kg)	x	IR (g/d)	x fi (unitless)	x	CF (kg/g)	x	EF (d/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	Ingestion SF $(mg/kg\text{-}d)^{-1}$	=	Cancer Risk
4,4'-DDD (p,p'-)	Child	0.046		18	1		0.001		365		13		30		25550		5.1E-06				
	Adult	0.046		41	1		0.001		365		17		70		25550		6.5E-06	1.2E-05	2.4E-01		2.8E-06
4,4'-DDE (p,p'-)	Child	0.106		18	1		0.001		365		13		30		25550		1.2E-05				
	Adult	0.106		41	1		0.001		365		17		70		25550		1.5E-05	2.7E-05	3.4E-01		9.1E-06
4,4'-DDT (p,p'-)	Child	0.070		18	1		0.001		365		13		30		25550		7.8E-06				
	Adult	0.070		41	1		0.001		365		17		70		25550		1.0E-05	1.8E-05	3.4E-01		6.1E-06
Aldrin	Child	0.005		18	1		0.001		365		13		30		25550		5.5E-07				
	Adult	0.005		41	1		0.001		365		17		70		25550		7.0E-07	1.3E-06	1.7E+01		2.1E-05
alpha-Chlordane	Child	0.005		18	1		0.001		365		13		30		25550		5.5E-07				
	Adult	0.005		41	1		0.001		365		17		70		25550		7.0E-07	1.3E-06	3.5E-01		4.4E-07
Arsenic	Child	0.045		18	1		0.001		365		13		30		25550		5.0E-06				
	Adult	0.045		41	1		0.001		365		17		70		25550		6.3E-06	1.1E-05	1.5E+00		1.7E-05
Chlordane	Child	0.065		18	1		0.001		365		13		30		25550		7.2E-06				
	Adult	0.065		41	1		0.001		365		17		70		25550		9.2E-06	1.6E-05	3.5E-01		5.7E-06
Dieldrin	Child	0.005		18	1		0.001		365		13		30		25550		5.7E-07				
	Adult	0.005		41	1		0.001		365		17		70		25550		7.3E-07	1.3E-06	1.6E+01		2.1E-05
gamma-Chlordane	Child	0.065		18	1		0.001		365		13		30		25550		7.2E-06				
	Adult	0.065		41	1		0.001		365		17		70		25550		9.2E-06	1.6E-05	3.5E-01		5.7E-06
N-Nitroso-di-n-propylamine	Child	0.034		18	1		0.001		365		13		30		25550		3.8E-06				
	Adult	0.034		41	1		0.001		365		17		70		25550		4.8E-06	8.6E-06	7.0E+00		6.0E-05
Pentachlorophenol (PCP)	Child	59.500		18	1		0.001		365		13		30		25550		6.6E-03				
	Adult	59.500		41	1		0.001		365		17		70		25550		8.5E-03	1.5E-02	1.2E-01		1.8E-03
Total PCBs	Child	2.827		18	1		0.001		365		13		30		25550		3.1E-04				
	Adult	2.827		41	1		0.001		365		17		70		25550		4.0E-04	7.2E-04	2.0E+00		1.4E-03
trans-Nonachlor	Child	0.005		18	1		0.001		365		13		30		25550		5.5E-07				
	Adult	0.005		41	1		0.001		365		17		70		25550		7.0E-07	1.3E-06	3.5E-01		4.4E-07
																					3.4E-03

Table D-3. Cancer Risk Calculations for Fish Consumption Scenarios

CT Scenario: Risk for Consumption of Fish

Chemical	Receptor	C (mg/kg)	x	IR (g/d)	x fi (unitless)	x	CF (kg/g)	x	EF (d/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	Ingestion SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDD (p,p'-)	Child	0.046		3.1	1		0.001		365		9		30		25550		6.0E-07				
	Adult	0.046		7.3	1		0.001		365		9		70		25550		6.1E-07	1.2E-06	2.4E-01		2.9E-07
4,4'-DDE (p,p'-)	Child	0.106		3.1	1		0.001		365		9		30		25550		1.4E-06				
	Adult	0.106		7.3	1		0.001		365		9		70		25550		1.4E-06	2.8E-06	3.4E-01		9.6E-07
4,4'-DDT (p,p'-)	Child	0.070		3.1	1		0.001		365		9		30		25550		9.3E-07				
	Adult	0.070		7.3	1		0.001		365		9		70		25550		9.4E-07	1.9E-06	3.4E-01		6.4E-07
Aldrin	Child	0.005		3.1	1		0.001		365		9		30		25550		6.6E-08				
	Adult	0.005		7.3	1		0.001		365		9		70		25550		6.6E-08	1.3E-07	1.7E+01		2.2E-06
alpha-Chlordane	Child	0.005		3.1	1		0.001		365		9		30		25550		6.6E-08				
	Adult	0.005		7.3	1		0.001		365		9		70		25550		6.6E-08	1.3E-07	3.5E-01		4.6E-08
Arsenic	Child	0.045		3.1	1		0.001		365		9		30		25550		5.9E-07				
	Adult	0.045		7.3	1		0.001		365		9		70		25550		6.0E-07	1.2E-06	1.5E+00		1.8E-06
Chlordane	Child	0.065		3.1	1		0.001		365		9		30		25550		8.6E-07				
	Adult	0.065		7.3	1		0.001		365		9		70		25550		8.7E-07	1.7E-06	3.5E-01		6.0E-07
Dieldrin	Child	0.005		3.1	1		0.001		365		9		30		25550		6.8E-08				
	Adult	0.005		7.3	1		0.001		365		9		70		25550		6.9E-08	1.4E-07	1.6E+01		2.2E-06
gamma-Chlordane	Child	0.065		3.1	1		0.001		365		9		30		25550		8.6E-07				
	Adult	0.065		7.3	1		0.001		365		9		70		25550		8.7E-07	1.7E-06	3.5E-01		6.0E-07
N-Nitroso-di-n-propylamine	Child	0.034		3.1	1		0.001		365		9		30		25550		4.5E-07				
	Adult	0.034		7.3	1		0.001		365		9		70		25550		4.6E-07	9.1E-07	7.0E+00		6.4E-06
Pentachlorophenol (PCP)	Child	59.500		3.1	1		0.001		365		9		30		25550		7.9E-04				
	Adult	59.500		7.3	1		0.001		365		9		70		25550		8.0E-04	1.6E-03	1.2E-01		1.9E-04
Total PCBs	Child	2.827		3.1	1		0.001		365		9		30		25550		3.8E-05				
	Adult	2.827		7.3	1		0.001		365		9		70		25550		3.8E-05	7.5E-05	2.0E+00		1.5E-04
trans-Nonachlor	Child	0.005		3.1	1		0.001		365		9		30		25550		6.6E-08				
	Adult	0.005		7.3	1		0.001		365		9		70		25550		6.6E-08	1.3E-07	3.5E-01		4.6E-08
																					3.6E-04

Table D-3. Cancer Risk Calculations for Fish Consumption Scenarios

Segment 3 (RM 4.9 to <6.5)

RME Scenario: Risk for Consumption of Fish

Chemical	Receptor	C (mg/kg)	x	IR (g/d)	x	fi (unitless)	x	CF (kg/g)	x	EF (d/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	Ingestion SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDD (p,p'-)	Child	0.052		18		1		0.001		365		13		30		25550		5.8E-06				
	Adult	0.052		41		1		0.001		365		17		70		25550		7.4E-06	1.3E-05	2.4E-01		3.2E-06
4,4'-DDE (p,p'-)	Child	0.081		18		1		0.001		365		13		30		25550		9.0E-06				
	Adult	0.081		41		1		0.001		365		17		70		25550		1.2E-05	2.1E-05	3.4E-01		7.0E-06
4,4'-DDT (p,p'-)	Child	0.041		18		1		0.001		365		13		30		25550		4.6E-06				
	Adult	0.041		41		1		0.001		365		17		70		25550		5.8E-06	1.0E-05	3.4E-01		3.5E-06
Aldrin	Child	0.012		18		1		0.001		365		13		30		25550		1.3E-06				
	Adult	0.012		41		1		0.001		365		17		70		25550		1.7E-06	3.0E-06	1.7E+01		5.0E-05
alpha-Chlordane	Child	0.006		18		1		0.001		365		13		30		25550		6.2E-07				
	Adult	0.006		41		1		0.001		365		17		70		25550		7.9E-07	1.4E-06	3.5E-01		5.0E-07
Arsenic	Child	0.027		18		1		0.001		365		13		30		25550		3.0E-06				
	Adult	0.027		41		1		0.001		365		17		70		25550		3.8E-06	6.8E-06	1.5E+00		1.0E-05
Chlordane	Child	0.211		18		1		0.001		365		13		30		25550		2.3E-05				
	Adult	0.211		41		1		0.001		365		17		70		25550		3.0E-05	5.3E-05	3.5E-01		1.9E-05
Dieldrin	Child	0.005		18		1		0.001		365		13		30		25550		5.5E-07				
	Adult	0.005		41		1		0.001		365		17		70		25550		7.0E-07	1.2E-06	1.6E+01		2.0E-05
gamma-Chlordane	Child	0.157		18		1		0.001		365		13		30		25550		1.7E-05				
	Adult	0.157		41		1		0.001		365		17		70		25550		2.2E-05	4.0E-05	3.5E-01		1.4E-05
N-Nitroso-di-n-propylamine	Child	0.034		18		1		0.001		365		13		30		25550		3.8E-06				
	Adult	0.034		41		1		0.001		365		17		70		25550		4.8E-06	8.6E-06	7.0E+00		6.0E-05
Pentachlorophenol (PCP)	Child	59.500		18		1		0.001		365		13		30		25550		6.6E-03				
	Adult	59.500		41		1		0.001		365		17		70		25550		8.5E-03	1.5E-02	1.2E-01		1.8E-03
Total PCBs	Child	5.805		18		1		0.001		365		13		30		25550		6.5E-04				
	Adult	5.805		41		1		0.001		365		17		70		25550		8.3E-04	1.5E-03	2.0E+00		2.9E-03
trans-Nonachlor	Child	0.005		18		1		0.001		365		13		30		25550		5.5E-07				
	Adult	0.005		41		1		0.001		365		17		70		25550		7.0E-07	1.2E-06	3.5E-01		4.4E-07
																						4.9E-03

Table D-3. Cancer Risk Calculations for Fish Consumption Scenarios

CT Scenario: Risk for Consumption of Fish

Chemical	Receptor	C (mg/kg)	x	IR (g/d)	x fi (unitless)	x	CF (kg/g)	x	EF (d/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	Ingestion SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDD (p,p'-)	Child	0.052		3.1	1		0.001		365		9		30		25550		6.9E-07				
	Adult	0.052		7.3	1		0.001		365		9		70		25550		7.0E-07	1.4E-06	2.4E-01		3.3E-07
4,4'-DDE (p,p'-)	Child	0.081		3.1	1		0.001		365		9		30		25550		1.1E-06				
	Adult	0.081		7.3	1		0.001		365		9		70		25550		1.1E-06	2.2E-06	3.4E-01		7.3E-07
4,4'-DDT (p,p'-)	Child	0.041		3.1	1		0.001		365		9		30		25550		5.4E-07				
	Adult	0.041		7.3	1		0.001		365		9		70		25550		5.5E-07	1.1E-06	3.4E-01		3.7E-07
Aldrin	Child	0.012		3.1	1		0.001		365		9		30		25550		1.5E-07				
	Adult	0.012		7.3	1		0.001		365		9		70		25550		1.6E-07	3.1E-07	1.7E+01		5.3E-06
alpha-Chlordane	Child	0.006		3.1	1		0.001		365		9		30		25550		7.4E-08				
	Adult	0.006		7.3	1		0.001		365		9		70		25550		7.5E-08	1.5E-07	3.5E-01		5.2E-08
Arsenic	Child	0.027		3.1	1		0.001		365		9		30		25550		3.6E-07				
	Adult	0.027		7.3	1		0.001		365		9		70		25550		3.6E-07	7.2E-07	1.5E+00		1.1E-06
Chlordane	Child	0.211		3.1	1		0.001		365		9		30		25550		2.8E-06				
	Adult	0.211		7.3	1		0.001		365		9		70		25550		2.8E-06	5.6E-06	3.5E-01		2.0E-06
Dieldrin	Child	0.005		3.1	1		0.001		365		9		30		25550		6.5E-08				
	Adult	0.005		7.3	1		0.001		365		9		70		25550		6.6E-08	1.3E-07	1.6E+01		2.1E-06
gamma-Chlordane	Child	0.157		3.1	1		0.001		365		9		30		25550		2.1E-06				
	Adult	0.157		7.3	1		0.001		365		9		70		25550		2.1E-06	4.2E-06	3.5E-01		1.5E-06
N-Nitroso-di-n-propylamine	Child	0.034		3.1	1		0.001		365		9		30		25550		4.5E-07				
	Adult	0.034		7.3	1		0.001		365		9		70		25550		4.6E-07	9.1E-07	7.0E+00		6.4E-06
Pentachlorophenol (PCP)	Child	59.500		3.1	1		0.001		365		9		30		25550		7.9E-04				
	Adult	59.500		7.3	1		0.001		365		9		70		25550		8.0E-04	1.6E-03	1.2E-01		1.9E-04
Total PCBs	Child	5.805		3.1	1		0.001		365		9		30		25550		7.7E-05				
	Adult	5.805		7.3	1		0.001		365		9		70		25550		7.8E-05	1.5E-04	2.0E+00		3.1E-04
trans-Nonachlor	Child	0.005		3.1	1		0.001		365		9		30		25550		6.5E-08				
	Adult	0.005		7.3	1		0.001		365		9		70		25550		6.6E-08	1.3E-07	3.5E-01		4.6E-08
																					5.2E-04

Table D-3. Cancer Risk Calculations for Fish Consumption Scenarios

Segment 4 (RM 6.5 to 8.8)

RME Scenario: Risk for Consumption of Fish

Chemical	Receptor	C (mg/kg)	x	IR (g/d)	x	fi (unitless)	x	CF (kg/g)	x	EF (d/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	Ingestion SF $(mg/kg\text{-}d)^{-1}$	=	Cancer Risk
4,4'-DDD (p,p'-)	Child	0.091		18		1		0.001		365		13		30		25550		1.0E-05				
	Adult	0.091		41		1		0.001		365		17		70		25550		1.3E-05	2.3E-05	2.4E-01		5.6E-06
4,4'-DDE (p,p'-)	Child	0.131		18		1		0.001		365		13		30		25550		1.5E-05				
	Adult	0.131		41		1		0.001		365		17		70		25550		1.9E-05	3.3E-05	3.4E-01		1.1E-05
4,4'-DDT (p,p'-)	Child	0.201		18		1		0.001		365		13		30		25550		2.2E-05				
	Adult	0.201		41		1		0.001		365		17		70		25550		2.9E-05	5.1E-05	3.4E-01		1.7E-05
Aldrin	Child	0.005		18		1		0.001		365		13		30		25550		5.5E-07				
	Adult	0.005		41		1		0.001		365		17		70		25550		7.0E-07	1.3E-06	1.7E+01		2.1E-05
alpha-Chlordane	Child	0.031		18		1		0.001		365		13		30		25550		3.4E-06				
	Adult	0.031		41		1		0.001		365		17		70		25550		4.4E-06	7.8E-06	3.5E-01		2.7E-06
Arsenic	Child	0.028		18		1		0.001		365		13		30		25550		3.1E-06				
	Adult	0.028		41		1		0.001		365		17		70		25550		4.0E-06	7.1E-06	1.5E+00		1.1E-05
Chlordane	Child	0.076		18		1		0.001		365		13		30		25550		8.5E-06				
	Adult	0.076		41		1		0.001		365		17		70		25550		1.1E-05	1.9E-05	3.5E-01		6.8E-06
Dieldrin	Child	0.034		18		1		0.001		365		13		30		25550		3.7E-06				
	Adult	0.034		41		1		0.001		365		17		70		25550		4.8E-06	8.5E-06	1.6E+01		1.4E-04
gamma-Chlordane	Child	0.035		18		1		0.001		365		13		30		25550		3.9E-06				
	Adult	0.035		41		1		0.001		365		17		70		25550		5.0E-06	8.9E-06	3.5E-01		3.1E-06
N-Nitroso-di-n-propylamine	Child	0.034		18		1		0.001		365		13		30		25550		3.8E-06				
	Adult	0.034		41		1		0.001		365		17		70		25550		4.8E-06	8.6E-06	7.0E+00		6.0E-05
Pentachlorophenol (PCP)	Child	59.500		18		1		0.001		365		13		30		25550		6.6E-03				
	Adult	59.500		41		1		0.001		365		17		70		25550		8.5E-03	1.5E-02	1.2E-01		1.8E-03
Total PCBs	Child	2.928		18		1		0.001		365		13		30		25550		3.3E-04				
	Adult	2.928		41		1		0.001		365		17		70		25550		4.2E-04	7.4E-04	2.0E+00		1.5E-03
trans-Nonachlor	Child	0.011		18		1		0.001		365		13		30		25550		1.2E-06				
	Adult	0.011		41		1		0.001		365		17		70		25550		1.5E-06	2.7E-06	3.5E-01		9.3E-07
																						3.6E-03

Table D-3. Cancer Risk Calculations for Fish Consumption Scenarios

CT Scenario: Risk for Consumption of Fish

Chemical	Receptor	C (mg/kg)	x	IR (g/d)	x fi (unitless)	x	CF (kg/g)	x	EF (d/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) LADD	=	LADD (mg/kg-d)	LADD (mg/kg-d)	Ingestion SF (mg/kg-d)$^{-1}$	=	Cancer Risk
4,4'-DDD (p,p'-)	Child	0.091		3.1	1		0.001		365		9		30		25550		1.2E-06				
	Adult	0.091		7.3	1		0.001		365		9		70		25550		1.2E-06	2.4E-06	2.4E-01		5.8E-07
4,4'-DDE (p,p'-)	Child	0.131		3.1	1		0.001		365		9		30		25550		1.7E-06				
	Adult	0.131		7.3	1		0.001		365		9		70		25550		1.8E-06	3.5E-06	3.4E-01		1.2E-06
4,4'-DDT (p,p'-)	Child	0.201		3.1	1		0.001		365		9		30		25550		2.7E-06				
	Adult	0.201		7.3	1		0.001		365		9		70		25550		2.7E-06	5.4E-06	3.4E-01		1.8E-06
Aldrin	Child	0.005		3.1	1		0.001		365		9		30		25550		6.6E-08				
	Adult	0.005		7.3	1		0.001		365		9		70		25550		6.6E-08	1.3E-07	1.7E+01		2.2E-06
alpha-Chlordane	Child	0.031		3.1	1		0.001		365		9		30		25550		4.1E-07				
	Adult	0.031		7.3	1		0.001		365		9		70		25550		4.1E-07	8.2E-07	3.5E-01		2.9E-07
Arsenic	Child	0.028		3.1	1		0.001		365		9		30		25550		3.7E-07				
	Adult	0.028		7.3	1		0.001		365		9		70		25550		3.8E-07	7.5E-07	1.5E+00		1.1E-06
Chlordane	Child	0.076		3.1	1		0.001		365		9		30		25550		1.0E-06				
	Adult	0.076		7.3	1		0.001		365		9		70		25550		1.0E-06	2.0E-06	3.5E-01		7.1E-07
Dieldrin	Child	0.034		3.1	1		0.001		365		9		30		25550		4.5E-07				
	Adult	0.034		7.3	1		0.001		365		9		70		25550		4.5E-07	8.9E-07	1.6E+01		1.4E-05
gamma-Chlordane	Child	0.035		3.1	1		0.001		365		9		30		25550		4.7E-07				
	Adult	0.035		7.3	1		0.001		365		9		70		25550		4.7E-07	9.3E-07	3.5E-01		3.3E-07
N-Nitroso-di-n-propylamine	Child	0.034		3.1	1		0.001		365		9		30		25550		4.5E-07				
	Adult	0.034		7.3	1		0.001		365		9		70		25550		4.6E-07	9.1E-07	7.0E+00		6.4E-06
Pentachlorophenol (PCP)	Child	59.500		3.1	1		0.001		365		9		30		25550		7.9E-04				
	Adult	59.500		7.3	1		0.001		365		9		70		25550		8.0E-04	1.6E-03	1.2E-01		1.9E-04
Total PCBs	Child	2.928		3.1	1		0.001		365		9		30		25550		3.9E-05				
	Adult	2.928		7.3	1		0.001		365		9		70		25550		3.9E-05	7.8E-05	2.0E+00		1.6E-04
trans-Nonachlor	Child	0.011		3.1	1		0.001		365		9		30		25550		1.4E-07				
	Adult	0.011		7.3	1		0.001		365		9		70		25550		1.4E-07	2.8E-07	3.5E-01		9.8E-08
																					3.8E-04

Table D-4. Noncancer Hazard Calculations for Sediment Contact Scenarios

Segment 1 (RM 0 to <3.2)

RME Scenario: Noncancer Hazard for Incidental Ingestion of Sediment for Adult Recreator

Chemical	C (mg/kg)	x	IR (mg/d)	x	CF (kg/mg)	fi (unitless)	x	B (unitless)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.020		50		1.0E-06	1		1		24		17		70		6205	9.4E-10		3.0E-05		3.1E-05
Arsenic	9.4		50		1.0E-06	1		1		24		17		70		6205	4.4E-07		3.0E-04		1.5E-03
bis(2-Ethylhexyl)phthalate	2.1		50		1.0E-06	1		1		24		17		70		6205	9.9E-08		2.0E-02		5.0E-06
Dieldrin	0.039		50		1.0E-06	1		1		24		17		70		6205	1.8E-09		5.0E-05		3.7E-05
Heptachlor epoxide	0.025		50		1.0E-06	1		1		24		17		70		6205	1.2E-09		1.3E-05		9.0E-05
PCB Aroclor 1016	0.017		50		1.0E-06	1		1		24		17		70		6205	8.1E-10		7.0E-05		1.2E-05
PCB Aroclor 1254	0.019		50		1.0E-06	1		1		24		17		70		6205	9.1E-10		2.0E-05		4.6E-05
Thallium	6.2		50		1.0E-06	1		1		24		17		70		6205	2.9E-07		6.7E-05		4.3E-03
																					6.0E-03

RME Scenario: Noncancer Hazard for Incidental Dermal Contact with Sediment for Adult Recreator

Chemical	C (mg/kg)	x	SA (cm^2/event)	x	AF (mg/cm^2)	x	ABS (unitless)	x	CF (kg/mg)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (adj) (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.020		4500		0.2		0.1		1.0E-06		24		17		70		6205	1.7E-09		1.5E-05		1.1E-04
Arsenic	9.4		4500		0.2		0.032		1.0E-06		24		17		70		6205	2.5E-07		1.2E-04		2.1E-03
bis(2-Ethylhexyl)phthalate	2.1		4500		0.2		0.1		1.0E-06		24		17		70		6205	1.8E-07		3.8E-03		4.7E-05
Dieldrin	0.039		4500		0.2		0.1		1.0E-06		24		17		70		6205	3.3E-09		2.5E-05		1.3E-04
Heptachlor epoxide	0.025		4500		0.2		0.1		1.0E-06		24		17		70		6205	2.1E-09		9.4E-06		2.3E-04
PCB Aroclor 1016	0.017		4500		0.2		0.06		1.0E-06		24		17		70		6205	8.8E-10		6.3E-05		1.4E-05
PCB Aroclor 1254	0.019		4500		0.2		0.06		1.0E-06		24		17		70		6205	9.9E-10		1.8E-05		5.5E-05
Thallium	6.2		4500		0.2		0.01		1.0E-06		24		17		70		6205	5.2E-08		1.0E-05		5.2E-03
																						7.8E-03

RME Scenario: Noncancer Hazard for Incidental Ingestion of Sediment for Child Recreator

Chemical	C (mg/kg)	x	IR (mg/d)	x	CF (kg/mg)	fi (unitless)	x	B (unitless)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.020		200		1.0E-06	1		1		48		13		30		4745	1.8E-08		3.0E-05		5.8E-04
Arsenic	9.4		200		1.0E-06	1		1		48		13		30		4745	8.3E-06		3.0E-04		2.8E-02
bis(2-Ethylhexyl)phthalate	2.1		200		1.0E-06	1		1		48		13		30		4745	1.8E-06		2.0E-02		9.2E-05
Dieldrin	0.039		200		1.0E-06	1		1		48		13		30		4745	3.4E-08		5.0E-05		6.8E-04
Heptachlor epoxide	0.025		200		1.0E-06	1		1		48		13		30		4745	2.2E-08		1.3E-05		1.7E-03
PCB Aroclor 1016	0.017		200		1.0E-06	1		1		48		13		30		4745	1.5E-08		7.0E-05		2.2E-04
PCB Aroclor 1254	0.019		200		1.0E-06	1		1		48		13		30		4745	1.7E-08		2.0E-05		8.5E-04
Thallium	6.2		200		1.0E-06	1		1		48		13		30		4745	5.4E-06		6.7E-05		8.1E-02
																					1.1E-01

RME Scenario: Noncancer Hazard for Incidental Dermal Contact with Sediment for Child Recreator

Chemical	C (mg/kg)	x	SA (cm^2/event)	x	AF (mg/cm^2)	x	ABS (unitless)	x	CF (kg/mg)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (adj) (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.020		2300		0.2		0.1		1.0E-06		48		13		30		4745	4.0E-09		1.5E-05		2.7E-04
Arsenic	9.4		2300		0.2		0.032		1.0E-06		48		13		30		4745	6.1E-07		1.2E-04		4.9E-03
bis(2-Ethylhexyl)phthalate	2.1		2300		0.2		0.1		1.0E-06		48		13		30		4745	4.3E-07		3.8E-03		1.1E-04
Dieldrin	0.039		2300		0.2		0.1		1.0E-06		48		13		30		4745	7.9E-09		2.5E-05		3.1E-04
Heptachlor epoxide	0.025		2300		0.2		0.1		1.0E-06		48		13		30		4745	5.0E-09		9.4E-06		5.4E-04
PCB Aroclor 1016	0.017		2300		0.2		0.06		1.0E-06		48		13		30		4745	2.1E-09		6.3E-05		3.3E-05
PCB Aroclor 1254	0.019		2300		0.2		0.06		1.0E-06		48		13		30		4745	2.4E-09		1.8E-05		1.3E-04
Thallium	6.2		2300		0.2		0.01		1.0E-06		48		13		30		4745	1.2E-07		1.0E-05		1.2E-02
																						1.9E-02

Table D-4. Noncancer Hazard Calculations for Sediment Contact Scenarios

CT Scenario: Noncancer Hazard for Incidental Ingestion of Sediment for Adult Recreator

Chemical	C (mg/kg)	x	IR (mg/d)	x	CF (kg/mg)	fi (unitless)	x	B (unitless)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.020		50		1.0E-06	1		1		16		9		70		3285	6.3E-10		3.0E-05		2.1E-05
Arsenic	9.4		50		1.0E-06	1		1		16		9		70		3285	2.9E-07		3.0E-04		9.8E-04
bis(2-Ethylhexyl)phthalate	2.1		50		1.0E-06	1		1		16		9		70		3285	6.6E-08		2.0E-02		3.3E-06
Dieldrin	0.039		50		1.0E-06	1		1		16		9		70		3285	1.2E-09		5.0E-05		2.4E-05
Heptachlor epoxide	0.025		50		1.0E-06	1		1		16		9		70		3285	7.8E-10		1.3E-05		6.0E-05
PCB Aroclor 1016	0.017		50		1.0E-06	1		1		16		9		70		3285	5.4E-10		7.0E-05		7.7E-06
PCB Aroclor 1254	0.019		50		1.0E-06	1		1		16		9		70		3285	6.1E-10		2.0E-05		3.0E-05
Thallium	6.2		50		1.0E-06	1		1		16		9		70		3285	1.9E-07		6.7E-05		2.9E-03
																					4.0E-03

CT Scenario: Noncancer Hazard for Incidental Dermal Contact with Sediment for Adult Recreator

Chemical	C (mg/kg)	x	SA (cm^2/event)	x	AF (mg/cm^2)	x	ABS (unitless)	x	CF (kg/mg)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (adj) (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.020		3500		0.2		0.1		1.0E-06		16		9		70		3285	8.8E-10		1.5E-05		5.8E-05
Arsenic	9.4		3500		0.2		0.032		1.0E-06		16		9		70		3285	1.3E-07		1.2E-04		1.1E-03
bis(2-Ethylhexyl)phthalate	2.1		3500		0.2		0.1		1.0E-06		16		9		70		3285	9.2E-08		3.8E-03		2.4E-05
Dieldrin	0.039		3500		0.2		0.1		1.0E-06		16		9		70		3285	1.7E-09		2.5E-05		6.8E-05
Heptachlor epoxide	0.025		3500		0.2		0.1		1.0E-06		16		9		70		3285	1.1E-09		9.4E-06		1.2E-04
PCB Aroclor 1016	0.017		3500		0.2		0.06		1.0E-06		16		9		70		3285	4.5E-10		6.3E-05		7.2E-06
PCB Aroclor 1254	0.019		3500		0.2		0.06		1.0E-06		16		9		70		3285	5.1E-10		1.8E-05		2.8E-05
Thallium	6.2		3500		0.2		0.01		1.0E-06		16		9		70		3285	2.7E-08		1.0E-05		2.7E-03
																						4.1E-03

CT Scenario: Noncancer Hazard for Incidental Ingestion of Sediment for Child Recreator

Chemical	C (mg/kg)	x	IR (mg/d)	x	CF (kg/mg)	fi (unitless)	x	B (unitless)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.020		140		1.0E-06	1		1		30		9		30		3285	7.7E-09		3.0E-05		2.6E-04
Arsenic	9.4		140		1.0E-06	1		1		30		9		30		3285	3.6E-06		3.0E-04		1.2E-02
bis(2-Ethylhexyl)phthalate	2.1		140		1.0E-06	1		1		30		9		30		3285	8.1E-07		2.0E-02		4.0E-05
Dieldrin	0.039		140		1.0E-06	1		1		30		9		30		3285	1.5E-08		5.0E-05		3.0E-04
Heptachlor epoxide	0.025		140		1.0E-06	1		1		30		9		30		3285	9.6E-09		1.3E-05		7.4E-04
PCB Aroclor 1016	0.017		140		1.0E-06	1		1		30		9		30		3285	6.6E-09		7.0E-05		9.5E-05
PCB Aroclor 1254	0.019		140		1.0E-06	1		1		30		9		30		3285	7.5E-09		2.0E-05		3.7E-04
Thallium	6.2		140		1.0E-06	1		1		30		9		30		3285	2.4E-06		6.7E-05		3.5E-02
																					4.9E-02

CT Scenario: Noncancer Hazard for Incidental Dermal Contact with Sediment for Child Recreator

Chemical	C (mg/kg)	x	SA (cm^2/event)	x	AF (mg/cm^2)	x	ABS (unitless)	x	CF (kg/mg)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (adj) (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.020		2200		0.2		0.1		1.0E-06		30		9		30		3285	2.4E-09		1.5E-05		1.6E-04
Arsenic	9.4		2200		0.2		0.032		1.0E-06		30		9		30		3285	3.6E-07		1.2E-04		3.0E-03
bis(2-Ethylhexyl)phthalate	2.1		2200		0.2		0.1		1.0E-06		30		9		30		3285	2.5E-07		3.8E-03		6.7E-05
Dieldrin	0.039		2200		0.2		0.1		1.0E-06		30		9		30		3285	4.7E-09		2.5E-05		1.9E-04
Heptachlor epoxide	0.025		2200		0.2		0.1		1.0E-06		30		9		30		3285	3.0E-09		9.4E-06		3.2E-04
PCB Aroclor 1016	0.017		2200		0.2		0.06		1.0E-06		30		9		30		3285	1.2E-09		6.3E-05		2.0E-05
PCB Aroclor 1254	0.019		2200		0.2		0.06		1.0E-06		30		9		30		3285	1.4E-09		1.8E-05		7.8E-05
Thallium	6.2		2200		0.2		0.01		1.0E-06		30		9		30		3285	7.4E-08		1.0E-05		7.4E-03
																						1.1E-02

Table D-4. Noncancer Hazard Calculations for Sediment Contact Scenarios

Segment 2 (RM 3.2 to <4.9)

RME Scenario: Noncancer Hazard for Incidental Ingestion of Sediment for Adult Recreator

