Human Health Risk Assessment

Remedial Investigation/Feasibility Study

Donna Reservoir and Canal System
Donna, Hidalgo County, Texas
EPA Identification No. TX0000605363

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TABLE OF CONTENTS

Page

LIST OF ATTACHMENTS

LIST OF FIGURES

LIST OF FIGURES (CONTINUED)

LIST OF TABLES

LIST OF TABLES (CONTINUED)

LIST OF TABLES (CONTINUED)

LIST OF TABLES (CONTINUED)

LIST OF TABLES (CONTINUED)

Number **Title**

LIST OF TABLES (CONTINUED)

LIST OF TABLES (CONTINUED)

LIST OF TABLES (CONTINUED)

LIST OF TABLES (CONTINUED)

LIST OF TABLES (CONTINUED)

LIST OF ACRONYMS AND ABBREVIATIONS

95UCL	95th percentile upper confidence limit on the mean
$\mu g/m^3$	Microgram(s) per cubic meter
µg/kg	Micrograms(s) per kilogram
ABS	Absorption factor
ACR	Arroyo Colorado River, Main Channel
ACT	Arroyo Colorado Tributary
ADAF	Age-dependent adjustment factor
ADI	Average daily intake
AF	Adherence factor
AT	Averaging time
ATSDR	Agency for Toxic Substances and Disease Registry
AWQC	Aquatic Water Quality Criteria
BW	Body weight
C_{air}	Concentration of chemical in air
CF	Conversion factor
cm^2	Square centimeter(s)
COMC	Cross Over Main Canal
COPC	Chemical(s) of potential concern
CR	Ingestion rate
CSM	Conceptual site model
DAD	Dermal absorbed dose
DA_{event}	Dermal absorbed dose per event
DAF	Dosimetric Adjustment Factor
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DRCS	Donna Reservoir and Canal System
DSHS	Texas Department of State Health Services
EA	EA Engineering, Science, and Technology, Inc., PBC
EC	Exposure concentration
ED	Exposure duration
EF	Exposure frequency
EFH	Exposure Factors Handbook
EPA	U.S. Environmental Protection Agency
EPC	Exposure point concentration

LIST OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

FOD	Frequency of detection
ft	Foot or feet
GIABS	Gastrointestinal dermal absorption factor
g/day	grams/day
g/week	grams/week
HEC	Human Equivalent Concentration
HHRA	Human Health Risk Assessment
HI	Hazard index
HQ	Hazard quotient
in.	Inches
IUR	Inhalation Unit Risk
kg	Kilogram(s)
kg/mg	Kilogram(s) per milligram
L	Liter(s)
L/cm3	Liter(s) per cubic centimeter
L/day	Liter(s) per day
LADI	Lifetime average daily intake
LEC_{10}	10 percent response level concentration
LEMC	Lower East Main Canal
LOAEL	Lowest observed adverse effect level
LRGVES	Lower Rio Grande Valley Environmental Study
LWMCL	Lower West Main Canal Lined
LWMCU	Lower West Main Canal Unlined
MC	Main Canal
MCL	Maximum Contaminant Level
mg/cm^2	Milligram(s) per square centimeter
mg/day	Milligram(s) per day
mg/kg	Milligram(s) per kilogram
mg/kg/day	Milligram(s) per kilogram per day
mg/L	Milligram(s) per liter
mg/m^3	Milligram(s) per cubic meter
NCP	National Contingency Plan
NOAEL	No observed adverse effect level

LIST OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PCL	Protective Concentration Level
PEF	Particulate Emissions Factor
ppm	Parts per million
RBEL	Risk-based Exposure Limit
RfC	Reference concentration
RfD	Reference dose
RGR	Rio Grande River
RI	Remedial Investigation
RL	Reporting limit
RME	Reasonable maximum exposure
RN3E	Reservoir Number 3, Second Enlargement East
RN3W	Reservoir Number 3, Second Enlargement West
RSL	Regional screening level
SA	Surface area
SF	Slope factor
TCEQ	Texas Commission on Environmental Quality
TCDD	2,3,7,8-Tetrachlorodibenzo-para-dioxin
TDH	Texas Department of Health
TEF	Toxicity Equivalent Factor
TEQ	Toxicity Equivalent Quotient
TNRCC	Texas Natural Resource Conservation Commission
UF	Uncertainty factor
UPL	Upper Prediction Limit
USDOC	U.S. Department of Commerce
USFWS	U.S. Fish and Wildlife Service
UWMC	Upper West Main Canal

1. INTRODUCTION

EA Engineering, Science, and Technology, Inc., PBC (EA) has been authorized by the U.S. Environmental Protection Agency (EPA), under Remedial Action Contract Number EP-W-06-004, Task Order 0082-RICO-06NS, to conduct a Remedial Investigation/Feasibility Study at the Donna Reservoir and Canal System (DRCS). EA has prepared this Human Health Risk Assessment (HHRA) in accordance with: (1) specifications provided in the EPA Statement of Work, Revision 03, dated 17 April 2013 (EPA 2013a); and (2) the EPA-approved EA Work Plan and Cost Estimate, Revision 03, dated 12 June 2013 (EA 2013).

The HHRA is an integral part of the Remedial Investigation (RI) process included in the National Contingency Plan (NCP) (40 Code of Federal Regulation 300.430) pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (42 U.S. Code 9605). This risk assessment estimates the risk and hazard to potential human receptors for exposure to media affected by past activities related to the site.

1.1 SITE HISTORY

The site is located in south Texas near the United States border with Mexico. The site includes a system of lined and unlined canals, reservoirs, and adjacent waterways. The canals extend north from the Rio Grande River for approximately 17 miles with lateral branches that extend approximately five miles to the east and west (Figure 1).

The initial construction of the DRCS began in 1906 and has undergone numerous modifications including expansions, rehabilitations, and maintenance (e.g., dredging). The DRCS supplies water to the City of Donna and the North Alamo Water Supply Plant No. 5, and irrigates the surrounding agricultural farmland. Residential development is occurring immediately north of the reservoir, and a combination of agriculture and residential areas exist northeast of the reservoir (Figure 2).

Routine environmental monitoring of the Lower Rio Grande Valley during the 1970s and 1980s revealed elevated concentrations of polychlorinated biphenyls (PCBs) in fish (0.04 to 0.49 milligrams per kilogram [mg/kg]) and sediment (0.02 to 0.40 mg/kg). However, PCBs were not detected among the 124 water samples collected during that time period (Texas Natural Resource Conservation Commission [TNRCC] 1998).

During the Lower Rio Grande Valley Environmental Study (LRGVES) of 1992, the DRCS became an area of interest. In response to the elevated rate of infants born with neural tube defects in Cameron County in 1991, the Interagency Coordinating Committee for United States/Mexico Border Environmental Health initiated the LRGVES. The LRGVES included a contaminant exposure study of nine families residing in Cameron and Hidalgo Counties (TNRCC 1998). The concentration of PCBs in a common carp taken from a local family was 399 mg/kg. This carp was reportedly caught in the DRCS Main Canal. Blood samples from the residents in possession of the fish also had elevated concentrations of PCBs (TNRCC 2001). In comparison, PCB concentrations in fish tissue were monitored through the National Contaminant

Biomonitoring Program conducted by the U.S. Fish and Wildlife Service (USFWS) from 1976 through 1984. By 1984, results of this survey revealed a downward trend in the geometric mean of total PCBs in whole fish from 0.89 parts per million (ppm) in 1976 to 0.39 ppm in 1984 (EPA 1999). The maximum total PCB concentrations detected in whole fish also declined from 70.6 ppm in 1976 to 6.7 ppm in 1984 (EPA 1999).

Following the results of the LRGVES, the Texas Department of Health (TDH) and TNRCC conducted extensive sampling throughout Hidalgo County and along the Rio Grande River from El Paso to Brownsville. The DRCS contained elevated concentrations of PCBs, while other waters studied did not reveal elevated concentrations (TNRCC 2001). Following the TDH Risk Determination for Consumption of Fish from the Donna Irrigation System on 4 February 1994, the TDH issued Aquatic Life Order Number 9, ordering that the Donna Irrigation System be declared a prohibited area for the taking of all species of aquatic life.

In 2001, a Screening Site Inspection was conducted at the site. Elevated concentrations of PCB Aroclor-1254 were found in suspended sediment samples. Concentrations ranged from 15 micrograms per kilogram (µg/kg) to 53 µg/kg over an approximate 5.75 mile distance in the DRCS. The conclusions presented in the Screening Site Inspection stated that concentrations of the hazardous substance PCB Aroclor-1254 met the observed release criteria (TNRCC 2001).

The 2005 fish tissue collection by Texas Department of State Health Services (DSHS) revealed that PCBs were present in most of the 30 fish collected in the Main Canal and Reservoir at concentrations ranging from below detection limits (<0.005 µg/kg) to 2,706 µg/kg. Fish and suspended sediments have already been impacted, and residents continue to consume fish regardless of the ban. Additional details regarding previous investigations at the site are provided in the *Conceptual Understanding of the Site Technical Memorandum* (EA 2012).

In March 2008, the site was listed on the National Priorities List due to PCB contamination in sediment and fish. The contamination source had not been identified, and the nature and extent of contamination were not fully delineated at that time.

On 6 August 2008, an action memorandum was signed and approved by EPA Region 6 for the removal of fish from the DRCS. The removal action involved the depopulation of edible size PCB-contaminated fish from the canal area. The removal was coordinated with USFWS, Agency for Toxic Substances and Disease Registry (ATSDR), DSHS, Texas Commission on Environmental Quality (TCEQ), and the Donna Irrigation District.

Fish removal actions were conducted in August 2008, February 2009, August 2009, and October 2012. Approximately 38,940 fish were removed during these removal actions of the canal and reservoir system. During the first fish removal, PCBs were not detected in fish samples taken from the main channel of the DRCS, which runs from the Rio Grande River to the Arroyo Colorado siphon. PCBs, primarily Aroclor-1254, were detected in fish from the channel that extends from north of the siphon to the west, and from the channel from north of the siphon to the northeast.

1.2 OBJECTIVE

The overall objective of this HHRA is to evaluate potential human health risk under current and potential future conditions at the site. Specifically, the HHRA presents the following objectives:

- Outline the regulatory basis and guidance for conducting the HHRA
- Outline the methods for determining chemicals of potential concern (COPCs) for the HHRA
- Present the exposure setting for the site that details local land use, nearby human populations, and potential site activities
- Develop a conceptual site model (CSM) that characterizes relevant contaminant pathways and receptors of concern
- Calculate potential carcinogenic and non-carcinogenic risk to receptors of concern (e.g., any human contact at the site under present or future scenarios)
- Identify areas or media that pose no unacceptable risks to human health and require no further action
- Determine COPCs or areas that contribute unacceptable risks, which will be used to determine risk-based preliminary remediation goals in the feasibility study.

1.3 GENERAL HUMAN HEALTH RISK ASSESSMENT APPROACH

The HHRA follows guidance as recommended by the EPA. Specific application of guidance throughout the risk assessment process is detailed in Section 2 of this document. The following guidance documents were used for this HHRA:

- *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part A) (Interim Final)*, EPA/540/1-89/002 (EPA 1989)
- *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual Supplemental Guidance – Standard Default Exposure Factors* (Interim Final), Publication 9285.6-03 (EPA 1991a)
- *Risk Assessment Guidance for Superfund*, *Volume I – Human Health Evaluation Manual (Part B – Development of Risk-based Preliminary Remediation Goals)*. EPA/540/R-92/003. December (EPA 1991b)

- *Guidelines for Data Usability in Risk Assessment (Part A)*. Office of Solid Waste and Emergency Response, Publication OSWER 9285.7-09A (EPA 1992)

- *Exposure Factors Handbook*: *Volumes I, II, and III.* EPA/600/P-95/002a,b,c. August (EPA 1997)

- *Guidance for Assessing Chemical Contaminant Data for Use in Fish Advisories; Volume 2: Risk Assessment and Fish Consumption Limits, Third Edition*. Office of Water, EPA 823-B-00-008. November (EPA 2000a)

- *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part D: Standardized Planning, Reporting and Review of Superfund Risk Assessments)*. Final. Office of Emergency and Remedial Response, Washington, D.C. Publication 9285.7-47. December (EPA 2002a)

- *Memorandum: Human Health Toxicity Values in Superfund Risk Assessments*. Office of Solid Waste and Emergency Response. OSWER 9285.7-53 (EPA 2003)

- *Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E: Supplemental Guidance for Dermal Risk Assessment)*. Final. Office of Superfund Remediation and Technology Innovation. EPA-540-R-99-005. OSWER 9285.7-02EP. July (EPA 2004)

- *Guidelines for Carcinogen Risk Assessment*. Risk Assessment Forum. EPA/630/P-03/001F. March (EPA 2005a)

- *Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens*. Risk Assessment Forum. EPA-630-R-03-003F. March (EPA 2005b)

- *Risk Assessment Guidance for Superfund*. *Volume I: Human Health Evaluation Manual (Part F: Supplemental Guidance for Inhalation Risk Assessment)*. Final. Office of Superfund Remediation and Technology Innovation. EPA-540-R-070-002. January (EPA 2009)

- *Exposure Factors Handbook*: *2011 Edition*. EPA-600-R-090-052F. September (EPA 2011)

- *Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors*. Office of Solid Waste and Emergency Response. OSWER 9200.1-120. 6 February (EPA 2014a)

- Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites. June (EPA 2015a)

- *Risk Levels, Hazard Indices, and Cumulative Adjustment*. Texas Commission on Environmental Quality. Remediation Division, RG-366/TRRP-18. October (TCEQ 2008)

- Protective Concentration Limits. Available at: https://www.tceq.texas.gov/remediation/trrp/trrppcls.html. November (TCEQ 2014).

2. HUMAN HEALTH RISK ASSESSMENT METHODOLOGY

The purpose of this HHRA is to evaluate potential human health concerns from exposure to environmental media within or near the site that has been affected by past releases. To determine human health concerns, the HHRA evaluates potential sources of contamination and routes of migration based on current and potential future site uses. The HHRA results are based upon exposure pathways that are occurring, can occur, or are reasonably likely to occur in the future. Risks determined in the HHRA are considered baseline risks associated with exposure to media affected by the site. The baseline risk assumes no remedial actions or other means of exposure reduction. The HHRA evaluates the reasonable maximum exposure (RME) that has the potential to occur at the site. Therefore, HHRA results are considered potential and should be used as a guideline in making risk management decisions.

Following EPA guidance (1989), the HHRA methodology involves a four-step process: data evaluation and hazard assessment, exposure assessment, toxicity assessment, and risk characterization. The following sections detail each step.

2.1 DATA EVALUATION AND HAZARD ASSESSMENT

In the data evaluation and hazard assessment, all available environmental data for the site are compiled and reviewed. The site environmental data are analyzed for data quality and compared to risk-based screening values. The comparison to risk-based screening values allows the HHRA to focus on analytes that may contribute significantly to overall sites risks. Analytes that are below risk-based screening values are below a level that is not considered a concern for human health and do not require further evaluation.

2.1.1 Data Included in the Human Health Risk Assessment

The HHRA incorporates the results of samples collected and analyzed as part of the RI field activities. The RI field activities were conducted from 2012 to 2015 and are documented in the RI Report. Environmental media sampled included soil, surface water, sediment, suspended sediment, ground water, fish tissue, mollusk tissue, and passive samplers. In addition, sample results from the fish removal actions completed in August 2008, February 2009, and August 2009 were also evaluated in the HHRA (Dynamac Corporation 2009). Sample locations are presented on Figures 3 through 12. A list of samples evaluated in the HHRA is included in Attachment 1.

Only validated soil, surface water, sediment, ground water, and fish tissue results were evaluated in the HHRA. Data validation is a systematic process of reviewing sample/analyte-specific data against a set of method criteria and data quality objectives to determine whether the quality of the data set is adequate for its intended use. The *Data Evaluation Technical Memorandum* (EA 2015) discusses the results of the data validation. Details about sampling methods, sample locations, and analytical methods can be found in the RI Report.

Ten ambient or background soil samples were collected from a 0 to 12 inch (in.) depth. Background samples were identified as AMB-101-SO through AMB-110-SO. These samples were collected within the Las Palomas Wildlife Management Area located southeast of the DRCS. Five soil samples were collected within the Baird Unit of the Las Palomas Wildlife Management Area, and five soil samples were collected within the Taormina Unit of the Las Palomas Wildlife Management Area (Figure 2). Background samples were analyzed for target analyte list metals, pesticides/PCBs, semivolatile organic compounds, and volatile organic compounds. Metals, three pesticides (4,4'-dichlorodiphenyldichloroethylene [DDE], 4,4'-dichlorodiphenyltrichloroethane [DDT], and gamma-Chlordane), di-n-butyl phthalate, and total PCB congeners were detected in background samples. It is noted that gamma-Chlordane and di-n-butyl phthalate were only detected in one background sample. Additionally, PCB congeners were detected in three background samples (AMB-101-SO, AMB-102-SO, and AMB-109-SO). These three background samples were the only samples analyzed for PCB congeners. For the HHRA, upper prediction limits (UPLs) were calculated for 4,4'-DDE, 4,4'-DDT, and metals in background data using ProUCL (Version 5.0.00). Background UPLs are presented on the risk-based screening tables for information purposes but were not used in the COPCs selection process. Background UPLs will be used to make risk management decisions for any chemical that is considered a potential chemical of concern in soil based upon the results of the HHRA.

2.1.2 Data Quality Evaluation

The inclusion or exclusion of data within the HHRA on the basis of analytical qualifiers was performed in accordance with EPA guidance (EPA 1989, 1992). Analytical qualifiers were applied during the data validation process. The following procedures were followed if qualifiers were present:

- Analytical results bearing the U qualifier (indicating that the analyte was not detected at the given reporting limit [RL]) were retained in the data set and considered non-detects at the given RL.

- Analytical results for organic and inorganic analytes bearing the J qualifier (indicating that the reported value was estimated because the analyte was detected at a concentration below the RL or for other reasons) were retained at the reported concentration.

- Inorganic analytical results bearing the B qualifier (indicating the analyte was detected between the method detection limit and the RL) were retained at the reported concentration.

- Analytical results bearing the R qualifier (indicating that the data were rejected during the validation process) were not used in the HHRA.

If duplicate samples were collected or duplicate analyses were conducted on a single sample, the following guidelines were employed to select the appropriate sample measurement:

- If both samples/analyses showed that the analyte was present, the maximum detected concentration of the two samples was retained for analysis.

- If both samples/analyses were not detected, the maximum of the two non-detect RLs was retained for analysis.

- If only one sample/analysis indicated that the analyte was present, it was retained for analysis and the non-detect value was discarded.

Organic contaminants detected in laboratory method blanks and blanks collected in the field may indicate that a contaminant could be present due to sample handling procedures. Organic sample results determined to be present from laboratory or field contamination were qualified "B" by the data validator. Organic analytes that are common laboratory contaminants were qualified if detected at less than 10 times the blank concentration. All other organic analytes were qualified if detected at less than five times the blank concentration. Organic analytes determined by the validator to be due to blank contamination are not evaluated in the HHRA.

Laboratory quality control samples, spikes, and blanks were not included in the HHRA. Arithmetic means and other statistical measures were calculated separately for each reduced database (i.e., excluding R qualified data) as detailed in the above discussion. The frequency of detection (FOD) is based on the number of detected concentrations out of the total number of samples, excluding R qualified data. Since samples were sometimes analyzed for different sets of analytes, the total number of samples used in calculation of the FOD may vary by analyte.

2.1.3 Chemical of Potential Concern Selection

To determine COPCs at the site, all detected analytes were compared to risk-based screening criteria. Risk-based screening was conducted by comparing maximum detected analyte concentrations to risk-based screening concentrations. Any analyte in any medium for which the maximum measured concentration exceeded the risk-based screening concentration was retained as a COPC. Tables 2.1 through 2.17 present the risk-based screening.

For soil and ground water, the EPA RSLs (EPA 2015a) were used for risk-based screening purposes in the HHRA. The EPA RSLs combine human health toxicity values with "standard" exposure scenarios to estimate analyte concentrations in environmental media that are considered by the EPA to be protective of human exposures (including sensitive populations), over a lifetime. For instance, a residential scenario assumes a standard exposure of 350 days per year over a 26-year duration. The screening values are based on specific, conservative, fixed levels of risk. For carcinogens, this is 10^{-6}, which is the lower bound for excess lifetime potential carcinogenic risk as defined by the NCP (EPA 1990a). For non-carcinogens, the screening values are based on a hazard quotient of 1.0. To account for potential cumulative effects of multiple contaminants affecting the same target organ, one-tenth of the acceptable non-carcinogenic threshold was used for screening. The EPA RSL table identifies some carcinogenic contaminants where the carcinogenic RSL is greater than one-tenth the non-carcinogenic RSL (identified in the EPA RSL tables as "c^{**}"). In these instances, the more conservative one-tenth the non-carcinogenic RSL was used. The EPA residential soil RSLs were used for soil, and the EPA tap water RSLs were used for ground water.

In addition, the TCEQ Protective Concentration Levels (PCLs) were used for risk-based screening of soil, ground water, and sediment (TCEQ 2006, 2014). For soil, the $^{Tot}Soil_{Comb}$ PCLs for a 0.5-acre source area were used. For ground water, the $^{GW}GW_{Ing}$ PCLs for a 0.5-acre source area were used. For sediment, TCEQ PCLs were used (TCEQ 2006). The TCEQ risk-based exposure limits (RBELs) were used for surface water screening (TCEQ 2011). For surface water, total inorganics were used for the risk-based screening, except for lead. For lead, the dissolved lead concentration in surface water was used in accordance with the TCEQ RBEL for this chemical (TCEQ 2011).

In addition, the HHRA evaluates field-collected fish tissue. Fish tissue results were compared to the EPA Region 3 RSL Resident Fish Screening Table (EPA 2015b), which assumes a default fish ingestion rate of 54 grams/day (g/day). EPA guidance (1991c) notes,

> "*For recreational fishing, the average consumption rate of 54 g/day [grams/day] from Pao, et al. (1982) is used. This value is derived from a 3-day study of people who ate finfish, other than canned, dried or raw. An example of this consumption rate is about two 8-ounce servings per week. Other values presented in EFH [Exposure Factors Handbook, EPA 1990b], for consumption of recreationally caught fish, are from limited studies of fishermen on the west coast and may not be applicable to catches in other areas*."

A subset of the samples collected for PCB Aroclors analysis were also analyzed for PCB congeners. Individual congener results were summed by the laboratory performing the analysis for a sample location to obtain a total PCB congener concentration. PCB congeners were summed assuming non-detects were equal to zero. Risk-based screening for total PCB congeners was compared to the appropriate media value for PCBs-"High Risk," which is similar to the screening values for all Aroclors.

Soil samples were collected from 0 to 6 in. and 6 to 12 in. soil horizons from areas along the DRCS and near irrigation risers within agricultural fields, and from depths up to 36 feet (ft). For risk-based screening, surface soil from each sampling horizon (0 to 6 in. and 6 to 12 in.) were screened separately as shown in Tables 2.1 and 2.2. However, soil was not divided by exposure areas and samples greater than 12 in. (collected during monitor well installation) were not evaluated. Additionally, background UPLs for metals, 4,4'-DDE, and 4,4'-DDT are presented on the risk-based screening tables. Background UPLs were not used to eliminate chemicals as COPCs. Only two ground water samples were collected from monitoring wells MW-101 and MW-102 (Table 2.3).

Based upon results of past investigations, potential source areas, and size of the DRCS, the site was divided into separate exposure areas. These exposure areas are shown on Figure 2. The following abbreviations were used for each exposure area:

- MC = Main Canal
- LWMCU = Lower West Main Canal Unlined
- LWMCL = Lower West Main Canal Lined
- LEMC = Lower East Main Canal
- COMC = Cross Over Main Canal
- RN3W = Reservoir Number 3, Second Enlargement, West
- RN3E = Reservoir Number 3, Third Enlargement, East
- ACR = Arroyo Colorado River, Main Channel
- ACT = Arroyo Colorado Tributary
- RGR = Rio Grande River
- SIP = Siphon.

As an initial risk-based screening in the HHRA, sediment sample results from these exposure areas were screened separately to determine if the individual exposure areas should be combined. This initial risk-based screening is provided in Attachment 2. Surface water samples were not screened separately at this initial point due to the lower number of surface water samples collected in relation to sediment samples. The results of the individual exposure area screening were used to combine the exposure areas based upon COPCs selected, COPC concentrations, and proximity. Additionally, Figure 13 presents the fish tissue sample results for Aroclor-1254, Aroclor-1260, and total PCB congeners. Figure 14 presents sediment sample locations with detectable Aroclors. Figures 15 through 21 present sediment sample results for Aroclor-1254 and Aroclor-1260 to detail the spatial distribution of these chemicals throughout the DRCS. Based upon the individual exposure area risk-based screening, the following exposure areas were combined:

1. Upstream and Adjacent to the Siphon (MC, RGR, ACT, and ACR)
2. The Siphon and Downstream (LWMCU, LWMCL, LEMC, and SIP)
3. The Reservoirs (RN3E and RN3W)
4. Downstream of the Reservoirs (COMC).

These combined exposure areas are presented on Figure 22 and were used for both surface water and sediment samples to perform a second risk-based screening of the combined dataset. Tables 2.4 through 2.11 present the risk-based screening for the combined surface water and sediment exposure areas.

Due to the movement of fish across the DRCS, fish tissue results were screened as a total dataset across the entire site. Additionally, individual fish species were also compared to risk-based screening criteria to support in potential risk management decisions for fish within the DRCS. Only fish species with greater than four samples were compared to risk-based screening criteria. Tables 2.12 through 2.17 present the fish tissue risk-based screening.

2.1.4 Analytes Exceeding Risk-Based Screening Levels

The occurrence, distribution, and selection of COPC are represented in medium-specific tables following the Risk Assessment Guidance for Superfund D format (EPA 2002a). Tables 2.1 through 2.17 present the risk-based screening results for the site. The tables present the minimum and maximum detected concentrations, the location of the maximum detected concentrations, as well as the FOD for each chemical detected. Analytes that exceed screening criteria are highlighted and presented in bold type.

2.1.4.1 Soils

The following COPCs were identified in soil (0 to 6 in.) (Table 2.1) based on the risk-based screening: aluminum, arsenic, cobalt, manganese, vanadium, and benzo(a)pyrene.

The following COPCs were identified in soil (6 to 12 in.) (Table 2.2) based on the risk-based screening: aluminum, arsenic, cobalt, manganese, and vanadium.

2.1.4.2 Ground Water

The following COPCs were identified in ground water (Table 2.3) based on the risk-based screening: dissolved and total arsenic, dissolved and total manganese, and dissolved vanadium.

2.1.4.3 Sediment

Exposure Area 1: Upstream and Adjacent to the Siphon (MC, RGR, ACT, and ACR)

This exposure area is associated with the segments from the Rio Grande River to the siphon entrance and includes the Arroyo Colorado River floodplain (Figure 22). Surface water and sediment samples were collected within the Main Canal (MC), Rio Grande River (RGR), Arroyo Colorado Tributary (ACT) and Arroyo Colorado River (ACR).