Chemical	C (mg/kg)	x	IR (mg/d)	x	CF (kg/mg)	fi (unitless)	x	B (unitless)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.045		50		1.0E-06	1		1		24		17		70		6205	2.1E-09		3.0E-05		7.0E-05
Arsenic	11.4		50		1.0E-06	1		1		24		17		70		6205	5.4E-07		3.0E-04		1.8E-03
bis(2-Ethylhexyl)phthalate	11.0		50		1.0E-06	1		1		24		17		70		6205	5.2E-07		2.0E-02		2.6E-05
Dieldrin	0.030		50		1.0E-06	1		1		24		17		70		6205	1.4E-09		5.0E-05		2.8E-05
Heptachlor epoxide	0.081		50		1.0E-06	1		1		24		17		70		6205	3.8E-09		1.3E-05		2.9E-04
PCB Aroclor 1016	0.34		50		1.0E-06	1		1		24		17		70		6205	1.6E-08		7.0E-05		2.3E-04
PCB Aroclor 1254	0.048		50		1.0E-06	1		1		24		17		70		6205	2.3E-09		2.0E-05		1.1E-04
Thallium	5.8		50		1.0E-06	1		1		24		17		70		6205	2.7E-07		6.7E-05		4.1E-03
																					6.6E-03

RME Scenario: Noncancer Hazard for Incidental Dermal Contact with Sediment for Adult Recreator

Chemical	C (mg/kg)	x	SA (cm^2/event)	x	AF (mg/cm^2)	x	ABS (unitless)	x	CF (kg/mg)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (adj) (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.045		4500		0.2		0.1		1.0E-06		24		17		70		6205	3.8E-09		1.5E-05		2.5E-04
Arsenic	11.4		4500		0.2		0.032		1.0E-06		24		17		70		6205	3.1E-07		1.2E-04		2.5E-03
bis(2-Ethylhexyl)phthalate	11.0		4500		0.2		0.1		1.0E-06		24		17		70		6205	9.3E-07		3.8E-03		2.4E-04
Dieldrin	0.030		4500		0.2		0.1		1.0E-06		24		17		70		6205	2.5E-09		2.5E-05		1.0E-04
Heptachlor epoxide	0.081		4500		0.2		0.1		1.0E-06		24		17		70		6205	6.8E-09		9.4E-06		7.3E-04
PCB Aroclor 1016	0.34		4500		0.2		0.06		1.0E-06		24		17		70		6205	1.7E-08		6.3E-05		2.8E-04
PCB Aroclor 1254	0.048		4500		0.2		0.06		1.0E-06		24		17		70		6205	2.4E-09		1.8E-05		1.4E-04
Thallium	5.8		4500		0.2		0.01		1.0E-06		24		17		70		6205	4.9E-08		1.0E-05		4.9E-03
																						9.1E-03

RME Scenario: Noncancer Hazard for Incidental Ingestion of Sediment for Child Recreator

Chemical	C (mg/kg)	x	IR (mg/d)	x	CF (kg/mg)	fi (unitless)	x	B (unitless)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.045		200		1.0E-06	1		1		48		13		30		4745	3.9E-08		3.0E-05		1.3E-03
Arsenic	11.4		200		1.0E-06	1		1		48		13		30		4745	1.0E-05		3.0E-04		3.3E-02
bis(2-Ethylhexyl)phthalate	11.0		200		1.0E-06	1		1		48		13		30		4745	9.6E-06		2.0E-02		4.8E-04
Dieldrin	0.030		200		1.0E-06	1		1		48		13		30		4745	2.6E-08		5.0E-05		5.3E-04
Heptachlor epoxide	0.081		200		1.0E-06	1		1		48		13		30		4745	7.1E-08		1.3E-05		5.5E-03
PCB Aroclor 1016	0.34		200		1.0E-06	1		1		48		13		30		4745	3.0E-07		7.0E-05		4.3E-03
PCB Aroclor 1254	0.048		200		1.0E-06	1		1		48		13		30		4745	4.2E-08		2.0E-05		2.1E-03
Thallium	5.8		200		1.0E-06	1		1		48		13		30		4745	5.1E-06		6.7E-05		7.6E-02
																					1.2E-01

RME Scenario: Noncancer Hazard for Incidental Dermal Contact with Sediment for Child Recreator

Chemical	C (mg/kg)	x	SA (cm^2/event)	x	AF (mg/cm^2)	x	ABS (unitless)	x	CF (kg/mg)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (adj) (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.045		2300		0.2		0.1		1.0E-06		48		13		30		4745	9.1E-09		1.5E-05		6.0E-04
Arsenic	11		2300		0.2		0.032		1.0E-06		48		13		30		4745	7.4E-07		1.2E-04		6.0E-03
bis(2-Ethylhexyl)phthalate	11		2300		0.2		0.1		1.0E-06		48		13		30		4745	2.2E-06		3.8E-03		5.8E-04
Dieldrin	0.030		2300		0.2		0.1		1.0E-06		48		13		30		4745	6.0E-09		2.5E-05		2.4E-04
Heptachlor epoxide	0.081		2300		0.2		0.1		1.0E-06		48		13		30		4745	1.6E-08		9.4E-06		1.7E-03
PCB Aroclor 1016	0.34		2300		0.2		0.06		1.0E-06		48		13		30		4745	4.1E-08		6.3E-05		6.6E-04
PCB Aroclor 1254	0.048		2300		0.2		0.06		1.0E-06		48		13		30		4745	5.8E-09		1.8E-05		3.2E-04
Thallium	5.8		2300		0.2		0.01		1.0E-06		48		13		30		4745	1.2E-07		1.0E-05		1.2E-02
																						2.2E-02

Table D-4. Noncancer Hazard Calculations for Sediment Contact Scenarios

CT Scenario: Noncancer Hazard for Incidental Ingestion of Sediment for Adult Recreator

Chemical	C (mg/kg)	x	IR (mg/d)	x	CF (kg/mg)	fi (unitless)	x	B (unitless)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.045		50		1.0E-06	1		1		16		9		70		3285	1.4E-09		3.0E-05		4.7E-05
Arsenic	11		50		1.0E-06	1		1		16		9		70		3285	3.6E-07		3.0E-04		1.2E-03
bis(2-Ethylhexyl)phthalate	11		50		1.0E-06	1		1		16		9		70		3285	3.4E-07		2.0E-02		1.7E-05
Dieldrin	0.030		50		1.0E-06	1		1		16		9		70		3285	9.4E-10		5.0E-05		1.9E-05
Heptachlor epoxide	0.081		50		1.0E-06	1		1		16		9		70		3285	2.5E-09		1.3E-05		2.0E-04
PCB Aroclor 1016	0.34		50		1.0E-06	1		1		16		9		70		3285	1.1E-08		7.0E-05		1.5E-04
PCB Aroclor 1254	0.048		50		1.0E-06	1		1		16		9		70		3285	1.5E-09		2.0E-05		7.6E-05
Thallium	5.8		50		1.0E-06	1		1		16		9		70		3285	1.8E-07		6.7E-05		2.7E-03
																					4.4E-03

CT Scenario: Noncancer Hazard for Incidental Dermal Contact with Sediment for Adult Recreator

Chemical	C (mg/kg)	x	SA (cm^2/event)	x	AF (mg/cm^2)	x	ABS (unitless)	x	CF (kg/mg)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (adj) (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.045		3500		0.2		0.1		1.0E-06		16		9		70		3285	2.0E-09		1.5E-05		1.3E-04
Arsenic	11		3500		0.2		0.032		1.0E-06		16		9		70		3285	1.6E-07		1.2E-04		1.3E-03
bis(2-Ethylhexyl)phthalate	11		3500		0.2		0.1		1.0E-06		16		9		70		3285	4.8E-07		3.8E-03		1.3E-04
Dieldrin	0.030		3500		0.2		0.1		1.0E-06		16		9		70		3285	1.3E-09		2.5E-05		5.3E-05
Heptachlor epoxide	0.081		3500		0.2		0.1		1.0E-06		16		9		70		3285	3.6E-09		9.4E-06		3.8E-04
PCB Aroclor 1016	0.34		3500		0.2		0.06		1.0E-06		16		9		70		3285	9.0E-09		6.3E-05		1.4E-04
PCB Aroclor 1254	0.048		3500		0.2		0.06		1.0E-06		16		9		70		3285	1.3E-09		1.8E-05		7.1E-05
Thallium	5.8		3500		0.2		0.01		1.0E-06		16		9		70		3285	2.5E-08		1.0E-05		2.5E-03
																						4.7E-03

CT Scenario: Noncancer Hazard for Incidental Ingestion of Sediment for Child Recreator

Chemical	C (mg/kg)	x	IR (mg/d)	x	CF (kg/mg)	fi (unitless)	x	B (unitless)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.045		140		1.0E-06	1		1		30		9		30		3285	1.7E-08		3.0E-05		5.8E-04
Arsenic	11		140		1.0E-06	1		1		30		9		30		3285	4.4E-06		3.0E-04		1.5E-02
bis(2-Ethylhexyl)phthalate	11		140		1.0E-06	1		1		30		9		30		3285	4.2E-06		2.0E-02		2.1E-04
Dieldrin	0.030		140		1.0E-06	1		1		30		9		30		3285	1.2E-08		5.0E-05		2.3E-04
Heptachlor epoxide	0.081		140		1.0E-06	1		1		30		9		30		3285	3.1E-08		1.3E-05		2.4E-03
PCB Aroclor 1016	0.34		140		1.0E-06	1		1		30		9		30		3285	1.3E-07		7.0E-05		1.9E-03
PCB Aroclor 1254	0.048		140		1.0E-06	1		1		30		9		30		3285	1.9E-08		2.0E-05		9.3E-04
Thallium	5.8		140		1.0E-06	1		1		30		9		30		3285	2.2E-06		6.7E-05		3.3E-02
																					5.4E-02

CT Scenario: Noncancer Hazard for Incidental Dermal Contact with Sediment for Child Recreator

Chemical	C (mg/kg)	x	SA (cm^2/event)	x	AF (mg/cm^2)	x	ABS (unitless)	x	CF (kg/mg)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (adj) (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.045		2200		0.2		0.1		1.0E-06		30		9		30		3285	5.4E-09		1.5E-05		3.6E-04
Arsenic	11		2200		0.2		0.032		1.0E-06		30		9		30		3285	4.4E-07		1.2E-04		3.6E-03
bis(2-Ethylhexyl)phthalate	11		2200		0.2		0.1		1.0E-06		30		9		30		3285	1.3E-06		3.8E-03		3.5E-04
Dieldrin	0.030		2200		0.2		0.1		1.0E-06		30		9		30		3285	3.6E-09		2.5E-05		1.4E-04
Heptachlor epoxide	0.081		2200		0.2		0.1		1.0E-06		30		9		30		3285	9.8E-09		9.4E-06		1.0E-03
PCB Aroclor 1016	0.34		2200		0.2		0.06		1.0E-06		30		9		30		3285	2.5E-08		6.3E-05		3.9E-04
PCB Aroclor 1254	0.048		2200		0.2		0.06		1.0E-06		30		9		30		3285	3.5E-09		1.8E-05		1.9E-04
Thallium	5.8		2200		0.2		0.01		1.0E-06		30		9		30		3285	7.0E-08		1.0E-05		7.0E-03
																						1.3E-02

Table D-4. Noncancer Hazard Calculations for Sediment Contact Scenarios

Segment 3 (RM 4.9 to <6.5)

RME Scenario: Noncancer Hazard for Incidental Ingestion of Sediment for Adult Recreator

Chemical	C (mg/kg)	x	IR (mg/d)	x	CF (kg/mg)	fi (unitless)	x	B (unitless)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.054		50		1.0E-06	1		1		24		17		70		6205	2.5E-09		3.0E-05		8.5E-05
Arsenic	9.1		50		1.0E-06	1		1		24		17		70		6205	4.3E-07		3.0E-04		1.4E-03
bis(2-Ethylhexyl)phthalate	220		50		1.0E-06	1		1		24		17		70		6205	1.0E-05		2.0E-02		5.2E-04
Dieldrin	0.017		50		1.0E-06	1		1		24		17		70		6205	8.0E-10		5.0E-05		1.6E-05
Heptachlor epoxide	0.040		50		1.0E-06	1		1		24		17		70		6205	1.9E-09		1.3E-05		1.4E-04
PCB Aroclor 1016	25		50		1.0E-06	1		1		24		17		70		6205	1.2E-06		7.0E-05		1.7E-02
PCB Aroclor 1254	0.48		50		1.0E-06	1		1		24		17		70		6205	2.3E-08		2.0E-05		1.1E-03
Thallium	4.6		50		1.0E-06	1		1		24		17		70		6205	2.2E-07		6.7E-05		3.2E-03
																					2.3E-02

RME Scenario: Noncancer Hazard for Incidental Dermal Contact with Sediment for Adult Recreator

Chemical	C (mg/kg)	x	SA (cm^2/event)	x	AF (mg/cm^2)	x	ABS (unitless)	x	CF (kg/mg)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (adj) (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.054		4500		0.2		0.1		1.0E-06		24		17		70		6205	4.6E-09		1.5E-05		3.0E-04
Arsenic	9.1		4500		0.2		0.032		1.0E-06		24		17		70		6205	2.5E-07		1.2E-04		2.0E-03
bis(2-Ethylhexyl)phthalate	220		4500		0.2		0.1		1.0E-06		24		17		70		6205	1.9E-05		3.8E-03		4.9E-03
Dieldrin	0.017		4500		0.2		0.1		1.0E-06		24		17		70		6205	1.4E-09		2.5E-05		5.7E-05
Heptachlor epoxide	0.040		4500		0.2		0.1		1.0E-06		24		17		70		6205	3.4E-09		9.4E-06		3.6E-04
PCB Aroclor 1016	25		4500		0.2		0.06		1.0E-06		24		17		70		6205	1.3E-06		6.3E-05		2.0E-02
PCB Aroclor 1254	0.48		4500		0.2		0.06		1.0E-06		24		17		70		6205	2.4E-08		1.8E-05		1.4E-03
Thallium	4.6		4500		0.2		0.01		1.0E-06		24		17		70		6205	3.9E-08		1.0E-05		3.9E-03
																						3.3E-02

RME Scenario: Noncancer Hazard for Incidental Ingestion of Sediment for Child Recreator

Chemical	C (mg/kg)	x	IR (mg/d)	x	CF (kg/mg)	fi (unitless)	x	B (unitless)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.054		200		1.0E-06	1		1		48		13		30		4745	4.7E-08		3.0E-05		1.6E-03
Arsenic	9.1		200		1.0E-06	1		1		48		13		30		4745	8.0E-06		3.0E-04		2.7E-02
bis(2-Ethylhexyl)phthalate	220		200		1.0E-06	1		1		48		13		30		4745	1.9E-04		2.0E-02		9.6E-03
Dieldrin	0.017		200		1.0E-06	1		1		48		13		30		4745	1.5E-08		5.0E-05		3.0E-04
Heptachlor epoxide	0.040		200		1.0E-06	1		1		48		13		30		4745	3.5E-08		1.3E-05		2.7E-03
PCB Aroclor 1016	25		200		1.0E-06	1		1		48		13		30		4745	2.2E-05		7.0E-05		3.1E-01
PCB Aroclor 1254	0.48		200		1.0E-06	1		1		48		13		30		4745	4.2E-07		2.0E-05		2.1E-02
Thallium	4.6		200		1.0E-06	1		1		48		13		30		4745	4.0E-06		6.7E-05		6.0E-02
																					4.3E-01

RME Scenario: Noncancer Hazard for Incidental Dermal Contact with Sediment for Child Recreator

Chemical	C (mg/kg)	x	SA (cm^2/event)	x	AF (mg/cm^2)	x	ABS (unitless)	x	CF (kg/mg)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (adj) (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.054		2300		0.2		0.1		1.0E-06		48		13		30		4745	1.1E-08		1.5E-05		7.3E-04
Arsenic	9.12		2300		0.2		0.032		1.0E-06		48		13		30		4745	5.9E-07		1.2E-04		4.8E-03
bis(2-Ethylhexyl)phthalate	220		2300		0.2		0.1		1.0E-06		48		13		30		4745	4.4E-05		3.8E-03		1.2E-02
Dieldrin	0.017		2300		0.2		0.1		1.0E-06		48		13		30		4745	3.4E-09		2.5E-05		1.4E-04
Heptachlor epoxide	0.040		2300		0.2		0.1		1.0E-06		48		13		30		4745	8.1E-09		9.4E-06		8.6E-04
PCB Aroclor 1016	25		2300		0.2		0.06		1.0E-06		48		13		30		4745	3.0E-06		6.3E-05		4.7E-02
PCB Aroclor 1254	0.48		2300		0.2		0.06		1.0E-06		48		13		30		4745	5.8E-08		1.8E-05		3.2E-03
Thallium	4.6		2300		0.2		0.01		1.0E-06		48		13		30		4745	9.3E-08		1.0E-05		9.3E-03
																						7.8E-02

Table D-4. Noncancer Hazard Calculations for Sediment Contact Scenarios

CT Scenario: Noncancer Hazard for Incidental Ingestion of Sediment for Adult Recreator

Chemical	C (mg/kg)	x	IR (mg/d)	x	CF (kg/mg)	fi (unitless)	x	B (unitless)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.054		50		1.0E-06	1		1		16		9		70		3285	1.7E-09		3.0E-05		5.6E-05
Arsenic	9.1		50		1.0E-06	1		1		16		9		70		3285	2.9E-07		3.0E-04		9.5E-04
bis(2-Ethylhexyl)phthalate	220		50		1.0E-06	1		1		16		9		70		3285	6.9E-06		2.0E-02		3.4E-04
Dieldrin	0.017		50		1.0E-06	1		1		16		9		70		3285	5.3E-10		5.0E-05		1.1E-05
Heptachlor epoxide	0.040		50		1.0E-06	1		1		16		9		70		3285	1.3E-09		1.3E-05		9.6E-05
PCB Aroclor 1016	25		50		1.0E-06	1		1		16		9		70		3285	7.7E-07		7.0E-05		1.1E-02
PCB Aroclor 1254	0.48		50		1.0E-06	1		1		16		9		70		3285	1.5E-08		2.0E-05		7.5E-04
Thallium	4.6		50		1.0E-06	1		1		16		9		70		3285	1.4E-07		6.7E-05		2.2E-03
																					1.5E-02

CT Scenario: Noncancer Hazard for Incidental Dermal Contact with Sediment for Adult Recreator

Chemical	C (mg/kg)	x	SA (cm^2/event)	x	AF (mg/cm^2)	x	ABS (unitless)	x	CF (kg/mg)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (adj) (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.054		3500		0.2		0.1		1.0E-06		16		9		70		3285	2.4E-09		1.5E-05		1.6E-04
Arsenic	9.1		3500		0.2		0.032		1.0E-06		16		9		70		3285	1.3E-07		1.2E-04		1.0E-03
bis(2-Ethylhexyl)phthalate	220		3500		0.2		0.1		1.0E-06		16		9		70		3285	9.6E-06		3.8E-03		2.5E-03
Dieldrin	0.017		3500		0.2		0.1		1.0E-06		16		9		70		3285	7.5E-10		2.5E-05		3.0E-05
Heptachlor epoxide	0.040		3500		0.2		0.1		1.0E-06		16		9		70		3285	1.8E-09		9.4E-06		1.9E-04
PCB Aroclor 1016	25		3500		0.2		0.06		1.0E-06		16		9		70		3285	6.5E-07		6.3E-05		1.0E-02
PCB Aroclor 1254	0.48		3500		0.2		0.06		1.0E-06		16		9		70		3285	1.3E-08		1.8E-05		7.0E-04
Thallium	4.6		3500		0.2		0.01		1.0E-06		16		9		70		3285	2.0E-08		1.0E-05		2.0E-03
																						1.7E-02

CT Scenario: Noncancer Hazard for Incidental Ingestion of Sediment for Child Recreator

Chemical	C (mg/kg)	x	IR (mg/d)	x	CF (kg/mg)	fi (unitless)	x	B (unitless)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.054		140		1.0E-06	1		1		30		9		30		3285	2.1E-08		3.0E-05		6.9E-04
Arsenic	9.1		140		1.0E-06	1		1		30		9		30		3285	3.5E-06		3.0E-04		1.2E-02
bis(2-Ethylhexyl)phthalate	220		140		1.0E-06	1		1		30		9		30		3285	8.4E-05		2.0E-02		4.2E-03
Dieldrin	0.017		140		1.0E-06	1		1		30		9		30		3285	6.5E-09		5.0E-05		1.3E-04
Heptachlor epoxide	0.040		140		1.0E-06	1		1		30		9		30		3285	1.5E-08		1.3E-05		1.2E-03
PCB Aroclor 1016	25		140		1.0E-06	1		1		30		9		30		3285	9.5E-06		7.0E-05		1.4E-01
PCB Aroclor 1254	0.48		140		1.0E-06	1		1		30		9		30		3285	1.8E-07		2.0E-05		9.2E-03
Thallium	4.6		140		1.0E-06	1		1		30		9		30		3285	1.8E-06		6.7E-05		2.6E-02
																					1.9E-01

CT Scenario: Noncancer Hazard for Incidental Dermal Contact with Sediment for Child Recreator

Chemical	C (mg/kg)	x	SA (cm^2/event)	x	AF (mg/cm^2)	x	ABS (unitless)	x	CF (kg/mg)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (adj) (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.054		2200		0.2		0.1		1.0E-06		30		9		30		3285	6.5E-09		1.5E-05		4.3E-04
Arsenic	9.1		2200		0.2		0.032		1.0E-06		30		9		30		3285	3.5E-07		1.2E-04		2.9E-03
bis(2-Ethylhexyl)phthalate	220		2200		0.2		0.1		1.0E-06		30		9		30		3285	2.7E-05		3.8E-03		7.0E-03
Dieldrin	0.017		2200		0.2		0.1		1.0E-06		30		9		30		3285	2.0E-09		2.5E-05		8.2E-05
Heptachlor epoxide	0.040		2200		0.2		0.1		1.0E-06		30		9		30		3285	4.8E-09		9.4E-06		5.2E-04
PCB Aroclor 1016	25		2200		0.2		0.06		1.0E-06		30		9		30		3285	1.8E-06		6.3E-05		2.8E-02
PCB Aroclor 1254	0.48		2200		0.2		0.06		1.0E-06		30		9		30		3285	3.5E-08		1.8E-05		1.9E-03
Thallium	4.6		2200		0.2		0.01		1.0E-06		30		9		30		3285	5.6E-08		1.0E-05		5.5E-03
																						4.7E-02

Table D-4. Noncancer Hazard Calculations for Sediment Contact Scenarios

Segment 4 (RM 6.5 to 8.8)

RME Scenario: Noncancer Hazard for Incidental Ingestion of Sediment for Adult Recreator

Chemical	C (mg/kg)	x	IR (mg/d)	x	CF (kg/mg)	fi (unitless)	x	B (unitless)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.0037		50		1.0E-06	1		1		24		17		70		6205	1.7E-10		3.0E-05		5.7E-06
Arsenic	8.4		50		1.0E-06	1		1		24		17		70		6205	3.9E-07		3.0E-04		1.3E-03
bis(2-Ethylhexyl)phthalate	7.4		50		1.0E-06	1		1		24		17		70		6205	3.5E-07		2.0E-02		1.7E-05
Dieldrin	0.0071		50		1.0E-06	1		1		24		17		70		6205	3.3E-10		5.0E-05		6.7E-06
Heptachlor epoxide	0.0054		50		1.0E-06	1		1		24		17		70		6205	2.5E-10		1.3E-05		2.0E-05
PCB Aroclor 1016	1.3		50		1.0E-06	1		1		24		17		70		6205	6.1E-08		7.0E-05		8.8E-04
PCB Aroclor 1254	0.96		50		1.0E-06	1		1		24		17		70		6205	4.5E-08		2.0E-05		2.3E-03
Thallium	2.8		50		1.0E-06	1		1		24		17		70		6205	1.3E-07		6.7E-05		2.0E-03
																					6.5E-03

RME Scenario: Noncancer Hazard for Incidental Dermal Contact with Sediment for Adult Recreator

Chemical	C (mg/kg)	x	SA (cm^2/event)	x	AF (mg/cm^2)	x	ABS (unitless)	x	CF (kg/mg)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (adj) (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.0037		4500		0.2		0.1		1.0E-06		24		17		70		6205	3.1E-10		1.5E-05		2.1E-05
Arsenic	8.4		4500		0.2		0.032		1.0E-06		24		17		70		6205	2.3E-07		1.2E-04		1.8E-03
bis(2-Ethylhexyl)phthalate	7.4		4500		0.2		0.1		1.0E-06		24		17		70		6205	6.3E-07		3.8E-03		1.6E-04
Dieldrin	0.0071		4500		0.2		0.1		1.0E-06		24		17		70		6205	6.0E-10		2.5E-05		2.4E-05
Heptachlor epoxide	0.0054		4500		0.2		0.1		1.0E-06		24		17		70		6205	4.6E-10		9.4E-06		4.9E-05
PCB Aroclor 1016	1.3		4500		0.2		0.06		1.0E-06		24		17		70		6205	6.6E-08		6.3E-05		1.1E-03
PCB Aroclor 1254	0.96		4500		0.2		0.06		1.0E-06		24		17		70		6205	4.9E-08		1.8E-05		2.7E-03
Thallium	2.8		4500		0.2		0.01		1.0E-06		24		17		70		6205	2.4E-08		1.0E-05		2.4E-03
																						8.2E-03

RME Scenario: Noncancer Hazard for Incidental Ingestion of Sediment for Child Recreator

Chemical	C (mg/kg)	x	IR (mg/d)	x	CF (kg/mg)	fi (unitless)	x	B (unitless)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.0037		200		1.0E-06	1		1		48		13		30		4745	3.2E-09		3.0E-05		1.1E-04
Arsenic	8.4		200		1.0E-06	1		1		48		13		30		4745	7.4E-06		3.0E-04		2.5E-02
bis(2-Ethylhexyl)phthalate	7.4		200		1.0E-06	1		1		48		13		30		4745	6.5E-06		2.0E-02		3.2E-04
Dieldrin	0.0071		200		1.0E-06	1		1		48		13		30		4745	6.2E-09		5.0E-05		1.2E-04
Heptachlor epoxide	0.0054		200		1.0E-06	1		1		48		13		30		4745	4.7E-09		1.3E-05		3.6E-04
PCB Aroclor 1016	1.3		200		1.0E-06	1		1		48		13		30		4745	1.1E-06		7.0E-05		1.6E-02
PCB Aroclor 1254	0.96		200		1.0E-06	1		1		48		13		30		4745	8.4E-07		2.0E-05		4.2E-02
Thallium	2.8		200		1.0E-06	1		1		48		13		30		4745	2.5E-06		6.7E-05		3.7E-02
																					1.2E-01

RME Scenario: Noncancer Hazard for Incidental Dermal Contact with Sediment for Child Recreator

Chemical	C (mg/kg)	x	SA (cm^2/event)	x	AF (mg/cm^2)	x	ABS (unitless)	x	CF (kg/mg)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (adj) (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.0037		2300		0.2		0.1		1.0E-06		48		13		30		4745	7.4E-10		1.5E-05		4.9E-05
Arsenic	8.4		2300		0.2		0.032		1.0E-06		48		13		30		4745	5.4E-07		1.2E-04		4.4E-03
bis(2-Ethylhexyl)phthalate	7.4		2300		0.2		0.1		1.0E-06		48		13		30		4745	1.5E-06		3.8E-03		3.9E-04
Dieldrin	0.0071		2300		0.2		0.1		1.0E-06		48		13		30		4745	1.4E-09		2.5E-05		5.7E-05
Heptachlor epoxide	0.0054		2300		0.2		0.1		1.0E-06		48		13		30		4745	1.1E-09		9.4E-06		1.2E-04
PCB Aroclor 1016	1.3		2300		0.2		0.06		1.0E-06		48		13		30		4745	1.6E-07		6.3E-05		2.5E-03
PCB Aroclor 1254	0.96		2300		0.2		0.06		1.0E-06		48		13		30		4745	1.2E-07		1.8E-05		6.4E-03
Thallium	2.8		2300		0.2		0.01		1.0E-06		48		13		30		4745	5.6E-08		1.0E-05		5.6E-03
																						2.0E-02

Table D-4. Noncancer Hazard Calculations for Sediment Contact Scenarios

CT Scenario: Noncancer Hazard for Incidental Ingestion of Sediment for Adult Recreator

Chemical	C (mg/kg)	x	IR (mg/d)	x	CF (kg/mg)	fi (unitless)	x	B (unitless)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.0037		50		1.0E-06	1		1		16		9		70		3285	1.1E-10		3.0E-05		3.8E-06
Arsenic	8.4		50		1.0E-06	1		1		16		9		70		3285	2.6E-07		3.0E-04		8.8E-04
bis(2-Ethylhexyl)phthalate	7.4		50		1.0E-06	1		1		16		9		70		3285	2.3E-07		2.0E-02		1.2E-05
Dieldrin	0.0071		50		1.0E-06	1		1		16		9		70		3285	2.2E-10		5.0E-05		4.4E-06
Heptachlor epoxide	0.0054		50		1.0E-06	1		1		16		9		70		3285	1.7E-10		1.3E-05		1.3E-05
PCB Aroclor 1016	1.3		50		1.0E-06	1		1		16		9		70		3285	4.1E-08		7.0E-05		5.8E-04
PCB Aroclor 1254	0.96		50		1.0E-06	1		1		16		9		70		3285	3.0E-08		2.0E-05		1.5E-03
Thallium	2.8		50		1.0E-06	1		1		16		9		70		3285	8.8E-08		6.7E-05		1.3E-03
																					4.3E-03

CT Scenario: Noncancer Hazard for Incidental Dermal Contact with Sediment for Adult Recreator

Chemical	C (mg/kg)	x	SA (cm^2/event)	x	AF (mg/cm^2)	x	ABS (unitless)	x	CF (kg/mg)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (adj) (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.0037		3500		0.2		0.1		1.0E-06		16		9		70		3285	1.6E-10		1.5E-05		1.1E-05
Arsenic	8.4		3500		0.2		0.032		1.0E-06		16		9		70		3285	1.2E-07		1.2E-04		9.6E-04
bis(2-Ethylhexyl)phthalate	7.4		3500		0.2		0.1		1.0E-06		16		9		70		3285	3.2E-07		3.8E-03		8.5E-05
Dieldrin	0.0071		3500		0.2		0.1		1.0E-06		16		9		70		3285	3.1E-10		2.5E-05		1.2E-05
Heptachlor epoxide	0.0054		3500		0.2		0.1		1.0E-06		16		9		70		3285	2.4E-10		9.4E-06		2.5E-05
PCB Aroclor 1016	1.3		3500		0.2		0.06		1.0E-06		16		9		70		3285	3.4E-08		6.3E-05		5.5E-04
PCB Aroclor 1254	0.96		3500		0.2		0.06		1.0E-06		16		9		70		3285	2.5E-08		1.8E-05		1.4E-03
Thallium	2.8		3500		0.2		0.01		1.0E-06		16		9		70		3285	1.2E-08		1.0E-05		1.2E-03
																						4.3E-03

CT Scenario: Noncancer Hazard for Incidental Ingestion of Sediment for Child Recreator

Chemical	C (mg/kg)	x	IR (mg/d)	x	CF (kg/mg)	fi (unitless)	x	B (unitless)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.0037		140		1.0E-06	1		1		30		9		30		3285	1.4E-09		3.0E-05		4.7E-05
Arsenic	8.4		140		1.0E-06	1		1		30		9		30		3285	3.2E-06		3.0E-04		1.1E-02
bis(2-Ethylhexyl)phthalate	7.4		140		1.0E-06	1		1		30		9		30		3285	2.8E-06		2.0E-02		1.4E-04
Dieldrin	0.0071		140		1.0E-06	1		1		30		9		30		3285	2.7E-09		5.0E-05		5.4E-05
Heptachlor epoxide	0.0054		140		1.0E-06	1		1		30		9		30		3285	2.1E-09		1.3E-05		1.6E-04
PCB Aroclor 1016	1.3		140		1.0E-06	1		1		30		9		30		3285	5.0E-07		7.0E-05		7.2E-03
PCB Aroclor 1254	0.96		140		1.0E-06	1		1		30		9		30		3285	3.7E-07		2.0E-05		1.8E-02
Thallium	2.8		140		1.0E-06	1		1		30		9		30		3285	1.1E-06		6.7E-05		1.6E-02
																					5.3E-02

CT Scenario: Noncancer Hazard for Incidental Dermal Contact with Sediment for Child Recreator

Chemical	C (mg/kg)	x	SA (cm^2/event)	x	AF (mg/cm^2)	x	ABS (unitless)	x	CF (kg/mg)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (adj) (mg/kg-d)	=	Non-Cancer Hazard
Aldrin	0.0037		2200		0.2		0.1		1.0E-06		30		9		30		3285	4.4E-10		1.5E-05		2.9E-05
Arsenic	8.4		2200		0.2		0.032		1.0E-06		30		9		30		3285	3.2E-07		1.2E-04		2.6E-03
bis(2-Ethylhexyl)phthalate	7.4		2200		0.2		0.1		1.0E-06		30		9		30		3285	8.9E-07		3.8E-03		2.3E-04
Dieldrin	0.0071		2200		0.2		0.1		1.0E-06		30		9		30		3285	8.6E-10		2.5E-05		3.4E-05
Heptachlor epoxide	0.0054		2200		0.2		0.1		1.0E-06		30		9		30		3285	6.5E-10		9.4E-06		7.0E-05
PCB Aroclor 1016	1.3		2200		0.2		0.06		1.0E-06		30		9		30		3285	9.5E-08		6.3E-05		1.5E-03
PCB Aroclor 1254	0.96		2200		0.2		0.06		1.0E-06		30		9		30		3285	6.9E-08		1.8E-05		3.9E-03
Thallium	2.8		2200		0.2		0.01		1.0E-06		30		9		30		3285	3.4E-08		1.0E-05		3.4E-03
																						1.2E-02

Table D-5. Noncancer Hazards Calculations for Surface Water Contact Scenarios

Segment 1 (RM 0 to <3.2)

RME Scenario: Noncancer Hazard for Incidental Ingestion of Surface Water for Adult Recreator

Chemical	C (mg/L)	x	IR (L/hr)	x	ET (hr/event)	x	EF (events/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0289		0.05		3.00		24		17		70		6205	4.1E-06		5.0E-03		8.2E-04
Aldrin	0.0001		0.05		3.00		24		17		70		6205	1.6E-08		3.0E-05		5.4E-04
Arsenic	0.0021		0.05		3.00		24		17		70		6205	2.9E-07		3.0E-04		9.7E-04
Atrazine	0.0090		0.05		3.00		24		17		70		6205	1.3E-06		3.5E-02		3.6E-05
Dieldrin	0.0003		0.05		3.00		24		17		70		6205	3.6E-08		5.0E-05		7.2E-04
Di-n-butylphthalate	0.0061		0.05		3.00		24		17		70		6205	8.6E-07		1.0E-01		8.6E-06
gamma-Benzene hexachloride	0.0001		0.05		3.00		24		17		70		6205	1.5E-08		3.0E-04		5.2E-05
Heptachlor	0.0001		0.05		3.00		24		17		70		6205	1.5E-08		5.0E-04		2.9E-05
Pentachlorophenol (PCP)	0.0385		0.05		3.00		24		17		70		6205	5.4E-06		3.0E-02		1.8E-04
Thallium	0.0025		0.05		3.00		24		17		70		6205	3.5E-07		6.7E-05		5.2E-03
																		8.5E-03

RME Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Adult Recreator

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0289		4500		0.0330		0.001		3		24		17		70		6205	1.2E-05		2.5E-03		4.8E-03
Aldrin	0.0001		4500		0.002		0.001		3		24		17		70		6205	2.3E-09		1.5E-05		1.6E-04
Arsenic	0.0021		4500		0.001		0.001		3		24		17		70		6205	2.6E-08		1.2E-04		2.1E-04
Atrazine	0.0090		4500		0.008		0.001		3		24		17		70		6205	8.7E-07		1.8E-02		5.0E-05
Dieldrin	0.0003		4500		0.016		0.001		3		24		17		70		6205	5.2E-08		2.5E-05		2.1E-03
Di-n-butylphthalate	0.0061		4500		0.033		0.001		3		24		17		70		6205	2.6E-06		1.0E-01		2.6E-05
gamma-Benzene hexachloride	0.0001		4500		0.014		0.001		3		24		17		70		6205	1.9E-08		2.9E-04		6.7E-05
Heptachlor	0.0001		4500		0.011		0.001		3		24		17		70		6205	1.5E-08		3.6E-04		4.0E-05
Pentachlorophenol (PCP)	0.0385		4500		0.650		0.001		3		24		17		70		6205	3.2E-04		3.0E-02		1.1E-02
Thallium	0.0025		4500		0.001		0.001		3		24		17		70		6205	3.1E-08		1.0E-05		3.1E-03
																						2.1E-02

RME Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Adult Boater

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0289		4500		0.0330		0.001		6.00		60.0		17		70		6205	6.1E-05		2.5E-03		2.4E-02
Aldrin	0.0001		4500		0.002		0.001		6.00		60.0		17		70		6205	1.2E-08		1.5E-05		7.8E-04
Arsenic	0.0021		4500		0.001		0.001		6.00		60.0		17		70		6205	1.3E-07		1.2E-04		1.1E-03
Atrazine	0.0090		4500		0.008		0.001		6.00		60.0		17		70		6205	4.4E-06		1.8E-02		2.5E-04
Dieldrin	0.0003		4500		0.016		0.001		6.00		60.0		17		70		6205	2.6E-07		2.5E-05		1.0E-02
Di-n-butylphthalate	0.0061		4500		0.033		0.001		6.00		60.0		17		70		6205	1.3E-05		1.0E-01		1.3E-04
gamma-Benzene hexachloride	0.0001		4500		0.014		0.001		6.00		60.0		17		70		6205	9.7E-08		2.9E-04		3.4E-04
Heptachlor	0.0001		4500		0.011		0.001		6.00		60.0		17		70		6205	7.3E-08		3.6E-04		2.0E-04
Pentachlorophenol (PCP)	0.0385		4500		0.650		0.001		6.00		60.0		17		70		6205	1.6E-03		3.0E-02		5.3E-02
Thallium	0.0025		4500		0.001		0.001		6.00		60.0		17		70		6205	1.6E-07		1.0E-05		1.5E-02
																						1.1E-01

RME Scenario: Noncancer Hazard for Incidental Ingestion of Surface Water for Child Recreator

Chemical	C (mg/L)	x	IR (L/hr)	x	ET (hr/event)	x	EF (events/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0289		0.05		3.00		48		13		30		4745	1.9E-05		5.0E-03		3.8E-03
Aldrin	0.0001		0.05		3.00		48		13		30		4745	7.6E-08		3.0E-05		2.5E-03
Arsenic	0.0021		0.05		3.00		48		13		30		4745	1.4E-06		3.0E-04		4.5E-03
Atrazine	0.0090		0.05		3.00		48		13		30		4745	5.9E-06		3.5E-02		1.7E-04
Dieldrin	0.0003		0.05		3.00		48		13		30		4745	1.7E-07		5.0E-05		3.4E-03
Di-n-butylphthalate	0.0061		0.05		3.00		48		13		30		4745	4.0E-06		1.0E-01		4.0E-05
gamma-Benzene hexachloride	0.0001		0.05		3.00		48		13		30		4745	7.2E-08		3.0E-04		2.4E-04
Heptachlor	0.0001		0.05		3.00		48		13		30		4745	6.8E-08		5.0E-04		1.4E-04
Pentachlorophenol (PCP)	0.0385		0.05		3.00		48		13		30		4745	2.5E-05		3.0E-02		8.4E-04
Thallium	0.0025		0.05		3.00		48		13		30		4745	1.6E-06		6.7E-05		2.4E-02
																		4.0E-02

Table D-5. Noncancer Hazards Calculations for Surface Water Contact Scenarios

RME Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Child Recreator

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0289		6800		0.0330		0.001		3		48		13		30		4745	8.5E-05		2.5E-03		3.4E-02
Aldrin	0.0001		6800		0.002		0.001		3		48		13		30		4745	1.7E-08		1.5E-05		1.1E-03
Arsenic	0.0021		6800		0.001		0.001		3		48		13		30		4745	1.8E-07		1.2E-04		1.5E-03
Atrazine	0.0090		6800		0.008		0.001		3		48		13		30		4745	6.1E-06		1.8E-02		3.5E-04
Dieldrin	0.0003		6800		0.016		0.001		3		48		13		30		4745	3.7E-07		2.5E-05		1.5E-02
Di-n-butylphthalate	0.0061		6800		0.033		0.001		3		48		13		30		4745	1.8E-05		1.0E-01		1.8E-04
gamma-Benzene hexachloride	0.0001		6800		0.014		0.001		3		48		13		30		4745	1.4E-07		2.9E-04		4.7E-04
Heptachlor	0.0001		6800		0.011		0.001		3		48		13		30		4745	1.0E-07		3.6E-04		2.8E-04
Pentachlorophenol (PCP)	0.0385		6800		0.650		0.001		3		48		13		30		4745	2.2E-03		3.0E-02		7.5E-02
Thallium	0.0025		6800		0.001		0.001		3		48		13		30		4745	2.2E-07		1.0E-05		2.2E-02
																						1.5E-01

RME Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Child Boater

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0289		6800		0.0330		0.001		6		30		13		30		4745	1.1E-04		2.5E-03		4.3E-02
Aldrin	0.0001		6800		0.002		0.001		6		30		13		30		4745	2.1E-08		1.5E-05		1.4E-03
Arsenic	0.0021		6800		0.001		0.001		6		30		13		30		4745	2.3E-07		1.2E-04		1.9E-03
Atrazine	0.0090		6800		0.008		0.001		6		30		13		30		4745	7.7E-06		1.8E-02		4.4E-04
Dieldrin	0.0003		6800		0.016		0.001		6		30		13		30		4745	4.6E-07		2.5E-05		1.8E-02
Di-n-butylphthalate	0.0061		6800		0.033		0.001		6		30		13		30		4745	2.3E-05		1.0E-01		2.3E-04
gamma-Benzene hexachloride	0.0001		6800		0.014		0.001		6		30		13		30		4745	1.7E-07		2.9E-04		5.9E-04
Heptachlor	0.0001		6800		0.011		0.001		6		30		13		30		4745	1.3E-07		3.6E-04		3.6E-04
Pentachlorophenol (PCP)	0.0385		6800		0.650		0.001		6		30		13		30		4745	2.8E-03		3.0E-02		9.3E-02
Thallium	0.0025		6800		0.001		0.001		6		30		13		30		4745	2.7E-07		1.0E-05		2.7E-02
																						1.9E-01

CT Scenario: Noncancer Hazard for Incidental Ingestion of Surface Water for Adult Recreator

Chemical	C (mg/L)	x	IR (L/hr)	x	ET (hr/event)	x	EF (events/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0289		0.05		1.00		16		9		70		3285	9.1E-07		5.0E-03		1.8E-04
Aldrin	0.0001		0.05		1.00		16		9		70		3285	3.6E-09		3.0E-05		1.2E-04
Arsenic	0.0021		0.05		1.00		16		9		70		3285	6.5E-08		3.0E-04		2.2E-04
Atrazine	0.0090		0.05		1.00		16		9		70		3285	2.8E-07		3.5E-02		8.1E-06
Dieldrin	0.0003		0.05		1.00		16		9		70		3285	8.0E-09		5.0E-05		1.6E-04
Di-n-butylphthalate	0.0061		0.05		1.00		16		9		70		3285	1.9E-07		1.0E-01		1.9E-06
gamma-Benzene hexachloride	0.0001		0.05		1.00		16		9		70		3285	3.4E-09		3.0E-04		1.1E-05
Heptachlor	0.0001		0.05		1.00		16		9		70		3285	3.3E-09		5.0E-04		6.5E-06
Pentachlorophenol (PCP)	0.0385		0.05		1.00		16		9		70		3285	1.2E-06		3.0E-02		4.0E-05
Thallium	0.0025		0.05		1.00		16		9		70		3285	7.7E-08		6.7E-05		1.1E-03
																		1.9E-03

CT Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Adult Recreator

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0289		11000		0.0330		0.001		1		16		9		70		3285	6.6E-06		2.5E-03		2.6E-03
Aldrin	0.0001		11000		0.002		0.001		1		16		9		70		3285	1.3E-09		1.5E-05		8.5E-05
Arsenic	0.0021		11000		0.001		0.001		1		16		9		70		3285	1.4E-08		1.2E-04		1.2E-04
Atrazine	0.0090		11000		0.008		0.001		1		16		9		70		3285	4.7E-07		1.8E-02		2.7E-05
Dieldrin	0.0003		11000		0.016		0.001		1		16		9		70		3285	2.8E-08		2.5E-05		1.1E-03
Di-n-butylphthalate	0.0061		11000		0.033		0.001		1		16		9		70		3285	1.4E-06		1.0E-01		1.4E-05
gamma-Benzene hexachloride	0.0001		11000		0.014		0.001		1		16		9		70		3285	1.1E-08		2.9E-04		3.6E-05
Heptachlor	0.0001		11000		0.011		0.001		1		16		9		70		3285	7.9E-09		3.6E-04		2.2E-05
Pentachlorophenol (PCP)	0.0385		11000		0.650		0.001		1		16		9		70		3285	1.7E-04		3.0E-02		5.7E-03
Thallium	0.0025		11000		0.001		0.001		1		16		9		70		3285	1.7E-08		1.0E-05		1.7E-03
																						1.1E-02

Table D-5. Noncancer Hazards Calculations for Surface Water Contact Scenarios

CT Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Adult Boater

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0289		11000		0.0330		0.001		6.00		30.0		9		70		3285	7.4E-05		2.5E-03		3.0E-02
Aldrin	0.0001		11000		0.002		0.001		6.00		30.0		9		70		3285	1.4E-08		1.5E-05		9.6E-04
Arsenic	0.0021		11000		0.001		0.001		6.00		30.0		9		70		3285	1.6E-07		1.2E-04		1.3E-03
Atrazine	0.0090		11000		0.008		0.001		6.00		30.0		9		70		3285	5.3E-06		1.8E-02		3.0E-04
Dieldrin	0.0003		11000		0.016		0.001		6.00		30.0		9		70		3285	3.2E-07		2.5E-05		1.3E-02
Di-n-butylphthalate	0.0061		11000		0.033		0.001		6.00		30.0		9		70		3285	1.6E-05		1.0E-01		1.6E-04
gamma-Benzene hexachloride	0.0001		11000		0.014		0.001		6.00		30.0		9		70		3285	1.2E-07		2.9E-04		4.1E-04
Heptachlor	0.0001		11000		0.011		0.001		6.00		30.0		9		70		3285	8.9E-08		3.6E-04		2.5E-04
Pentachlorophenol (PCP)	0.0385		11000		0.650		0.001		6.00		30.0		9		70		3285	1.9E-03		3.0E-02		6.5E-02
Thallium	0.0025		11000		0.001		0.001		6.00		30.0		9		70		3285	1.9E-07		1.0E-05		1.9E-02
																						1.3E-01

CT Scenario: Noncancer Hazard for Incidental Ingestion of Surface Water for Child Recreator

Chemical	C (mg/L)	x	IR (L/hr)	x	ET (hr/event)	x	EF (events/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0289		0.05		1.00		30		9		30		3285	4.0E-06		5.0E-03		7.9E-04
Aldrin	0.0001		0.05		1.00		30		9		30		3285	1.6E-08		3.0E-05		5.3E-04
Arsenic	0.0021		0.05		1.00		30		9		30		3285	2.8E-07		3.0E-04		9.4E-04
Atrazine	0.0090		0.05		1.00		30		9		30		3285	1.2E-06		3.5E-02		3.5E-05
Dieldrin	0.0003		0.05		1.00		30		9		30		3285	3.5E-08		5.0E-05		7.0E-04
Di-n-butylphthalate	0.0061		0.05		1.00		30		9		30		3285	8.4E-07		1.0E-01		8.4E-06
gamma-Benzene hexachloride	0.0001		0.05		1.00		30		9		30		3285	1.5E-08		3.0E-04		5.0E-05
Heptachlor	0.0001		0.05		1.00		30		9		30		3285	1.4E-08		5.0E-04		2.9E-05
Pentachlorophenol (PCP)	0.0385		0.05		1.00		30		9		30		3285	5.3E-06		3.0E-02		1.8E-04
Thallium	0.0025		0.05		1.00		30		9		30		3285	3.4E-07		6.7E-05		5.0E-03
																		8.3E-03

CT Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Child Recreator

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0289		5500		0.0330		0.001		1		30		9		30		3285	1.4E-05		2.5E-03		5.8E-03
Aldrin	0.0001		5500		0.002		0.001		1		30		9		30		3285	2.8E-09		1.5E-05		1.9E-04
Arsenic	0.0021		5500		0.001		0.001		1		30		9		30		3285	3.1E-08		1.2E-04		2.5E-04
Atrazine	0.0090		5500		0.008		0.001		1		30		9		30		3285	1.0E-06		1.8E-02		5.9E-05
Dieldrin	0.0003		5500		0.016		0.001		1		30		9		30		3285	6.2E-08		2.5E-05		2.5E-03
Di-n-butylphthalate	0.0061		5500		0.033		0.001		1		30		9		30		3285	3.0E-06		1.0E-01		3.0E-05
gamma-Benzene hexachloride	0.0001		5500		0.014		0.001		1		30		9		30		3285	2.3E-08		2.9E-04		8.0E-05
Heptachlor	0.0001		5500		0.011		0.001		1		30		9		30		3285	1.7E-08		3.6E-04		4.8E-05
Pentachlorophenol (PCP)	0.0385		5500		0.650		0.001		1		30		9		30		3285	3.8E-04		3.0E-02		1.3E-02
Thallium	0.0025		5500		0.001		0.001		1		30		9		30		3285	3.7E-08		1.0E-05		3.7E-03
																						2.5E-02

CT Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Child Boater

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0289		5500		0.0330		0.001		6.00		30.0		9		30		3285	8.6E-05		2.5E-03		3.5E-02
Aldrin	0.0001		5500		0.002		0.001		6.00		30.0		9		30		3285	1.7E-08		1.5E-05		1.1E-03
Arsenic	0.0021		5500		0.001		0.001		6.00		30.0		9		30		3285	1.9E-07		1.2E-04		1.5E-03
Atrazine	0.0090		5500		0.008		0.001		6.00		30.0		9		30		3285	6.2E-06		1.8E-02		3.6E-04
Dieldrin	0.0003		5500		0.016		0.001		6.00		30.0		9		30		3285	3.7E-07		2.5E-05		1.5E-02
Di-n-butylphthalate	0.0061		5500		0.033		0.001		6.00		30.0		9		30		3285	1.8E-05		1.0E-01		1.8E-04
gamma-Benzene hexachloride	0.0001		5500		0.014		0.001		6.00		30.0		9		30		3285	1.4E-07		2.9E-04		4.8E-04
Heptachlor	0.0001		5500		0.011		0.001		6.00		30.0		9		30		3285	1.0E-07		3.6E-04		2.9E-04
Pentachlorophenol (PCP)	0.0385		5500		0.650		0.001		6.00		30.0		9		30		3285	2.3E-03		3.0E-02		7.5E-02
Thallium	0.0025		5500		0.001		0.001		6.00		30.0		9		30		3285	2.2E-07		1.0E-05		2.2E-02
																						1.5E-01

Table D-5. Noncancer Hazards Calculations for Surface Water Contact Scenarios

Segment 2 (RM 3.2 to <4.9)

RME Scenario: Noncancer Hazard for Incidental Ingestion of Surface Water for Adult Recreator

Chemical	C (mg/L)	x	IR (L/hr)	x	ET (hr/event)	x	EF (events/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		0.05		3		24		17		70		6205	7.0E-07		5.0E-03		1.4E-04
Aldrin	0.0000		0.05		3		24		17		70		6205	3.5E-09		3.0E-05		1.2E-04
Arsenic	0.0038		0.05		3		24		17		70		6205	5.4E-07		3.0E-04		1.8E-03
Atrazine	0.0050		0.05		3		24		17		70		6205	7.0E-07		3.5E-02		2.0E-05
Dieldrin	0.0001		0.05		3		24		17		70		6205	7.0E-09		5.0E-05		1.4E-04
Di-n-butylphthalate	0.0050		0.05		3		24		17		70		6205	7.0E-07		1.0E-01		7.0E-06
gamma-Benzene hexachloride (g-E	0.0000		0.05		3		24		17		70		6205	3.5E-09		3.0E-04		1.2E-05
Heptachlor	0.0000		0.05		3		24		17		70		6205	3.5E-09		5.0E-04		7.0E-06
Pentachlorophenol (PCP)	0.0125		0.05		3		24		17		70		6205	1.8E-06		3.0E-02		5.9E-05
Thallium	0.0016		0.05		3		24		17		70		6205	2.3E-07		6.7E-05		3.4E-03

RME Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Adult Recreator

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		4500		0.0330		0.001		3		24		17		70		6205	2.1E-06		2.5E-03		8.4E-04
Aldrin	0.0000		4500		0.002		0.001		3		24		17		70		6205	5.1E-10		1.5E-05		3.4E-05
Arsenic	0.0038		4500		0.001		0.001		3		24		17		70		6205	4.8E-08		1.2E-04		3.9E-04
Atrazine	0.0050		4500		0.008		0.001		3		24		17		70		6205	4.8E-07		1.8E-02		2.8E-05
Dieldrin	0.0001		4500		0.016		0.001		3		24		17		70		6205	1.0E-08		2.5E-05		4.1E-04
Di-n-butylphthalate	0.0050		4500		0.033		0.001		3		24		17		70		6205	2.1E-06		1.0E-01		2.1E-05
gamma-Benzene hexachloride	0.0000		4500		0.014		0.001		3		24		17		70		6205	4.4E-09		2.9E-04		1.5E-05
Heptachlor	0.0000		4500		0.011		0.001		3		24		17		70		6205	3.5E-09		3.6E-04		9.7E-06
Pentachlorophenol (PCP)	0.0125		4500		0.650		0.001		3		24		17		70		6205	1.0E-04		3.0E-02		3.4E-03
Thallium	0.0016		4500		0.001		0.001		3		24		17		70		6205	2.0E-08		1.0E-05		2.0E-03
																						7.2E-03

RME Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Adult Boater

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		4500		0.0330		0.001		6		60		17		70		6205	1.0E-05		2.5E-03		4.2E-03
Aldrin	0.0000		4500		0.002		0.001		6		60		17		70		6205	2.5E-09		1.5E-05		1.7E-04
Arsenic	0.0038		4500		0.001		0.001		6		60		17		70		6205	2.4E-07		1.2E-04		2.0E-03
Atrazine	0.0050		4500		0.008		0.001		6		60		17		70		6205	2.4E-06		1.8E-02		1.4E-04
Dieldrin	0.0001		4500		0.016		0.001		6		60		17		70		6205	5.1E-08		2.5E-05		2.0E-03
Di-n-butylphthalate	0.0050		4500		0.033		0.001		6		60		17		70		6205	1.0E-05		1.0E-01		1.0E-04
gamma-Benzene hexachloride	0.0000		4500		0.014		0.001		6		60		17		70		6205	2.2E-08		2.9E-04		7.6E-05
Heptachlor	0.0000		4500		0.011		0.001		6		60		17		70		6205	1.7E-08		3.6E-04		4.8E-05
Pentachlorophenol (PCP)	0.0125		4500		0.650		0.001		6		60		17		70		6205	5.2E-04		3.0E-02		1.7E-02
Thallium	0.0016		4500		0.001		0.001		6		60		17		70		6205	1.0E-07		1.0E-05		1.0E-02
																						3.6E-02

RME Scenario: Noncancer Hazard for Incidental Ingestion of Surface Water for Child Recreator

Chemical	C (mg/L)	x	IR (L/hr)	x	ET (hr/event)	x	EF (events/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		0.05		3		48		13		30		4745	3.3E-06		5.0E-03		6.6E-04
Aldrin	0.0000		0.05		3		48		13		30		4745	1.6E-08		3.0E-05		5.5E-04
Arsenic	0.0038		0.05		3		48		13		30		4745	2.5E-06		3.0E-04		8.3E-03
Atrazine	0.0050		0.05		3		48		13		30		4745	3.3E-06		3.5E-02		9.4E-05
Dieldrin	0.0001		0.05		3		48		13		30		4745	3.3E-08		5.0E-05		6.6E-04
Di-n-butylphthalate	0.0050		0.05		3		48		13		30		4745	3.3E-06		1.0E-01		3.3E-05
gamma-Benzene hexachloride	0.0000		0.05		3		48		13		30		4745	1.6E-08		3.0E-04		5.5E-05
Heptachlor	0.0000		0.05		3		48		13		30		4745	1.6E-08		5.0E-04		3.3E-05
Pentachlorophenol (PCP)	0.0125		0.05		3		48		13		30		4745	8.2E-06		3.0E-02		2.7E-04
Thallium	0.0016		0.05		3		48		13		30		4745	1.1E-06		6.7E-05		1.6E-02
																		2.6E-02

Table D-5. Noncancer Hazards Calculations for Surface Water Contact Scenarios

RME Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Child Recreator

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		6800		0.0330		0.001		3		48		13		30		4745	1.5E-05		2.5E-03		5.9E-03
Aldrin	0.0000		6800		0.002		0.001		3		48		13		30		4745	3.6E-09		1.5E-05		2.4E-04
Arsenic	0.0038		6800		0.001		0.001		3		48		13		30		4745	3.4E-07		1.2E-04		2.8E-03
Atrazine	0.0050		6800		0.008		0.001		3		48		13		30		4745	3.4E-06		1.8E-02		1.9E-04
Dieldrin	0.0001		6800		0.016		0.001		3		48		13		30		4745	7.2E-08		2.5E-05		2.9E-03
Di-n-butylphthalate	0.0050		6800		0.033		0.001		3		48		13		30		4745	1.5E-05		1.0E-01		1.5E-04
gamma-Benzene hexachloride	0.0000		6800		0.014		0.001		3		48		13		30		4745	3.1E-08		2.9E-04		1.1E-04
Heptachlor	0.0000		6800		0.011		0.001		3		48		13		30		4745	2.5E-08		3.6E-04		6.8E-05
Pentachlorophenol (PCP)	0.0125		6800		0.650		0.001		3		48		13		30		4745	7.3E-04		3.0E-02		2.4E-02
Thallium	0.0016		6800		0.001		0.001		3		48		13		30		4745	1.4E-07		1.0E-05		1.4E-02
																						5.1E-02

RME Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Child Boater

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		6800		0.0330		0.001		6		30		13		30		4745	1.8E-05		2.5E-03		7.4E-03
Aldrin	0.0000		6800		0.002		0.001		6		30		13		30		4745	4.5E-09		1.5E-05		3.0E-04
Arsenic	0.0038		6800		0.001		0.001		6		30		13		30		4745	4.2E-07		1.2E-04		3.5E-03
Atrazine	0.0050		6800		0.008		0.001		6		30		13		30		4745	4.2E-06		1.8E-02		2.4E-04
Dieldrin	0.0001		6800		0.016		0.001		6		30		13		30		4745	8.9E-08		2.5E-05		3.6E-03
Di-n-butylphthalate	0.0050		6800		0.033		0.001		6		30		13		30		4745	1.8E-05		1.0E-01		1.8E-04
gamma-Benzene hexachloride	0.0000		6800		0.014		0.001		6		30		13		30		4745	3.9E-08		2.9E-04		1.3E-04
Heptachlor	0.0000		6800		0.011		0.001		6		30		13		30		4745	3.1E-08		3.6E-04		8.5E-05
Pentachlorophenol (PCP)	0.0125		6800		0.650		0.001		6		30		13		30		4745	9.1E-04		3.0E-02		3.0E-02
Thallium	0.0016		6800		0.001		0.001		6		30		13		30		4745	1.8E-07		1.0E-05		1.8E-02
																						6.3E-02

CT Scenario: Noncancer Hazard for Incidental Ingestion of Surface Water for Adult Recreator

Chemical	C (mg/L)	x	IR (L/hr)	x	ET (hr/event)	x	EF (events/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		0.05		1		16		9		70		3285	1.6E-07		5.0E-03		3.1E-05
Aldrin	0.0000		0.05		1		16		9		70		3285	7.8E-10		3.0E-05		2.6E-05
Arsenic	0.0038		0.05		1		16		9		70		3285	1.2E-07		3.0E-04		4.0E-04
Atrazine	0.0050		0.05		1		16		9		70		3285	1.6E-07		3.5E-02		4.5E-06
Dieldrin	0.0001		0.05		1		16		9		70		3285	1.6E-09		5.0E-05		3.1E-05
Di-n-butylphthalate	0.0050		0.05		1		16		9		70		3285	1.6E-07		1.0E-01		1.6E-06
gamma-Benzene hexachloride	0.0000		0.05		1		16		9		70		3285	7.8E-10		3.0E-04		2.6E-06
Heptachlor	0.0000		0.05		1		16		9		70		3285	7.8E-10		5.0E-04		1.6E-06
Pentachlorophenol (PCP)	0.0125		0.05		1		16		9		70		3285	3.9E-07		3.0E-02		1.3E-05
Thallium	0.0016		0.05		1		16		9		70		3285	5.0E-08		6.7E-05		7.5E-04
																		1.3E-03

CT Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Adult Recreator

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		11000		0.0330		0.001		1		16		9		70		3285	1.1E-06		2.5E-03		4.5E-04
Aldrin	0.0000		11000		0.002		0.001		1		16		9		70		3285	2.8E-10		1.5E-05		1.8E-05
Arsenic	0.0038		11000		0.001		0.001		1		16		9		70		3285	2.6E-08		1.2E-04		2.1E-04
Atrazine	0.0050		11000		0.008		0.001		1		16		9		70		3285	2.6E-07		1.8E-02		1.5E-05
Dieldrin	0.0001		11000		0.016		0.001		1		16		9		70		3285	5.5E-09		2.5E-05		2.2E-04
Di-n-butylphthalate	0.0050		11000		0.033		0.001		1		16		9		70		3285	1.1E-06		1.0E-01		1.1E-05
gamma-Benzene hexachloride	0.0000		11000		0.014		0.001		1		16		9		70		3285	2.4E-09		2.9E-04		8.3E-06
Heptachlor	0.0000		11000		0.011		0.001		1		16		9		70		3285	1.9E-09		3.6E-04		5.3E-06
Pentachlorophenol (PCP)	0.0125		11000		0.650		0.001		1		16		9		70		3285	5.6E-05		3.0E-02		1.9E-03
Thallium	0.0016		11000		0.001		0.001		1		16		9		70		3285	1.1E-08		1.0E-05		1.1E-03
																						3.9E-03

Table D-5. Noncancer Hazards Calculations for Surface Water Contact Scenarios

CT Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Adult Boater

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		11000		0.0330		0.001		4.3		26.3		9		70		3285	8.0E-06		2.5E-03		3.2E-03
Aldrin	0.0000		11000		0.002		0.001		4.3		26.3		9		70		3285	1.9E-09		1.5E-05		1.3E-04
Arsenic	0.0038		11000		0.001		0.001		4.3		26.3		9		70		3285	1.9E-07		1.2E-04		1.5E-03
Atrazine	0.0050		11000		0.008		0.001		4.3		26.3		9		70		3285	1.9E-06		1.8E-02		1.1E-04
Dieldrin	0.0001		11000		0.016		0.001		4.3		26.3		9		70		3285	3.9E-08		2.5E-05		1.6E-03
Di-n-butylphthalate	0.0050		11000		0.033		0.001		4.3		26.3		9		70		3285	8.0E-06		1.0E-01		8.0E-05
gamma-Benzene hexachloride	0.0000		11000		0.014		0.001		4.3		26.3		9		70		3285	1.7E-08		2.9E-04		5.9E-05
Heptachlor	0.0000		11000		0.011		0.001		4.3		26.3		9		70		3285	1.3E-08		3.6E-04		3.7E-05
Pentachlorophenol (PCP)	0.0125		11000		0.650		0.001		4.3		26.3		9		70		3285	4.0E-04		3.0E-02		1.3E-02
Thallium	0.0016		11000		0.001		0.001		4.3		26.3		9		70		3285	7.8E-08		1.0E-05		7.8E-03
																						2.8E-02

CT Scenario: Noncancer Hazard for Incidental Ingestion of Surface Water for Child Recreator

Chemical	C (mg/L)	x	IR (L/hr)	x	ET (hr/event)	x	EF (events/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		0.05		1		30		9		30		3285	6.8E-07		5.0E-03		1.4E-04
Aldrin	0.0000		0.05		1		30		9		30		3285	3.4E-09		3.0E-05		1.1E-04
Arsenic	0.0038		0.05		1		30		9		30		3285	5.2E-07		3.0E-04		1.7E-03
Atrazine	0.0050		0.05		1		30		9		30		3285	6.8E-07		3.5E-02		2.0E-05
Dieldrin	0.0001		0.05		1		30		9		30		3285	6.8E-09		5.0E-05		1.4E-04
Di-n-butylphthalate	0.0050		0.05		1		30		9		30		3285	6.8E-07		1.0E-01		6.8E-06
gamma-Benzene hexachloride	0.0000		0.05		1		30		9		30		3285	3.4E-09		3.0E-04		1.1E-05
Heptachlor	0.0000		0.05		1		30		9		30		3285	3.4E-09		5.0E-04		6.8E-06
Pentachlorophenol (PCP)	0.0125		0.05		1		30		9		30		3285	1.7E-06		3.0E-02		5.7E-05
Thallium	0.0016		0.05		1		30		9		30		3285	2.2E-07		6.7E-05		3.3E-03
																		5.5E-03