Aluminum and benzo(a)pyrene were the only COPCs identified in sediment (Table 2.4) based on the TCEQ sediment PCL screening.

The following COPCs were identified in surface water (Table 2.5) based on the TCEQ surface water RBEL screening: arsenic, manganese, mercury, total PCBs, and bis(2-ethylhexyl)phthalate.

Exposure Area 2: The Siphon and Downstream (LWMCU, LWMCL, and LEMC)

This exposure area is associated with canal segments that extend from the siphon exit to the reservoirs (Figure 22). Surface water and sediment samples were collected within the Lower West Main Canal Unlined (LWMCU), Lower East Main Canal (LEMC), and Lower West Main Canal Lined (LWMCL).

The following COPCs were identified in sediment (Table 2.6) based on the TCEQ sediment PCL screening: aluminum, benzo(a)pyrene, Aroclor-1254, and total PCBs.

The following COPC were identified in surface water (Table 2.7) based on the TCEQ surface water RBEL screening: manganese, Aroclor-1254, total PCBs, and 4,4'-DDT.

Exposure Area 3: The Reservoirs (RN3E and RN3W)

This exposure area includes the reservoirs of the DRCS (Figure 22). Surface water and sediment samples were collected within the the Reservoir No. 3 Second Enlargement West Reservoir (RN3W) and Reservoir No. 3 Third Enlargement East Reservoir (RN3E).

Aluminum was the only COPC identified in sediment (Table 2.8) based on the TCEQ sediment PCL screening.

The following COPCs were identified in surface water (Table 2.9) based on the TCEQ surface water RBEL screening: total PCBs and 4,4'-DDT.

Exposure Area 4: Downstream of the Reservoirs (COMC)

This exposure area contains the canal segments north of the reservoirs. It is noted that no samples were collected in the Upper West Main Canal (UWMC; Figure 2). Surface water and sediment samples were collected within the COMC (Figure 22).

The following COPCs were identified in sediment (Table 2.10) based on the TCEQ sediment PCL screening: aluminum, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene.

The following COPC was identified in surface water (Table 2.11) based on the TCEQ surface water RBEL screening: total PCBs.

2.1.4.4 Fish Tissue

The following COPCs were identified in all fish tissue results (Table 2.12) based on the EPA fish RSL screen: arsenic, cobalt, mercury, Aroclor-1254, Aroclor-1260, total PCBs, 4,4-DDE, 4,4-DDT, Aldrin, alpha-BHC, delta-BHC, dieldrin, endrin, gamma-BHC, gamma-chlordane, and heptachlor epoxide.

In addition, certain species were also evaluated separately based upon the number of samples collected for the species. Samples results from the buffalo, catfish, carp, gar, and largemouth bass were screened against the EPA fish RSL screen.

For the buffalo fish, the following COPCs were identified (Table 2.13): arsenic, mercury, Aroclor-1254, Aroclor-1260, total PCBs, 4,4-DDE, dieldrin, gamma-chlordane, and heptachlor epoxide.

For the gar, the following COPCs were identified (Table 2.14): cobalt, mercury, Aroclor-1254, Aroclor-1260, total PCBs, and 4,4'-DDE.

For the catfish, the following COPCs were identified (Table 2.15): mercury, Aroclor-1254, Aroclor-1260, total PCBs, 4,4-DDE, alpha-BHC, delta-BHC, dieldrin, gamma-BHC, and heptachlor epoxide.

For the largemouth bass, the following COPCs were identified (Table 2.16): mercury, Aroclor-1254, total PCBs, 4,4'-DDE, Aldrin, dieldrin, and heptachlor epoxide.

For the carp, the following COPCs were identified (Table 2.17): arsenic, cobalt, mercury, Aroclor-1254, Aroclor-1260, total PCBs, 4,4'-DDE, 4,4'-DDT, aldrin, dieldrin, endrin, gamma-chlordane, and heptachlor epoxide.

In addition to the species identified above, samples were also collected from drum (four samples analyzed for Aroclors and one sample for total PCBs congeners), shad (one sample for Aroclors), tilapia (one sample for Aroclors), and white bass (four samples analyzed for Aroclors and one sample for total PCBs congeners). These fish species were not evaluated separately due to the low sample size. Results from these fish species are included within the evaluation of all fish tissue results dataset.

2.2 EXPOSURE ASSESSMENT

The second step of the HHRA process is the exposure assessment. In the exposure assessment, the receptors of concern and potential exposure pathways are identified. The COPCs in site environmental media are converted into systemic doses, taking into account contaminant concentrations, rates of contact (e.g., ingestion rates), and absorption rates of different COPCs. The magnitude, frequency, and duration of these exposures are then integrated to obtain estimates of daily doses over a specified period of time (e.g., lifetime, activity-specific duration).

The exposure assessment includes several steps:

- Evaluating the exposure setting, including a description of the land uses and the potentially exposed human populations

- Developing the CSM identifying the source of contamination, contamination transport and release mechanisms, exposure media, exposure routes, and potentially exposed populations

- Calculating exposure point concentrations (EPCs) for each COPC for each of the complete exposure pathways identified in the CSM

- Identifying the exposure models and parameters with which to calculate the exposure doses

- Calculating exposure doses.

2.2.1 Exposure Setting

The DRCS is located in south Texas near the United States border with Mexico and the Gulf of Mexico, southwest of the city of Donna (Figure 1). The DRCS includes the 400-acre Donna Reservoir and a system of lateral canals and pipes. The DRCS extends north from the Rio Grande River approximately 17 miles with lateral canals that extend approximately 5.6 miles to the east and west. The DRCS is owned and operated by the Donna Irrigation District No. 1.

Water is pumped into the DRCS from the Rio Grande through five pipes at a point approximately one mile downstream from Reynosa, Tamaulipas, Mexico. The pumps lifting water from the Rio Grande are capable of moving fish from the river to the DRCS. However, the pumps do not allow fish to return to the Rio Grande. Pumps at the Rio Grande and at the reservoir were both originally diesel driven, however the pumps at the reservoir have been converted to electrical drive. The volume and velocity of the water entering the canal system and thus the reservoir can be controlled by the number of operational pumps (DSHS 2010). The water enters the canal at an average rate of 3.4 cubic meters per second (120 cubic feet per second) (U.S. Geological Survey 2002) and travels north by gravity flow for approximately two miles in an unlined, earthen canal until it reaches a siphon. The siphon submerges below the Arroyo Colorado River in a concrete box 9 ft in width and height for a distance of 1,600 ft. After the siphon, water flow continues a short distance in the unlined, earthen canal (MC) before it reaches a concrete-lined channel that conveys water north an additional 1.75 mile to the reservoirs (TNRCC 2001).

The reservoirs are a system of reservoirs that have an average depth of 5 ft and store up to 1,200 acre-ft (390 million gallons) of water. The system is made up of three major segments: the East, West, and Northwest sections (Figure 2). The LWMCL flows directly into the West Reservoir, where water flows freely into the East Reservoir through two conduits beneath South Valley View Road, which divides the west and east reservoir segments. The Northwest Reservoir is being reworked and is currently not in use. The reservoir system is surrounded by earthen levees that slope outward to prevent surface water runoff from entering the system.

Re-lift Pumping Plant No. 3 uses electric drive pumps to lift water from the north side of the West Reservoir into the confluence of the UWMC and the COMC (Dynamac Corporation 2009). The COMC extends east for two miles, past the City of Donna Wastewater Treatment Plant, before turning north and continuing for 10 miles. Any remaining water that enters the DRCS and is not diverted for irrigation or drinking water supply flows north of the DRCS into the Donna Drain then east into the North Floodway (TNRCC 2001).

The canal segments are above grade, except for siphons to carry water under the Arroyo Colorado River and some roads. The canal levees are earthen construction with no liner, except for a 1.75 mile section immediately south of the reservoir systems which is concrete lined. Several concrete control structures are located along the canal and are used to direct and control the flow of water. Pumps at the reservoir system distribute water to the east and west main canals north of the reservoir system for further distribution. There is easy road access along most of the canals and reservoir shorelines, allowing for unrestricted fishing throughout the DRCS. On February 9, 1994, the TDH issued Aquatic Life Order #9. This order prohibited possession of any fish species from the DRCS. Despite the possession ban, the DRCS remains a popular fishing spot for residents of Hidalgo County.

The land use surrounding the reservoir and canal system is commercial farming and agricultural. Residential development is occurring immediately north of the Northwest Reservoir, while a combination of agriculture and residential areas exist north of the East and West Reservoirs. Irrigation water is provided by the Donna Irrigation District from the canal system for farming operations. The canal system, which is elevated above the surrounding cropland, provides water to other branching irrigation canals. Irrigation is primarily achieved by flood irrigation.

Within Hidalgo County, where the site is located, consists of approximately 831,000 people (U.S. Census 2015). Approximately 95 percent of Hidalgo County is identified as Hispanic or Latino. The median household income for Hidalgo County is $34,146. The percentage of persons below the poverty level is 34.8 percent. Approximately 46.5 percent of children under the age of 18 live in poverty in Hidalgo County (U.S. Department of Commerce [USDOC] 2015). Approximately 38 percent of the population 25 years and over has less than a high school education, and approximately 29 percent of this population has only a high school education (USDOC 2015).

2.2.2 Conceptual Site Model

Based upon the site history, field reconnaissance, and exposure setting, a CSM was formulated for the site. The CSM presents the potential sources of contamination, routes of migration, and potential receptors. Exposure pathways begin from potential source areas and progress through the environment via various fate and transport processes to potential human receptors. Figure 23 illustrates the CSM. The CSM identifies which exposure pathways are complete and require further evaluation in the HHRA. An exposure pathway describes a mechanism by which a population or individual may be exposed to COPCs within the DRCS. A completed exposure pathway requires the following four components:

- Source and mechanism of chemical release to the environment
- Environmental transport medium for the released chemical
- Point of potential human contact with the contaminated medium
- Human exposure route at the point of exposure.

All four components must exist for an exposure pathway to be complete and for exposure to occur. Incomplete exposure pathways do not result in actual human exposure and are not included in the exposure assessment and resulting risk characterization.

2.2.2.1 Chemical Release and Transport Mechanisms

Based upon past site investigations, the primary chemicals of concern are PCBs. The primary source of the PCBs has not been clearly identified for the DRCS. Key fate and transport pathways within the DRCS for PCBs are erosion and deposition, adsorption and desorption, and bioaccumulation. Anthropogenic transport may also play a role due to dredging and agriculture.

Chemical degradation may also play a role in fate and transport, but is less significant due to the persistence of the compounds involved. PCBs are hydrophobic (ATSDR 2000). Therefore, they tend to bind to sediment particles and organic matter in sediments, and bioaccumulate into tissue. As such, migration of soil, sediment, or aquatic life in surface water are all potential routes of migration for PCBs.

PCBs are not typically water soluble and they sorb strongly to particulate matter (ATSDR 2000). Since PCBs bind to sediment particles, they are typically transported with the movement of the sediment. Therefore, erosion and deposition of sediment is an important pathway. Fine-grained sediments and bank soils may be eroded from the sediment bed or banks during periods of high flow, transported to other areas, and deposited as flow velocities decrease. Erosion is most likely to occur in areas of high water velocity; for example, the center of the canal channel, on steep portions of the canal banks, at outflows from the reservoir, or in areas where the canal narrows or becomes shallower.

Deposition is most likely to occur in areas of low water velocity; for example, where the canal widens or deepens, in the channel near the banks, in the reservoir, in agricultural fields, or in areas where obstructions or stream features create eddies. Fine-grained sediments and organic matter in sediment (i.e., colloids) are most likely to be eroded and transported longer distances because they are lighter and/or less dense. Given that the COPCs tend to bind to fine-grained particles and organic matter, erosion and transport are considered likely.

There are three major anthropogenic factors that influence fate and transport at the site. The first is dredging, which has been conducted at the canal in the past. Dredging typically disturbs sediment and results in high levels of suspended sediment in the water column which contributed to mobilization of sediments. Another factor influencing transport is irrigation. As noted above, water is periodically released from the canal system to irrigate agricultural fields. This moves water and suspended sediments from the canal and reservoir system onto nearby fields and deposits sediments onto soil. The third anthropogenic influence is tilling associated with agriculture. Tilling turns the soil and may move chemicals in sediment deposited on the soil surface to lower in the soil profile via mixing.

PCBs are classified as bioaccumulative (EPA 2000b). Hydrophobic compounds such as PCBs tend to adsorb to fat and lipids within tissue and are not readily eliminated from the body. Through this bioaccumulation of chemicals, organisms may accumulate concentrations of chemicals in tissue higher than in the media to which they were exposed. Given that fish tissue collected from the system in previous studies demonstrated high concentrations of PCBs, bioaccumulation is considered an important fate and transport pathway within the aquatic environments at the site. Bioaccumulation factors from water into tissue are often higher than 10,000 (ATSDR 2000).

In addition to bioaccumulation, PCBs may biomagnify up to three orders of magnitude compared to sediment concentrations (ATSDR 2000). Biomagnification occurs when lower trophic level organisms (e.g. worms, insects and crustacean) bioaccumulate chemicals in their tissue. Small fish that consume these organisms may eat many individuals, and thus accumulate PCBs and pesticides from all of the tissues they consume. Larger fish and wildlife in turn consume many smaller fish, and thus may receive large doses of chemicals. In cases where biomagnification is observed, organisms at the top of the food chain have the highest levels of chemicals in their tissue because of the compounded accumulation up each trophic level. PCBs have been observed to biomagnify as well as bioaccumulate.