CT Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Child Recreator

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		5500		0.0330		0.001		1		30		9		30		3285	2.5E-06		2.5E-03		9.9E-04
Aldrin	0.0000		5500		0.002		0.001		1		30		9		30		3285	6.0E-10		1.5E-05		4.0E-05
Arsenic	0.0038		5500		0.001		0.001		1		30		9		30		3285	5.7E-08		1.2E-04		4.7E-04
Atrazine	0.0050		5500		0.008		0.001		1		30		9		30		3285	5.7E-07		1.8E-02		3.3E-05
Dieldrin	0.0001		5500		0.016		0.001		1		30		9		30		3285	1.2E-08		2.5E-05		4.8E-04
Di-n-butylphthalate	0.0050		5500		0.033		0.001		1		30		9		30		3285	2.5E-06		1.0E-01		2.5E-05
gamma-Benzene hexachloride	0.0000		5500		0.014		0.001		1		30		9		30		3285	5.3E-09		2.9E-04		1.8E-05
Heptachlor	0.0000		5500		0.011		0.001		1		30		9		30		3285	4.1E-09		3.6E-04		1.2E-05
Pentachlorophenol (PCP)	0.0125		5500		0.650		0.001		1		30		9		30		3285	1.2E-04		3.0E-02		4.1E-03
Thallium	0.0016		5500		0.001		0.001		1		30		9		30		3285	2.4E-08		1.0E-05		2.4E-03
																						8.5E-03

CT Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Child Boater

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		5500		0.0330		0.001		4.3		26.3		9		30		3285	9.4E-06		2.5E-03		3.7E-03
Aldrin	0.0000		5500		0.002		0.001		4.3		26.3		9		30		3285	2.3E-09		1.5E-05		1.5E-04
Arsenic	0.0038		5500		0.001		0.001		4.3		26.3		9		30		3285	2.2E-07		1.2E-04		1.8E-03
Atrazine	0.0050		5500		0.008		0.001		4.3		26.3		9		30		3285	2.2E-06		1.8E-02		1.2E-04
Dieldrin	0.0001		5500		0.016		0.001		4.3		26.3		9		30		3285	4.5E-08		2.5E-05		1.8E-03
Di-n-butylphthalate	0.0050		5500		0.033		0.001		4.3		26.3		9		30		3285	9.4E-06		1.0E-01		9.4E-05
gamma-Benzene hexachloride	0.0000		5500		0.014		0.001		4.3		26.3		9		30		3285	2.0E-08		2.9E-04		6.8E-05
Heptachlor	0.0000		5500		0.011		0.001		4.3		26.3		9		30		3285	1.6E-08		3.6E-04		4.3E-05
Pentachlorophenol (PCP)	0.0125		5500		0.650		0.001		4.3		26.3		9		30		3285	4.6E-04		3.0E-02		1.5E-02
Thallium	0.0016		5500		0.001		0.001		4.3		26.3		9		30		3285	9.1E-08		1.0E-05		9.0E-03
																						3.2E-02

Table D-5. Noncancer Hazards Calculations for Surface Water Contact Scenarios

Segment 3 (RM 4.9 to <6.5)

RME Scenario: Noncancer Hazard for Incidental Ingestion of Surface Water for Adult Recreator

Chemical	C (mg/L)		IR (L/hr)		ET (hr/event)		EF (events/yr)		ED (yr)		BW (kg)		AT (d) ADD		ADD (mg/kg-d)		Oral RfD (mg/kg-d)		Non-Cancer Hazard
2-Chlorophenol	0.0050	x	0.05	x	3	x	24	x	17	/	70	x	6205		7.0E-07	/	5.0E-03	=	1.4E-04
Aldrin	0.0000	x	0.05	x	3	x	24	x	17	/	70	x	6205		3.5E-09	/	3.0E-05	=	1.2E-04
Arsenic	0.0012	x	0.05	x	3	x	24	x	17	/	70	x	6205		1.6E-07	/	3.0E-04	=	5.4E-04
Atrazine	0.0050	x	0.05	x	3	x	24	x	17	/	70	x	6205		7.0E-07	/	3.5E-02	=	2.0E-05
Dieldrin	0.0001	x	0.05	x	3	x	24	x	17	/	70	x	6205		7.0E-09	/	5.0E-05	=	1.4E-04
Di-n-butylphthalate	0.0050	x	0.05	x	3	x	24	x	17	/	70	x	6205		7.0E-07	/	1.0E-01	=	7.0E-06
gamma-Benzene hexachloride	0.0000	x	0.05	x	3	x	24	x	17	/	70	x	6205		3.5E-09	/	3.0E-04	=	1.2E-05
Heptachlor	0.0000	x	0.05	x	3	x	24	x	17	/	70	x	6205		3.5E-09	/	5.0E-04	=	7.0E-06
Pentachlorophenol (PCP)	0.0125	x	0.05	x	3	x	24	x	17	/	70	x	6205		1.8E-06	/	3.0E-02	=	5.9E-05
Thallium	0.0016	x	0.05	x	3	x	24	x	17	/	70	x	6205		2.3E-07	/	6.7E-05	=	3.4E-03
																			4.4E-03

RME Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Adult Recreator

Chemical	C (mg/L)		SA (cm^2)		Kp (cm/hr)		CF (L/cm^3)		ET (hr/event)		EF (event/yr)		ED (yr)		BW (kg)		AT (d) ADD		ADD (mg/kg-d)		Dermal RfD (mg/kg-d)		Non-Cancer Hazard
2-Chlorophenol	0.0050	x	4500	x	0.0330	x	0.001	x	3	x	24	x	17	/	70	x	6205		2.1E-06	/	2.5E-03	=	8.4E-04
Aldrin	0.0000	x	4500	x	0.002	x	0.001	x	3	x	24	x	17	/	70	x	6205		5.1E-10	/	1.5E-05	=	3.4E-05
Arsenic	0.0012	x	4500	x	0.001	x	0.001	x	3	x	24	x	17	/	70	x	6205		1.5E-08	/	1.2E-04	=	1.2E-04
Atrazine	0.0050	x	4500	x	0.008	x	0.001	x	3	x	24	x	17	/	70	x	6205		4.8E-07	/	1.8E-02	=	2.8E-05
Dieldrin	0.0001	x	4500	x	0.016	x	0.001	x	3	x	24	x	17	/	70	x	6205		1.0E-08	/	2.5E-05	=	4.1E-04
Di-n-butylphthalate	0.0050	x	4500	x	0.033	x	0.001	x	3	x	24	x	17	/	70	x	6205		2.1E-06	/	1.0E-01	=	2.1E-05
gamma-Benzene hexachloride	0.0000	x	4500	x	0.014	x	0.001	x	3	x	24	x	17	/	70	x	6205		4.4E-09	/	2.9E-04	=	1.5E-05
Heptachlor	0.0000	x	4500	x	0.011	x	0.001	x	3	x	24	x	17	/	70	x	6205		3.5E-09	/	3.6E-04	=	9.7E-06
Pentachlorophenol (PCP)	0.0125	x	4500	x	0.650	x	0.001	x	3	x	24	x	17	/	70	x	6205		1.0E-04	/	3.0E-02	=	3.4E-03
Thallium	0.0016	x	4500	x	0.001	x	0.001	x	3	x	24	x	17	/	70	x	6205		2.0E-08	/	1.0E-05	=	2.0E-03
																							6.9E-03

RME Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Adult Boater

Chemical	C (mg/L)		SA (cm^2)		Kp (cm/hr)		CF (L/cm^3)		ET (hr/event)		EF (event/yr)		ED (yr)		BW (kg)		AT (d) ADD		ADD (mg/kg-d)		Dermal RfD (mg/kg-d)		Non-Cancer Hazard
2-Chlorophenol	0.0050	x	4500	x	0.0330	x	0.001	x	6	x	60	x	17	/	70	x	6205		1.0E-05	/	2.5E-03	=	4.2E-03
Aldrin	0.0000	x	4500	x	0.002	x	0.001	x	6	x	60	x	17	/	70	x	6205		2.5E-09	/	1.5E-05	=	1.7E-04
Arsenic	0.0012	x	4500	x	0.001	x	0.001	x	6	x	60	x	17	/	70	x	6205		7.3E-08	/	1.2E-04	=	5.9E-04
Atrazine	0.0050	x	4500	x	0.008	x	0.001	x	6	x	60	x	17	/	70	x	6205		2.4E-06	/	1.8E-02	=	1.4E-04
Dieldrin	0.0001	x	4500	x	0.016	x	0.001	x	6	x	60	x	17	/	70	x	6205		5.1E-08	/	2.5E-05	=	2.0E-03
Di-n-butylphthalate	0.0050	x	4500	x	0.033	x	0.001	x	6	x	60	x	17	/	70	x	6205		1.0E-05	/	1.0E-01	=	1.0E-04
gamma-Benzene hexachloride	0.0000	x	4500	x	0.014	x	0.001	x	6	x	60	x	17	/	70	x	6205		2.2E-08	/	2.9E-04	=	7.6E-05
Heptachlor	0.0000	x	4500	x	0.011	x	0.001	x	6	x	60	x	17	/	70	x	6205		1.7E-08	/	3.6E-04	=	4.8E-05
Pentachlorophenol (PCP)	0.0125	x	4500	x	0.650	x	0.001	x	6	x	60	x	17	/	70	x	6205		5.2E-04	/	3.0E-02	=	1.7E-02
Thallium	0.0016	x	4500	x	0.001	x	0.001	x	6	x	60	x	17	/	70	x	6205		1.0E-07	/	1.0E-05	=	1.0E-02
																							3.5E-02

RME Scenario: Noncancer Hazard for Incidental Ingestion of Surface Water for Child Recreator

Chemical	C (mg/L)		IR (L/hr)		ET (hr/event)		EF (events/yr)		ED (yr)		BW (kg)		AT (d) ADD		ADD (mg/kg-d)		Oral RfD (mg/kg-d)		Non-Cancer Hazard
2-Chlorophenol	0.0050	x	0.05	x	3	x	48	x	13	/	30	x	4745		3.3E-06	/	5.0E-03	=	6.6E-04
Aldrin	0.0000	x	0.05	x	3	x	48	x	13	/	30	x	4745		1.6E-08	/	3.0E-05	=	5.5E-04
Arsenic	0.0012	x	0.05	x	3	x	48	x	13	/	30	x	4745		7.6E-07	/	3.0E-04	=	2.5E-03
Atrazine	0.0050	x	0.05	x	3	x	48	x	13	/	30	x	4745		3.3E-06	/	3.5E-02	=	9.4E-05
Dieldrin	0.0001	x	0.05	x	3	x	48	x	13	/	30	x	4745		3.3E-08	/	5.0E-05	=	6.6E-04
Di-n-butylphthalate	0.0050	x	0.05	x	3	x	48	x	13	/	30	x	4745		3.3E-06	/	1.0E-01	=	3.3E-05
gamma-Benzene hexachloride	0.0000	x	0.05	x	3	x	48	x	13	/	30	x	4745		1.6E-08	/	3.0E-04	=	5.5E-05
Heptachlor	0.0000	x	0.05	x	3	x	48	x	13	/	30	x	4745		1.6E-08	/	5.0E-04	=	3.3E-05
Pentachlorophenol (PCP)	0.0125	x	0.05	x	3	x	48	x	13	/	30	x	4745		8.2E-06	/	3.0E-02	=	2.7E-04
Thallium	0.0016	x	0.05	x	3	x	48	x	13	/	30	x	4745		1.1E-06	/	6.7E-05	=	1.6E-02
																			2.1E-02

Table D-5. Noncancer Hazards Calculations for Surface Water Contact Scenarios

RME Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Child Recreator

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		6800		0.0330		0.001		3		48		13		30		4745	1.5E-05		2.5E-03		5.9E-03
Aldrin	0.0000		6800		0.002		0.001		3		48		13		30		4745	3.6E-09		1.5E-05		2.4E-04
Arsenic	0.0012		6800		0.001		0.001		3		48		13		30		4745	1.0E-07		1.2E-04		8.4E-04
Atrazine	0.0050		6800		0.008		0.001		3		48		13		30		4745	3.4E-06		1.8E-02		1.9E-04
Dieldrin	0.0001		6800		0.016		0.001		3		48		13		30		4745	7.2E-08		2.5E-05		2.9E-03
Di-n-butylphthalate	0.0050		6800		0.033		0.001		3		48		13		30		4745	1.5E-05		1.0E-01		1.5E-04
gamma-Benzene hexachloride	0.0000		6800		0.014		0.001		3		48		13		30		4745	3.1E-08		2.9E-04		1.1E-04
Heptachlor	0.0000		6800		0.011		0.001		3		48		13		30		4745	2.5E-08		3.6E-04		6.8E-05
Pentachlorophenol (PCP)	0.0125		6800		0.650		0.001		3		48		13		30		4745	7.3E-04		3.0E-02		2.4E-02
Thallium	0.0016		6800		0.001		0.001		3		48		13		30		4745	1.4E-07		1.0E-05		1.4E-02
																						4.9E-02

RME Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Child Boater

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		6800		0.0330		0.001		6		30		13		30		4745	1.8E-05		2.5E-03		7.4E-03
Aldrin	0.0000		6800		0.002		0.001		6		30		13		30		4745	4.5E-09		1.5E-05		3.0E-04
Arsenic	0.0012		6800		0.001		0.001		6		30		13		30		4745	1.3E-07		1.2E-04		1.0E-03
Atrazine	0.0050		6800		0.008		0.001		6		30		13		30		4745	4.2E-06		1.8E-02		2.4E-04
Dieldrin	0.0001		6800		0.016		0.001		6		30		13		30		4745	8.9E-08		2.5E-05		3.6E-03
Di-n-butylphthalate	0.0050		6800		0.033		0.001		6		30		13		30		4745	1.8E-05		1.0E-01		1.8E-04
gamma-Benzene hexachloride	0.0000		6800		0.014		0.001		6		30		13		30		4745	3.9E-08		2.9E-04		1.3E-04
Heptachlor	0.0000		6800		0.011		0.001		6		30		13		30		4745	3.1E-08		3.6E-04		8.5E-05
Pentachlorophenol (PCP)	0.0125		6800		0.650		0.001		6		30		13		30		4745	9.1E-04		3.0E-02		3.0E-02
Thallium	0.0016		6800		0.001		0.001		6		30		13		30		4745	1.8E-07		1.0E-05		1.8E-02
																						6.1E-02

CT Scenario: Noncancer Hazard for Incidental Ingestion of Surface Water for Adult Recreator

Chemical	C (mg/L)	x	IR (L/hr)	x	ET (hr/event)	x	EF (events/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		0.05		1		16		9		70		3285	1.6E-07		5.0E-03		3.1E-05
Aldrin	0.0000		0.05		1		16		9		70		3285	7.8E-10		3.0E-05		2.6E-05
Arsenic	0.0012		0.05		1		16		9		70		3285	3.6E-08		3.0E-04		1.2E-04
Atrazine	0.0050		0.05		1		16		9		70		3285	1.6E-07		3.5E-02		4.5E-06
Dieldrin	0.0001		0.05		1		16		9		70		3285	1.6E-09		5.0E-05		3.1E-05
Di-n-butylphthalate	0.0050		0.05		1		16		9		70		3285	1.6E-07		1.0E-01		1.6E-06
gamma-Benzene hexachloride	0.0000		0.05		1		16		9		70		3285	7.8E-10		3.0E-04		2.6E-06
Heptachlor	0.0000		0.05		1		16		9		70		3285	7.8E-10		5.0E-04		1.6E-06
Pentachlorophenol (PCP)	0.0125		0.05		1		16		9		70		3285	3.9E-07		3.0E-02		1.3E-05
Thallium	0.0016		0.05		1		16		9		70		3285	5.0E-08		6.7E-05		7.5E-04
																		9.8E-04

CT Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Adult Recreator

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		11000		0.0330		0.001		1		16		9		70		3285	1.1E-06		2.5E-03		4.5E-04
Aldrin	0.0000		11000		0.002		0.001		1		16		9		70		3285	2.8E-10		1.5E-05		1.8E-05
Arsenic	0.0012		11000		0.001		0.001		1		16		9		70		3285	7.9E-09		1.2E-04		6.4E-05
Atrazine	0.0050		11000		0.008		0.001		1		16		9		70		3285	2.6E-07		1.8E-02		1.5E-05
Dieldrin	0.0001		11000		0.016		0.001		1		16		9		70		3285	5.5E-09		2.5E-05		2.2E-04
Di-n-butylphthalate	0.0050		11000		0.033		0.001		1		16		9		70		3285	1.1E-06		1.0E-01		1.1E-05
gamma-Benzene hexachloride	0.0000		11000		0.014		0.001		1		16		9		70		3285	2.4E-09		2.9E-04		8.3E-06
Heptachlor	0.0000		11000		0.011		0.001		1		16		9		70		3285	1.9E-09		3.6E-04		5.3E-06
Pentachlorophenol (PCP)	0.0125		11000		0.650		0.001		1		16		9		70		3285	5.6E-05		3.0E-02		1.9E-03
Thallium	0.0016		11000		0.001		0.001		1		16		9		70		3285	1.1E-08		1.0E-05		1.1E-03
																						3.8E-03

Table D-5. Noncancer Hazards Calculations for Surface Water Contact Scenarios

CT Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Adult Boater

Chemical	C (mg/L)		SA (cm^2)		Kp (cm/hr)		CF (L/cm^3)		ET (hr/event)		EF (event/yr)		ED (yr)	/	BW (kg)		AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050	x	11000	x	0.0330	x	0.001	x	4.3	x	26.3	x	9	/	70	x	3285	8.0E-06	/	2.5E-03	=	3.2E-03
Aldrin	0.0000	x	11000	x	0.002	x	0.001	x	4.3	x	26.3	x	9	/	70	x	3285	1.9E-09	/	1.5E-05	=	1.3E-04
Arsenic	0.0012	x	11000	x	0.001	x	0.001	x	4.3	x	26.3	x	9	/	70	x	3285	5.6E-08	/	1.2E-04	=	4.6E-04
Atrazine	0.0050	x	11000	x	0.008	x	0.001	x	4.3	x	26.3	x	9	/	70	x	3285	1.9E-06	/	1.8E-02	=	1.1E-04
Dieldrin	0.0001	x	11000	x	0.016	x	0.001	x	4.3	x	26.3	x	9	/	70	x	3285	3.9E-08	/	2.5E-05	=	1.6E-03
Di-n-butylphthalate	0.0050	x	11000	x	0.033	x	0.001	x	4.3	x	26.3	x	9	/	70	x	3285	8.0E-06	/	1.0E-01	=	8.0E-05
gamma-Benzene hexachloride	0.0000	x	11000	x	0.014	x	0.001	x	4.3	x	26.3	x	9	/	70	x	3285	1.7E-08	/	2.9E-04	=	5.9E-05
Heptachlor	0.0000	x	11000	x	0.011	x	0.001	x	4.3	x	26.3	x	9	/	70	x	3285	1.3E-08	/	3.6E-04	=	3.7E-05
Pentachlorophenol (PCP)	0.0125	x	11000	x	0.650	x	0.001	x	4.3	x	26.3	x	9	/	70	x	3285	4.0E-04	/	3.0E-02	=	1.3E-02
Thallium	0.0016	x	11000	x	0.001	x	0.001	x	4.3	x	26.3	x	9	/	70	x	3285	7.8E-08	/	1.0E-05	=	7.8E-03
																						2.7E-02

CT Scenario: Noncancer Hazard for Incidental Ingestion of Surface Water for Child Recreator

Chemical	C (mg/L)		IR (L/hr)		ET (hr/event)		EF (events/yr)		ED (yr)	/	BW (kg)		AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050	x	0.05	x	1	x	30	x	9	/	30	x	3285	6.8E-07	/	5.0E-03	=	1.4E-04
Aldrin	0.0000	x	0.05	x	1	x	30	x	9	/	30	x	3285	3.4E-09	/	3.0E-05	=	1.1E-04
Arsenic	0.0012	x	0.05	x	1	x	30	x	9	/	30	x	3285	1.6E-07	/	3.0E-04	=	5.3E-04
Atrazine	0.0050	x	0.05	x	1	x	30	x	9	/	30	x	3285	6.8E-07	/	3.5E-02	=	2.0E-05
Dieldrin	0.0001	x	0.05	x	1	x	30	x	9	/	30	x	3285	6.8E-09	/	5.0E-05	=	1.4E-04
Di-n-butylphthalate	0.0050	x	0.05	x	1	x	30	x	9	/	30	x	3285	6.8E-07	/	1.0E-01	=	6.8E-06
gamma-Benzene hexachloride	0.0000	x	0.05	x	1	x	30	x	9	/	30	x	3285	3.4E-09	/	3.0E-04	=	1.1E-05
Heptachlor	0.0000	x	0.05	x	1	x	30	x	9	/	30	x	3285	3.4E-09	/	5.0E-04	=	6.8E-06
Pentachlorophenol (PCP)	0.0125	x	0.05	x	1	x	30	x	9	/	30	x	3285	1.7E-06	/	3.0E-02	=	5.7E-05
Thallium	0.0016	x	0.05	x	1	x	30	x	9	/	30	x	3285	2.2E-07	/	6.7E-05	=	3.3E-03
																		4.3E-03

CT Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Child Recreator

Chemical	C (mg/L)		SA (cm^2)		Kp (cm/hr)		CF (L/cm^3)		ET (hr/event)		EF (event/yr)		ED (yr)	/	BW (kg)		AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050	x	5500	x	0.0330	x	0.001	x	1	x	30	x	9	/	30	x	3285	2.5E-06	/	2.5E-03	=	9.9E-04
Aldrin	0.0000	x	5500	x	0.002	x	0.001	x	1	x	30	x	9	/	30	x	3285	6.0E-10	/	1.5E-05	=	4.0E-05
Arsenic	0.0012	x	5500	x	0.001	x	0.001	x	1	x	30	x	9	/	30	x	3285	1.7E-08	/	1.2E-04	=	1.4E-04
Atrazine	0.0050	x	5500	x	0.008	x	0.001	x	1	x	30	x	9	/	30	x	3285	5.7E-07	/	1.8E-02	=	3.3E-05
Dieldrin	0.0001	x	5500	x	0.016	x	0.001	x	1	x	30	x	9	/	30	x	3285	1.2E-08	/	2.5E-05	=	4.8E-04
Di-n-butylphthalate	0.0050	x	5500	x	0.033	x	0.001	x	1	x	30	x	9	/	30	x	3285	2.5E-06	/	1.0E-01	=	2.5E-05
gamma-Benzene hexachloride	0.0000	x	5500	x	0.014	x	0.001	x	1	x	30	x	9	/	30	x	3285	5.3E-09	/	2.9E-04	=	1.8E-05
Heptachlor	0.0000	x	5500	x	0.011	x	0.001	x	1	x	30	x	9	/	30	x	3285	4.1E-09	/	3.6E-04	=	1.2E-05
Pentachlorophenol (PCP)	0.0125	x	5500	x	0.650	x	0.001	x	1	x	30	x	9	/	30	x	3285	1.2E-04	/	3.0E-02	=	4.1E-03
Thallium	0.0016	x	5500	x	0.001	x	0.001	x	1	x	30	x	9	/	30	x	3285	2.4E-08	/	1.0E-05	=	2.4E-03
																						8.2E-03

CT Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Child Boater

Chemical	C (mg/L)		SA (cm^2)		Kp (cm/hr)		CF (L/cm^3)		ET (hr/event)		EF (event/yr)		ED (yr)	/	BW (kg)		AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050	x	5500	x	0.0330	x	0.001	x	4.3	x	26.3	x	9	/	30	x	3285	9.4E-06	/	2.5E-03	=	3.7E-03
Aldrin	0.0000	x	5500	x	0.002	x	0.001	x	4.3	x	26.3	x	9	/	30	x	3285	2.3E-09	/	1.5E-05	=	1.5E-04
Arsenic	0.0012	x	5500	x	0.001	x	0.001	x	4.3	x	26.3	x	9	/	30	x	3285	6.5E-08	/	1.2E-04	=	5.3E-04
Atrazine	0.0050	x	5500	x	0.008	x	0.001	x	4.3	x	26.3	x	9	/	30	x	3285	2.2E-06	/	1.8E-02	=	1.2E-04
Dieldrin	0.0001	x	5500	x	0.016	x	0.001	x	4.3	x	26.3	x	9	/	30	x	3285	4.5E-08	/	2.5E-05	=	1.8E-03
Di-n-butylphthalate	0.0050	x	5500	x	0.033	x	0.001	x	4.3	x	26.3	x	9	/	30	x	3285	9.4E-06	/	1.0E-01	=	9.4E-05
gamma-Benzene hexachloride	0.0000	x	5500	x	0.014	x	0.001	x	4.3	x	26.3	x	9	/	30	x	3285	2.0E-08	/	2.9E-04	=	6.8E-05
Heptachlor	0.0000	x	5500	x	0.011	x	0.001	x	4.3	x	26.3	x	9	/	30	x	3285	1.6E-08	/	3.6E-04	=	4.3E-05
Pentachlorophenol (PCP)	0.0125	x	5500	x	0.650	x	0.001	x	4.3	x	26.3	x	9	/	30	x	3285	4.6E-04	/	3.0E-02	=	1.5E-02
Thallium	0.0016	x	5500	x	0.001	x	0.001	x	4.3	x	26.3	x	9	/	30	x	3285	9.1E-08	/	1.0E-05	=	9.0E-03
																						3.1E-02

Table D-5. Noncancer Hazards Calculations for Surface Water Contact Scenarios

Segment 4 (RM 6.5 to 8.8)

RME Scenario: Noncancer Hazard for Incidental Ingestion of Surface Water for Adult Recreator

Chemical	C (mg/L)	x	IR (L/hr)	x	ET (hr/event)	x	EF (events/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		0.05		3		24		17		70		6205	7.0E-07		5.0E-03		1.4E-04
Aldrin	0.0000		0.05		3		24		17		70		6205	3.5E-09		3.0E-05		1.2E-04
Arsenic	0.0012		0.05		3		24		17		70		6205	1.6E-07		3.0E-04		5.4E-04
Atrazine	0.0050		0.05		3		24		17		70		6205	7.0E-07		3.5E-02		2.0E-05
Dieldrin	0.0001		0.05		3		24		17		70		6205	7.0E-09		5.0E-05		1.4E-04
Di-n-butylphthalate	0.0050		0.05		3		24		17		70		6205	7.0E-07		1.0E-01		7.0E-06
gamma-Benzene hexachloride	0.0000		0.05		3		24		17		70		6205	3.5E-09		3.0E-04		1.2E-05
Heptachlor	0.0000		0.05		3		24		17		70		6205	3.5E-09		5.0E-04		7.0E-06
Pentachlorophenol (PCP)	0.0125		0.05		3		24		17		70		6205	1.8E-06		3.0E-02		5.9E-05
Thallium	0.0016		0.05		3		24		17		70		6205	2.3E-07		6.7E-05		3.4E-03
																		4.4E-03

RME Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Adult Recreator

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		4500		0.0330		0.001		3		24		17		70		6205	2.1E-06		2.5E-03		8.4E-04
Aldrin	0.0000		4500		0.0016		0.001		3		24		17		70		6205	5.1E-10		1.5E-05		3.4E-05
Arsenic	0.0012		4500		0.0010		0.001		3		24		17		70		6205	1.5E-08		1.2E-04		1.2E-04
Atrazine	0.0050		4500		0.008		0.001		3		24		17		70		6205	4.8E-07		1.8E-02		2.8E-05
Dieldrin	0.0001		4500		0.016		0.001		3		24		17		70		6205	1.0E-08		2.5E-05		4.1E-04
Di-n-butylphthalate	0.0050		4500		0.033		0.001		3		24		17		70		6205	2.1E-06		1.0E-01		2.1E-05
gamma-Benzene hexachloride	0.0000		4500		0.014		0.001		3		24		17		70		6205	4.4E-09		2.9E-04		1.5E-05
Heptachlor	0.0000		4500		0.011		0.001		3		24		17		70		6205	3.5E-09		3.6E-04		9.7E-06
Pentachlorophenol (PCP)	0.0125		4500		0.650		0.001		3		24		17		70		6205	1.0E-04		3.0E-02		3.4E-03
Thallium	0.0016		4500		0.001		0.001		3		24		17		70		6205	2.0E-08		1.0E-05		2.0E-03
																						6.9E-03

RME Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Adult Boater

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		4500		0.0330		0.001		6		60		17		70		6205	1.0E-05		2.5E-03		4.2E-03
Aldrin	0.0000		4500		0.0016		0.001		6		60		17		70		6205	2.5E-09		1.5E-05		1.7E-04
Arsenic	0.0012		4500		0.0010		0.001		6		60		17		70		6205	7.3E-08		1.2E-04		5.9E-04
Atrazine	0.0050		4500		0.008		0.001		6		60		17		70		6205	2.4E-06		1.8E-02		1.4E-04
Dieldrin	0.0001		4500		0.016		0.001		6		60		17		70		6205	5.1E-08		2.5E-05		2.0E-03
Di-n-butylphthalate	0.0050		4500		0.033		0.001		6		60		17		70		6205	1.0E-05		1.0E-01		1.0E-04
gamma-Benzene hexachloride	0.0000		4500		0.014		0.001		6		60		17		70		6205	2.2E-08		2.9E-04		7.6E-05
Heptachlor	0.0000		4500		0.011		0.001		6		60		17		70		6205	1.7E-08		3.6E-04		4.8E-05
Pentachlorophenol (PCP)	0.0125		4500		0.650		0.001		6		60		17		70		6205	5.2E-04		3.0E-02		1.7E-02
Thallium	0.0016		4500		0.001		0.001		6		60		17		70		6205	1.0E-07		1.0E-05		1.0E-02
																						3.5E-02

RME Scenario: Noncancer Hazard for Incidental Ingestion of Surface Water for Child Recreator

Chemical	C (mg/L)	x	IR (L/hr)	x	ET (hr/event)	x	EF (events/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		0.05		3		48		13		30		4745	3.3E-06		5.0E-03		6.6E-04
Aldrin	0.0000		0.05		3		48		13		30		4745	1.6E-08		3.0E-05		5.5E-04
Arsenic	0.0012		0.05		3		48		13		30		4745	7.6E-07		3.0E-04		2.5E-03
Atrazine	0.0050		0.05		3		48		13		30		4745	3.3E-06		3.5E-02		9.4E-05
Dieldrin	0.0001		0.05		3		48		13		30		4745	3.3E-08		5.0E-05		6.6E-04
Di-n-butylphthalate	0.0050		0.05		3		48		13		30		4745	3.3E-06		1.0E-01		3.3E-05
gamma-Benzene hexachloride	0.0000		0.05		3		48		13		30		4745	1.6E-08		3.0E-04		5.5E-05
Heptachlor	0.0000		0.05		3		48		13		30		4745	1.6E-08		5.0E-04		3.3E-05
Pentachlorophenol (PCP)	0.0125		0.05		3		48		13		30		4745	8.2E-06		3.0E-02		2.7E-04
Thallium	0.0016		0.05		3		48		13		30		4745	1.1E-06		6.7E-05		1.6E-02
																		2.1E-02

Table D-5. Noncancer Hazards Calculations for Surface Water Contact Scenarios

RME Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Child Recreator

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		6800		0.033		0.001		3		48		13		30		4745	1.5E-05		2.5E-03		5.9E-03
Aldrin	0.0000		6800		0.0016		0.001		3		48		13		30		4745	3.6E-09		1.5E-05		2.4E-04
Arsenic	0.0012		6800		0.0010		0.001		3		48		13		30		4745	1.0E-07		1.2E-04		8.4E-04
Atrazine	0.0050		6800		0.008		0.001		3		48		13		30		4745	3.4E-06		1.8E-02		1.9E-04
Dieldrin	0.0001		6800		0.016		0.001		3		48		13		30		4745	7.2E-08		2.5E-05		2.9E-03
Di-n-butylphthalate	0.0050		6800		0.033		0.001		3		48		13		30		4745	1.5E-05		1.0E-01		1.5E-04
gamma-Benzene hexachloride	0.0000		6800		0.014		0.001		3		48		13		30		4745	3.1E-08		2.9E-04		1.1E-04
Heptachlor	0.0000		6800		0.011		0.001		3		48		13		30		4745	2.5E-08		3.6E-04		6.8E-05
Pentachlorophenol (PCP)	0.0125		6800		0.650		0.001		3		48		13		30		4745	7.3E-04		3.0E-02		2.4E-02
Thallium	0.0016		6800		0.001		0.001		3		48		13		30		4745	1.4E-07		1.0E-05		1.4E-02
																						4.9E-02

RME Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Child Boater

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		6800		0.033		0.001		6		30		13		30		4745	1.8E-05		2.5E-03		7.4E-03
Aldrin	0.0000		6800		0.0016		0.001		6		30		13		30		4745	4.5E-09		1.5E-05		3.0E-04
Arsenic	0.0012		6800		0.0010		0.001		6		30		13		30		4745	1.3E-07		1.2E-04		1.0E-03
Atrazine	0.0050		6800		0.008		0.001		6		30		13		30		4745	4.2E-06		1.8E-02		2.4E-04
Dieldrin	0.0001		6800		0.016		0.001		6		30		13		30		4745	8.9E-08		2.5E-05		3.6E-03
Di-n-butylphthalate	0.0050		6800		0.033		0.001		6		30		13		30		4745	1.8E-05		1.0E-01		1.8E-04
gamma-Benzene hexachloride	0.0000		6800		0.014		0.001		6		30		13		30		4745	3.9E-08		2.9E-04		1.3E-04
Heptachlor	0.0000		6800		0.011		0.001		6		30		13		30		4745	3.1E-08		3.6E-04		8.5E-05
Pentachlorophenol (PCP)	0.0125		6800		0.650		0.001		6		30		13		30		4745	9.1E-04		3.0E-02		3.0E-02
Thallium	0.0016		6800		0.001		0.001		6		30		13		30		4745	1.8E-07		1.0E-05		1.8E-02
																						6.1E-02

CT Scenario: Noncancer Hazard for Incidental Ingestion of Surface Water for Adult Recreator

Chemical	C (mg/L)	x	IR (L/hr)	x	ET (hr/event)	x	EF (events/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		0.05		1		16		9		70		3285	1.6E-07		5.0E-03		3.1E-05
Aldrin	0.0000		0.05		1		16		9		70		3285	7.8E-10		3.0E-05		2.6E-05
Arsenic	0.0012		0.05		1		16		9		70		3285	3.6E-08		3.0E-04		1.2E-04
Atrazine	0.0050		0.05		1		16		9		70		3285	1.6E-07		3.5E-02		4.5E-06
Dieldrin	0.0001		0.05		1		16		9		70		3285	1.6E-09		5.0E-05		3.1E-05
Di-n-butylphthalate	0.0050		0.05		1		16		9		70		3285	1.6E-07		1.0E-01		1.6E-06
gamma-Benzene hexachloride	0.0000		0.05		1		16		9		70		3285	7.8E-10		3.0E-04		2.6E-06
Heptachlor	0.0000		0.05		1		16		9		70		3285	7.8E-10		5.0E-04		1.6E-06
Pentachlorophenol (PCP)	0.0125		0.05		1		16		9		70		3285	3.9E-07		3.0E-02		1.3E-05
Thallium	0.0016		0.05		1		16		9		70		3285	5.0E-08		6.7E-05		7.5E-04
																		9.8E-04

CT Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Adult Recreator

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		11000		0.033		0.001		1		16		9		70		3285	1.1E-06		2.5E-03		4.5E-04
Aldrin	0.0000		11000		0.0016		0.001		1		16		9		70		3285	2.8E-10		1.5E-05		1.8E-05
Arsenic	0.0012		11000		0.0010		0.001		1		16		9		70		3285	7.9E-09		1.2E-04		6.4E-05
Atrazine	0.0050		11000		0.008		0.001		1		16		9		70		3285	2.6E-07		1.8E-02		1.5E-05
Dieldrin	0.0001		11000		0.016		0.001		1		16		9		70		3285	5.5E-09		2.5E-05		2.2E-04
Di-n-butylphthalate	0.0050		11000		0.033		0.001		1		16		9		70		3285	1.1E-06		1.0E-01		1.1E-05
gamma-Benzene hexachloride	0.0000		11000		0.014		0.001		1		16		9		70		3285	2.4E-09		2.9E-04		8.3E-06
Heptachlor	0.0000		11000		0.011		0.001		1		16		9		70		3285	1.9E-09		3.6E-04		5.3E-06
Pentachlorophenol (PCP)	0.0125		11000		0.650		0.001		1		16		9		70		3285	5.6E-05		3.0E-02		1.9E-03
Thallium	0.0016		11000		0.001		0.001		1		16		9		70		3285	1.1E-08		1.0E-05		1.1E-03
																						3.8E-03

Table D-5. Noncancer Hazards Calculations for Surface Water Contact Scenarios

CT Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Adult Boater

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		11000		0.033		0.001		4.3		26.3		9		70		3285	8.0E-06		2.5E-03		3.2E-03
Aldrin	0.0000		11000		0.0016		0.001		4.3		26.3		9		70		3285	1.9E-09		1.5E-05		1.3E-04
Arsenic	0.0012		11000		0.0010		0.001		4.3		26.3		9		70		3285	5.6E-08		1.2E-04		4.6E-04
Atrazine	0.0050		11000		0.008		0.001		4.3		26.3		9		70		3285	1.9E-06		1.8E-02		1.1E-04
Dieldrin	0.0001		11000		0.016		0.001		4.3		26.3		9		70		3285	3.9E-08		2.5E-05		1.6E-03
Di-n-butylphthalate	0.0050		11000		0.033		0.001		4.3		26.3		9		70		3285	8.0E-06		1.0E-01		8.0E-05
gamma-Benzene hexachloride	0.0000		11000		0.014		0.001		4.3		26.3		9		70		3285	1.7E-08		2.9E-04		5.9E-05
Heptachlor	0.0000		11000		0.011		0.001		4.3		26.3		9		70		3285	1.3E-08		3.6E-04		3.7E-05
Pentachlorophenol (PCP)	0.0125		11000		0.650		0.001		4.3		26.3		9		70		3285	4.0E-04		3.0E-02		1.3E-02
Thallium	0.0016		11000		0.001		0.001		4.3		26.3		9		70		3285	7.8E-08		1.0E-05		7.8E-03
																						2.7E-02

CT Scenario: Noncancer Hazard for Incidental Ingestion of Surface Water for Child Recreator

Chemical	C (mg/L)	x	IR (L/hr)	x	ET (hr/event)	x	EF (events/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		0.05		1		30		9		30		3285	6.8E-07		5.0E-03		1.4E-04
Aldrin	0.0000		0.05		1		30		9		30		3285	3.4E-09		3.0E-05		1.1E-04
Arsenic	0.0012		0.05		1		30		9		30		3285	1.6E-07		3.0E-04		5.3E-04
Atrazine	0.0050		0.05		1		30		9		30		3285	6.8E-07		3.5E-02		2.0E-05
Dieldrin	0.0001		0.05		1		30		9		30		3285	6.8E-09		5.0E-05		1.4E-04
Di-n-butylphthalate	0.0050		0.05		1		30		9		30		3285	6.8E-07		1.0E-01		6.8E-06
gamma-Benzene hexachloride (g-E	0.0000		0.05		1		30		9		30		3285	3.4E-09		3.0E-04		1.1E-05
Heptachlor	0.0000		0.05		1		30		9		30		3285	3.4E-09		5.0E-04		6.8E-06
Pentachlorophenol (PCP)	0.0125		0.05		1		30		9		30		3285	1.7E-06		3.0E-02		5.7E-05
Thallium	0.0016		0.05		1		30		9		30		3285	2.2E-07		6.7E-05		3.3E-03
																		4.3E-03

CT Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Child Recreator

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		5500		0.033		0.001		1		30		9		30		3285	2.5E-06		2.5E-03		9.9E-04
Aldrin	0.0000		5500		0.0016		0.001		1		30		9		30		3285	6.0E-10		1.5E-05		4.0E-05
Arsenic	0.0012		5500		0.0010		0.001		1		30		9		30		3285	1.7E-08		1.2E-04		1.4E-04
Atrazine	0.0050		5500		0.008		0.001		1		30		9		30		3285	5.7E-07		1.8E-02		3.3E-05
Dieldrin	0.0001		5500		0.016		0.001		1		30		9		30		3285	1.2E-08		2.5E-05		4.8E-04
Di-n-butylphthalate	0.0050		5500		0.033		0.001		1		30		9		30		3285	2.5E-06		1.0E-01		2.5E-05
gamma-Benzene hexachloride	0.0000		5500		0.014		0.001		1		30		9		30		3285	5.3E-09		2.9E-04		1.8E-05
Heptachlor	0.0000		5500		0.011		0.001		1		30		9		30		3285	4.1E-09		3.6E-04		1.2E-05
Pentachlorophenol (PCP)	0.0125		5500		0.650		0.001		1		30		9		30		3285	1.2E-04		3.0E-02		4.1E-03
Thallium	0.0016		5500		0.001		0.001		1		30		9		30		3285	2.4E-08		1.0E-05		2.4E-03
																						8.2E-03

CT Scenario: Noncancer Hazard for Incidental Dermal Contact with Surface Water for Child Boater

Chemical	C (mg/L)	x	SA (cm^2)	x	Kp (cm/hr)	x	CF (L/cm^3)	x	ET (hr/event)	x	EF (event/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Dermal RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.0050		5500		0.033		0.001		4.3		26.3		9		30		3285	9.4E-06		2.5E-03		3.7E-03
Aldrin	0.0000		5500		0.0016		0.001		4.3		26.3		9		30		3285	2.3E-09		1.5E-05		1.5E-04
Arsenic	0.0012		5500		0.0010		0.001		4.3		26.3		9		30		3285	6.5E-08		1.2E-04		5.3E-04
Atrazine	0.0050		5500		0.008		0.001		4.3		26.3		9		30		3285	2.2E-06		1.8E-02		1.2E-04
Dieldrin	0.0001		5500		0.016		0.001		4.3		26.3		9		30		3285	4.5E-08		2.5E-05		1.8E-03
Di-n-butylphthalate	0.0050		5500		0.033		0.001		4.3		26.3		9		30		3285	9.4E-06		1.0E-01		9.4E-05
gamma-Benzene hexachloride	0.0000		5500		0.014		0.001		4.3		26.3		9		30		3285	2.0E-08		2.9E-04		6.8E-05
Heptachlor	0.0000		5500		0.011		0.001		4.3		26.3		9		30		3285	1.6E-08		3.6E-04		4.3E-05
Pentachlorophenol (PCP)	0.0125		5500		0.650		0.001		4.3		26.3		9		30		3285	4.6E-04		3.0E-02		1.5E-02
Thallium	0.0016		5500		0.001		0.001		4.3		26.3		9		30		3285	9.1E-08		1.0E-05		9.0E-03
																						3.1E-02

Table D-6. Cancer Risk Calculations for Fish Consumption Scenarios

Segment 1 (RM 0 to <3.2)

RME Scenario: Noncancer Hazard for Consumption of Fish for Adult Consumer

Chemical	C (mg/kg)	x	IR (g/d)	x	fi (unitless)	x	CF (kg/g)	x	EF (d/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.810		41		1		0.001		365		17		70		6205	4.7E-04		5.0E-03		9.5E-02
4,4'-DDT (p,p'-)	0.193		41		1		0.001		365		17		70		6205	1.1E-04		5.0E-04		2.3E-01
Aldrin	0.005		41		1		0.001		365		17		70		6205	2.9E-06		3.0E-05		9.6E-02
alpha-Chlordane	0.018		41		1		0.001		365		17		70		6205	1.1E-05		5.0E-04		2.1E-02
Arsenic	0.049		41		1		0.001		365		17		70		6205	2.9E-05		3.0E-04		9.6E-02
Atrazine	0.597		41		1		0.001		365		17		70		6205	3.5E-04		3.5E-02		1.0E-02
Chlordane	0.160		41		1		0.001		365		17		70		6205	9.4E-05		5.0E-04		1.9E-01
Dieldrin	0.020		41		1		0.001		365		17		70		6205	1.2E-05		5.0E-05		2.3E-01
Di-n-butylphthalate	18.987		41		1		0.001		365		17		70		6205	1.1E-02		1.0E-01		1.1E-01
gamma-Chlordane	0.130		41		1		0.001		365		17		70		6205	7.6E-05		5.0E-04		1.5E-01
Pentachlorophenol (PCP)	183.136		41		1		0.001		365		17		70		6205	1.1E-01		3.0E-02		3.6E+00
Thallium	0.246		41		1		0.001		365		17		70		6205	1.4E-04		6.7E-05		2.1E+00
Total PCBs	5.890		41		1		0.001		365		17		70		6205	3.4E-03		2.0E-05		1.7E+02
trans-Nonachlor	0.005		41		1		0.001		365		17		70		6205	2.9E-06		5.0E-04		5.8E-03
																				1.8E+02

RME Scenario: Noncancer Hazard for Consumption of Fish for Child Consumer

Chemical	C (mg/kg)	x	IR (g/d)	x	fi (unitless)	x	CF (kg/g)	x	EF (d/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.810		18		1		0.001		365		13		30		4745	4.9E-04		5.0E-03		9.7E-02
4,4'-DDT (p,p'-)	0.193		18		1		0.001		365		13		30		4745	1.2E-04		5.0E-04		2.3E-01
Aldrin	0.005		18		1		0.001		365		13		30		4745	3.0E-06		3.0E-05		9.9E-02
alpha-Chlordane	0.018		18		1		0.001		365		13		30		4745	1.1E-05		5.0E-04		2.2E-02
Arsenic	0.049		18		1		0.001		365		13		30		4745	3.0E-05		3.0E-04		9.9E-02
Atrazine	0.597		18		1		0.001		365		13		30		4745	3.6E-04		3.5E-02		1.0E-02
Chlordane	0.160		18		1		0.001		365		13		30		4745	9.6E-05		5.0E-04		1.9E-01
Dieldrin	0.020		18		1		0.001		365		13		30		4745	1.2E-05		5.0E-05		2.4E-01
Di-n-butylphthalate	18.987		18		1		0.001		365		13		30		4745	1.1E-02		1.0E-01		1.1E-01
gamma-Chlordane	0.130		18		1		0.001		365		13		30		4745	7.8E-05		5.0E-04		1.6E-01
Pentachlorophenol (PCP)	183.136		18		1		0.001		365		13		30		4745	1.1E-01		3.0E-02		3.7E+00
Thallium	0.246		18		1		0.001		365		13		30		4745	1.5E-04		6.7E-05		2.2E+00
Total PCBs	5.890		18		1		0.001		365		13		30		4745	3.5E-03		2.0E-05		1.8E+02
trans-Nonachlor	0.005		18		1		0.001		365		13		30		4745	3.0E-06		5.0E-04		5.9E-03
																				1.8E+02

Table D-6. Cancer Risk Calculations for Fish Consumption Scenarios

CT Scenario: Noncancer Hazard for Consumption of Fish for Adult Consumer

Chemical	C (mg/kg)	x	IR (g/d)	x	fi (unitless)	x	CF (kg/g)	x	EF (d/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.810		7.3		1		0.001		365		9		70		3285	8.5E-05		5.0E-03		1.7E-02
4,4'-DDT (p,p'-)	0.193		7.3		1		0.001		365		9		70		3285	2.0E-05		5.0E-04		4.0E-02
Aldrin	0.005		7.3		1		0.001		365		9		70		3285	5.1E-07		3.0E-05		1.7E-02
alpha-Chlordane	0.018		7.3		1		0.001		365		9		70		3285	1.9E-06		5.0E-04		3.8E-03
Arsenic	0.049		7.3		1		0.001		365		9		70		3285	5.2E-06		3.0E-04		1.7E-02
Atrazine	0.597		7.3		1		0.001		365		9		70		3285	6.2E-05		3.5E-02		1.8E-03
Chlordane	0.160		7.3		1		0.001		365		9		70		3285	1.7E-05		5.0E-04		3.3E-02
Dieldrin	0.020		7.3		1		0.001		365		9		70		3285	2.1E-06		5.0E-05		4.2E-02
Di-n-butylphthalate	18.987		7.3		1		0.001		365		9		70		3285	2.0E-03		1.0E-01		2.0E-02
gamma-Chlordane	0.130		7.3		1		0.001		365		9		70		3285	1.4E-05		5.0E-04		2.7E-02
Pentachlorophenol (PCP)	183.136		7.3		1		0.001		365		9		70		3285	1.9E-02		3.0E-02		6.4E-01
Thallium	0.246		7.3		1		0.001		365		9		70		3285	2.6E-05		6.7E-05		3.8E-01
Total PCBs	5.890		7.3		1		0.001		365		9		70		3285	6.1E-04		2.0E-05		3.1E+01
trans-Nonachlor	0.005		7.3		1		0.001		365		9		70		3285	5.1E-07		5.0E-04		1.0E-03
																				3.2E+01

CT Scenario: Noncancer Hazard for Consumption of Fish for Child Consumer

Chemical	C (mg/kg)	x	IR (g/d)	x	fi (unitless)	x	CF (kg/g)	x	EF (d/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.810		3.1		1		0.001		365		9		30		3285	8.4E-05		5.0E-03		1.7E-02
4,4'-DDT (p,p'-)	0.193		3.1		1		0.001		365		9		30		3285	2.0E-05		5.0E-04		4.0E-02
Aldrin	0.005		3.1		1		0.001		365		9		30		3285	5.1E-07		3.0E-05		1.7E-02
alpha-Chlordane	0.018		3.1		1		0.001		365		9		30		3285	1.9E-06		5.0E-04		3.7E-03
Arsenic	0.049		3.1		1		0.001		365		9		30		3285	5.1E-06		3.0E-04		1.7E-02
Atrazine	0.597		3.1		1		0.001		365		9		30		3285	6.2E-05		3.5E-02		1.8E-03
Chlordane	0.160		3.1		1		0.001		365		9		30		3285	1.7E-05		5.0E-04		3.3E-02
Dieldrin	0.020		3.1		1		0.001		365		9		30		3285	2.1E-06		5.0E-05		4.1E-02
Di-n-butylphthalate	18.987		3.1		1		0.001		365		9		30		3285	2.0E-03		1.0E-01		2.0E-02
gamma-Chlordane	0.130		3.1		1		0.001		365		9		30		3285	1.3E-05		5.0E-04		2.7E-02
Pentachlorophenol (PCP)	183.136		3.1		1		0.001		365		9		30		3285	1.9E-02		3.0E-02		6.3E-01
Thallium	0.246		3.1		1		0.001		365		9		30		3285	2.5E-05		6.7E-05		3.8E-01
Total PCBs	5.890		3.1		1		0.001		365		9		30		3285	6.1E-04		2.0E-05		3.0E+01
trans-Nonachlor	0.005		3.1		1		0.001		365		9		30		3285	5.1E-07		5.0E-04		1.0E-03
																				3.2E+01

Table D-6. Cancer Risk Calculations for Fish Consumption Scenarios

Segment 2 (RM 3.2 to <4.9)

RME Scenario: Noncancer Hazard for Consumption of Fish for Adult Consumer

Chemical	C (mg/kg)	x	IR (g/d)	x	fi (unitless)	x	CF (kg/g)	x	EF (d/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	15.500		41		1		0.001		365		17		70		6205	9.1E-03		5.0E-03		1.8E+00
4,4'-DDT (p,p'-)	0.070		41		1		0.001		365		17		70		6205	4.1E-05		5.0E-04		8.2E-02
Aldrin	0.005		41		1		0.001		365		17		70		6205	2.9E-06		3.0E-05		9.6E-02
alpha-Chlordane	0.005		41		1		0.001		365		17		70		6205	2.9E-06		5.0E-04		5.8E-03
Arsenic	0.045		41		1		0.001		365		17		70		6205	2.6E-05		3.0E-04		8.7E-02
Atrazine	0.330		41		1		0.001		365		17		70		6205	1.9E-04		3.5E-02		5.5E-03
Chlordane	0.065		41		1		0.001		365		17		70		6205	3.8E-05		5.0E-04		7.6E-02
Dieldrin	0.005		41		1		0.001		365		17		70		6205	3.0E-06		5.0E-05		6.0E-02
Di-n-butylphthalate	15.500		41		1		0.001		365		17		70		6205	9.1E-03		1.0E-01		9.1E-02
gamma-Chlordane	0.065		41		1		0.001		365		17		70		6205	3.8E-05		5.0E-04		7.6E-02
Pentachlorophenol (PCP)	59.500		41		1		0.001		365		17		70		6205	3.5E-02		3.0E-02		1.2E+00
Thallium	0.160		41		1		0.001		365		17		70		6205	9.4E-05		6.7E-05		1.4E+00
Total PCBs	2.827		41		1		0.001		365		17		70		6205	1.7E-03		2.0E-05		8.3E+01
trans-Nonachlor	0.005		41		1		0.001		365		17		70		6205	2.9E-06		5.0E-04		5.8E-03
																				8.8E+01

RME Scenario: Noncancer Hazard for Consumption of Child for Consumer

Chemical	C (mg/kg)	x	IR (g/d)	x	fi (unitless)	x	CF (kg/g)	x	EF (d/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	15.500		18		1		0.001		365		13		30		4745	9.3E-03		5.0E-03		1.9E+00
4,4'-DDT (p,p'-)	0.070		18		1		0.001		365		13		30		4745	4.2E-05		5.0E-04		8.4E-02
Aldrin	0.005		18		1		0.001		365		13		30		4745	3.0E-06		3.0E-05		9.9E-02
alpha-Chlordane	0.005		18		1		0.001		365		13		30		4745	3.0E-06		5.0E-04		5.9E-03
Arsenic	0.045		18		1		0.001		365		13		30		4745	2.7E-05		3.0E-04		8.9E-02
Atrazine	0.330		18		1		0.001		365		13		30		4745	2.0E-04		3.5E-02		5.7E-03
Chlordane	0.065		18		1		0.001		365		13		30		4745	3.9E-05		5.0E-04		7.8E-02
Dieldrin	0.005		18		1		0.001		365		13		30		4745	3.1E-06		5.0E-05		6.2E-02
Di-n-butylphthalate	15.500		18		1		0.001		365		13		30		4745	9.3E-03		1.0E-01		9.3E-02
gamma-Chlordane	0.065		18		1		0.001		365		13		30		4745	3.9E-05		5.0E-04		7.8E-02
Pentachlorophenol (PCP)	59.500		18		1		0.001		365		13		30		4745	3.6E-02		3.0E-02		1.2E+00
Thallium	0.160		18		1		0.001		365		13		30		4745	9.6E-05		6.7E-05		1.4E+00
Total PCBs	2.827		18		1		0.001		365		13		30		4745	1.7E-03		2.0E-05		8.5E+01
trans-Nonachlor	0.005		18		1		0.001		365		13		30		4745	3.0E-06		5.0E-04		5.9E-03
																				9.0E+01

Table D-6. Cancer Risk Calculations for Fish Consumption Scenarios

CT Scenario: Noncancer Hazard for Consumption of Fish for Adult Consumer

Chemical	C (mg/kg)	x	IR (g/d)	x	fi (unitless)	x	CF (kg/g)	x	EF (d/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	15.500		7.3		1		0.001		365		9		70		3285	1.6E-03		5.0E-03		3.2E-01
4,4'-DDT (p,p'-)	0.070		7.3		1		0.001		365		9		70		3285	7.3E-06		5.0E-04		1.5E-02
Aldrin	0.005		7.3		1		0.001		365		9		70		3285	5.2E-07		3.0E-05		1.7E-02
alpha-Chlordane	0.005		7.3		1		0.001		365		9		70		3285	5.2E-07		5.0E-04		1.0E-03
Arsenic	0.045		7.3		1		0.001		365		9		70		3285	4.6E-06		3.0E-04		1.5E-02
Atrazine	0.330		7.3		1		0.001		365		9		70		3285	3.4E-05		3.5E-02		9.8E-04
Chlordane	0.065		7.3		1		0.001		365		9		70		3285	6.7E-06		5.0E-04		1.3E-02
Dieldrin	0.005		7.3		1		0.001		365		9		70		3285	5.3E-07		5.0E-05		1.1E-02
Di-n-butylphthalate	15.500		7.3		1		0.001		365		9		70		3285	1.6E-03		1.0E-01		1.6E-02
gamma-Chlordane	0.065		7.3		1		0.001		365		9		70		3285	6.7E-06		5.0E-04		1.3E-02
Pentachlorophenol (PCP)	59.500		7.3		1		0.001		365		9		70		3285	6.2E-03		3.0E-02		2.1E-01
Thallium	0.160		7.3		1		0.001		365		9		70		3285	1.7E-05		6.7E-05		2.5E-01
Total PCBs	2.827		7.3		1		0.001		365		9		70		3285	2.9E-04		2.0E-05		1.5E+01
trans-Nonachlor	0.005		7.3		1		0.001		365		9		70		3285	5.2E-07		5.0E-04		1.0E-03
																				1.6E+01

CT Scenario: Noncancer Hazard for Consumption of Fish for Child Consumer

Chemical	C (mg/kg)	x	IR (g/d)	x	fi (unitless)	x	CF (kg/g)	x	EF (d/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	15.500		3.1		1		0.001		365		9		30		3285	1.6E-03		5.0E-03		3.2E-01
4,4'-DDT (p,p'-)	0.070		3.1		1		0.001		365		9		30		3285	7.3E-06		5.0E-04		1.5E-02
Aldrin	0.005		3.1		1		0.001		365		9		30		3285	5.1E-07		3.0E-05		1.7E-02
alpha-Chlordane	0.005		3.1		1		0.001		365		9		30		3285	5.1E-07		5.0E-04		1.0E-03
Arsenic	0.045		3.1		1		0.001		365		9		30		3285	4.6E-06		3.0E-04		1.5E-02
Atrazine	0.330		3.1		1		0.001		365		9		30		3285	3.4E-05		3.5E-02		9.7E-04
Chlordane	0.065		3.1		1		0.001		365		9		30		3285	6.7E-06		5.0E-04		1.3E-02
Dieldrin	0.005		3.1		1		0.001		365		9		30		3285	5.3E-07		5.0E-05		1.1E-02
Di-n-butylphthalate	15.500		3.1		1		0.001		365		9		30		3285	1.6E-03		1.0E-01		1.6E-02
gamma-Chlordane	0.065		3.1		1		0.001		365		9		30		3285	6.7E-06		5.0E-04		1.3E-02
Pentachlorophenol (PCP)	59.500		3.1		1		0.001		365		9		30		3285	6.1E-03		3.0E-02		2.0E-01
Thallium	0.160		3.1		1		0.001		365		9		30		3285	1.7E-05		6.7E-05		2.5E-01
Total PCBs	2.827		3.1		1		0.001		365		9		30		3285	2.9E-04		2.0E-05		1.5E+01
trans-Nonachlor	0.005		3.1		1		0.001		365		9		30		3285	5.1E-07		5.0E-04		1.0E-03
																				1.5E+01

Table D-6. Cancer Risk Calculations for Fish Consumption Scenarios

Segment 3 (RM 4.9 to <6.5)

RME Scenario: Noncancer Hazard for Consumption of Fish for Adult Consumer

Chemical	C (mg/kg)	x	IR (g/d)	x	fi (unitless)	x	CF (kg/g)	x	EF (d/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.140		41		1		0.001		365		17		70		6205	8.2E-05		5.0E-03		1.6E-02
4,4'-DDT (p,p'-)	0.041		41		1		0.001		365		17		70		6205	2.4E-05		5.0E-04		4.8E-02
Aldrin	0.012		41		1		0.001		365		17		70		6205	6.8E-06		3.0E-05		2.3E-01
alpha-Chlordane	0.006		41		1		0.001		365		17		70		6205	3.3E-06		5.0E-04		6.5E-03
Arsenic	0.027		41		1		0.001		365		17		70		6205	1.6E-05		3.0E-04		5.3E-02
Atrazine	0.330		41		1		0.001		365		17		70		6205	1.9E-04		3.5E-02		5.5E-03
Chlordane	0.211		41		1		0.001		365		17		70		6205	1.2E-04		5.0E-04		2.5E-01
Dieldrin	0.005		41		1		0.001		365		17		70		6205	2.9E-06		5.0E-05		5.8E-02
Di-n-butylphthalate	15.500		41		1		0.001		365		17		70		6205	9.1E-03		1.0E-01		9.1E-02
gamma-Chlordane	0.157		41		1		0.001		365		17		70		6205	9.2E-05		5.0E-04		1.8E-01
Pentachlorophenol (PCP)	59.500		41		1		0.001		365		17		70		6205	3.5E-02		3.0E-02		1.2E+00
Thallium	0.160		41		1		0.001		365		17		70		6205	9.4E-05		6.7E-05		1.4E+00
Total PCBs	5.805		41		1		0.001		365		17		70		6205	3.4E-03		2.0E-05		1.7E+02
trans-Nonachlor	0.005		41		1		0.001		365		17		70		6205	2.9E-06		5.0E-04		5.8E-03
																				1.7E+02

RME Scenario: Noncancer Hazard for Consumption of Fish for Child Consumer

Chemical	C (mg/kg)	x	IR (g/d)	x	fi (unitless)	x	CF (kg/g)	x	EF (d/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.140		18		1		0.001		365		13		30		4745	8.4E-05		5.0E-03		1.7E-02
4,4'-DDT (p,p'-)	0.041		18		1		0.001		365		13		30		4745	2.5E-05		5.0E-04		4.9E-02
Aldrin	0.012		18		1		0.001		365		13		30		4745	7.0E-06		3.0E-05		2.3E-01
alpha-Chlordane	0.006		18		1		0.001		365		13		30		4745	3.3E-06		5.0E-04		6.7E-03
Arsenic	0.027		18		1		0.001		365		13		30		4745	1.6E-05		3.0E-04		5.4E-02
Atrazine	0.330		18		1		0.001		365		13		30		4745	2.0E-04		3.5E-02		5.7E-03
Chlordane	0.211		18		1		0.001		365		13		30		4745	1.3E-04		5.0E-04		2.5E-01
Dieldrin	0.005		18		1		0.001		365		13		30		4745	3.0E-06		5.0E-05		5.9E-02
Di-n-butylphthalate	15.500		18		1		0.001		365		13		30		4745	9.3E-03		1.0E-01		9.3E-02
gamma-Chlordane	0.157		18		1		0.001		365		13		30		4745	9.4E-05		5.0E-04		1.9E-01
Pentachlorophenol (PCP)	59.500		18		1		0.001		365		13		30		4745	3.6E-02		3.0E-02		1.2E+00
Thallium	0.160		18		1		0.001		365		13		30		4745	9.6E-05		6.7E-05		1.4E+00
Total PCBs	5.805		18		1		0.001		365		13		30		4745	3.5E-03		2.0E-05		1.7E+02
trans-Nonachlor	0.005		18		1		0.001		365		13		30		4745	3.0E-06		5.0E-04		5.9E-03
																				1.8E+02

Table D-6. Cancer Risk Calculations for Fish Consumption Scenarios

CT Scenario: Noncancer Hazard for Consumption of Fish for Adult Consumer

Chemical	C (mg/kg)	x	IR (g/d)	x	fi (unitless)	x	CF (kg/g)	x	EF (d/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.140		7.3		1		0.001		365		9		70		3285	1.5E-05		5.0E-03		2.9E-03
4,4'-DDT (p,p'-)	0.041		7.3		1		0.001		365		9		70		3285	4.3E-06		5.0E-04		8.5E-03
Aldrin	0.012		7.3		1		0.001		365		9		70		3285	1.2E-06		3.0E-05		4.0E-02
alpha-Chlordane	0.006		7.3		1		0.001		365		9		70		3285	5.8E-07		5.0E-04		1.2E-03
Arsenic	0.027		7.3		1		0.001		365		9		70		3285	2.8E-06		3.0E-04		9.4E-03
Atrazine	0.330		7.3		1		0.001		365		9		70		3285	3.4E-05		3.5E-02		9.8E-04
Chlordane	0.211		7.3		1		0.001		365		9		70		3285	2.2E-05		5.0E-04		4.4E-02
Dieldrin	0.005		7.3		1		0.001		365		9		70		3285	5.1E-07		5.0E-05		1.0E-02
Di-n-butylphthalate	15.500		7.3		1		0.001		365		9		70		3285	1.6E-03		1.0E-01		1.6E-02
gamma-Chlordane	0.157		7.3		1		0.001		365		9		70		3285	1.6E-05		5.0E-04		3.3E-02
Pentachlorophenol (PCP)	59.500		7.3		1		0.001		365		9		70		3285	6.2E-03		3.0E-02		2.1E-01
Thallium	0.160		7.3		1		0.001		365		9		70		3285	1.7E-05		6.7E-05		2.5E-01
Total PCBs	5.805		7.3		1		0.001		365		9		70		3285	6.1E-04		2.0E-05		3.0E+01
trans-Nonachlor	0.005		7.3		1		0.001		365		9		70		3285	5.1E-07		5.0E-04		1.0E-03
																				3.1E+01