Bioaccumulation and biomagnification are not considered significant transport pathways in terrestrial environments for human consumption. PCBs tend to be poorly taken up by plant roots, which must compete with adsorption to soil particles.

2.2.2.2 Media of Concern

Surface soil samples collected from 0 to 6 in. and 6 to 12 in. revealed the presence of both Aroclors and PCB congeners. However, the concentration of Aroclor PCBs were not above risk-based screening criteria in any of the soil horizons. Only metals were considered COPCs in both soil sample horizons, and benzo(a)pyrene was also considered a COPC in the 0 to 6 in. sample horizon. Because the concentrations of metals were similar in both soil horizons, soil was evaluated as one dataset for the 0 to 12 in. soil horizons combined.

Aluminum was identified as a COPC in sediment for all four exposure areas based upon a comparison to $1/10^{th}$ of the TCEQ sediment PCL. However, aluminum is not expected to be a site-related contaminant. Additionally, the maximum detected concentration of aluminum does not exceed the full TCEQ sediment PCL. As a result, aluminum was not evaluated further in the HHRA for contact with sediment. Only sediment identified in Exposure Area 2: The Siphon and Downstream (i.e., LEMC, LWMCU, and LWMCL) revealed the presence of both PCBs (Aroclors) and PCB congeners above risk-based screening criteria. Additionally, only Exposure Area 4: Downstream of the Reservoirs sediment (i.e., COMC) revealed polyaromatic hydrocarbons (PAHs) above risk-based screening criteria. As a result, only sediment within the Exposure Area 2: The Siphon and Downstream and Exposure Area 4: Downstream of the Reservoirs were evaluated quantitatively in the HHRA.

Only one detection of Aroclor-1254 was identified in surface water. However, PCB congeners were detected in all surface water samples analyzed for congeners. In addition, various metals and one semivolatile organic compound [bis(2-ethylhexyl)phthalate] were detected in surface water of various segments of the DRCS. Due to the limited number of surface water samples and the consistent detection of PCB congeners across the DRCS, surface water samples were not evaluated by exposure area. Surface water was evaluated as one dataset to provide an evaluation of potential contact consistent with surface water movement across the entire DRCS.

Ground water samples were collected from monitoring wells surrounding the DRCS. No Aroclors or PCB congeners were detected within the monitoring well samples. The only COPCs were metals. As a result, ground water is not considered a medium of concern relating to source media within the DRCS.

2.2.2.3 Receptors of Concern

Within the exposure assessment, EPA guidance (1989, 1991b) requires that plausible exposure under both current and future land use be evaluated in the HHRA. The site is primarily surrounded by agricultural fields with residential or commercial/industrial land uses nearby. It is likely that agricultural workers that tend to the surrounding agricultural fields would be present. Additionally, future land use of the area surrounding the DRCS, and including the agricultural fields, may include residential. As a result, a resident is a potential receptor for the media of concern at the DRCS. Due to the popularity of the DRCS for fishing, a recreational user scenario is also a potential receptor. Figure 23 presents the potential receptors for the DRCS.

For soil, samples were primarily collected adjacent to the canal segments and within agricultural fields. Due to the location of the samples and the COPCs identified on Tables 2.1 and 2.2, it is expected that all potential receptors could contact soil samples collected at the site. However, only the resident and agricultural worker were evaluated quantitatively for exposure to soil. Both of these receptors provide protective evaluation for all potential receptors who may contact soil.

For surface water, sediment, and fish ingestion, all potential receptors are expected to have exposure to these media. Exposure to surface water and sediment is primarily expected to occur during fishing. As a result, typical exposures for a resident to surface water, sediment, and fish is expected to be similar to that of a recreational user since the resident is expected to visit the DRCS for recreational activities not because the areas are part of the residence. Therefore, the recreational user is the primary receptor for exposure to these media. Typically, a resident is assumed to have two age ranges: adult and child. To present age ranges that correspond to a recreational user, three age ranges were evaluated: adult, adolescent, and child. The adult is assumed to be an age range greater than 16 years. The adolescent is assumed to be an age range of 6 to 16 years of age. For the child, the typical age range is 0 to 6 years of age. However, infants (i.e., less than 1 year) and toddlers (i.e., 1 year to 3 years) are not expected to have contact with surface water and sediment due to the construction of the canals (i.e., steep side slopes) and that the canals are not used for recreational swimming. Additionally, children less than 2 years of age are not expected to ingest fish or contact surface water and sediment within the DRCS due to the construction of the canal segments. As a result, the assumed range for the child exposure is assumed from 2 to 6 years of age. It is noted that carcinogenic risks for the recreational user were not evaluated cumulatively, which is typically done for a resident to represent excess lifetime carcinogenic risks. However, the evaluation of an adult recreational user assumes an exposure duration (ED) of 26 years, which is equivalent to the ED of a resident. This increased ED for the adult recreational user provides a protective evaluation for potential residential receptors who may frequent the DRCS.

Similarly, agricultural workers are expected to use the DRCS for recreational fishing. The agricultural worker exposure while fishing is expected to be the same as the adult recreational user. Therefore, only the adult, adolescent, and child recreational user are evaluated quantitatively for exposure to surface water, sediment, and fish tissue from the DRCS.

In addition to recreational users, the EPA suggests that, along with ethnic characteristics and cultural practices of an area's population, the poverty rate could contribute to any determination of the rate of subsistence fishing in an area. Subsistence fishers have been defined by the EPA as fishers who rely on non-commercially caught fish and shellfish as a major source of protein in their diets (EPA 2000a). Subsistence fishing is an important determination because subsistence fishers may consume more locally caught fish than the general population. As shown by the demographics presented in Section 2.2.1, Hidalgo County has a high poverty rate. As a result, these residents are more likely to have characteristics of subsistence fishers. These groups sometimes harvest fish from the same water body over many years to supplement caloric and protein intake. Subsistence fishing, while not explicitly documented within the DRCS, likely occurs. Therefore, a subsistence fisher is a potential receptor at the DRCS. The subsistence fisher is expected to fish within the DRCS at rates significantly higher than the general population. Based upon the construction of the canals and reservoirs, the DRCS is not used for swimming. As a result, the subsistence fisher is not expected to have a higher contact rate with surface water and sediment within the DRCS than a recreational user.

2.2.3 Selection of Exposure Point Concentrations

EPCs were derived to quantify concentrations of COPCs. For the HHRA, the EPC represents the concentration of COPC in media of concern that a potential receptor is expected to contact over a designated exposure period. Reported concentrations of COPC, as discussed in Section 2.1.2, were used to calculate the 95th percentile upper confidence limit on the mean (95UCL) in each medium of concern (EPA 1989, 1992). For calculation of the 95UCL, each non-detected analyte was assigned a numerical value equal to its RL (EPA 2013b). For U qualified data resulting from higher dilution levels, the result from the undiluted or initial run was included as the result.

The 95UCL was used because assuming long-term contact with the maximum concentration is not reasonable (EPA 1989). The 95UCL was determined through the EPA ProUCL program version 5.0.00 (EPA 2013b). The EPA ProUCL program determines the distribution, sample size, variance, and 95UCL of each COPC data set (EPA 2013b). The EPC is based on the lesser of the maximum detected concentration for a medium or the 95UCL (EPA 1989). Outputs for the ProUCL program are presented in Attachment 3.

EPCs are presented for surface soil (0 to 6 in.), surface water, and sediment in Tables 3.1 through 3.4. For fish tissue, multiple EPCs were determined. Fish tissue EPCs were determined for all fish tissue results, which represents potential concentrations along the entire DRCS. EPCs were also determined for specific fish species (i.e., catfish, buffalo, etc.). Tables 3.5 through 3.10 present the EPCs for fish tissue.

2.2.4 Exposure Equations

The next step in the exposure assessment is to estimate COPC intake or exposure for each exposure pathway considered in the HHRA. In the exposure assessment, two different measures of intake are provided, depending on the nature of the effect being evaluated. When evaluating longer-term (i.e., subchronic and chronic) exposures to chemicals that produce adverse non-carcinogenic effects, intakes are averaged over the period of exposure (i.e., the averaging time [AT]) (EPA 1989). This measure of intake is referred to as the average daily intake (ADI) and is a less than lifetime exposure. For chemicals that produce carcinogenic effects, intakes are averaged over an entire lifetime and are referred to as the lifetime average daily intake (LADI) (EPA 1989). Detailed equations for determining intake are provided on Tables 4.1 through 4.13.

2.2.4.1 Soil and Sediment Intake Equations

Tables 4.1 through 4.3 present the exposure parameters and intake equations for the soil exposure, and Tables 4.7 through 4.9 present the exposure parameters and intake equation for sediment exposure pathways. The generic equation to calculate ingestion intake from soil and sediment is given below:

$$(L)ADI = \frac{EPC\ x\ CR\ x\ EF\ x\ ED\ x\ CF}{BW\ x\ AT}$$

where

(L)ADI	=	(Lifetime) Average daily intake (mg/kg per day [mg/kg/day])
EPC	=	Concentration of a COPC in soil or sediment (mg/kg)
CR	=	Ingestion Rate (milligrams per day [mg/day])
EF	=	Exposure frequency (days/year)
ED	=	Exposure duration (years)
BW	=	Body weight (kilograms [kg])
AT	=	Averaging time (days) For non-carcinogens, AT = ED × 365 days/year For carcinogens, AT = 70 years × 365 days/year
CF	=	Conversion Factor (10^{-6} kilograms per milligram [kg/mg]).

The generic equation to calculate dermal intake from soil and sediment is given below:

$$(L)ADI = \frac{EPC\ x\ SA\ x\ DA\ x\ EF\ x\ ED\ x\ CF}{BW\ x\ AT}$$

where

(L)ADI	=	(Lifetime) Average daily intake (mg/kg/day)
EPC	=	Concentration of a COPC in soil or sediment (mg/kg)
SA	=	Surface Area for Contact (square centimeters [cm^2])

DA_{event}	=	Dermal absorbed dose per event For soil DA = Absorption Factor (ABS) × Adherence Factor (AF) (milligrams per square centimeters [mg/cm^2])
EF	=	Exposure frequency (days/year)
ED	=	Exposure duration (years)
BW	=	Body weight (kg)
AT	=	Averaging time (days) For non-carcinogens, AT = ED × 365 days/year For carcinogens, AT = 70 years × 365 days/year
CF	=	Conversion Factor (10^{-6} kg/mg).

The intake of particulates were only evaluated for soil using the following equation (EPA 2009):

$$EC = \frac{C_{air} \ x \ ET \ x \ EF \ x \ ED \ x \ CF_1}{AT \ x \ CF_2}$$

where:

EC	=	Exposure concentration (milligrams per cubic meter [mg/m^3] or micrograms per cubic meter [$\mu g/m^3$])
C_{air}	=	Concentration of chemical in air (mg/m^3)
ET	=	Exposure time (hours)
EF	=	Exposure frequency (days/year)
ED	=	Exposure duration (years)
CF_1	=	Conversion Factor (1,000 micrograms per milligram) (carcinogenic intakes only)
CF_2	=	Conversion Factor (24 hours/day)
AT	=	Averaging time (days) For non-carcinogens, AT = ED x 365 days/year For carcinogens, AT = 70 years x 365 days/year.

The concentration of chemicals in air resulting from emissions from soil is developed following procedures presented in the EPA Soil Screening guidance (EPA 2002b). The chemical concentration in air is calculated from:

$$C_{air} = C_{soil} \ x \left[\frac{1}{PEF} \right]$$

where:

C_{air}	=	Concentration of chemical in air (mg/m^3)
C_{soil}	=	Chemical concentration in soil (mg/kg)
PEF	=	Particulate emission factor (cubic meters per kilogram).

The PEF relates the concentration of a chemical in soil with the concentration of dust particles in air. For residential exposures, a PEF value of 2.78×10^9 is used based a 0.5-acre site and using EPA guidance values for Houston, Texas (EPA 2002b).

2.2.4.2 Surface Water Intake Equations

Tables 4.4 through 4.6 present the exposure parameters and intake equations for the surface water exposure pathways. The generic equation to calculate surface water ingestion intakes is given below:

$$(L)ADI = \frac{EPC \ x \ CR \ x \ EF \ x \ ED}{BW \ x \ AT}$$

where

(L)ADI	=	(Lifetime) Average daily intake (mg/kg/day)
EPC	=	Concentration of a COPC in surface water (milligrams per liter [mg/L])
CR	=	Ingestion Rate (liter per day [L/day])
EF	=	Exposure frequency (days/year)
ED	=	Exposure duration (years)
BW	=	Body weight (kilograms [kg])
AT	=	Averaging time (days) For non-carcinogens, AT = ED × 365 days/year For carcinogens, AT = 70 years × 365 days/year.

The following equation is used to assess dermal absorbed dose from surface water:

$$DAD = \frac{DA_{event} \ x \ SA \ x \ EF \ x \ ED \ x \ CF}{BW \ x \ AT}$$

where

DAD	=	Dermal absorbed dose (mg/kg/day)
DA_{event}	=	Dermal absorbed dose per event (mg/cm^2-event)
SA	=	Skin-surface area available for contact (cm^2)
EF	=	Exposure frequency (days/year)
ED	=	Exposure duration (years)
BW	=	Body weight (kg)
AT	=	Averaging time (days) For non-carcinogens, AT = ED × 365 days/year For carcinogens, AT = 70 years × 365 days/year.