CT Scenario: Noncancer Hazard for Consumption of Fish for Child Consumer

Chemical	C (mg/kg)	x	IR (g/d)	x	fi (unitless)	x	CF (kg/g)	x	EF (d/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.140		3.1		1		0.001		365		9		30		3285	1.4E-05		5.0E-03		2.9E-03
4,4'-DDT (p,p'-)	0.041		3.1		1		0.001		365		9		30		3285	4.2E-06		5.0E-04		8.5E-03
Aldrin	0.012		3.1		1		0.001		365		9		30		3285	1.2E-06		3.0E-05		4.0E-02
alpha-Chlordane	0.006		3.1		1		0.001		365		9		30		3285	5.8E-07		5.0E-04		1.2E-03
Arsenic	0.027		3.1		1		0.001		365		9		30		3285	2.8E-06		3.0E-04		9.3E-03
Atrazine	0.330		3.1		1		0.001		365		9		30		3285	3.4E-05		3.5E-02		9.7E-04
Chlordane	0.211		3.1		1		0.001		365		9		30		3285	2.2E-05		5.0E-04		4.4E-02
Dieldrin	0.005		3.1		1		0.001		365		9		30		3285	5.1E-07		5.0E-05		1.0E-02
Di-n-butylphthalate	15.500		3.1		1		0.001		365		9		30		3285	1.6E-03		1.0E-01		1.6E-02
gamma-Chlordane	0.157		3.1		1		0.001		365		9		30		3285	1.6E-05		5.0E-04		3.2E-02
Pentachlorophenol (PCP)	59.500		3.1		1		0.001		365		9		30		3285	6.1E-03		3.0E-02		2.0E-01
Thallium	0.160		3.1		1		0.001		365		9		30		3285	1.7E-05		6.7E-05		2.5E-01
Total PCBs	5.805		3.1		1		0.001		365		9		30		3285	6.0E-04		2.0E-05		3.0E+01
trans-Nonachlor	0.005		3.1		1		0.001		365		9		30		3285	5.1E-07		5.0E-04		1.0E-03
																				3.1E+01

Table D-6. Cancer Risk Calculations for Fish Consumption Scenarios

Segment 4 (RM 6.5 to 8.8)

RME Scenario: Noncancer Hazard for Consumption of Fish for Adult Consumer

Chemical	C (mg/kg)	x	IR (g/d)	x	fi (unitless)	x	CF (kg/g)	x	EF (d/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.140		41		1		0.001		365		17		70		6205	8.2E-05		5.0E-03		1.6E-02
4,4'-DDT (p,p'-)	0.201		41		1		0.001		365		17		70		6205	1.2E-04		5.0E-04		2.4E-01
Aldrin	0.005		41		1		0.001		365		17		70		6205	2.9E-06		3.0E-05		9.7E-02
alpha-Chlordane	0.031		41		1		0.001		365		17		70		6205	1.8E-05		5.0E-04		3.6E-02
Arsenic	0.028		41		1		0.001		365		17		70		6205	1.6E-05		3.0E-04		5.5E-02
Atrazine	0.330		41		1		0.001		365		17		70		6205	1.9E-04		3.5E-02		5.5E-03
Chlordane	0.076		41		1		0.001		365		17		70		6205	4.5E-05		5.0E-04		8.9E-02
Dieldrin	0.034		41		1		0.001		365		17		70		6205	2.0E-05		5.0E-05		3.9E-01
Di-n-butylphthalate	15.500		41		1		0.001		365		17		70		6205	9.1E-03		1.0E-01		9.1E-02
gamma-Chlordane	0.035		41		1		0.001		365		17		70		6205	2.1E-05		5.0E-04		4.1E-02
Pentachlorophenol (PCP)	59.500		41		1		0.001		365		17		70		6205	3.5E-02		3.0E-02		1.2E+00
Thallium	0.160		41		1		0.001		365		17		70		6205	9.4E-05		6.7E-05		1.4E+00
Total PCBs	2.928		41		1		0.001		365		17		70		6205	1.7E-03		2.0E-05		8.6E+01
trans-Nonachlor	0.011		41		1		0.001		365		17		70		6205	6.2E-06		5.0E-04		1.2E-02
																				8.9E+01

RME Scenario: Noncancer Hazard for Consumption of Fish for Child Consumer

Chemical	C (mg/kg)	x	IR (g/d)	x	fi (unitless)	x	CF (kg/g)	x	EF (d/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.140		18		1		0.001		365		13		30		4745	8.4E-05		5.0E-03		1.7E-02
4,4'-DDT (p,p'-)	0.201		18		1		0.001		365		13		30		4745	1.2E-04		5.0E-04		2.4E-01
Aldrin	0.005		18		1		0.001		365		13		30		4745	3.0E-06		3.0E-05		9.9E-02
alpha-Chlordane	0.031		18		1		0.001		365		13		30		4745	1.8E-05		5.0E-04		3.7E-02
Arsenic	0.028		18		1		0.001		365		13		30		4745	1.7E-05		3.0E-04		5.6E-02
Atrazine	0.330		18		1		0.001		365		13		30		4745	2.0E-04		3.5E-02		5.7E-03
Chlordane	0.076		18		1		0.001		365		13		30		4745	4.6E-05		5.0E-04		9.2E-02
Dieldrin	0.034		18		1		0.001		365		13		30		4745	2.0E-05		5.0E-05		4.0E-01
Di-n-butylphthalate	15.500		18		1		0.001		365		13		30		4745	9.3E-03		1.0E-01		9.3E-02
gamma-Chlordane	0.035		18		1		0.001		365		13		30		4745	2.1E-05		5.0E-04		4.2E-02
Pentachlorophenol (PCP)	59.500		18		1		0.001		365		13		30		4745	3.6E-02		3.0E-02		1.2E+00
Thallium	0.160		18		1		0.001		365		13		30		4745	9.6E-05		6.7E-05		1.4E+00
Total PCBs	2.928		18		1		0.001		365		13		30		4745	1.8E-03		2.0E-05		8.8E+01
trans-Nonachlor	0.011		18		1		0.001		365		13		30		4745	6.3E-06		5.0E-04		1.3E-02
																				9.2E+01

Table D-6. Cancer Risk Calculations for Fish Consumption Scenarios

CT Scenario: Noncancer Hazard for Consumption of Fish for Adult Consumer

Chemical	C (mg/kg)	x	IR (g/d)	x	fi (unitless)	x	CF (kg/g)	x	EF (d/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.140		7.3		1		0.001		365		9		70		3285	1.5E-05		5.0E-03		2.9E-03
4,4'-DDT (p,p'-)	0.201		7.3		1		0.001		365		9		70		3285	2.1E-05		5.0E-04		4.2E-02
Aldrin	0.005		7.3		1		0.001		365		9		70		3285	5.2E-07		3.0E-05		1.7E-02
alpha-Chlordane	0.031		7.3		1		0.001		365		9		70		3285	3.2E-06		5.0E-04		6.4E-03
Arsenic	0.028		7.3		1		0.001		365		9		70		3285	2.9E-06		3.0E-04		9.8E-03
Atrazine	0.330		7.3		1		0.001		365		9		70		3285	3.4E-05		3.5E-02		9.8E-04
Chlordane	0.076		7.3		1		0.001		365		9		70		3285	8.0E-06		5.0E-04		1.6E-02
Dieldrin	0.034		7.3		1		0.001		365		9		70		3285	3.5E-06		5.0E-05		7.0E-02
Di-n-butylphthalate	15.5		7.3		1		0.001		365		9		70		3285	1.6E-03		1.0E-01		1.6E-02
gamma-Chlordane	0.035		7.3		1		0.001		365		9		70		3285	3.7E-06		5.0E-04		7.3E-03
Pentachlorophenol (PCP)	60		7.3		1		0.001		365		9		70		3285	6.2E-03		3.0E-02		2.1E-01
Thallium	0.160		7.3		1		0.001		365		9		70		3285	1.7E-05		6.7E-05		2.5E-01
Total PCBs	2.928		7.3		1		0.001		365		9		70		3285	3.1E-04		2.0E-05		1.5E+01
trans-Nonachlor	0.011		7.3		1		0.001		365		9		70		3285	1.1E-06		5.0E-04		2.2E-03
																				1.6E+01

CT Scenario: Noncancer Hazard for Consumption of Fish for Child Consumer

Chemical	C (mg/kg)	x	IR (g/d)	x	fi (unitless)	x	CF (kg/g)	x	EF (d/yr)	x	ED (yr)	/	BW (kg)	x	AT (d) ADD	ADD (mg/kg-d)	/	Oral RfD (mg/kg-d)	=	Non-Cancer Hazard
2-Chlorophenol	0.140		3.1		1		0.001		365		9		30		3285	1.4E-05		5.0E-03		2.9E-03
4,4'-DDT (p,p'-)	0.201		3.1		1		0.001		365		9		30		3285	2.1E-05		5.0E-04		4.2E-02
Aldrin	0.005		3.1		1		0.001		365		9		30		3285	5.1E-07		3.0E-05		1.7E-02
alpha-Chlordane	0.031		3.1		1		0.001		365		9		30		3285	3.2E-06		5.0E-04		6.3E-03
Arsenic	0.028		3.1		1		0.001		365		9		30		3285	2.9E-06		3.0E-04		9.7E-03
Atrazine	0.330		3.1		1		0.001		365		9		30		3285	3.4E-05		3.5E-02		9.7E-04
Chlordane	0.076		3.1		1		0.001		365		9		30		3285	7.9E-06		5.0E-04		1.6E-02
Dieldrin	0.034		3.1		1		0.001		365		9		30		3285	3.5E-06		5.0E-05		6.9E-02
Di-n-butylphthalate	15.5		3.1		1		0.001		365		9		30		3285	1.6E-03		1.0E-01		1.6E-02
gamma-Chlordane	0.035		3.1		1		0.001		365		9		30		3285	3.6E-06		5.0E-04		7.2E-03
Pentachlorophenol (PCP)	60		3.1		1		0.001		365		9		30		3285	6.1E-03		3.0E-02		2.0E-01
Thallium	0.160		3.1		1		0.001		365		9		30		3285	1.7E-05		6.7E-05		2.5E-01
Total PCBs	2.928		3.1		1		0.001		365		9		30		3285	3.0E-04		2.0E-05		1.5E+01
trans-Nonachlor	0.011		3.1		1		0.001		365		9		30		3285	1.1E-06		5.0E-04		2.2E-03
																				1.6E+01

Table D-7. Summary of Chemical- and Pathway- Specific Cancer Risks, Reasonable Maximum Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Pathway: Ingestion of Sediment	Dermal Contact with Sediment	Ingestion of Surface Water	Dermal Contact with Surface Water	Fish Consumption	Exposure Pathways Total	% of Total Risk
Segment 1 (RM 0 to <3.2)							
Recreator							
4,4'-DDT (p,p'-)	---	---	1.1E-08	8.4E-07	---	8.6E-07	0.7%
Aldrin	5.9E-08	3.9E-08	3.1E-07	1.2E-07	---	5.3E-07	0.4%
Arsenic	2.5E-06	6.4E-07	4.9E-07	1.5E-07	---	3.7E-06	3.1%
Benzo[a]anthracene	3.9E-08	4.2E-08	---	---	---	8.1E-08	0.1%
Benzo[a]pyrene	4.8E-07	5.1E-07	---	---	---	9.9E-07	0.8%
Benzo[b]fluoranthene	5.3E-08	5.7E-08	---	---	---	1.1E-07	0.1%
Benzo[k]fluoranthene	9.1E-09	9.8E-09	---	---	---	1.9E-08	0.0%
bis(2-Ethylhexyl)phthalate	5.1E-09	9.0E-09	---	---	---	1.4E-08	0.0%
Dibenz[a,h]anthracene	5.1E-07	5.5E-07	---	---	---	1.1E-06	0.9%
Dieldrin	1.1E-07	7.2E-08	6.4E-07	2.6E-06	---	3.4E-06	2.8%
Heptachlor	---	---	7.3E-08	1.4E-07	---	2.1E-07	0.2%
Heptachlor epoxide	4.0E-08	1.8E-08	---	---	---	5.8E-08	0.0%
Indeno[1,2,3-cd]pyrene	3.6E-08	3.9E-08	---	---	---	7.5E-08	0.1%
N-Nitroso-di-n-propylamine	6.6E-07	8.8E-07	2.0E-05	2.8E-05	---	4.9E-05	41%
Total Polychlorinated Biphenyls (PCBs)	4.4E-07	9.8E-08	---	---	---	5.4E-07	0.4%
Pentachlorophenol (PCP)	---	---	7.2E-07	5.9E-05	---	6.0E-05	49.6%
(Total)	**4.9E-06**	**3.0E-06**	**2.2E-05**	**9.1E-05**	**0.0E+00**	**1.2E-04**	
Angler							
4,4'-DDD (p,p'-)	---	---	---	---	5.6E-06	5.6E-06	0.2%
4,4'-DDE (p,p'-)	---	---	---	---	1.4E-05	1.4E-05	0.4%
4,4'-DDT (p,p'-)	---	---	---	1.6E-06	1.7E-05	1.8E-05	0.5%
Aldrin	---	---	---	2.3E-07	2.1E-05	2.2E-05	0.6%
alpha-Chlordane	---	---	---	---	1.4E-05	1.4E-05	0.4%
Arsenic	---	---	---	2.7E-07	1.9E-05	1.9E-05	0.6%
Chlordane	---	---	---	---	1.4E-05	1.4E-05	0.4%
Dieldrin	---	---	---	4.7E-06	8.1E-05	8.6E-05	2.6%
gamma-Chlordane	---	---	---	---	1.2E-05	1.2E-05	0.3%
N-Nitroso-di-n-propylamine	---	---	---	5.1E-05	---	5.1E-05	1.5%
Pentachlorophenol (PCP)	---	---	---	1.1E-04	---	1.1E-04	3%
Total Polychlorinated Biphenyls (PCBs)	---	---	---	---	3.0E-03	3.0E-03	89%
trans-Nonachlor	---	---	---	---	4.4E-07	4.4E-07	0.0%
(Total)	**0.0E+00**	**0.0E+00**	**0.0E+00**	**1.7E-04**	**3.2E-03**	**3.4E-03**	

Table D-7. Summary of Chemical- and Pathway- Specific Cancer Risks, Reasonable Maximum Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Pathway: Ingestion of Sediment	Dermal Contact with Sediment	Ingestion of Surface Water	Dermal Contact with Surface Water	Fish Consumption	Exposure Pathways Total	% of Total Risk
Segment 2 (RM 3.2 to <4.9)							
Recreator							
4,4'-DDT (p,p'-)	---	---	2.7E-09	2.1E-07	---	2.1E-07	0.4%
Aldrin	1.3E-07	8.9E-08	6.6E-08	2.7E-08	---	3.2E-07	0.7%
Arsenic	3.0E-06	7.7E-07	8.9E-07	2.7E-07	---	4.9E-06	10.3%
Benzo[a]anthracene	1.1E-07	1.2E-07	---	---	---	2.3E-07	0.5%
Benzo[a]pyrene	9.5E-07	1.0E-06	---	---	---	2.0E-06	4.1%
Benzo[b]fluoranthene	1.6E-07	1.7E-07	---	---	---	3.4E-07	0.7%
Benzo[k]fluoranthene	9.0E-09	9.6E-09	---	---	---	1.9E-08	0.0%
bis(2-Ethylhexyl)phthalate	2.7E-08	4.7E-08	---	---	---	7.4E-08	0.2%
Dibenz[a,h]anthracene	7.6E-07	8.2E-07	---	---	---	1.6E-06	3.3%
Dieldrin	8.4E-08	5.6E-08	1.3E-07	5.0E-07	---	7.7E-07	1.6%
Heptachlor	---	---	1.8E-08	3.4E-08	---	5.1E-08	0.1%
Heptachlor epoxide	1.3E-07	5.9E-08	---	---	---	1.9E-07	0.4%
Indeno[1,2,3-cd]pyrene	7.4E-08	7.9E-08	---	---	---	1.5E-07	0.3%
N-Nitroso-di-n-propylamine	1.2E-06	1.6E-06	5.5E-06	7.7E-06	---	1.6E-05	33.5%
Total Polychlorinated Biphenyls (PCBs)	1.3E-06	2.8E-07	---	---	---	1.6E-06	3.3%
Pentachlorophenol (PCP)	---	---	2.3E-07	1.9E-05	---	1.9E-05	40.6%
(Total)	**7.9E-06**	**5.2E-06**	**6.8E-06**	**2.8E-05**	**0.0E+00**	**4.8E-05**	
Angler							
4,4'-DDD (p,p'-)	---	---	---	---	2.8E-06	2.8E-06	0.18%
4,4'-DDE (p,p'-)	---	---	---	---	9.1E-06	9.1E-06	0.58%
4,4'-DDT (p,p'-)	---	---	---	3.8E-07	6.1E-06	6.4E-06	0.41%
Aldrin	---	---	---	4.9E-08	2.1E-05	2.1E-05	1.36%
alpha-Chlordane	---	---	---	---	4.4E-07	4.4E-07	0.03%
Arsenic	---	---	---	5.0E-07	1.7E-05	1.7E-05	1.11%
Chlordane	---	---	---	---	5.7E-06	5.7E-06	0.36%
Dieldrin	---	---	---	9.3E-07	2.1E-05	2.2E-05	1.38%
gamma-Chlordane	---	---	---	---	5.7E-06	5.7E-06	0.36%
N-Nitroso-di-n-propylamine	---	---	---	1.4E-05	---	1.4E-05	0.90%
Pentachlorophenol (PCP)	---	---	---	3.5E-05	---	3.5E-05	2.24%
Total Polychlorinated Biphenyls (PCBs)	---	---	---	---	1.4E-03	1.4E-03	91.06%
trans-Nonachlor	---	---	---	---	4.4E-07	4.4E-07	0.03%
(Total)	**0.0E+00**	**0.0E+00**	**0.0E+00**	**5.1E-05**	**1.5E-03**	**1.6E-03**	

Table D-7. Summary of Chemical- and Pathway- Specific Cancer Risks, Reasonable Maximum Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest		Exposure Pathway: Ingestion of Sediment	Dermal Contact with Sediment	Ingestion of Surface Water	Dermal Contact with Surface Water	Fish Consumption	Exposure Pathways Total	% of Total Risk
Segment 3 (RM 4.9 to <6.5)								
Recreator								
4,4'-DDT (p,p'-)		---	---	2.7E-09	2.1E-07	---	2.1E-07	0.2%
Aldrin		1.6E-07	1.1E-07	6.6E-08	2.7E-08	---	3.6E-07	0.3%
Arsenic		2.4E-06	6.2E-07	4.1E-07	8.3E-08	---	3.5E-06	3.3%
Benzo[a]anthracene		3.2E-07	3.4E-07	---	---	---	6.6E-07	0.6%
Benzo[a]pyrene		3.8E-06	4.1E-06	---	---	---	7.9E-06	7.5%
Benzo[b]fluoranthene		5.0E-07	5.3E-07	---	---	---	1.0E-06	1.0%
Benzo[k]fluoranthene		4.3E-08	4.6E-08	---	---	---	9.0E-08	0.1%
bis(2-Ethylhexyl)phthalate		5.4E-07	9.4E-07	---	---	---	1.5E-06	1.4%
Dibenz[a,h]anthracene		8.3E-06	8.9E-06	---	---	---	1.7E-05	16.2%
Dieldrin		4.7E-08	3.2E-08	1.3E-07	5.0E-07	---	7.1E-07	0.7%
Heptachlor		---	---	1.8E-08	3.4E-08	---	5.1E-08	0.0%
Heptachlor epoxide		6.3E-08	2.9E-08	---	---	---	9.3E-08	0.1%
Indeno[1,2,3-cd]pyrene		3.3E-07	3.5E-07	---	---	---	6.9E-07	0.6%
N-Nitroso-di-n-propylamine		7.9E-06	1.1E-05	5.5E-06	7.7E-06	---	3.2E-05	29.8%
Total Polychlorinated Biphenyls (PCBs)		1.7E-05	3.8E-06	---	---	---	2.1E-05	19.9%
Pentachlorophenol (PCP)		---	---	2.3E-07	1.9E-05	---	1.9E-05	18.3%
	(Total)	**4.2E-05**	**3.0E-05**	**6.3E-06**	**2.8E-05**	**0.0E+00**	**1.1E-04**	
Angler								
4,4'-DDD (p,p'-)		---	---	---	---	3.2E-06	3.2E-06	0.1%
4,4'-DDE (p,p'-)		---	---	---	---	7.0E-06	7.0E-06	0.2%
4,4'-DDT (p,p'-)		---	---	---	3.8E-07	3.5E-06	3.9E-06	0.1%
Aldrin		---	---	---	4.9E-08	5.0E-05	5.0E-05	1.6%
alpha-Chlordane		---	---	---	---	5.0E-07	5.0E-07	0.0%
Arsenic		---	---	---	1.5E-07	1.0E-05	1.0E-05	0.3%
Chlordane		---	---	---	---	1.9E-05	1.9E-05	0.6%
Dieldrin		---	---	---	9.3E-07	2.0E-05	2.1E-05	0.7%
gamma-Chlordane		---	---	---	---	1.4E-05	1.4E-05	0.4%
N-Nitroso-di-n-propylamine		---	---	---	1.4E-05	---	1.4E-05	0.5%
Pentachlorophenol (PCP)		---	---	---	3.5E-05	---	3.5E-05	1.1%
Total Polychlorinated Biphenyls (PCBs)		---	---	---	---	2.9E-03	2.9E-03	94.3%
trans-Nonachlor		---	---	---	---	4.4E-07	4.4E-07	0.0%
	(Total)	**0.0E+00**	**0.0E+00**	**0.0E+00**	**5.1E-05**	**3.1E-03**	**3.1E-03**	

Table D-7. Summary of Chemical- and Pathway- Specific Cancer Risks, Reasonable Maximum Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Pathway: Ingestion of Sediment	Dermal Contact with Sediment	Ingestion of Surface Water	Dermal Contact with Surface Water	Fish Consumption	Exposure Pathways Total	% of Total Risk
Segment 4 (RM 6.5 to 8.8)							
Recreator							
4,4'-DDT (p,p'-)	---	---	2.7E-09	2.1E-07	---	2.1E-07	0.4%
Aldrin	1.1E-08	7.2E-09	6.6E-08	2.7E-08	---	1.1E-07	0.2%
Arsenic	2.2E-06	5.7E-07	2.7E-07	8.3E-08	---	3.1E-06	5.3%
Benzo[a]anthracene	2.9E-07	3.1E-07	---	---	---	6.1E-07	1.0%
Benzo[a]pyrene	3.1E-06	3.3E-06	---	---	---	6.3E-06	10.7%
Benzo[b]fluoranthene	3.8E-07	4.1E-07	---	---	---	7.9E-07	1.3%
Benzo[k]fluoranthene	3.8E-08	4.1E-08	---	---	---	7.9E-08	0.1%
bis(2-Ethylhexyl)phthalate	5.4E-07	9.4E-07	---	---	---	1.5E-06	2.5%
Dibenz[a,h]anthracene	1.1E-06	1.2E-06	---	---	---	2.3E-06	3.8%
Dieldrin	2.0E-08	1.3E-08	1.3E-07	5.0E-07	---	6.6E-07	1.1%
Heptachlor	---	---	1.8E-08	3.4E-08	---	5.1E-08	0.1%
Heptachlor epoxide	8.6E-09	4.0E-09	---	---	---	1.3E-08	0.0%
Indeno[1,2,3-cd]pyrene	2.7E-07	2.9E-07	---	---	---	5.5E-07	0.9%
N-Nitroso-di-n-propylamine	3.8E-06	5.0E-06	5.5E-06	7.7E-06	---	2.2E-05	37.0%
Total Polychlorinated Biphenyls (PCBs)	1.4E-06	3.1E-07	---	---	---	1.7E-06	2.8%
Pentachlorophenol (PCP)	---	---	2.3E-07	1.9E-05	---	1.9E-05	32.7%
(Total)	**1.3E-05**	**1.2E-05**	**6.2E-06**	**2.8E-05**	**0.0E+00**	**5.9E-05**	
Angler							
4,4'-DDD (p,p'-)	---	---	---	---	5.6E-06	5.6E-06	0.3%
4,4'-DDE (p,p'-)	---	---	---	---	1.1E-05	1.1E-05	0.6%
4,4'-DDT (p,p'-)	---	---	---	3.8E-07	1.7E-05	1.8E-05	1.0%
Aldrin	---	---	---	4.9E-08	2.1E-05	2.1E-05	1.2%
alpha-Chlordane	---	---	---	---	2.7E-06	2.7E-06	0.2%
Arsenic	---	---	---	1.5E-07	1.1E-05	1.1E-05	0.6%
Chlordane	---	---	---	---	6.8E-06	6.8E-06	0.4%
Dieldrin	---	---	---	9.3E-07	1.4E-04	1.4E-04	7.8%
gamma-Chlordane	---	---	---	---	3.1E-06	3.1E-06	0.2%
N-Nitroso-di-n-propylamine	---	---	---	1.4E-05	---	1.4E-05	0.8%
Pentachlorophenol (PCP)	---	---	---	3.5E-05	---	3.5E-05	2.0%
Total Polychlorinated Biphenyls (PCBs)	---	---	---	---	1.5E-03	1.5E-03	84.8%
trans-Nonachlor	---	---	---	---	9.3E-07	9.3E-07	0.1%
(Total)	**0.0E+00**	**0.0E+00**	**0.0E+00**	**5.1E-05**	**1.7E-03**	**1.8E-03**	

Table D-8. Summary of Chemical- and Pathway- Specific Cancer Risks, Central Tendency Exposure , Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Pathway: Ingestion of Sediment	Dermal Contact with Sediment	Ingestion of Surface Water	Dermal Contact with Surface Water	Fish Consumption	Exposure Pathways Total	% of Total Risk
Segment 1 (RM 0 to <3.2)							
Recreator							
4,4'-DDT (p,p'-)	---	---	1.5E-09	1.2E-07	---	1.2E-07	0.7%
Aldrin	1.8E-08	7.2E-09	4.3E-08	1.8E-08	---	8.6E-08	0.5%
Arsenic	7.5E-07	1.2E-07	6.7E-08	2.1E-08	---	9.6E-07	5.3%
Benzo[a]anthracene	1.2E-08	7.7E-09	---	---	---	2.0E-08	0.1%
Benzo[a]pyrene	1.5E-07	9.3E-08	---	---	---	2.4E-07	1.3%
Benzo[b]fluoranthene	1.6E-08	1.0E-08	---	---	---	2.6E-08	0.1%
Benzo[k]fluoranthene	2.8E-09	1.8E-09	---	---	---	4.6E-09	0.0%
bis(2-Ethylhexyl)phthalate	1.6E-09	1.6E-09	---	---	---	3.2E-09	0.0%
Dibenz[a,h]anthracene	1.6E-07	9.9E-08	---	---	---	2.5E-07	1.4%
Dieldrin	3.3E-08	1.3E-08	8.8E-08	3.7E-07	---	5.0E-07	2.8%
Heptachlor	---	---	1.0E-08	2.0E-08	---	3.0E-08	0.2%
Heptachlor epoxide	1.2E-08	3.3E-09	---	---	---	1.5E-08	0.1%
Indeno[1,2,3-cd]pyrene	1.1E-08	7.1E-09	---	---	---	1.8E-08	0.1%
N-Nitroso-di-n-propylamine	2.0E-07	1.6E-07	2.7E-06	4.0E-06	---	7.1E-06	39.2%
Total Polychlorinated Biphenyls (PCBs)	1.4E-07	1.8E-08	---	---	---	1.5E-07	0.8%
Pentachlorophenol (PCP)	---	---	1.0E-07	8.5E-06	---	8.6E-06	47.3%
(Total)	**1.5E-06**	**5.4E-07**	**3.0E-06**	**1.3E-05**	**0.0E+00**	**1.8E-05**	
Angler							
4,4'-DDD (p,p'-)	---	---	---	---	5.9E-07	5.9E-07	0.1%
4,4'-DDE (p,p'-)	---	---	---	---	1.4E-06	1.4E-06	0.3%
4,4'-DDT (p,p'-)	---	---	---	9.3E-07	1.8E-06	2.7E-06	0.6%
Aldrin	---	---	---	1.4E-07	2.2E-06	2.4E-06	0.5%
alpha-Chlordane	---	---	---	---	1.7E-07	1.7E-07	0.0%
Arsenic	---	---	---	1.6E-07	2.0E-06	2.1E-06	0.5%
Chlordane	---	---	---	---	1.5E-06	1.5E-06	0.3%
Dieldrin	---	---	---	2.8E-06	8.6E-06	1.1E-05	2.6%
gamma-Chlordane	---	---	---	---	1.2E-06	1.2E-06	0.3%
N-Nitroso-di-n-propylamine	---	---	---	3.1E-05	---	3.1E-05	7.1%
Pentachlorophenol (PCP)	---	---	---	6.5E-05	---	6.5E-05	15.0%
Total Polychlorinated Biphenyls (PCBs)	---	---	---	---	3.1E-04	3.1E-04	72.6%
trans-Nonachlor	---	---	---	---	4.6E-08	4.6E-08	0.0%
(Total)	**0.0E+00**	**0.0E+00**	**0.0E+00**	**9.9E-05**	**3.3E-04**	**4.3E-04**	

Table D-8. Summary of Chemical- and Pathway- Specific Cancer Risks, Central Tendency Exposure , Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Pathway: Ingestion of Sediment	Dermal Contact with Sediment	Ingestion of Surface Water	Dermal Contact with Surface Water	Fish Consumption	Exposure Pathways Total	% of Total Risk
Segment 2 (RM 3.2 to <4.9)							
Recreator							
4,4'-DDT (p,p'-)	---	---	3.7E-10	2.9E-08	---	3.0E-08	0.4%
Aldrin	4.1E-08	1.6E-08	9.2E-09	3.8E-09	---	7.0E-08	0.8%
Arsenic	9.1E-07	1.4E-07	1.2E-07	3.9E-08	---	1.2E-06	14.6%
Benzo[a]anthracene	3.5E-08	2.2E-08	---	---	---	5.7E-08	0.7%
Benzo[a]pyrene	2.9E-07	1.9E-07	---	---	---	4.8E-07	5.7%
Benzo[b]fluoranthene	5.0E-08	3.2E-08	---	---	---	8.2E-08	1.0%
Benzo[k]fluoranthene	2.8E-09	1.8E-09	---	---	---	4.5E-09	0.1%
bis(2-Ethylhexyl)phthalate	8.2E-09	8.6E-09	---	---	---	1.7E-08	0.2%
Dibenz[a,h]anthracene	2.3E-07	1.5E-07	---	---	---	3.8E-07	4.6%
Dieldrin	2.6E-08	1.0E-08	1.7E-08	7.2E-08	---	1.3E-07	1.5%
Heptachlor	---	---	2.4E-09	4.9E-09	---	7.3E-09	0.1%
Heptachlor epoxide	3.9E-08	1.1E-08	---	---	---	5.0E-08	0.6%
Indeno[1,2,3-cd]pyrene	2.3E-08	1.4E-08	---	---	---	3.7E-08	0.4%
N-Nitroso-di-n-propylamine	3.7E-07	3.0E-07	7.6E-07	1.1E-06	---	2.5E-06	30.5%
Total Polychlorinated Biphenyls (PCBs)	3.9E-07	5.2E-08	---	---	---	4.4E-07	5.3%
Pentachlorophenol (PCP)	---	---	3.2E-08	2.8E-06	---	2.8E-06	33.5%
(Total)	**2.4E-06**	**9.4E-07**	**9.4E-07**	**4.0E-06**	**0.0E+00**	**8.3E-06**	
Angler							
4,4'-DDD (p,p'-)	---	---	---	---	2.9E-07	2.9E-07	0.2%
4,4'-DDE (p,p'-)	---	---	---	---	9.6E-07	9.6E-07	0.5%
4,4'-DDT (p,p'-)	---	---	---	1.4E-07	6.4E-07	7.8E-07	0.4%
Aldrin	---	---	---	1.8E-08	2.2E-06	2.3E-06	1.3%
alpha-Chlordane	---	---	---	---	4.6E-08	4.6E-08	0.0%
Arsenic	---	---	---	1.9E-07	1.8E-06	2.0E-06	1.1%
Chlordane	---	---	---	---	6.0E-07	6.0E-07	0.3%
Dieldrin	---	---	---	3.5E-07	2.2E-06	2.5E-06	1.4%
gamma-Chlordane	---	---	---	---	6.0E-07	6.0E-07	0.3%
N-Nitroso-di-n-propylamine	---	---	---	5.3E-06	---	5.3E-06	3.0%
Pentachlorophenol (PCP)	---	---	---	1.3E-05	---	1.3E-05	7.4%
Total Polychlorinated Biphenyls (PCBs)	---	---	---	---	1.5E-04	1.5E-04	84.0%
trans-Nonachlor	---	---	---	---	4.6E-08	4.6E-08	0.0%
(Total)	**0.0E+00**	**0.0E+00**	**0.0E+00**	**1.9E-05**	**1.6E-04**	**1.8E-04**	