The dermal absorbed dose per event (DA_{event}) is estimated using a non-steady state approach for organic compounds and a steady-state approach for inorganics. For organics, the following equations apply:

$$If\ t_{event} < t^{*}\ then: DA_{event} = (2)(K_p)(FA)(C_w)(CF)\left(\sqrt{\frac{6\tau\, t_{event}}{\pi}}\right)$$

$$If\ t_{event} > t^{*}\ then: DA_{event} = (K_p)(FA)(C_w)(CF)\left(\frac{t_{event}}{1+B} + 2\tau\left[\frac{1+3B+3B^2}{(1+B)^2}\right]\right)$$

where

t_{event}	=	Event duration (hour/event)
t^*	=	Time to reach steady-state conditions (hour)
K_p	=	Permeability coefficient of water through skin (centimeters per hour)
FA	=	Chemical-specific fraction absorbed (dimensionless)
C_w	=	Chemical concentration in water (mg/L)
τ	=	Lag time (hour)
π	=	Pi (dimensionless; equal to 3.14)
CF	=	Conversion factor (0.011 Liter(s) per cubic centimeter [L/cm^3])
B	=	Dimensionless ratio of the permeability of the stratum corneum relative to permeability across the viable epidermis.

For inorganics, the following steady-state equation is used to estimate DA_{event}:

$$DA_{event} = (K_p) \times (C_w) \times (t_{event})$$

A majority of the exposure assumptions for dermal contact with water are based on default assumptions presented in EPA Risk Assessment Guidance for Superfund E guidance (EPA 2004). For surface water, it is assumed that primary contact with the DRCS would be very infrequent and not a result of swimming. Therefore, the exposure to surface water also assumes only contact with exposed extremities.

2.2.4.3 Fish Ingestion Intake Equation

Tables 4.10 through 4.13 present the exposure parameters and intake equations for the intake of fish. The generic equation to calculate fish intake is given below:

$$(L)ADI\,(mg/kg-day) = \frac{EPC\ x\ IR\ x\ FI\ x\ EF\ x\ ED}{AT\ x\ BW}$$

where,

EPC	=	Concentration of COPC in fish (mg/kg)
IR	=	Ingestion/Consumption rate (kg/day)

FI	=	Fraction ingested from contaminated source (unit less), assume 100%
EF	=	Exposure frequency (days/year)
ED	=	Exposure duration (years)
AT	=	Averaging time (days) Non-carcinogen (ED x 365 days/year) Carcinogen (70 years x 365 days/year = 25,550 days).

2.2.5 Selection of Exposure Parameters

The second step in quantifying intake requires the identification of exposure parameters. Exposure parameters include rates of contact (e.g., ingestion rates, skin surface areas, etc.), exposure frequency and duration, body weight (BW), and averaging time. The contact rate reflects the amount of contaminated media contacted per unit time or event. Exposure frequency and duration are used to estimate the total time of exposure to COPC in media of concern. The BW represents the average BW over an exposure period (EPA 1989). Specific exposure parameters for each receptor are chosen based on EPA guidance (EPA 1989, 1991a, 1991b, 1997, 2000a, 2000c, 2004, 2011, 2014a, and 2015a) and other appropriate resources. The receptor-specific exposure parameters used in the HHRA were developed in accordance with EPA guidance and are shown in Tables 4.1 through 4.13.

2.2.5.1 Soil

Exposure parameters for resident adult and child exposure to soil are presented on Tables 4.1 and 4.2, and exposure parameters for the agricultural worker are presented on Table 4.3. For all receptors, complete exposure pathways to soil include ingestion of, dermal contact with, and inhalation of particulates. The ingestion rate for residential exposure to soil is presented in multiple EPA guidance documents and is assumed at 100 mg/kg for the adult and 200 mg/kg for the child (EPA 1991a, 1991b, 2011, and 2015a). The ingestion rate for the agricultural worker was assumed to be similar to a construction worker or other worker who performs frequent digging or soil disturbances and is taken from guidance for the calculation of the EPA RSLs and Supplemental Guidance for Developing Soil Screening Levels (EPA 2002b, 2015a). An agricultural worker soil ingestion rate of 330 mg/kg is assumed. Dermal exposure to soil is assumed for exposed body surface areas (SAs) only. The SA available for contact generally assumes hands, forearms, head, and feet for the resident. The recommended SA for the adult is 6,032 cm^2 and the child is 2,373 cm^2, based on the mean SA (EPA 2015a). The agricultural worker is only assumed to contact soil with hands, forearms, and head with a mean SA of 3,527 cm^2 (EPA 2015a). The inhalation of soil particulates assumes a 24-hour exposure period for the resident and an 8 hour work day for the worker. The resident adult and agricultural worker are assumed to weigh 80 kg, and the resident child is assumed to weigh 15 kg. The resident adult is expected to be exposed to soil for a 20 year duration at a frequency of 350 days per year. The resident child is expected to be exposed to soil for 6 years at a frequency of 350 days per year. The agricultural worker is assumed to contact soil for 250 days per year over a 25-year duration.

2.2.5.2 Surface Water

Exposure parameters for surface water are presented on Tables 4.4 through 4.6. Contact with surface water is assessed for the recreational user only. The recreational user is expected to have three age ranges: child (2 to 6 years), adolescent (6 years to 16 years), and adult (greater than 16 years). Exposure to surface water is assumed as primarily incidental contact while fishing. Contact with surface water could also occur during irrigation of local fields. However, contact with surface water during field irrigation is considered a very low contact exposure. It is expected that people may ingest some surface water during water activities. The ingestion rate for this type of ingestion is difficult to quantify. EPA guidance has identified a volume of freshwater swallowed during water recreation activities (EPA 2011). Table 3-93 of the EPA *Exposure Factors Handbook* (EFH) identifies a value for estimated water ingestion during water recreation activities (EPA 2011). An ingestion rate of 10.8 milliliters per hour was based upon fishing within surface water. The estimated amount of time fishing is 2 hours. The table does not present an age range for the ingestion value. Therefore, this rate was assumed for all age ranges.

It is expected that contact with surface water for all recreational users would be primarily with the exposed extremities, including the head, hands, forearms, lower legs, and feet. These exposed skin SA are similar to soil for the adult and child. The recommended SA for the adult is 6,032 cm^2 and the child is 2,373 cm^2, based on the mean surface area (EPA 2015a). For the adolescent, the mean SA was taken from the EPA 2011 EFH (EPA 2011). Tables 7-8 and 7-11 of the 2011 EFH were used to determine the mean SA for the head, hands, forearms, lower legs, and feet for the age range of 6 to 16 years of age. The mean SA for males was selected from Tables 7-8 and 7-11 because the expected recreational receptors for fishing are expected to be males. The skin SA for surface water contact was estimated at 4,455 cm^2 for the adolescent recreational user. The EF for contact with surface water is based upon professional judgement. Due to the local climate, it is expected that fishing could occur year-round at the site. Therefore, an assumption of surface water contact for 1 day per week for 12 months of the year, which results in 52 days per year, was assumed.

2.2.5.3 Sediment

Exposure parameters for sediment are presented on Tables 4.7 through 4.9. Exposure to sediment is similar to surface water exposures. Sediment ingestion rates are not presented in the EPA Exposures Factor Handbook. Therefore, ingestion of sediment was assumed to equal the soil ingestion rate presented in the EPA EFH (EPA 2011). Table 5.1 of the *Exposure Factors Handbook* shows a central tendency value of 50 milligrams per day of ingestion of soil only for the age ranges of from 1 to <6 years and from 6 to <21 years. Dust ingestion was not included and is not expected for sediment. It is expected that contact with sediment for both the adult and child would be primarily with the head, hands, forearms, lower legs, and feet, which is similar to surface water. The recommended SA for the adult is 6,032 cm^2, the adolescent is 4,455 cm^2, and the child is 2,373 cm^2, based on the mean surface area (EPA 2011, 2015a). It was assumed that people would contact sediment at the same rate as surface water for 1 day per week for 12 months of the year, which results in 52 days per year.

2.2.5.4 Fish Ingestion

Exposure parameters for fish ingestion are presented on Tables 4.10 through 4.13. Default fish ingestion/consumption rates are not available. Generally, fish ingestion rates are based upon site-specific surveys or determinations of a water body use. For the site, two separate populations will be assessed for fish ingestion in the HHRA. It is assumed that recreational users and subsistence fishers will ingest fish from the site. It is expected that the amount of fish ingested specifically from the site differs significantly between a recreational user and a subsistence fisher. A recreational user represents the general population that may fish at the site occasionally mainly for recreational purposes. A subsistence fisher represents a sensitive, subpopulation that fishes at the site frequently and uses fish from the site to supplement the dietary intake.

Recreational User

As noted, the recreational user fisher is meant to represent the general population that fishes at the site occasionally. To determine fish consumption rates for this receptor, separate methods can be followed. The first is to assume a fish portion size per meal and then make an assumption about the number of meals year. This is similar to the method set forth by the EPA in the determination of fish advisories (EPA 2000b). For an adult, the typical fish portion is 8 ounces per meal (EPA 2000b). For children younger than 4, a portion is estimated at 3 ounces (EPA 2000b). Other age ranges can be scaled from the adult portion size based upon the weight of the receptor. To estimate the number of meals per year, assumptions based upon best professional judgement must be made. The first assumption is that the recreational user consumes fish each day they fish at the site. The second assumption is the number of days per week or month they visit the site. Based upon the local climate, it is reasonable to assume fishing can occur at the site year-round. Table 10-62 of EPA EFH (2011) presents a study of finfish consumption by recreational anglers in Lavaca Bay, Texas. For adult males, the number of meals per month was 3.2 (mean) and 3.5 (95UCL), which correspond to 38 to 42 meals per year. It is noted that the portion size determined by this study agrees with the default portion size of approximately 8 ounces for an adult male (Alcoa 1998). Assuming a yearly exposure (52 weeks), this would average out to a fish consumption rate of 26.3 g/day or 184 grams/week (g/week) (6.5 ounces/week) averaged over 365 days per year (assuming 42 meals per year). It is noted that the number of meals per year for the recreational user differ from the number of days for exposure to sediment and surface water (52 days/year). This is expected because not all days spent fishing recreationally result in keeping/consuming fish from the site.

The Aquatic Water Quality Criteria (AWQC) are set forth based upon a daily fish ingestion rate for the general population. The Texas AWQC assume a fish consumption rate of 17.5 g/day, which equates to approximately 123 g/week or 4.3 ounces/week (assuming a 52 week or yearly exposure). A revised Federal AWQC fish consumption rate has been proposed at 22 g/day, which is based upon the 90th percentile consumption rate for ages 21 and older (EPA 2015c).

This equates to 154 g/week or 5.4 ounces/week. For the recreational user, the fish consumption rates presented range from 17.5 g/day (Texas AWQC) to 26.2 g/day (Lavaca Bay Study). To provide a protective evaluation of potential risk concerns from fish ingestion for the recreational user, the fish consumption rate of 26.3 g/day or 184.1 g/week is selected for the adult recreational user. For the child recreational user, the assumption of 3 ounces per meal for 42 meals per year corresponds to a fish consumption rate of 9.8 g/day or 68.7 g/week. For an adolescent, a meal size of 6 ounces is assumed based upon the adult portion. This corresponds to a fish consumption rate of 19.6 g/day or 137.3 g/week. Because these rates are fish consumption rates, the daily rate is multiplied by an EF of 365 days/year to represent the total yearly intake rate of fish.

Subsistence Fisher

Determining potential fish ingestion rates for the subsistence fisher is more difficult and results in greater uncertainty. To determine potential fish ingestion rates for a subsistence user, a hierarchy has been set forth by the EPA in the development of AWQC for the protection of human health was used. The EPA recommended, "the use of local or regional data over default values as more representative of target population groups" (EPA 2000c). The EPA has recommended a preference hierarchy for the determination of fish consumption rates (EPA 2000c). The preference hierarchy includes:

1. Results from fish intake surveys of local watersheds

2. Results from existing fish intake surveys that reflect similar geography and population groups

3. Select intake rate assumptions for different population groups from national food consumption surveys

4. Use fish intake default rates from AWQC guidance.

Note that all default intake rates are based upon on uncooked weights of fish analyzed. This is also the preferred weight for fish advisories (EPA 2000b, 2011). The actual consumed intake rate of fish is based on cooked weights, which are generally less than uncooked weights. The use of uncooked weights results in higher than expected fish intake rates. The uncertainty associated with uncooked versus cooked weights of fish will be discussed in the uncertainty section of the HHRA.

In relation to the EPA preferred hierarchy for fish ingestion rates, results from fish intake surveys of local watersheds could not be located. Scholarly articles or intake surveys were found for waterways within Texas, which could satisfy the first hierarchy (depending upon definition of local) and the first part of the second hierarchy, results from existing fish intake surveys that reflect similar geography. These articles did not identify specific intakes, so they do not qualify as intake surveys (Hunt and Ditton 1996, 2002; USFWS 2002). These articles generally discussed fishing behaviors and patterns among various population groups in the State of Texas.

Of particular note from the studies, one study found that most anglers surveyed (91 percent) had fished for more than 10 years, with a mean number of years fishing as 32 years (Hunt et. al 1996). This reveals that potential EDs for any site fishers (both recreational and subsistence) should take into account long-term potential for exposure to fish in the canal system, similar to the default ED of an adult resident. One study of a Texas waterway was of the Laguna Atocosa National Wildlife Refuge (USFWS 2002).

This area receives water from a series of canals that are fed by the Rio Grande, similar to the site. This area is located approximately 43 miles east of the site. Four subpopulations of fishers were evaluated in this study: child recreational, child subsistence, adult recreational, and adult subsistence. The study presented fish consumption rates, but these rates were not based upon intake surveys of the local waterway. The following fish consumption rates were used in the study:

Receptor	Average Meal Size (grams)	Number of Meals per year	Consumption Rate (grams/day)
Child Recreational	85 grams (3 ounces)	14	3.26
Child Subsistence	85 grams (3 ounces)	156	36.3
Adult Recreational	114 grams (4 ounces)	14	4.37
Adult Subsistence	114 grams (4 ounces)	156	48.7

Note: Consumption rate determined by the following:

$$\frac{\text{Average meal size * number of meals per year}}{\text{365 days/year}}$$

Ref: USFWS 2002

It is noted that the number of meals per year were not determined through local intake surveys, and the reasoning behind the number of meals per year is not given in the report for the subsistence fisher (USFWS 2002). The number of meals per year is equal to 13 meals per month or three meals per week. The meal size was identified as an older version of EPA guidance for fish advisories (1997) in the report. The study also noted, "Although gar are not a common sport fish in the majority of the country, they are eaten by local people in the valley area, and given the intensive fishing effort, it was apparent that gar were the most common fish in the Cayo, and therefore, the most likely fish to be caught and consumed (USFWS 2002). It is noted that the same fish species (i.e., gar) is frequently eaten by fishers of the DRCS. This point about specific species favored by local populations was re-iterated in most studies of local fishing populations, not just those specific to Texas (Hunt and Ditton 1996, 2002; Burger et. al 1999; Silver et. al 2007; Derrick et. al 2008; and Brown and Toth 2001). As a result, the evaluation of fish consumption will evaluate individual species, as noted earlier, to account for preferences in local subpopulations and provide potential risk management decisions for the DRCS.

The second preferred hierarchy also suggests the selection of results from existing fish intake surveys that reflect similar population groups. Hidalgo County, where the site is located, consists of approximately 831,000 people (U.S. Census 2015). Approximately 95 percent of Hidalgo County is identified as Hispanic or Latino. The median household income for Hidalgo

County is $34,146. The percentage of persons below the poverty level is 34.8 percent. Approximately 46.5 percent of children under the age of 18 live in poverty in Hidalgo County (USDOC 2015). Approximately 38 percent of the population 25 years and over has less than a high school education, and approximately 29 percent of this population has only a high school education (USDOC 2015).

Studies of similar population groups were found that were similar in percentage living below the poverty level, fishing was used as a subsistence source of protein, and as a cultural way of life (Brown and Toth 2001; Silver et. al 2007; Derrick et. al 2008; Burger et. al 1999). All of these studies noted the importance of fishing for these populations. The studies also noted that many subsistence fishers in these studies not only fished for themselves and their families but also gave some of their catch to friends and neighbors. Noting that exposure to fish within the site is most likely not only limited to those who directly fish in the reservoirs and canals. The studies not only identified a greater number of meals per month for these populations but also larger portion sizes than the general population (Burger et. al 1999; Derrick et. al 2008). One study provided specific meal sizes and number of meals per month. The study from Burger et. al 1999 found an average meal size of 13 ounces. The study found that "people who ate fish the most often also ate the largest fish meals, increasing their total consumption over a year" (Burger et. al 1999). The consumption rates determined for the highest fish consumers was 49.1 kg/year or 134.5 g/day. All of these studies noted that fish advisories or signs posted along the waterways did not change fishing behaviors.

The third preferred hierarchy notes the use of intake rates from national food consumption surveys. Under the AWQC, the EPA recommends the 99th percentile of per capita fish consumption distribution as a surrogate for subsistence fishers (EPA 2000c). Based upon the recent National Health and Nutrition Examination Study, fish consumption rates are presented for multiple categories that may fit the community surrounding the site (EPA 2014b). Table F-4 in Appendix F of the National Health and Nutrition Examination Study presents the total freshwater finfish and shellfish usual consumption rates. Based upon the local population, the following consumption rates may be applicable: Mexican American (76.7 g/day), other Hispanic (69.2 g/day), and income greater than $20,000 per year (48.4 g/day).

However, per capita fish consumption rates are generally lower than those rates for consumers only. Per capita consumption rates are based on the general population and include fish consumers and fish non-consumers equally. Table 10-8 of EPA EFH (2011) presents finfish consumption rates in gram fish/ kg-BW-day for various populations. The 99th percentile intake assuming an 80 kg adult for populations near the site include Mexican American (376 g/day) and other Hispanic (392 g/day). Note these 99th percentile values are identified as less statistically reliable in the EFH (EPA 2011). Reliable statistical estimates are provided for the 95th percentile intake which equate to 224 g/day for Mexican Americans and 261 g/day for other Hispanic (EPA 2011).

The fourth preferred hierarchy is the use of default subsistence consumptions rates. The federal AWQC sets forth a default subsistence consumption rate of 142.4 g/day (EPA 2000c). EPA Risk Assessment Guidance for Superfund guidance also identifies a standard default consumption rate for subsistence fishers (EPA 1991a). A 95th percentile daily fish consumption rate of 132 g/day is set forth. The value was "derived from a 3-day study of people who ate fish, other than canned, dried or raw. An example of this consumption rate is about four 8-ounce servings per week" (EPA 1991a).

A wide range of potential fish consumption rates are possible for a subsistence fisher. Local surveys of subsistence fishers near the site are not available, which adds uncertainty to any consumption rate selected. As noted, subsistence fishers, especially adults, are expected to eat more fish than the general population and eat larger portion sizes, which increases their consumption rates. The goal of the HHRA is to provide a protective evaluation of all potential receptors to the site. Most of the default exposure parameters selected as default rates in the HHRA, represent upper-level exposures and provide some level of protectiveness. In addition, any toxicity values used in the calculation of risks also provide a level of protectiveness. Therefore, the selected subsistence fisher consumption rate should be protective but not at a level that would grossly over-estimate potential risks. Consumption rates ranged from 48.4 g/day (not based on actual consumption studies) to as high as 261 g/day. The higher consumption rates are based upon national consumption surveys but they take into account all finfish consumption not just finfish consumption from local waterbodies. Therefore, these consumption rates would most likely greatly overestimate potential exposures. As a result, the AWQC default subsistence consumption rate of 142.4 g/day is selected for the adult subsistence fisher. This rate corresponds to a little more than four 8-ounce meals per week, which is a reasonable assumption for users of the site. Additionally, only an adult subsistence fisher was evaluated in the HHRA. The adult subsistence fisher is expected to have the highest fish intake of all age ranges and evaluation of this receptor provides a protective measure for all potential subsistence users of the DRCS.

2.3 TOXICITY ASSESSMENT

Toxicity assessment is the third step of the HHRA process. The toxicity assessment considers the types of potential adverse health effects associated with exposures to COPCs, the relationship between the magnitude of exposure and potential adverse effects, and related uncertainties, such as the weight of evidence of a particular COPC carcinogenicity in humans. EPA guidance (EPA 1989) specifies that the assessment be accomplished in two steps: hazard identification and dose-response assessment. Hazard identification is the process of determining whether studies demonstrate that exposure to a COPC may cause the incidence of an adverse effect. EPA specifies the dose-response assessment, which involves: (1) EPA's quantitative evaluation of the existing toxicity information, and (2) EPA's characterization of the relationship between the dose of the COPC administered or received, and the incidence of potentially adverse health effects in the exposed population. From this quantitative dose-response relationship, specific toxicity values are derived by EPA that can be used to estimate the incidence of potentially adverse effects occurring in humans at different exposure levels (EPA 1989).

Toxicity values were selected in keeping with appropriate EDs and EPA guidance (EPA 2003). Tier 1 values were found using the Integrated Risk Information System (EPA 2015d) for established, current values. When toxicity values were not available from Integrated Risk Information System, Tier 2 values were then examined.

Tier 2 values were EPA's Provisional Peer Reviewed Toxicity Values, which are developed by the Office of Research and Development, the National Center for Environmental Assessment, and the Superfund Health Risk Technical Support Center on a chemical-specific basis when requested by the Superfund program.

Tier 3, other toxicity values, were considered when Tier 1 or Tier 2 toxicity values were not available. These toxicity values were taken from additional EPA and non-EPA sources and were chosen based on the most current and best peer-reviewed source available. The California Environmental Protection Agency Cancer Potency Values (California Environmental Protection Agency 2009) and ATSDR Minimal Risk Levels (ATSDR 2015) are the Tier 3 sources utilized for this HHRA.

2.3.1 Toxicity Assessment for Non-Carcinogens

EPA-derived toxicity values for evaluating potential chronic non-carcinogenic effects for all COPCs are summarized in Table 5.1. Table 5.2 presents relative chemical-specific parameters utilized in calculating dermal exposure for all COPC.

The methodology used by EPA for deriving non-cancer reference values for non-carcinogens, are discussed in detail in EPA guidance (EPA 2015d). Non-carcinogens are typically judged to have a threshold daily dose below which deleterious or harmful effects are unlikely to occur. This concentration is called the no-observed-adverse-effect-level (NOAEL), and may be derived from either animal laboratory experiments or human epidemiology investigations (usually workplace studies). In developing a toxicity value or human NOAEL for non-carcinogens (i.e., a reference dose [RfD]), the regulatory approach is to: (1) identify the critical toxic effect associated with chemical exposure (i.e., the most sensitive adverse effect); (2) identify the threshold dose in either an animal or human study; and (3) modify this dose to account for interspecies variability (where appropriate), differences in individual sensitivity (within-species variability), and other uncertainty and modifying factors. For the Reference Concentrations (RfCs), experimental exposures are extrapolated to a Human Equivalent Concentration (HEC). The HEC is determined through a two-step process that begins with a point of departure, which is adjusted (multiplied) by a Dosimetric Adjustment Factor (DAF) (EPA 2009). The point of departure can represent a NOAEL, lowest-observed-adverse-effect-level (LOAEL), benchmark concentration, lower confidence limit, and the lower limit on an effective concentration using a 10 percent response level (LEC_{10}). The DAF is for the specific site of the chemical's effects (e.g., respiratory tract, etc.). The DAF is dependent upon the nature of the contaminant and the target site of the toxic effect.

Uncertainty factors (UFs) are applied to account for specific types of uncertainty inherent in extrapolation from the available data. The Ufs are generally 10-fold, default factors used in operationally deriving the RfD and RfC from experimental data. Ufs less than 10 can be used.

A UF of 3 can be used in place of one-half power ($10^{0.5}$) when appropriate. The Ufs are intended to account for: (1) variation in susceptibility among the members of the human population (i.e., inter-individual or intraspecies variability); (2) uncertainty in extrapolating animal data to humans (i.e., interspecies uncertainty); (3) uncertainty in extrapolating from data obtained in a study with less-than-lifetime exposure (i.e., extrapolating from subchronic to chronic exposure); (4) uncertainty in extrapolating from a LOAEL rather than from an NOAEL; and (5) uncertainty associated with extrapolation when the database is incomplete. The maximum UF for the derivation of the RfCs used in this HHRA is 1,000. The maximum UF for the derivation of the RfDs used in this HHRA is 3,000. To calculate the RfD, the appropriate NOAEL is divided by the product of all the applicable UFs. This is expressed as:

$$RfD = NOAEL / (UF_1 \times UF_2 \times UF_3 \times UF_4)$$

The resulting RfD is expressed in units of milligrams of chemical per kilogram of BW per day. To calculate the RfC, the HEC is divided by UFs and is expressed in units of mg/m^3.

2.3.2 Toxicity Assessment for Carcinogenicity

EPA-derived toxicity values for evaluating potential carcinogenic effects for all COPC are summarized in Table 6. Unlike non-carcinogens, carcinogens are generally assumed to have no threshold. There is presumed to be no level of exposure below which carcinogenic effects will not manifest themselves. This "non-threshold" concept supports the idea that there are small, finite probabilities of inducing a carcinogenic response associated with every level of exposure to a potential carcinogen. EPA uses a two-part evaluation for carcinogenic effects. This evaluation includes the assignment of a weight-of-evidence classification and the quantification of a cancer toxic potency concentration. Quantification is expressed as a slope factor (SF) for oral and dermal exposures and an Inhalation Unit Risk (IUR) for inhalation exposures, which reflects the dose-response data for the carcinogenic endpoint(s) (EPA 1989, 2009).

The weight-of-evidence classification system assigns a letter or alphanumeric (A through E) to each potential carcinogen that reflects an assessment of its potential to be a human carcinogen (EPA 1986).[1] The EPA has established five recommended standard hazard descriptors: "*Carcinogenic to Humans*," "*Likely to Be Carcinogenic to Humans*," "*Suggestive Evidence of Carcinogenic Potential*," "*Inadequate Information to Assess Carcinogenic Potential*," and "*Not Likely to Be Carcinogenic to Humans*" (EPA 2005a). The weight-of-evidence classification is based on a thorough scientific examination of the body of available data. Only compounds that have a weight-of-evidence classification of C or above are considered to have carcinogenic potential in this HHRA.

[1]A = A known human carcinogen; B1 = A probable human carcinogen, based on sufficient animal data and limited human data; B2 = A probable human carcinogen based on sufficient animal data and inadequate or no human data; C = A possible human carcinogen; D = Not classifiable as to human carcinogenicity; and E = Evidence of non-carcinogenicity for humans.