Table D-8. Summary of Chemical- and Pathway- Specific Cancer Risks, Central Tendency Exposure , Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Pathway: Ingestion of Sediment	Dermal Contact with Sediment	Ingestion of Surface Water	Dermal Contact with Surface Water	Fish Consumption	Exposure Pathways Total	% of Total Risk
Segment 3 (RM 4.9 to <6.5)							
Recreator							
4,4'-DDT (p,p'-)	---	---	3.7E-10	2.9E-08	---	3.0E-08	0.1%
Aldrin	4.9E-08	1.9E-08	9.2E-09	3.8E-09	---	8.1E-08	0.4%
Arsenic	7.3E-07	1.1E-07	3.7E-08	1.2E-08	---	8.9E-07	3.9%
Benzo[a]anthracene	9.7E-08	6.2E-08	---	---	---	1.6E-07	0.7%
Benzo[a]pyrene	1.2E-06	7.5E-07	---	---	---	1.9E-06	8.3%
Benzo[b]fluoranthene	1.5E-07	9.7E-08	---	---	---	2.5E-07	1.1%
Benzo[k]fluoranthene	1.3E-08	8.5E-09	---	---	---	2.2E-08	0.1%
bis(2-Ethylhexyl)phthalate	1.6E-07	1.7E-07	---	---	---	3.4E-07	1.5%
Dibenz[a,h]anthracene	2.5E-06	1.6E-06	---	---	---	4.1E-06	17.9%
Dieldrin	1.5E-08	5.7E-09	1.7E-08	7.2E-08	---	1.1E-07	0.5%
Heptachlor	---	---	2.4E-09	4.9E-09	---	7.3E-09	0.0%
Heptachlor epoxide	1.9E-08	5.3E-09	---	---	---	2.5E-08	0.1%
Indeno[1,2,3-cd]pyrene	1.0E-07	6.5E-08	---	---	---	1.7E-07	0.7%
N-Nitroso-di-n-propylamine	2.4E-06	1.9E-06	7.6E-07	1.1E-06	---	6.2E-06	26.9%
Total Polychlorinated Biphenyls (PCBs)	5.3E-06	7.0E-07	---	---	---	6.0E-06	25.9%
Pentachlorophenol (PCP)	---	---	3.2E-08	2.8E-06	---	2.8E-06	12.0%
(Total)	**1.3E-05**	**5.5E-06**	**8.6E-07**	**4.0E-06**	**0.0E+00**	**2.3E-05**	100%
Angler							
4,4'-DDD (p,p'-)	---	---	---	---	3.3E-07	3.3E-07	0.1%
4,4'-DDE (p,p'-)	---	---	---	---	7.3E-07	7.3E-07	0.2%
4,4'-DDT (p,p'-)	---	---	---	1.4E-07	3.7E-07	5.1E-07	0.1%
Aldrin	---	---	---	1.8E-08	5.3E-06	5.3E-06	1.5%
alpha-Chlordane	---	---	---	---	5.2E-08	5.2E-08	0.0%
Arsenic	---	---	---	5.7E-08	1.1E-06	1.1E-06	0.3%
Chlordane	---	---	---	---	2.0E-06	2.0E-06	0.6%
Dieldrin	---	---	---	3.5E-07	2.1E-06	2.4E-06	0.7%
gamma-Chlordane	---	---	---	---	1.5E-06	1.5E-06	0.4%
N-Nitroso-di-n-propylamine	---	---	---	5.3E-06	---	5.3E-06	1.6%
Pentachlorophenol (PCP)	---	---	---	1.3E-05	---	1.3E-05	3.9%
Total Polychlorinated Biphenyls (PCBs)	---	---	---	---	3.1E-04	3.1E-04	90.5%
trans-Nonachlor	---	---	---	---	4.6E-08	4.6E-08	0.0%
(Total)	**0.0E+00**	**0.0E+00**	**0.0E+00**	**1.9E-05**	**3.2E-04**	**3.4E-04**	

Table D-8. Summary of Chemical- and Pathway- Specific Cancer Risks, Central Tendency Exposure , Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Pathway: Ingestion of Sediment	Dermal Contact with Sediment	Ingestion of Surface Water	Dermal Contact with Surface Water	Fish Consumption	Exposure Pathways Total	% of Total Risk
Segment 4 (RM 6.5 to 8.8)							
Recreator							
4,4'-DDT (p,p'-)	---	---	3.7E-10	2.9E-08	---	3.0E-08	0.3%
Aldrin	3.3E-09	1.3E-09	9.2E-09	3.8E-09	---	1.8E-08	0.2%
Arsenic	6.7E-07	1.0E-07	3.7E-08	1.2E-08	---	8.3E-07	7.4%
Benzo[a]anthracene	9.0E-08	5.7E-08	---	---	---	1.5E-07	1.3%
Benzo[a]pyrene	9.3E-07	6.0E-07	---	---	---	1.5E-06	13.8%
Benzo[b]fluoranthene	1.2E-07	7.5E-08	---	---	---	1.9E-07	1.7%
Benzo[k]fluoranthene	1.2E-08	7.5E-09	---	---	---	1.9E-08	0.2%
bis(2-Ethylhexyl)phthalate	1.6E-07	1.7E-07	---	---	---	3.4E-07	3.0%
Dibenz[a,h]anthracene	3.4E-07	2.2E-07	---	---	---	5.5E-07	5.0%
Dieldrin	6.1E-09	2.4E-09	1.7E-08	7.2E-08	---	9.8E-08	0.9%
Heptachlor	---	---	2.4E-09	4.9E-09	---	7.3E-09	0.1%
Heptachlor epoxide	2.6E-09	7.2E-10	---	---	---	3.3E-09	0.0%
Indeno[1,2,3-cd]pyrene	8.2E-08	5.2E-08	---	---	---	1.3E-07	1.2%
N-Nitroso-di-n-propylamine	1.2E-06	9.2E-07	7.6E-07	1.1E-06	---	3.9E-06	35.5%
Total Polychlorinated Biphenyls (PCBs)	4.2E-07	5.6E-08	---	---	---	4.8E-07	4.3%
Pentachlorophenol (PCP)	---	---	3.2E-08	2.8E-06	---	2.8E-06	25.1%
(Total)	**4.0E-06**	**2.3E-06**	**8.6E-07**	**4.0E-06**	**0.0E+00**	**1.1E-05**	
Angler							
4,4'-DDD (p,p'-)	---	---	---	---	5.8E-07	5.8E-07	0.3%
4,4'-DDE (p,p'-)	---	---	---	---	1.2E-06	1.2E-06	0.6%
4,4'-DDT (p,p'-)	---	---	---	1.4E-07	1.8E-06	2.0E-06	1.0%
Aldrin	---	---	---	1.8E-08	2.2E-06	2.3E-06	1.1%
alpha-Chlordane	---	---	---	---	2.9E-07	2.9E-07	0.1%
Arsenic	---	---	---	5.7E-08	1.1E-06	1.2E-06	0.6%
Chlordane	---	---	---	---	7.1E-07	7.1E-07	0.4%
Dieldrin	---	---	---	3.5E-07	1.4E-05	1.5E-05	7.4%
gamma-Chlordane	---	---	---	---	3.3E-07	3.3E-07	0.2%
N-Nitroso-di-n-propylamine	---	---	---	5.3E-06	---	5.3E-06	2.7%
Pentachlorophenol (PCP)	---	---	---	1.3E-05	---	1.3E-05	6.7%
Total Polychlorinated Biphenyls (PCBs)	---	---	---	---	1.6E-04	1.6E-04	78.9%
trans-Nonachlor	---	---	---	---	9.8E-08	9.8E-08	0.0%
(Total)	**0.0E+00**	**0.0E+00**	**0.0E+00**	**1.9E-05**	**1.8E-04**	**2.0E-04**	

Table D-9. Summary of Chemical- and Pathway- Specific Noncancer Hazards, Reasonable Maximum Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Pathway: Ingestion of Sediment	Dermal Contact with Sediment	Ingestion of Surface Water	Dermal Contact with Surface Water	Fish Consumption	Exposure Pathways Total	% of Total Hazard
Segment 1 (RM 0 to <3.2)							
Adult Recreator							
2-Chlorophenol	---	---	8.2E-04	4.8E-03	---	5.7E-03	13.0%
Aldrin	3.1E-05	1.1E-04	5.4E-04	1.6E-04	---	8.4E-04	1.9%
Arsenic	1.5E-03	2.1E-03	9.7E-04	2.1E-04	---	4.7E-03	10.9%
Atrazine	---	---	3.6E-05	5.0E-05	---	8.6E-05	0.2%
bis(2-Ethylhexyl)phthalate	5.0E-06	4.7E-05	---	---	---	5.2E-05	0.1%
Dieldrin	3.7E-05	1.3E-04	7.2E-04	2.1E-03	---	3.0E-03	6.8%
Di-n-butylphthalate	---	---	8.6E-06	2.6E-05	---	3.4E-05	0.1%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	5.2E-05	6.7E-05	---	1.2E-04	0.3%
Heptachlor	---	---	2.9E-05	4.0E-05	---	7.0E-05	0.2%
Heptachlor epoxide	9.0E-05	2.3E-04	---	---	---	3.2E-04	0.7%
PCB Aroclor 1016	1.2E-05	1.4E-05	---	---	---	2.5E-05	0.1%
PCB Aroclor 1254	4.6E-05	5.5E-05	---	---	---	1.0E-04	0.2%
Pentachlorophenol (PCP)	---	---	1.8E-04	1.1E-02	---	1.1E-02	24.7%
Thallium	4.3E-03	5.2E-03	5.2E-03	3.1E-03	---	1.8E-02	40.8%
(Total)	**6.0E-03**	**7.8E-03**	**8.5E-03**	**2.1E-02**	**0.0E+00**	**4.4E-02**	
Child Recreator							
2-Chlorophenol	---	---	3.8E-03	3.4E-02	---	3.8E-02	11.9%
Aldrin	5.8E-04	2.7E-04	2.5E-03	1.1E-03	---	4.5E-03	1.4%
Arsenic	2.8E-02	4.9E-03	4.5E-03	1.5E-03	---	3.8E-02	12.0%
Atrazine	---	---	1.7E-04	3.5E-04	---	5.2E-04	0.2%
bis(2-Ethylhexyl)phthalate	9.2E-05	1.1E-04	---	---	---	2.0E-04	0.5%
Dieldrin	6.8E-04	3.1E-04	3.4E-03	1.5E-02	---	1.9E-02	5.9%
Di-n-butylphthalate	---	---	4.0E-05	1.8E-04	---	2.2E-04	0.1%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	2.4E-04	4.7E-04	---	7.1E-04	0.2%
Heptachlor	---	---	1.4E-04	2.8E-04	---	4.2E-04	0.1%
Heptachlor epoxide	1.7E-03	5.4E-04	---	---	---	2.2E-03	0.7%
PCB Aroclor 1016	2.2E-04	3.3E-05	---	---	---	2.5E-04	0.1%
PCB Aroclor 1254	8.5E-04	1.3E-04	---	---	---	9.8E-04	0.3%
Pentachlorophenol (PCP)	---	---	8.4E-04	7.5E-02	---	7.5E-02	23.6%
Thallium	8.1E-02	1.2E-02	2.4E-02	2.2E-02	---	1.4E-01	43.5%
(Total)	**1.1E-01**	**1.9E-02**	**4.0E-02**	**1.5E-01**	**0.0E+00**	**3.2E-01**	

Table D-9. Summary of Chemical- and Pathway- Specific Noncancer Hazards, Reasonable Maximum Exposure Scenario, Lower Ottawa River HHRA

	Exposure Pathway						
Chemical of Interest	**Ingestion of Sediment**	**Dermal Contact with Sediment**	**Ingestion of Surface Water**	**Dermal Contact with Surface Water**	**Fish Consumption**	**Exposure Pathways Total**	**% of Total Hazard**
Adult Angler							
2-Chlorophenol	---	---	---	2.4E-02	---	2.4E-02	0.0%
4,4'-DDT (p,p'-)	---	---	---	---	2.3E-01	2.3E-01	0.1%
Aldrin	---	---	---	7.8E-04	9.6E-02	9.7E-02	0.1%
alpha-Chlordane	---	---	---	---	2.1E-02	2.1E-02	0.0%
Arsenic	---	---	---	1.1E-03	9.6E-02	9.8E-02	0.1%
Atrazine	---	---	---	2.5E-04	---	2.5E-04	0.0%
Chlordane	---	---	---	---	1.9E-01	1.9E-01	0.1%
Dieldrin	---	---	---	1.0E-02	2.3E-01	2.5E-01	0.1%
Di-n-butylphthalate	---	---	---	1.3E-04	---	1.3E-04	0.0%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	---	3.4E-04	---	3.4E-04	0.0%
gamma-Chlordane	---	---	---	---	1.5E-01	1.5E-01	0.1%
Pentachlorophenol (PCP)	---	---	---	5.3E-02	---	5.3E-02	0.0%
Thallium	---	---	---	1.5E-02	---	1.5E-02	0.0%
Total Polychlorinated Biphenyls (PCBs)	---	---	---	---	1.7E+02	1.7E+02	99.4%
trans-Nonachlor	---	---	---	---	5.8E-03	5.8E-03	0.0%
(Total)	**0.0E+00**	**0.0E+00**	**0.0E+00**	**1.1E-01**	**1.7E+02**	**1.7E+02**	
Child Angler							
2-Chlorophenol	---	---	---	4.3E-02	---	4.3E-02	0.0%
4,4'-DDT (p,p'-)	---	---	---	---	2.3E-01	2.3E-01	0.1%
Aldrin	---	---	---	1.4E-03	9.9E-02	1.0E-01	0.1%
alpha-Chlordane	---	---	---	---	2.2E-02	2.2E-02	0.0%
Arsenic	---	---	---	1.9E-03	9.9E-02	1.0E-01	0.1%
Atrazine	---	---	---	4.4E-04	---	4.4E-04	0.0%
Chlordane	---	---	---	---	1.9E-01	1.9E-01	0.1%
Dieldrin	---	---	---	1.8E-02	2.4E-01	2.6E-01	0.1%
Di-n-butylphthalate	---	---	---	2.3E-04	---	2.3E-04	0.0%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	---	5.9E-04	---	5.9E-04	0.0%
gamma-Chlordane	---	---	---	---	1.6E-01	1.6E-01	0.1%
Pentachlorophenol (PCP)	---	---	---	9.3E-02	---	9.3E-02	0.1%
Thallium	---	---	---	2.7E-02	---	2.7E-02	0.0%
Total Polychlorinated Biphenyls (PCBs)	---	---	---	---	1.8E+02	1.8E+02	99.3%
trans-Nonachlor	---	---	---	---	5.9E-03	5.9E-03	0.0%
(Total)	**0.0E+00**	**0.0E+00**	**0.0E+00**	**1.9E-01**	**1.8E+02**	**1.8E+02**	

Table D-9. Summary of Chemical- and Pathway- Specific Noncancer Hazards, Reasonable Maximum Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Pathway: Ingestion of Sediment	Dermal Contact with Sediment	Ingestion of Surface Water	Dermal Contact with Surface Water	Fish Consumption	Exposure Pathways Total	% of Total Hazard
Segment 2 (RM 3.2 to <4.9)							
Adult Recreator							
2-Chlorophenol	---	---	1.4E-04	8.4E-04	---	9.8E-04	3.4%
Aldrin	7.0E-05	2.5E-04	1.2E-04	3.4E-05	---	4.8E-04	1.7%
Arsenic	1.8E-03	2.5E-03	1.8E-03	3.9E-04	---	6.5E-03	22.6%
Atrazine	---	---	2.0E-05	2.8E-05	---	4.8E-05	0.2%
bis(2-Ethylhexyl)phthalate	2.6E-05	2.4E-04	---	---	---	2.7E-04	0.6%
Dieldrin	2.8E-05	1.0E-04	1.4E-04	4.1E-04	---	6.8E-04	2.4%
Di-n-butylphthalate	---	---	7.0E-06	2.1E-05	---	2.8E-05	0.1%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	1.2E-05	1.5E-05	---	2.7E-05	0.1%
Heptachlor	---	---	7.0E-06	9.7E-06	---	1.7E-05	0.1%
Heptachlor epoxide	2.9E-04	7.3E-04	---	---	---	1.0E-03	3.6%
PCB Aroclor 1016	2.3E-04	2.8E-04	---	---	---	5.1E-04	1.8%
PCB Aroclor 1254	1.1E-04	1.4E-04	---	---	---	2.5E-04	0.9%
Pentachlorophenol (PCP)	---	---	5.9E-05	3.4E-03	---	3.5E-03	12.2%
Thallium	4.1E-03	4.9E-03	3.4E-03	2.0E-03	---	1.4E-02	50.1%
(Total)	**6.6E-03**	**9.1E-03**	**5.7E-03**	**7.2E-03**	**0.0E+00**	**2.9E-02**	
Child Recreator							
2-Chlorophenol	---	---	6.6E-04	5.9E-03	---	6.6E-03	2.9%
Aldrin	1.3E-03	6.0E-04	5.5E-04	2.4E-04	---	2.7E-03	1.2%
Arsenic	3.3E-02	6.0E-03	8.3E-03	2.8E-03	---	5.0E-02	22.6%
Atrazine	---	---	9.4E-05	1.9E-04	---	2.9E-04	0.1%
bis(2-Ethylhexyl)phthalate	4.8E-04	5.8E-04	---	---	---	1.1E-03	2.4%
Dieldrin	5.3E-04	2.4E-04	6.6E-04	2.9E-03	---	4.3E-03	1.9%
Di-n-butylphthalate	---	---	3.3E-05	1.5E-04	---	1.8E-04	0.1%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	3.3E-05	1.1E-04	---	1.4E-04	0.1%
Heptachlor	---	---	2.7E-04	6.8E-05	---	3.4E-04	0.2%
Heptachlor epoxide	5.5E-03	1.7E-03	---	---	---	7.2E-03	3.2%
PCB Aroclor 1016	4.3E-03	6.6E-04	---	---	---	4.9E-03	2.2%
PCB Aroclor 1254	2.1E-03	3.2E-04	---	---	---	2.4E-03	1.1%
Pentachlorophenol (PCP)	---	---	2.7E-04	2.4E-02	---	2.4E-02	11.0%
Thallium	7.6E-02	1.2E-02	1.6E-02	1.4E-02	---	1.2E-01	52.8%
(Total)	**1.2E-01**	**2.2E-02**	**2.7E-02**	**5.1E-02**	**0.0E+00**	**2.2E-01**	

Table D-9. Summary of Chemical- and Pathway- Specific Noncancer Hazards, Reasonable Maximum Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Pathway: Ingestion of Sediment	Dermal Contact with Sediment	Ingestion of Surface Water	Dermal Contact with Surface Water	Fish Consumption	Exposure Pathways Total	% of Total Hazard
Adult Angler							
2-Chlorophenol	---	---	---	4.2E-03	---	4.2E-03	0.0%
4,4'-DDT (p,p'-)	---	---	---	---	8.2E-02	8.2E-02	0.1%
Aldrin	---	---	---	1.7E-04	9.6E-02	9.7E-02	0.1%
alpha-Chlordane	---	---	---	---	5.8E-03	5.8E-03	0.0%
Arsenic	---	---	---	2.0E-03	8.7E-02	8.9E-02	0.1%
Atrazine	---	---	---	1.4E-04	---	1.4E-04	0.0%
Chlordane	---	---	---	---	7.6E-02	7.6E-02	0.1%
Dieldrin	---	---	---	2.0E-03	6.0E-02	6.2E-02	0.1%
Di-n-butylphthalate	---	---	---	1.0E-04	---	1.0E-04	0.0%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	---	7.6E-05	---	7.6E-05	0.0%
gamma-Chlordane	---	---	---	---	7.6E-02	7.6E-02	0.1%
Pentachlorophenol (PCP)	---	---	---	1.7E-02	---	1.7E-02	0.0%
Thallium	---	---	---	1.0E-02	---	1.0E-02	0.0%
Total Polychlorinated Biphenyls (PCBs)	---	---	---	---	8.3E+01	8.3E+01	99.4%
trans-Nonachlor	---	---	---	---	5.8E-03	5.8E-03	0.0%
(Total)	**0.0E+00**	**0.0E+00**	**0.0E+00**	**3.6E-02**	**8.3E+01**	**8.3E+01**	
Child Angler							
2-Chlorophenol	---	---	---	7.4E-03	---	7.4E-03	0.0%
4,4'-DDT (p,p'-)	---	---	---	---	8.4E-02	8.4E-02	0.1%
Aldrin	---	---	---	3.0E-04	9.9E-02	9.9E-02	0.1%
alpha-Chlordane	---	---	---	---	5.9E-03	5.9E-03	0.0%
Arsenic	---	---	---	3.5E-03	8.9E-02	9.3E-02	0.1%
Atrazine	---	---	---	2.4E-04	---	2.4E-04	0.0%
Chlordane	---	---	---	---	7.8E-02	7.8E-02	0.1%
Dieldrin	---	---	---	3.6E-03	6.2E-02	6.5E-02	0.1%
Di-n-butylphthalate	---	---	---	1.8E-04	---	1.8E-04	0.0%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	---	1.3E-04	---	1.3E-04	0.0%
gamma-Chlordane	---	---	---	---	7.8E-02	7.8E-02	0.1%
Pentachlorophenol (PCP)	---	---	---	3.0E-02	---	3.0E-02	0.0%
Thallium	---	---	---	1.8E-02	---	1.8E-02	0.0%
Total Polychlorinated Biphenyls (PCBs)	---	---	---	---	8.5E+01	8.5E+01	99.3%
trans-Nonachlor	---	---	---	---	5.9E-03	5.9E-03	0.0%
(Total)	**0.0E+00**	**0.0E+00**	**0.0E+00**	**6.3E-02**	**8.5E+01**	**8.5E+01**	

Table D-9. Summary of Chemical- and Pathway- Specific Noncancer Hazards, Reasonable Maximum Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Pathway: Ingestion of Sediment	Dermal Contact with Sediment	Ingestion of Surface Water	Dermal Contact with Surface Water	Fish Consumption	Exposure Pathways Total	% of Total Hazard
Segment 3 (RM 4.9 to <6.5)							
Adult Recreator							
2-Chlorophenol	---	---	1.4E-04	8.4E-04	---	9.8E-04	1.5%
Aldrin	8.5E-05	3.0E-04	1.2E-04	3.4E-05	---	5.4E-04	0.8%
Arsenic	1.4E-03	2.0E-03	5.4E-04	1.2E-04	---	4.1E-03	6.1%
Atrazine	---	---	2.0E-05	2.8E-05	---	4.8E-05	0.1%
bis(2-Ethylhexyl)phthalate	5.2E-04	4.9E-03	---	---	---	5.4E-03	12.4%
Dieldrin	1.6E-05	5.7E-05	1.4E-04	4.1E-04	---	6.2E-04	0.9%
Di-n-butylphthalate	---	---	7.0E-06	2.1E-05	---	2.8E-05	0.0%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	1.2E-05	1.5E-05	---	2.7E-05	0.0%
Heptachlor	---	---	7.0E-06	9.7E-06	---	1.7E-05	0.0%
Heptachlor epoxide	1.4E-04	3.6E-04	---	---	---	5.1E-04	0.8%
PCB Aroclor 1016	1.7E-02	2.0E-02	---	---	---	3.6E-02	54.2%
PCB Aroclor 1254	1.1E-03	1.4E-03	---	---	---	2.5E-03	3.7%
Pentachlorophenol (PCP)	---	---	5.9E-05	3.4E-03	---	3.5E-03	5.2%
Thallium	3.2E-03	3.9E-03	3.4E-03	2.0E-03	---	1.2E-02	18.6%
(Total)	**2.3E-02**	**3.3E-02**	**4.4E-03**	**6.9E-03**	**0.0E+00**	**6.7E-02**	
Child Recreator							
2-Chlorophenol	---	---	6.6E-04	5.9E-03	---	6.6E-03	1.1%
Aldrin	1.6E-03	7.3E-04	5.5E-04	2.4E-04	---	3.1E-03	0.5%
Arsenic	2.7E-02	4.8E-03	2.5E-03	8.4E-04	---	3.5E-02	6.0%
Atrazine	---	---	9.4E-05	1.9E-04	---	2.9E-04	0.0%
bis(2-Ethylhexyl)phthalate	9.6E-03	1.2E-02	---	---	---	2.1E-02	49.0%
Dieldrin	3.0E-04	1.4E-04	6.6E-04	2.9E-03	---	4.0E-03	0.7%
Di-n-butylphthalate	---	---	3.3E-05	1.5E-04	---	1.8E-04	0.0%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	5.5E-05	1.1E-04	---	1.6E-04	0.0%
Heptachlor	---	---	3.3E-05	6.8E-05	---	1.0E-04	0.0%
Heptachlor epoxide	2.7E-03	8.6E-04	---	---	---	3.6E-03	0.6%
PCB Aroclor 1016	3.1E-01	4.7E-02	---	---	---	3.6E-01	
PCB Aroclor 1254	2.1E-02	3.2E-03	---	---	---	2.4E-02	4.2%
Pentachlorophenol (PCP)	---	---	2.7E-04	2.4E-02	---	2.4E-02	4.2%
Thallium	6.0E-02	9.3E-03	1.6E-02	1.4E-02	---	1.0E-01	17.2%
(Total)	**4.3E-01**	**7.8E-02**	**2.1E-02**	**4.9E-02**	**0.0E+00**	**5.8E-01**	

Table D-9. Summary of Chemical- and Pathway- Specific Noncancer Hazards, Reasonable Maximum Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Pathway: Ingestion of Sediment	Dermal Contact with Sediment	Ingestion of Surface Water	Dermal Contact with Surface Water	Fish Consumption	Exposure Pathways Total	% of Total Hazard
Adult Angler							
2-Chlorophenol	---	---	---	4.2E-03	---	4.2E-03	0.0%
4,4'-DDT (p,p'-)	---	---	---	---	4.8E-02	4.8E-02	0.0%
Aldrin	---	---	---	1.7E-04	2.3E-01	2.3E-01	0.1%
alpha-Chlordane	---	---	---	---	6.5E-03	6.5E-03	0.0%
Arsenic	---	---	---	5.9E-04	5.3E-02	5.3E-02	0.0%
Atrazine	---	---	---	1.4E-04	---	1.4E-04	0.0%
Chlordane	---	---	---	---	2.5E-01	2.5E-01	0.1%
Dieldrin	---	---	---	2.0E-03	5.8E-02	6.0E-02	0.0%
Di-n-butylphthalate	---	---	---	1.0E-04	---	1.0E-04	0.0%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	---	7.6E-05	---	7.6E-05	0.0%
gamma-Chlordane	---	---	---	---	1.8E-01	1.8E-01	0.1%
Pentachlorophenol (PCP)	---	---	---	1.7E-02	---	1.7E-02	0.0%
Thallium	---	---	---	1.0E-02	---	1.0E-02	0.0%
Total Polychlorinated Biphenyls (PCBs)	---	---	---	---	1.7E+02	1.7E+02	99.5%
trans-Nonachlor	---	---	---	---	5.8E-03	5.8E-03	0.0%
(Total)	**0.0E+00**	**0.0E+00**	**0.0E+00**	**3.5E-02**	**1.7E+02**	**1.7E+02**	
Child Angler							
2-Chlorophenol	---	---	---	7.4E-03	---	7.4E-03	0.0%
4,4'-DDT (p,p'-)	---	---	---	---	4.9E-02	4.9E-02	0.0%
Aldrin	---	---	---	3.0E-04	2.3E-01	2.3E-01	0.1%
alpha-Chlordane	---	---	---	---	6.7E-03	6.7E-03	0.0%
Arsenic	---	---	---	1.0E-03	5.4E-02	5.5E-02	0.0%
Atrazine	---	---	---	2.4E-04	---	2.4E-04	0.0%
Chlordane	---	---	---	---	2.5E-01	2.5E-01	0.1%
Dieldrin	---	---	---	3.6E-03	5.9E-02	6.3E-02	0.0%
Di-n-butylphthalate	---	---	---	1.8E-04	---	1.8E-04	0.0%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	---	1.3E-04	---	1.3E-04	0.0%
gamma-Chlordane	---	---	---	---	1.9E-01	1.9E-01	0.1%
Pentachlorophenol (PCP)	---	---	---	3.0E-02	---	3.0E-02	0.0%
Thallium	---	---	---	1.8E-02	---	1.8E-02	0.0%
Total Polychlorinated Biphenyls (PCBs)	---	---	---	---	1.7E+02	1.7E+02	99.5%
trans-Nonachlor	---	---	---	---	5.9E-03	5.9E-03	0.0%
(Total)	**0.0E+00**	**0.0E+00**	**0.0E+00**	**6.1E-02**	**1.7E+02**	**1.8E+02**	

Table D-9. Summary of Chemical- and Pathway- Specific Noncancer Hazards, Reasonable Maximum Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Pathway: Ingestion of Sediment	Dermal Contact with Sediment	Ingestion of Surface Water	Dermal Contact with Surface Water	Fish Consumption	Exposure Pathways Total	% of Total Hazard
Segment 4 (RM 6.5 to 8.8)							
Adult Recreator							
2-Chlorophenol	---	---	1.4E-04	8.4E-04	---	9.8E-04	3.8%
Aldrin	5.7E-06	2.1E-05	1.2E-04	3.4E-05	---	1.8E-04	0.7%
Arsenic	1.3E-03	1.8E-03	5.4E-04	1.2E-04	---	3.8E-03	14.7%
Atrazine	---	---	2.0E-05	2.8E-05	---	4.8E-05	0.2%
bis(2-Ethylhexyl)phthalate	1.7E-05	1.6E-04	---	---	---	1.8E-04	0.4%
Dieldrin	6.7E-06	2.4E-05	1.4E-04	4.1E-04	---	5.8E-04	2.2%
Di-n-butylphthalate	---	---	7.0E-06	2.1E-05	---	2.8E-05	0.1%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	1.2E-05	1.5E-05	---	2.7E-05	0.1%
Heptachlor	---	---	7.0E-06	9.7E-06	---	1.7E-05	0.1%
Heptachlor epoxide	2.0E-05	4.9E-05	---	---	---	6.8E-05	0.3%
PCB Aroclor 1016	8.8E-04	1.1E-03	---	---	---	1.9E-03	7.4%
PCB Aroclor 1254	2.3E-03	2.7E-03	---	---	---	5.0E-03	19.0%
Pentachlorophenol (PCP)	---	---	5.9E-05	3.4E-03	---	3.5E-03	13.4%
Thallium	2.0E-03	2.4E-03	3.4E-03	2.0E-03	---	9.7E-03	37.3%
(Total)	**6.5E-03**	**8.2E-03**	**4.4E-03**	**6.9E-03**	**0.0E+00**	**2.6E-02**	
Child Recreator							
2-Chlorophenol	---	---	6.6E-04	5.9E-03	---	6.6E-03	3.1%
Aldrin	1.1E-04	4.9E-05	5.5E-04	2.4E-04	---	9.4E-04	0.4%
Arsenic	2.5E-02	4.4E-03	2.5E-03	8.4E-04	---	3.2E-02	15.4%
Atrazine	---	---	9.4E-05	1.9E-04	---	2.9E-04	0.1%
bis(2-Ethylhexyl)phthalate	3.2E-04	3.9E-04	---	---	---	7.2E-04	1.6%
Dieldrin	1.2E-04	5.7E-05	6.6E-04	2.9E-03	---	3.7E-03	1.8%
Di-n-butylphthalate	---	---	3.3E-05	1.5E-04	---	1.8E-04	0.1%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	5.5E-05	1.1E-04	---	1.6E-04	0.1%
Heptachlor	---	---	3.3E-05	6.8E-05	---	1.0E-04	0.0%
Heptachlor epoxide	3.6E-04	1.2E-04	---	---	---	4.8E-04	0.2%
PCB Aroclor 1016	1.6E-02	2.5E-03	---	---	---	1.9E-02	9.0%
PCB Aroclor 1254	4.2E-02	6.4E-03	---	---	---	4.8E-02	23.1%
Pentachlorophenol (PCP)	---	---	2.7E-04	2.4E-02	---	2.4E-02	11.7%
Thallium	3.7E-02	5.6E-03	1.6E-02	1.4E-02	---	7.2E-02	34.5%
(Total)	**1.2E-01**	**2.0E-02**	**2.1E-02**	**4.9E-02**	**0.0E+00**	**2.1E-01**	

Table D-9. Summary of Chemical- and Pathway- Specific Noncancer Hazards, Reasonable Maximum Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Pathway: Ingestion of Sediment	Dermal Contact with Sediment	Ingestion of Surface Water	Dermal Contact with Surface Water	Fish Consumption	Exposure Pathways Total	% of Total Hazard
Adult Angler							
2-Chlorophenol	---	---	---	4.2E-03	---	4.2E-03	0.0%
4,4'-DDT (p,p'-)	---	---	---	---	2.4E-01	2.4E-01	0.3%
Aldrin	---	---	---	1.7E-04	9.7E-02	9.7E-02	0.1%
alpha-Chlordane	---	---	---	---	3.6E-02	3.6E-02	0.0%
Arsenic	---	---	---	5.9E-04	5.5E-02	5.5E-02	0.1%
Atrazine	---	---	---	1.4E-04	---	1.4E-04	0.0%
Chlordane	---	---	---	---	8.9E-02	8.9E-02	0.1%
Dieldrin	---	---	---	2.0E-03	3.9E-01	3.9E-01	0.5%
Di-n-butylphthalate	---	---	---	1.0E-04	---	1.0E-04	0.0%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	---	7.6E-05	---	7.6E-05	0.0%
gamma-Chlordane	---	---	---	---	4.1E-02	4.1E-02	0.0%
Pentachlorophenol (PCP)	---	---	---	1.7E-02	---	1.7E-02	0.0%
Thallium	---	---	---	1.0E-02	---	1.0E-02	0.0%
Total Polychlorinated Biphenyls (PCBs)	---	---	---	---	8.6E+01	8.6E+01	98.9%
trans-Nonachlor	---	---	---	---	1.2E-02	1.2E-02	0.0%
(Total)	**0.0E+00**	**0.0E+00**	**0.0E+00**	**3.5E-02**	**8.7E+01**	**8.7E+01**	
Child Angler							
2-Chlorophenol	---	---	---	7.4E-03	---	7.4E-03	0.0%
4,4'-DDT (p,p'-)	---	---	---	---	2.4E-01	2.4E-01	0.3%
Aldrin	---	---	---	3.0E-04	9.9E-02	9.9E-02	0.1%
alpha-Chlordane	---	---	---	---	3.7E-02	3.7E-02	0.0%
Arsenic	---	---	---	1.0E-03	5.6E-02	5.7E-02	0.1%
Atrazine	---	---	---	2.4E-04	---	2.4E-04	0.0%
Chlordane	---	---	---	---	9.2E-02	9.2E-02	0.1%
Dieldrin	---	---	---	3.6E-03	4.0E-01	4.1E-01	0.5%
Di-n-butylphthalate	---	---	---	1.8E-04	---	1.8E-04	0.0%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	---	1.3E-04	---	1.3E-04	0.0%
gamma-Chlordane	---	---	---	---	4.2E-02	4.2E-02	0.0%
Pentachlorophenol (PCP)	---	---	---	3.0E-02	---	3.0E-02	0.0%
Thallium	---	---	---	1.8E-02	---	1.8E-02	0.0%
Total Polychlorinated Biphenyls (PCBs)	---	---	---	---	8.8E+01	8.8E+01	98.8%
trans-Nonachlor	---	---	---	---	1.3E-02	1.3E-02	0.0%
(Total)	**0.0E+00**	**0.0E+00**	**0.0E+00**	**6.1E-02**	**8.9E+01**	**8.9E+01**	

Table D-10. Summary of Chemical- and Pathway- Specific Noncancer Hazards, Central Tendency Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Pathway: Ingestion of Sediment	Dermal Contact with Sediment	Ingestion of Surface Water	Dermal Contact with Surface Water	Fish Consumption	Exposure Pathways Total	% of Total Hazard
Segment 1 (RM 0 to <3.2)							
Adult Recreator							
2-Chlorophenol	---	---	1.8E-04	2.6E-03	---	2.8E-03	13.1%
Aldrin	2.1E-05	5.8E-05	1.2E-04	8.5E-05	---	2.8E-04	1.3%
Arsenic	9.8E-04	1.1E-03	2.2E-04	1.2E-04	---	2.4E-03	11.1%
Atrazine	---	---	8.1E-06	2.7E-05	---	3.5E-05	0.2%
bis(2-Ethylhexyl)phthalate	3.3E-06	2.4E-05	---	---	---	2.8E-05	0.1%
Dieldrin	2.4E-05	6.8E-05	1.6E-04	1.1E-03	---	1.4E-03	6.4%
Di-n-butylphthalate	---	---	1.9E-06	1.4E-05	---	1.6E-05	0.1%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	1.1E-05	3.6E-05	---	4.8E-05	0.2%
Heptachlor	---	---	6.5E-06	2.2E-05	---	2.8E-05	0.1%
Heptachlor epoxide	6.0E-05	1.2E-04	---	---	---	1.8E-04	0.8%
PCB Aroclor 1016	7.7E-06	7.2E-06	---	---	---	1.5E-05	0.1%
PCB Aroclor 1254	3.0E-05	2.8E-05	---	---	---	5.9E-05	0.3%
Pentachlorophenol (PCP)	---	---	4.0E-05	5.7E-03	---	5.8E-03	27.0%
Thallium	2.9E-03	2.7E-03	1.1E-03	1.7E-03	---	8.4E-03	39.2%
(Total)	**4.0E-03**	**4.1E-03**	**1.9E-03**	**1.1E-02**	**0.0E+00**	**2.1E-02**	
Child Recreator							
2-Chlorophenol	---	---	7.9E-04	5.8E-03	---	6.5E-03	7.0%
Aldrin	2.6E-04	1.6E-04	5.3E-04	1.9E-04	---	1.1E-03	1.2%
Arsenic	1.2E-02	3.0E-03	9.4E-04	2.5E-04	---	1.6E-02	17.3%
Atrazine	---	---	3.5E-05	5.9E-05	---	9.5E-05	0.1%
bis(2-Ethylhexyl)phthalate	4.0E-05	6.7E-05	---	---	---	1.1E-04	0.1%
Dieldrin	3.0E-04	1.9E-04	7.0E-04	2.5E-03	---	3.6E-03	3.9%
Di-n-butylphthalate	---	---	8.4E-06	3.0E-05	---	3.9E-05	0.0%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	5.0E-05	8.0E-05	---	1.3E-04	0.1%
Heptachlor	---	---	2.9E-05	4.8E-05	---	7.6E-05	0.1%
Heptachlor epoxide	7.4E-04	3.2E-04	---	---	---	1.1E-03	1.1%
PCB Aroclor 1016	9.5E-05	2.0E-05	---	---	---	1.1E-04	0.1%
PCB Aroclor 1254	3.7E-04	7.8E-05	---	---	---	4.5E-04	0.5%
Pentachlorophenol (PCP)	---	---	1.8E-04	1.3E-02	---	1.3E-02	13.6%
Thallium	3.5E-02	7.4E-03	5.0E-03	3.7E-03	---	5.1E-02	54.8%
(Total)	**4.9E-02**	**1.1E-02**	**8.3E-03**	**2.5E-02**	**0.0E+00**	**9.4E-02**	

Table D-10. Summary of Chemical- and Pathway- Specific Noncancer Hazards, Central Tendency Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Pathway: Ingestion of Sediment	Dermal Contact with Sediment	Ingestion of Surface Water	Dermal Contact with Surface Water	Fish Consumption	Exposure Pathways Total	% of Total Hazard
Adult Angler							
2-Chlorophenol	---	---	---	3.0E-02	---	3.0E-02	0.1%
4,4'-DDT (p,p'-)	---	---	---	---	4.0E-02	4.0E-02	0.1%
Aldrin	---	---	---	9.6E-04	1.7E-02	1.8E-02	0.1%
alpha-Chlordane	---	---	---	---	3.8E-03	3.8E-03	0.0%
Arsenic	---	---	---	1.3E-03	1.7E-02	1.8E-02	0.1%
Atrazine	---	---	---	3.0E-04	---	3.0E-04	0.0%
Chlordane	---	---	---	---	3.3E-02	3.3E-02	0.1%
Dieldrin	---	---	---	1.3E-02	4.2E-02	5.4E-02	0.2%
Di-n-butylphthalate	---	---	---	1.6E-04	---	1.6E-04	0.0%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	---	4.1E-04	---	4.1E-04	0.0%
gamma-Chlordane	---	---	---	---	2.7E-02	2.7E-02	0.1%
Pentachlorophenol (PCP)	---	---	---	6.5E-02	---	6.5E-02	0.2%
Thallium	---	---	---	1.9E-02	---	1.9E-02	0.1%
Total Polychlorinated Biphenyls (PCBs)	---	---	---	---	3.1E+01	3.1E+01	99.0%
trans-Nonachlor	---	---	---	---	1.0E-03	1.0E-03	0.0%
(Total)	**0.0E+00**	**0.0E+00**	**0.0E+00**	**1.3E-01**	**3.1E+01**	**3.1E+01**	
Child Angler							
2-Chlorophenol	---	---	---	3.5E-02	---	3.5E-02	0.1%
4,4'-DDT (p,p'-)	---	---	---	---	4.0E-02	4.0E-02	0.1%
Aldrin	---	---	---	1.1E-03	1.7E-02	1.8E-02	0.1%
alpha-Chlordane	---	---	---	---	3.7E-03	3.7E-03	0.0%
Arsenic	---	---	---	1.5E-03	1.7E-02	1.9E-02	0.1%
Atrazine	---	---	---	3.6E-04	---	3.6E-04	0.0%
Chlordane	---	---	---	---	3.3E-02	3.3E-02	0.1%
Dieldrin	---	---	---	1.5E-02	4.1E-02	5.6E-02	0.2%
Di-n-butylphthalate	---	---	---	1.8E-04	---	1.8E-04	0.0%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	---	4.8E-04	---	4.8E-04	0.0%
gamma-Chlordane	---	---	---	---	2.7E-02	2.7E-02	0.1%
Pentachlorophenol (PCP)	---	---	---	7.5E-02	---	7.5E-02	0.2%
Thallium	---	---	---	2.2E-02	---	2.2E-02	0.1%
Total Polychlorinated Biphenyls (PCBs)	---	---	---	---	3.0E+01	3.0E+01	98.9%
trans-Nonachlor	---	---	---	---	1.0E-03	1.0E-03	0.0%
(Total)	**0.0E+00**	**0.0E+00**	**0.0E+00**	**1.5E-01**	**3.1E+01**	**3.1E+01**	100.0%

Table D-10. Summary of Chemical- and Pathway- Specific Noncancer Hazards, Central Tendency Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Pathway: Ingestion of Sediment	Dermal Contact with Sediment	Ingestion of Surface Water	Dermal Contact with Surface Water	Fish Consumption	Exposure Pathways Total	% of Total Hazard
Segment 2 (RM 3.2 to <4.9)							
Adult Recreator							
2-Chlorophenol	---	---	3.1E-05	4.5E-04	---	4.9E-04	3.4%
Aldrin	4.7E-05	1.3E-04	2.6E-05	1.8E-05	---	2.2E-04	1.6%
Arsenic	1.2E-03	1.3E-03	4.0E-04	2.1E-04	---	3.1E-03	21.7%
Atrazine	---	---	4.5E-06	1.5E-05	---	1.9E-05	0.1%
bis(2-Ethylhexyl)phthalate	1.7E-05	1.3E-04	---	---	---	1.4E-04	1.0%
Dieldrin	1.9E-05	5.3E-05	3.1E-05	2.2E-04	---	3.2E-04	2.3%
Di-n-butylphthalate	---	---	1.6E-06	1.1E-05	---	1.3E-05	0.1%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	2.6E-06	8.3E-06	---	1.1E-05	0.1%
Heptachlor	---	---	1.6E-06	5.3E-06	---	6.8E-06	0.0%
Heptachlor epoxide	2.0E-04	3.8E-04	---	---	---	5.7E-04	4.0%
PCB Aroclor 1016	1.5E-04	1.4E-04	---	---	---	3.0E-04	2.1%
PCB Aroclor 1254	7.6E-05	7.1E-05	---	---	---	1.5E-04	1.0%
Pentachlorophenol (PCP)	---	---	1.3E-05	1.9E-03	---	1.9E-03	13.1%
Thallium	2.7E-03	2.5E-03	7.5E-04	1.1E-03	---	7.1E-03	49.5%
(Total)	**4.4E-03**	**4.7E-03**	**1.3E-03**	**3.9E-03**	**0.0E+00**	**1.4E-02**	
Child Recreator							
2-Chlorophenol	---	---	1.4E-04	9.9E-04	---	1.1E-03	#REF!
Aldrin	5.8E-04	3.6E-04	1.1E-04	4.0E-05	---	1.1E-03	#REF!
Arsenic	1.5E-02	3.6E-03	1.7E-03	4.7E-04	---	2.0E-02	#REF!
Atrazine	---	---	2.0E-05	3.3E-05	---	5.2E-05	#REF!
bis(2-Ethylhexyl)phthalate	2.1E-04	3.5E-04	---	---	---	5.6E-04	#REF!
Dieldrin	2.3E-04	1.4E-04	1.4E-04	4.8E-04	---	9.9E-04	#REF!
Di-n-butylphthalate	---	---	6.8E-06	2.5E-05	---	3.2E-05	#REF!
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	6.8E-06	1.8E-05	---	2.5E-05	#REF!
Heptachlor	---	---	5.7E-05	1.2E-05	---	6.9E-05	#REF!
Heptachlor epoxide	2.4E-03	1.0E-03	---	---	---	3.4E-03	#REF!
PCB Aroclor 1016	1.9E-03	3.9E-04	---	---	---	2.3E-03	#REF!
PCB Aroclor 1254	9.3E-04	1.9E-04	---	---	---	1.1E-03	#REF!
Pentachlorophenol (PCP)	#REF!	#REF!	5.7E-05	4.1E-03	---	#REF!	#REF!
Thallium	3.3E-02	7.0E-03	3.3E-03	2.4E-03	---	4.6E-02	#REF!
(Total)	**#REF!**	**#REF!**	**5.5E-03**	**8.5E-03**	**0.0E+00**	**#REF!**	

Table D-10. Summary of Chemical- and Pathway- Specific Noncancer Hazards, Central Tendency Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Pathway						
	Ingestion of Sediment	Dermal Contact with Sediment	Ingestion of Surface Water	Dermal Contact with Surface Water	Fish Consumption	Exposure Pathways Total	% of Total Hazard
Adult Angler							
2-Chlorophenol	---	---	---	3.2E-03	---	3.2E-03	0.0%
4,4'-DDT (p,p'-)	---	---	---	---	1.5E-02	1.5E-02	0.1%
Aldrin	---	---	---	1.3E-04	1.7E-02	1.7E-02	0.1%
alpha-Chlordane	---	---	---	---	1.0E-03	1.0E-03	0.0%
Arsenic	---	---	---	1.5E-03	1.5E-02	1.7E-02	0.1%
Atrazine	---	---	---	1.1E-04	---	1.1E-04	0.0%
Chlordane	---	---	---	---	1.3E-02	1.3E-02	0.1%
Dieldrin	---	---	---	1.6E-03	1.1E-02	1.2E-02	0.1%
Di-n-butylphthalate	---	---	---	8.0E-05	---	8.0E-05	0.0%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	---	5.9E-05	---	5.9E-05	0.0%
gamma-Chlordane	---	---	---	---	1.3E-02	1.3E-02	0.1%
Pentachlorophenol (PCP)	---	---	---	1.3E-02	---	1.3E-02	0.1%
Thallium	---	---	---	7.8E-03	---	7.8E-03	0.1%
Total Polychlorinated Biphenyls (PCBs)	---	---	---	---	1.5E+01	1.5E+01	99.2%
trans-Nonachlor	---	---	---	---	1.0E-03	1.0E-03	0.0%
(Total)	**0.0E+00**	**0.0E+00**	**0.0E+00**	**2.8E-02**	**1.5E+01**	**1.5E+01**	
Child Angler							
2-Chlorophenol	---	---	---	3.7E-03	---	3.7E-03	0.0%
4,4'-DDT (p,p'-)	---	---	---	---	1.5E-02	1.5E-02	0.1%
Aldrin	---	---	---	1.5E-04	1.7E-02	1.7E-02	0.1%
alpha-Chlordane	---	---	---	---	1.0E-03	1.0E-03	0.0%
Arsenic	---	---	---	1.8E-03	1.5E-02	1.7E-02	0.1%
Atrazine	---	---	---	1.2E-04	9.7E-04	1.1E-03	0.0%
Chlordane	---	---	---	---	---	0.0E+00	0.0%
Dieldrin	---	---	---	1.8E-03	1.1E-02	1.2E-02	0.1%
Di-n-butylphthalate	---	---	---	9.4E-05	---	9.4E-05	0.0%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	---	6.8E-05	---	6.8E-05	0.0%
gamma-Chlordane	---	---	---	---	1.3E-02	1.3E-02	0.1%
Pentachlorophenol (PCP)	---	---	---	1.5E-02	---	1.5E-02	0.1%
Thallium	---	---	---	9.0E-03	---	9.0E-03	0.1%
Total Polychlorinated Biphenyls (PCBs)	---	---	---	---	1.5E+01	1.5E+01	99.3%
trans-Nonachlor	---	---	---	---	1.0E-03	1.0E-03	0.0%
(Total)	**0.0E+00**	**0.0E+00**	**0.0E+00**	**3.2E-02**	**1.5E+01**	**1.5E+01**	

Table D-10. Summary of Chemical- and Pathway- Specific Noncancer Hazards, Central Tendency Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Pathway: Ingestion of Sediment	Dermal Contact with Sediment	Ingestion of Surface Water	Dermal Contact with Surface Water	Fish Consumption	Exposure Pathways Total	% of Total Hazard
Segment 3 (RM 4.9 to <6.5)							
Adult Recreator							
2-Chlorophenol	---	---	3.1E-05	4.5E-04	---	4.9E-04	1.3%
Aldrin	5.6E-05	1.6E-04	2.6E-05	1.8E-05	---	2.6E-04	0.7%
Arsenic	9.5E-04	1.0E-03	1.2E-04	6.4E-05	---	2.2E-03	5.9%
Atrazine	---	---	4.5E-06	1.5E-05	---	1.9E-05	0.1%
bis(2-Ethylhexyl)phthalate	3.4E-04	2.5E-03	---	---	---	2.9E-03	7.8%
Dieldrin	1.1E-05	3.0E-05	3.1E-05	2.2E-04	---	2.9E-04	0.8%
Di-n-butylphthalate	---	---	1.6E-06	1.1E-05	---	1.3E-05	0.0%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	2.6E-06	8.3E-06	---	1.1E-05	0.0%
Heptachlor	---	---	1.6E-06	5.3E-06	---	6.8E-06	0.0%
Heptachlor epoxide	9.6E-05	1.9E-04	---	---	---	2.8E-04	0.8%
PCB Aroclor 1016	1.1E-02	1.0E-02	---	---	---	2.1E-02	57.5%
PCB Aroclor 1254	7.5E-04	7.0E-04	---	---	---	1.5E-03	3.9%
Pentachlorophenol (PCP)	---	---	1.3E-05	1.9E-03	---	1.9E-03	5.1%
Thallium	2.2E-03	2.0E-03	7.5E-04	1.1E-03	---	6.0E-03	16.2%
(Total)	**1.5E-02**	**1.7E-02**	**9.8E-04**	**3.8E-03**	**0.0E+00**	**3.7E-02**	
Child Recreator							
2-Chlorophenol	---	---	1.4E-04	9.9E-04	---	1.1E-03	#REF!
Aldrin	6.9E-04	4.3E-04	1.1E-04	4.0E-05	---	1.3E-03	#REF!
Arsenic	1.2E-02	2.9E-03	5.3E-04	1.4E-04	---	1.5E-02	#REF!
Atrazine	---	---	2.0E-05	3.3E-05	---	5.2E-05	#REF!
bis(2-Ethylhexyl)phthalate	4.2E-03	7.0E-03	---	---	---	1.1E-02	#REF!
Dieldrin	1.3E-04	8.2E-05	1.4E-04	4.8E-04	---	8.3E-04	#REF!
Di-n-butylphthalate	---	---	6.8E-06	2.5E-05	---	3.2E-05	#REF!
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	1.1E-05	1.8E-05	---	3.0E-05	#REF!
Heptachlor	---	---	6.8E-06	1.2E-05	---	1.8E-05	#REF!
Heptachlor epoxide	1.2E-03	5.2E-04	---	---	---	1.7E-03	#REF!
PCB Aroclor 1016	1.4E-01	2.8E-02	---	---	---	1.6E-01	#REF!
PCB Aroclor 1254	9.2E-03	1.9E-03	---	---	---	1.1E-02	#REF!
Pentachlorophenol (PCP)	#REF!	#REF!	5.7E-05	4.1E-03	---	#REF!	#REF!
Thallium	2.6E-02	5.5E-03	3.3E-03	2.4E-03	---	3.8E-02	#REF!
(Total)	**#REF!**	**#REF!**	**4.3E-03**	**8.2E-03**	**0.0E+00**	**#REF!**	

Table D-10. Summary of Chemical- and Pathway- Specific Noncancer Hazards, Central Tendency Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Pathway: Ingestion of Sediment	Dermal Contact with Sediment	Ingestion of Surface Water	Dermal Contact with Surface Water	Fish Consumption	Exposure Pathways Total	% of Total Hazard
Adult Angler							
2-Chlorophenol	---	---	---	3.2E-03	---	3.2E-03	0.0%
4,4'-DDT (p,p'-)	---	---	---	---	8.5E-03	8.5E-03	0.0%
Aldrin	---	---	---	1.3E-04	4.0E-02	4.1E-02	0.1%
alpha-Chlordane	---	---	---	---	1.2E-03	1.2E-03	0.0%
Arsenic	---	---	---	4.6E-04	9.4E-03	9.8E-03	0.0%
Atrazine	---	---	---	1.1E-04	---	1.1E-04	0.0%
Chlordane	---	---	---	---	4.4E-02	4.4E-02	0.1%
Dieldrin	---	---	---	1.6E-03	1.0E-02	1.2E-02	0.0%
Di-n-butylphthalate	---	---	---	8.0E-05	---	8.0E-05	0.0%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	---	5.9E-05	---	5.9E-05	0.0%
gamma-Chlordane	---	---	---	---	3.3E-02	3.3E-02	0.1%
Pentachlorophenol (PCP)	---	---	---	1.3E-02	---	1.3E-02	0.0%
Thallium	---	---	---	7.8E-03	---	7.8E-03	0.0%
Total Polychlorinated Biphenyls (PCBs)	---	---	---	---	3.0E+01	3.0E+01	99.4%
trans-Nonachlor	---	---	---	---	1.0E-03	1.0E-03	0.0%
(Total)	**0.0E+00**	**0.0E+00**	**0.0E+00**	**2.7E-02**	**3.0E+01**	**3.0E+01**	
Child Angler							
2-Chlorophenol	---	---	---	3.7E-03	---	3.7E-03	0.0%
4,4'-DDT (p,p'-)	---	---	---	---	8.5E-03	8.5E-03	0.0%
Aldrin	---	---	---	1.5E-04	4.0E-02	4.0E-02	0.1%
alpha-Chlordane	---	---	---	---	1.2E-03	1.2E-03	0.0%
Arsenic	---	---	---	5.3E-04	9.3E-03	9.8E-03	0.0%
Atrazine	---	---	---	1.2E-04	---	1.2E-04	0.0%
Chlordane	---	---	---	---	4.4E-02	4.4E-02	0.1%
Dieldrin	---	---	---	1.8E-03	1.0E-02	1.2E-02	0.0%
Di-n-butylphthalate	---	---	---	9.4E-05	---	9.4E-05	0.0%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	---	6.8E-05	---	6.8E-05	0.0%
gamma-Chlordane	---	---	---	---	3.2E-02	3.2E-02	0.1%
Pentachlorophenol (PCP)	---	---	---	1.5E-02	---	1.5E-02	0.1%
Thallium	---	---	---	9.0E-03	---	9.0E-03	0.0%
Total Polychlorinated Biphenyls (PCBs)	---	---	---	---	3.0E+01	3.0E+01	99.4%
trans-Nonachlor	---	---	---	---	1.0E-03	1.0E-03	0.0%
(Total)	**0.0E+00**	**0.0E+00**	**0.0E+00**	**3.1E-02**	**3.0E+01**	**3.0E+01**	

Table D-10. Summary of Chemical- and Pathway- Specific Noncancer Hazards, Central Tendency Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Pathway: Ingestion of Sediment	Dermal Contact with Sediment	Ingestion of Surface Water	Dermal Contact with Surface Water	Fish Consumption	Exposure Pathways Total	% of Total Hazard
Segment 4 (RM 6.5 to 8.8)							
Adult Recreator							
2-Chlorophenol	---	---	3.1E-05	4.5E-04	---	4.9E-04	3.7%
Aldrin	3.8E-06	1.1E-05	2.6E-05	1.8E-05	---	5.9E-05	0.4%
Arsenic	8.8E-04	9.6E-04	1.2E-04	6.4E-05	---	2.0E-03	15.2%
Atrazine	---	---	4.5E-06	1.5E-05	---	1.9E-05	0.1%
bis(2-Ethylhexyl)phthalate	1.2E-05	8.5E-05	---	---	---	9.7E-05	0.7%
Dieldrin	4.4E-06	1.2E-05	3.1E-05	2.2E-04	---	2.7E-04	2.0%
Di-n-butylphthalate	---	---	1.6E-06	1.1E-05	---	1.3E-05	0.1%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	2.6E-06	8.3E-06	---	1.1E-05	0.1%
Heptachlor	---	---	1.6E-06	5.3E-06	---	6.8E-06	0.1%
Heptachlor epoxide	1.3E-05	2.5E-05	---	---	---	3.8E-05	0.3%
PCB Aroclor 1016	5.8E-04	5.5E-04	---	---	---	1.1E-03	8.5%
PCB Aroclor 1254	1.5E-03	1.4E-03	---	---	---	2.9E-03	21.8%
Pentachlorophenol (PCP)	---	---	1.3E-05	1.9E-03	---	1.9E-03	14.1%
Thallium	1.3E-03	1.2E-03	7.5E-04	1.1E-03	---	4.4E-03	32.9%
(Total)	**4.3E-03**	**4.3E-03**	**9.8E-04**	**3.8E-03**	**0.0E+00**	**1.3E-02**	
Child Recreator							
2-Chlorophenol	---	---	1.4E-04	9.9E-04	---	1.1E-03	#REF!
Aldrin	4.7E-05	2.9E-05	1.1E-04	4.0E-05	---	2.3E-04	#REF!
Arsenic	1.1E-02	2.6E-03	5.3E-04	1.4E-04	---	1.4E-02	#REF!
Atrazine	---	---	2.0E-05	3.3E-05	---	5.2E-05	#REF!
bis(2-Ethylhexyl)phthalate	1.4E-04	2.3E-04	---	---	---	3.8E-04	#REF!
Dieldrin	5.4E-05	3.4E-05	1.4E-04	4.8E-04	---	7.1E-04	#REF!
Di-n-butylphthalate	---	---	6.8E-06	2.5E-05	---	3.2E-05	#REF!
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	1.1E-05	1.8E-05	---	3.0E-05	#REF!
Heptachlor	---	---	6.8E-06	1.2E-05	---	1.8E-05	#REF!
Heptachlor epoxide	1.6E-04	7.0E-05	---	---	---	2.3E-04	#REF!
PCB Aroclor 1016	7.2E-03	1.5E-03	---	---	---	8.7E-03	#REF!
PCB Aroclor 1254	1.8E-02	3.9E-03	---	---	---	2.2E-02	#REF!
Pentachlorophenol (PCP)	#REF!	#REF!	5.7E-05	4.1E-03	---	#REF!	#REF!
Thallium	1.6E-02	3.4E-03	3.3E-03	2.4E-03	---	2.5E-02	#REF!
(Total)	**#REF!**	**#REF!**	**4.3E-03**	**8.2E-03**	**0.0E+00**	**#REF!**	

Table D-10. Summary of Chemical- and Pathway- Specific Noncancer Hazards, Central Tendency Exposure Scenario, Lower Ottawa River HHRA

Chemical of Interest	Exposure Pathway: Ingestion of Sediment	Dermal Contact with Sediment	Ingestion of Surface Water	Dermal Contact with Surface Water	Fish Consumption	Exposure Pathways Total	% of Total Hazard
Adult Angler							
2-Chlorophenol	---	---	---	3.2E-03	---	3.2E-03	0.0%
4,4'-DDT (p,p'-)	---	---	---	---	4.2E-02	4.2E-02	0.3%
Aldrin	---	---	---	1.3E-04	1.7E-02	1.7E-02	0.1%
alpha-Chlordane	---	---	---	---	6.4E-03	6.4E-03	0.0%
Arsenic	---	---	---	4.6E-04	9.8E-03	1.0E-02	0.1%
Atrazine	---	---	---	1.1E-04	---	1.1E-04	0.0%
Chlordane	---	---	---	---	1.6E-02	1.6E-02	0.1%
Dieldrin	---	---	---	1.6E-03	7.0E-02	7.1E-02	0.5%
Di-n-butylphthalate	---	---	---	8.0E-05	---	8.0E-05	0.0%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	---	5.9E-05	---	5.9E-05	0.0%
gamma-Chlordane	---	---	---	---	7.3E-03	7.3E-03	0.0%
Pentachlorophenol (PCP)	---	---	---	1.3E-02	---	1.3E-02	0.1%
Thallium	---	---	---	7.8E-03	---	7.8E-03	0.1%
Total Polychlorinated Biphenyls (PCBs)	---	---	---	---	1.5E+01	1.5E+01	98.7%
trans-Nonachlor	---	---	---	---	2.2E-03	2.2E-03	0.0%
(Total)	**0.0E+00**	**0.0E+00**	**0.0E+00**	**2.7E-02**	**1.5E+01**	**1.5E+01**	
Child Angler							
2-Chlorophenol	---	---	---	3.7E-03	---	3.7E-03	0.0%
4,4'-DDT (p,p'-)	---	---	---	---	4.2E-02	4.2E-02	0.3%
Aldrin	---	---	---	1.5E-04	1.7E-02	1.7E-02	0.1%
alpha-Chlordane	---	---	---	---	6.3E-03	6.3E-03	0.0%
Arsenic	---	---	---	5.3E-04	9.7E-03	1.0E-02	0.1%
Atrazine	---	---	---	1.2E-04	---	1.2E-04	0.0%
Chlordane	---	---	---	---	1.6E-02	1.6E-02	0.1%
Dieldrin	---	---	---	1.8E-03	6.9E-02	7.1E-02	0.5%
Di-n-butylphthalate	---	---	---	9.4E-05	---	9.4E-05	0.0%
gamma-Benzene hexachloride (g-BHC; Lindane)	---	---	---	6.8E-05	---	6.8E-05	0.0%
gamma-Chlordane	---	---	---	---	7.2E-03	7.2E-03	0.0%
Pentachlorophenol (PCP)	---	---	---	1.5E-02	---	1.5E-02	0.1%
Thallium	---	---	---	9.0E-03	---	9.0E-03	0.1%
Total Polychlorinated Biphenyls (PCBs)	---	---	---	---	1.5E+01	1.5E+01	98.7%
trans-Nonachlor	---	---	---	---	2.2E-03	2.2E-03	0.0%
(Total)	**0.0E+00**	**0.0E+00**	**0.0E+00**	**3.1E-02**	**1.5E+01**	**1.5E+01**	

APPENDIX E

PCB HAZARD CALCULATIONS FOR FISH CONSUMPTION CATEGORIES LOWER OTTAWA RIVER HUMAN HEALTH RISK ASSESSMENT

Table E-1. PCB Hazard Calculations for Fish Consumption Categories

Consumption Category	Segment	Chemical	C (mg/kg)	x	IR (g/d)	x	fi (unitless)	x	CF (kg/g)	/	BW (kg)	=	ADD (mg/kg-d)	/	Ingestion RfD (mg/kg-d)	=	Noncancer Hazard
Category 1 (Unrestricted consumption)	1	Total PCBs	5.890		140		1		0.001		70		1.2E-02		5.0E-05		236
Category 1 (Unrestricted consumption)	2	Total PCBs	2.827		140		1		0.001		70		5.7E-03		5.0E-05		113
Category 1 (Unrestricted consumption)	3	Total PCBs	5.805		140		1		0.001		70		1.2E-02		5.0E-05		232
Category 1 (Unrestricted consumption)	4	Total PCBs	2.928		140		1		0.001		70		5.9E-03		5.0E-05		117
Category 2 (One meal per week)	1	Total PCBs	5.890		40		1		0.001		70		3.4E-03		5.0E-05		67
Category 2 (One meal per week)	2	Total PCBs	2.827		40		1		0.001		70		1.6E-03		5.0E-05		32
Category 2 (One meal per week)	3	Total PCBs	5.805		40		1		0.001		70		3.3E-03		5.0E-05		66
Category 2 (One meal per week)	4	Total PCBs	2.928		40		1		0.001		70		1.7E-03		5.0E-05		33
Category 3 (One meal per month)	1	Total PCBs	5.890		7.5		1		0.001		70		6.3E-04		5.0E-05		13
Category 3 (One meal per month)	2	Total PCBs	2.827		7.5		1		0.001		70		3.0E-04		5.0E-05		6.1
Category 3 (One meal per month)	3	Total PCBs	5.805		7.5		1		0.001		70		6.2E-04		5.0E-05		12
Category 3 (One meal per month)	4	Total PCBs	2.928		7.5		1		0.001		70		3.1E-04		5.0E-05		6.3
Category 4 (One meal every two months)	1	Total PCBs	5.890		3.7		1		0.001		70		3.1E-04		5.0E-05		6.2
Category 4 (One meal every two months)	2	Total PCBs	2.827		3.7		1		0.001		70		1.5E-04		5.0E-05		3.0
Category 4 (One meal every two months)	3	Total PCBs	5.805		3.7		1		0.001		70		3.1E-04		5.0E-05		6.1
Category 4 (One meal every two months)	4	Total PCBs	2.928		3.7		1		0.001		70		1.5E-04		5.0E-05		3.1