The SF and the IUR are the upper 95th percentile confidence limit of the probability of response per unit daily intake of a chemical over a lifetime. The SF is expressed in units of proportion (of a population) affected per milligrams per kilograms per day (mg/kg/day). The IUR is expressed in $\mu g/m^3$. Typically, the SF and the IUR are used to estimate the upper-bound lifetime probability of a person developing cancer from exposure to a given concentration of a carcinogen. SFs and IURs are generally based on experimental animal data, unless suitable epidemiological studies are available. Because of the difficulty in detecting and measuring carcinogenic endpoints at low exposure concentrations, SFs and IURs are typically developed by using a model to fit the available high dose, experimental animal data, and then extrapolating downward to the low-dose range to which humans are typically exposed. EPA recommends the linear multistage model to derive an SF and IUR. The model is conservative and provides an upper bound estimate of excess lifetime cancer risk. These methods and approaches are discussed in greater detail within the EPA *Cancer Guidelines* (EPA 2005a).

Carcinogenic compounds were also assessed for mutagenic modes of action. The mutagenic mode of action is assessed with a linear approach (EPA 2005b). Table 6 identifies COPC with a mutagenic mode of action. PAHs (i.e., benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene) are the only site COPCs that have been identified with a mutagenic mode of action. To account for the early-life exposure and the mutagenic mode of action, the cancer potency estimates are adjusted by an age-dependent adjustment factor (ADAF). The EPA recommends, for mutagenic chemicals, when no chemical-specific data exist, a default approach using estimates from chronic studies (i.e., cancer slope factors) with appropriate modifications to address the potential for differential risk of early life stage exposure (EPA 2005a, 2005b). An ADAF modification for early life stage exposure to mutagenic COPC is required because available studies indicate higher cancer risks resulting from a given exposure occurring early in life when compared with the same amount of exposure during adulthood (EPA 2005b). For this HHRA, the intakes for COPC identified with a mutagenic mode of action are modified by an ADAF for the following (EPA 2005b, 2013b):

- For exposures before 2 years of age (i.e., spanning a 2-year time interval from the first day of birth up until a child's second birthday), a 10-fold adjustment.

- For exposures between 2 and <16 years of age (i.e., spanning a 14-year time interval from a child's second birthday up until their sixteenth birthday), a 3-fold adjustment.

- For exposures after turning 16 years of age, no adjustment.

The application of the mutagenic adjustment factor for each appropriate receptor is presented in Tables 4.1 through 4.13. These tables present the age range evaluated and the breakdown of each adjustment factor appropriate for the age-range evaluated. For this HHRA, the resident, child recreational user, and adolescent recreational user are within the age range that requires adjustment for a mutagenic mode of action.

As noted in Section 2.2.2.3, two age groups are considered for the residential scenario, an adult and a child. The age group for the child is assumed at 0-6 years. The resident adult is evaluated from an age range of 7-26 years old (EPA 1991b, 2014). Although adults are typically assumed at an age range of greater than 16 years of age, the resident adult is evaluated for a long-term exposure typical of residents (EPA 1991b). Residents are typically assumed at a duration of 26 years, so the resident adult spans that 7-26 years beyond childhood (EPA 1991a, 2014a). Therefore, both the resident child and the resident adult require an adjustment for potential mutagenic modes of action.

2.3.3 Toxicity Assessment Modification for Dermal Contact

Toxicity values specific to dermal exposures are not available and require adjustment of the oral toxicity values (oral RfDs or SFs). This adjustment accounts for the difference between the daily intake dose through dermal contact as opposed to ingestion. Most toxicity values are based on the actual administered dose and must be corrected for the percent of chemical-specific absorption that occurs across the gastrointestinal tract prior to use in dermal contact risk assessment (EPA 1989, 2004). EPA recommends utilizing oral absorption efficiency factors in converting oral toxicity values to dermal toxicity values (EPA 2004). This adjustment accounts for the absorption efficiency in the "critical study," which is utilized in determining the RfD and SF. Where oral absorption in the critical study is essentially complete (i.e., 100 percent), the absorbed dose is equivalent to the administered dose, and no adjustment of oral toxicity values is necessary when evaluating dermal exposures. When gastrointestinal absorption of a chemical in the critical study is poor (e.g., 1 percent), the absorbed dose is much smaller than the administered dose, and toxicity values for dermal exposure are adjusted to account for the difference in the absorbed dose relative to the administered dose. To account for the differences between the administered (oral) and the absorbed (dermal) dose, RfDs and SFs are modified by the gastrointestinal dermal absorption factor (GIABS).

In addition to the GIABS modification of the toxicity values for dermal contact, dermal contact rates are also evaluated based upon a chemical's ability to be absorbed through the skin surface. This absorption rate is dependent upon the medium evaluated. For sediment, EPA recommends following the same approach used for soil (EPA 2004). For soil, EPA has identified a dermal ABS that is chemical-specific. The ABS value reflects the desorption of a chemical from soil and the absorption of the chemical across the skin and into the blood stream. Recommended values are presented that take into account ranges of values that result from different soil types, loading rates, chemical concentrations, and other conditions. Values specific to sediment are not available. The EPA recommends the use of soil ABS values for sediment (EPA 2004).

The chemical-specific parameters utilized in assessing dermal exposure, GIABS and ABS are selected from the EPA dermal guidance (EPA 2004). Table 5.2 presents relative chemical-specific parameters utilized in calculating dermal exposure for all COPCs in sediment.

2.3.4 Polychlorinated Biphenyls

PCBs represent a class of chlorinated organic compounds comprised of one to 10 chlorine atoms on a biphenyl molecule. There is a possibility of 209 possible unique patterns on which the chlorines can be substituted onto the biphenyl ring. Therefore, there are potentially 209 PCB congeners. PCBs were manufactured as mixtures of PCB congeners until a target percentage of chlorine by weight was achieved (EPA 2015e). The most common mixtures of PCB congeners were the Aroclors. Aroclors are PCB congener mixtures with a distinguishing suffix number that indicates the degree of chlorination (EPA 2015e). Environmental samples collected during the RI were submitted to the laboratory for analysis of PCBs as Aroclors and as PCB congeners. The laboratory analysis of PCB congeners would account for specific Aroclor concentrations, but the Aroclor analysis does not account for all PCB congener concentrations. As a result, potential risks for Aroclors and total PCB congeners were determined separately in the HHRA and not presented as cumulative risk results.

The number of samples analyzed for Aroclors includes (note does not include duplicate samples): 90 soil samples, two ground water samples, 170 sediment samples, 67 surface water samples, and 105 fish tissue samples. The number of samples analyzed for PCB congeners includes: 24 soil samples, two ground water samples, 42 sediment samples, 37 surface water samples, and 20 fish tissue samples. The following Aroclors were detected in various site media: Aroclor-1016, Aroclor-1221, Aroclor-1242, Aroclor-1248, Aroclor-1254, and Aroclor-1260. For PCB congeners, almost all 209 congeners were detected in various media. For the HHRA, the PCB congeners detected in a sample were summed assuming non-detects were equal to zero. This resulting summation is presented as a total PCB congener concentration in the HHRA.

Health effects associated with PCBs are based upon PCB mixtures. For the assessment of potential carcinogenicity, PCBs were divided into "high-risk" and "low-risk" (EPA 1996). The Aroclors considered COPCs at the site are considered "high-risk" (EPA 1996, 2015a, 2015d). It is also noted that the "high-risk" determination pertains to, "exposure pathways associated with environmental processes that tend to increase risk" (EPA 1996). EPA noted,

> *"To make distinctions about risks from environmental mixtures, the range of potency observed for commercial mixtures can be considered along with factors that increase or decrease risk. First among these is persistence and bioaccumulation through the food chain. Bioaccumulated PCBs appear to be more toxic than commercial PCBs… For exposure through the food chain, risks can be higher than those estimated in this assessment"* (EPA 1996).

As a result, the evaluation of cancer risks for Aroclors and total PCB congeners assumes "high-risk" PCB mixtures with an upper bound SF of 2.0 per mg/kg/day.

When assessing PCB mixtures, a subset of 12 PCB congeners are considered dioxin-like. Both the dioxin-like and nondioxin-like modes of action contribute to overall PCB toxicity (EPA 1996). It is noted that these potential dioxin-like PCB congeners are potentially present in both the laboratory concentrations presented for total PCB congeners and Aroclors. To account for these dioxin-like congeners, the EPA has noted, “Because relatively few PCB congeners are dioxin-like, dioxin equivalence explains only part of a PCB mixture's toxicity. Hence, PCB assessments should begin with the mixture-based approach. When congener concentrations are available, the mixture-based approach can be supplemented by analysis of dioxin [toxicity equivalent quotient] TEQs to evaluate dioxin-like toxicity” (EPA 1996). Therefore, the evaluation of the dioxin-like and nondioxin-like PCB congeners is presented in Section 4.1 of the Uncertainty Section.

2.4 RISK CHARACTERIZATION

Risk characterization is the fourth step of the HHRA process. In this step, the toxicity values are combined with the calculated chemical intakes for the receptor populations to quantitatively estimate both carcinogenic and non-carcinogenic risks.

2.4.1 Hazard Index for Non-Carcinogenic Effects

The potential human health risks associated with exposures to non-carcinogenic COPCs are calculated by comparing the ADI or the EC with the chemical-specific RfD or RfC, as per EPA Guidance (EPA 1989, 2009a). A hazard quotient (HQ) is derived for each COPC, as shown in the equation below:

$$HQ = \frac{ADI}{RfD} \quad \text{or} \quad HQ = \frac{EC}{RfC}$$

where

HQ	=	Hazard Quotient; ratio of average daily intake level to acceptable daily intake level (unit less)
ADI	=	Calculated non-carcinogenic average daily intake (mg/kg/day or mg/m^3)
EC	=	Exposure Concentration (mg/m^3)
RfD	=	Reference dose (mg/kg/day)
RfC	=	Reference concentration (mg/m^3).

If the average daily dose exceeds the RfD or RfC, the HQ will exceed a ratio of one (1.0) and there may be concern that potential adverse systemic health effects will be observed in the exposed populations. If the ADI does not exceed the RfD or the RfC, the HQ will not exceed 1.0 and there will be no concern that potential adverse systemic health effects will be observed in the exposed populations. However, if the sum of several HQs exceeds 1.0, and the COPC affect the same target organ, there may be concern that potential adverse systemic health effects will be observed in the exposed populations. In general, the greater the value of the HQ above 1.0, the greater the level of concern. However, the HQ does not represent a statistical probability that an adverse health effect will occur.

For consideration of exposures to more than one chemical causing systemic toxicity via several different pathways, the individual HQs are summed to provide an overall hazard index (HI). If the HI is less than 1.0, then no adverse health effects are likely to be associated with exposures at the site. However, if the total HI is greater than 1.0, separate endpoint-specific HIs may be calculated based on toxic endpoint of concern or target organ (e.g., HQs for neurotoxins are summed separately from HQs for renal toxins). Only if an endpoint-specific HI is greater than 1.0 is there reason for concern about potential health effects for that endpoint.

2.4.2 Carcinogenic Risks

Carcinogenic risk is calculated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen. The numerical estimate of excess lifetime cancer risk is calculated by multiplying the LADI by the risk per unit dose (the SF) or multiplying the EC by the IUR.

This is shown in the following equation:

$$\text{Risk} = \text{LADI} \times \text{SF}$$
$$\text{Risk} = \text{EC} \times \text{IUR}$$

where

Risk	=	Unit less probability of an exposed individual developing cancer
LADI	=	Lifetime cancer average daily intake (mg/kg/day)
EC	=	Exposure Concentration ($\mu g/m^3$)
SF	=	Cancer slope factor $(mg/kg/day)^{-1}$
IUR	=	Inhalation Unit Risk $(\mu g/m^3)^{-1}$.

Because the SF and the IUR are the statistical 95th percent upper-bound confidence limit on the dose-response slope, this method provides a conservative, upper-bound estimate of risk. It should be noted that the interpretation of the significance of the cancer risk estimate is based on the appropriate public policy. EPA in the NCP (40 Code of Federal Regulation Part 300) (EPA 1990a) states that:

> *"...For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6}."*

3. HUMAN HEALTH RISK ASSESSMENT RESULTS

For ease of risk interpretation and presentation, risk characterization is presented primarily by media of concern. Risk results are presented separately for soil, surface water and sediment, and fish tissue.

3.1 RISK CHARACTERIZATION RESULTS FOR SOIL

The resident and agricultural worker receptors were evaluated for COPC exposure in soil. Calculations for this exposure are presented by receptor in Tables 7.1 through 7.3. Table 7.4 presents the calculation of air concentration due to dust entrainment. The estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 9.1 and 9.2.

3.1.1 Resident

The total non-carcinogenic HI for the resident adult is 0.1, which is below the acceptable threshold of 1.0 (Table 9.1). The total non-carcinogenic HI for the resident child is 1, which is equal the acceptable threshold of 1.0 (Table 9.1). Table 9.1 presents a breakdown by target organ. No target organ has a HI greater than 1.

Carcinogenic risks for the resident adult and child are combined to account for a lifetime incremental cumulative carcinogenic risk. The cumulative carcinogenic risk for the resident adult and child is 2×10^{-5} (Table 9.1), which is within the EPA's target risk range of 10^{-4} to 10^{-6}. Arsenic (1.3×10^{-5}) and benzo(a)pyrene (6.9×10^{-6}) have carcinogenic risks greater than 10^{-6}.

3.1.2 Agricultural Worker

The total non-carcinogenic HI for the agricultural worker is 0.06, which is below the acceptable threshold of 1.0 (Table 9.2).

The carcinogenic risk for the agricultural worker is 3×10^{-6} (Table 9.2), which is within the EPA's target risk range of 10^{-4} to 10^{-6}. Arsenic (2.9×10^{-6}) is the only COPC with carcinogenic risks greater than 10^{-6}.

3.2 RISK CHARACTERIZATION RESULTS FOR SEDIMENT AND SURFACE WATER

Based upon the results of the risk-based screening, risk for exposure to sediment were only determined for the grouped exposure areas: Exposure Area 2: The Siphon and Downstream (LWMCU, LWMCL, and LEMC) and Exposure Area 4: Downstream of the Siphon (COMC). For surface water, exposure was evaluated for the entire DRCS.

The adult recreational user, adolescent recreational user, and child recreational user receptors were evaluated for COPC exposure to surface water and sediment. Calculations are presented by receptor in Tables 7.5 through 7.10 for sediment and Tables 7.11 through 7.13 for surface water. The estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 9.3 through 9.11.

3.2.1 Sediment

Exposure Area 2: The Siphon and Downstream (LWMCU, LWMCL, LEMC)

The total non-carcinogenic HI for the adult recreational user is 0.008, which is below the acceptable threshold of 1.0 (Table 9.3). The carcinogenic risk for the adult recreational user is 1×10^{-7} (Table 9.3), which is below the lower end of EPA's target risk range.

The total non-carcinogenic HI for the adolescent recreational user is 0.03, which is below the acceptable threshold of 1.0 (Table 9.4). The carcinogenic risk for the adolescent recreational user is 1×10^{-7} (Table 9.4), which is below the lower end of EPA's target risk range.

The total non-carcinogenic HI for the child recreational user is 0.05, which is below the acceptable threshold of 1.0 (Table 9.5). The carcinogenic risk for the child recreational user is 1×10^{-7} (Table 9.5), which is below the lower end of the EPA's target risk range.

Exposure Area 4: Downstream of the Reservoirs (COMC)

The only COPCs for Exposure Area 4: Downstream of the Reservoirs were PAHs. These PAHs do not have non-carcinogenic toxicity values. As a result, only carcinogenic risks were determined for this exposure area. The carcinogenic risk for the adult recreational user is 1×10^{-5} (Table 9.6), which is within EPA's target risk range. The carcinogenic risk for the adolescent recreational user is 4×10^{-5} (Table 9.7), which is within the upper end of EPA's target risk range. The carcinogenic risk for the child recreational user is 4×10^{-5} (Table 9.8), which is within EPA's target risk range.

3.2.2 Surface Water

The total non-carcinogenic HI for the adult recreational user is 0.09, which is below the acceptable threshold of 1.0 (Table 9.9). The carcinogenic risk for the adult recreational user is 5×10^{-6} (Table 9.9), which is within EPA's target risk range.

The total non-carcinogenic HI for the adolescent recreational user is 0.1, which is below the acceptable threshold of 1.0 (Table 9.10). The carcinogenic risk for the adolescent recreational user is 3×10^{-6} (Table 9.10), which is within EPA's target risk range.

The total non-carcinogenic HI for the child recreational user is 0.3, which is below the acceptable threshold of 1.0 (Table 9.11). The carcinogenic risk for the child recreational user is 2×10^{-6} (Table 9.11), which is within EPA's target risk range.

3.3 FISH TISSUE

The adult recreational user, adolescent recreational user, and child recreational user receptors were evaluated for COPC exposure through the consumption of fish. In addition, an adult subsistence fisher was also evaluated for fish consumption. As noted in Section 2.2, consumption of fish was evaluated for the entire dataset across the DRCS. In addition, specific species were also evaluated to provide potential risk management decisions based upon COPC concentrations within individual fish species. Calculations are presented by receptor in Tables 7.14 through 7.32. The estimates of cumulative risks across all pathways for non-carcinogenic and carcinogenic effects are presented in Tables 9.12 through 9.30.

It is noted that these tables only contain the evaluation of potential risks from individual Aroclors and other COPCs. The evaluation of potential risks from total PCB congeners was evaluated separately and is discussed in Section 3.4 which precedes this section.

For the evaluation of individual fish species, only the recreational users were evaluated for the consumption of specific fish species. Due to the amount of fish consumed by the subsistence fisher, they are not expected to consume individual species at the higher overall consumption rate assumed for this receptor. The evaluation of the recreational user for each fish species provides a protective evaluation for subsistence fisher consumption of specific fish species.

Entire DRCS (All fish tissue results) Exposure Area

The total non-carcinogenic HI for the adult recreational user is 9, which is above the acceptable threshold of 1.0 (Table 9.12). Aroclor-1254 (HQ=7.0) is the only COPCs with an HQ greater than 1.0. The carcinogenic risk for the adult recreational user is 2×10^{-4} (Table 9.12), which is above the upper end of the EPA's target risk range. Aroclor-1254 (1.0×10^{-4}), Aroclor-1260 (5.5×10^{-5}), and arsenic (2.0×10^{-5}) have carcinogenic risks above 10^{-5}. Alpha-BHC (5.5×10^{-6}), delta-BHC (1.1×10^{-6}), Aldrin (3.3×10^{-6}), dieldrin (7.7×10^{-6}), 4,4'-DDE (2.7×10^{-6}), 4,4'-DDT (1.7×10^{-6}), and heptachlor epoxide (1.7×10^{-6}) have carcinogenic risks above 10^{-6}.

The total non-carcinogenic HI for the adolescent recreational user is 11, which is above the acceptable threshold of 1.0 (Table 9.13). Mercury (HQ=1.5) and Aroclor-1254 (HQ=9.3) are the only COPCs with an HQ greater than 1.0. The carcinogenic risk for the adolescent recreational user is 1×10^{-4} (Table 9.13), which is equal to the upper end of the EPA's target risk range. Aroclor-1254 (5.3×10^{-5}), Aroclor-1260 (2.8×10^{-5}), and arsenic (1.0×10^{-5}) have carcinogenic risks above 10^{-5}. Alpha-BHC (2.8×10^{-6}), aldrin (1.7×10^{-6}), dieldrin (3.9×10^{-6}), and 4,4'-DDE (1.4×10^{-6}) have carcinogenic risks above 10^{-6}.

The total non-carcinogenic HI for the child recreational user is 23, which is above the acceptable threshold of 1.0 (Table 9.14). Mercury (HQ=3.0) and Aroclor-1254 (HQ=19) are the only COPCs with an HQ greater than 1.0. The carcinogenic risk for the child recreational user is 6×10^{-5} (Table 9.14), which is within the EPA's target risk range. Aroclor-1254 (3.2×10^{-5}), Aroclor-1260 (1.7×10^{-5}) have carcinogenic risks above 10^{-5}. Arsenic (6.0×10^{-6}), alpha-BHC (1.7×10^{-6}), and dieldrin (2.4×10^{-6}) have carcinogenic risks above 10^{-6}.

The total non-carcinogenic HI for the adult subsistence fisher is 47, which is above the acceptable threshold of 1.0 (Table 9.15). Mercury (HQ=6.3) and Aroclor-1254 (HQ=39) are the only COPCs with an HQ greater than 1.0. The carcinogenic risk for the adult subsistence fisher is 9×10^{-4} (Table 9.15), which is above the upper end of the EPA's target risk range. Aroclor-1254 (4.5×10^{-4}), Aroclor-1260 (2.3×10^{-4}) have carcinogenic risks above 10^{-4}. Arsenic (8.4×10^{-5}), alpha-BHC (2.3×10^{-5}), aldrin (1.4×10^{-5}), dieldrin (3.3×10^{-5}), 4,4'-DDE (1.1×10^{-5}) have carcinogenic risks above 10^{-5}. Gamma-BHC (2.9×10^{-6}), gamma-Chlordane (2.9×10^{-6}), 4,4'-DDT (7.4×10^{-6}), and heptachlor epoxide (7.1×10^{-6}).

Individual Fish Species

Buffalo Fish

The total non-carcinogenic HI for the adult recreational user is 28, which is above the acceptable threshold of 1.0 (Table 9.16). Aroclor-1254 (HQ=29) is the only COPC with an HQ greater than 1.0. The carcinogenic risk for the adult recreational user is 1×10^{-3} (Table 9.16), which is above the upper end of EPA's target risk range. Aroclor-1254 and Aroclor-1260 have carcinogenic risks above 10^{-4}. Arsenic and dieldrin have carcinogenic risks above 10^{-5}. Gamma-chlordane, 4,4'-DDE, and heptachlor epoxide have carcinogenic risks above 10^{-6}.

The total non-carcinogenic HI for the adolescent recreational user is 37, which is above the acceptable threshold of 1.0 (Table 9.17). Aroclor-1254 (HQ=37) is the only COPC with an HQ greater than 1.0. The carcinogenic risk for the adolescent recreational user is 7×10^{-4} (Table 9.17), which is above the upper end of EPA's target risk range. Aroclor-1254 and Aroclor-1260 have carcinogenic risks above 10^{-4}. Arsenic, dieldrin, 4,4'-DDE, and heptachlor epoxide have carcinogenic risks above 10^{-6}.

The total non-carcinogenic HI for the child recreational user is 75, which is above the acceptable threshold of 1.0 (Table 9.18). Aroclor-1254 (HQ=74) is the only COPCs with an HQ greater than 1.0. The carcinogenic risk for the child recreational user is 4×10^{-4} (Table 9.18), which is above the upper end of EPA's target risk range. Aroclor-1254 and Aroclor-1260 have carcinogenic risks above 10^{-4}. Arsenic, dieldrin, and 4,4-DDE have carcinogenic risks above 10^{-6}.

Carp Fish

The total non-carcinogenic HI for the adult recreational user is 4, which is above the acceptable threshold of 1.0 (Table 9.19). Aroclor-1254 (HQ=2.4) is the only COPCs with an HQ greater than 1.0. The carcinogenic risk for the adult recreational user is 2×10^{-4} (Table 9.19), which is equal to the upper end of EPA's target risk range. Aroclor-1254, Aroclor-1260, arsenic, and dieldrin have carcinogenic risks above 10^{-5}. Aldrin, 4,4'-DDE, 4,4'-DDT, and heptachlor epoxide have carcinogenic risks above 10^{-6}.

The total non-carcinogenic HI for the adolescent recreational user is 5, which is above the acceptable threshold of 1.0 (Table 9.20). Aroclor-1254 (HQ=3.2) is the only COPC with an HQ greater than 1.0. The carcinogenic risk for the adolescent recreational user is 8×10^{-5} (Table 9.20), which is within EPA's target risk range. Aroclor-1254, Aroclor-1260 and arsenic have carcinogenic risks above 10^{-5}. Aldrin, dieldrin, 4,4'-DDE, 4,4'-DDT, and heptachlor epoxide have carcinogenic risks above 10^{-6}.

The total non-carcinogenic HI for the child recreational user is 10, which is above the acceptable threshold of 1.0 (Table 9.21). Mercury (HQ=1.5) and Aroclor-1254 (HQ=6.4) are the only COPCs with an HQ greater than 1.0. The carcinogenic risk for the child recreational user is 5×10^{-5} (Table 9.21), which is within the upper end of EPA's target risk range. Aroclor-1254, Aroclor-1260, and arsenic have carcinogenic risks above 10^{-5}. Aldrin, dieldrin, 4,4'-DDT, and heptachlor epoxide have carcinogenic risks above 10^{-6}.

Gar Fish

The total non-carcinogenic HI for the adult recreational user is 8, which is above the acceptable threshold of 1.0 (Table 9.22). Aroclor-1254 (HQ=7.3) is the only COPC with an HQ greater than 1.0. The carcinogenic risk for the adult recreational user is 3×10^{-4} (Table 9.22), which is above the upper end of EPA's target risk range. Aroclor-1254 and Aroclor-1260 have carcinogenic risks above 10^{-4}.

The total non-carcinogenic HI for the adolescent recreational user is 11, which is above the acceptable threshold of 1.0 (Table 9.23). Aroclor-1254 (HQ=9.7) is the only COPC with an HQ greater than 1.0. The carcinogenic risk for the adolescent recreational user is 1×10^{-4} (Table 9.23), which is equal to the upper end of EPA's target risk range. Aroclor-1254 and Aroclor-1260 have carcinogenic risks above 10^{-5}.

The total non-carcinogenic HI for the child recreational user is 21, which is above the acceptable threshold of 1.0 (Table 9.24). Aroclor-1254 (HQ=19) and mercury (HQ=1.9) are the only COPCs with an HQ greater than 1.0. The carcinogenic risk for the child recreational user is 8×10^{-5} (Table 9.24), which is within EPA's target risk range. Aroclor-1254 and Aroclor-1260 have carcinogenic risks above 10^{-5}.

Catfish

The total non-carcinogenic HI for the adult recreational user is 6, which is above the acceptable threshold of 1.0 (Table 9.25). Aroclor-1254 (HQ=5.7) is the only COPC with an HQ greater than 1.0. The carcinogenic risk for the adult recreational user is 1×10^{-4} (Table 9.25), which is equal to the upper end of EPA's target risk range. Aroclor-1254, Aroclor-1260, and dieldrin have carcinogenic risks above 10^{-5}. Alpha-BHC, delta-BHC, and 4,4'-DDE have carcinogenic risks above 10^{-6}.

The total non-carcinogenic HI for the adolescent recreational user is 8, which is above the acceptable threshold of 1.0 (Table 9.26). Aroclor-1254 (HQ=7.5) is the only COPC with an HQ greater than 1.0. The carcinogenic risk for the adolescent recreational user is 8×10^{-5} (Table 9.26), which is within EPA's target risk range. Aroclor-1254 and Aroclor-1260 have carcinogenic risks above 10^{-5}. Alpha-BHC, dieldrin, and 4,4'-DDE have carcinogenic risks above 10^{-6}.

The total non-carcinogenic HI for the child recreational user is 17, which is above the acceptable threshold of 1.0 (Table 9.27). Aroclor-1254 (HQ=15) and mercury (HQ=1.3) are the only COPCs with an HQ greater than 1.0. The carcinogenic risk for the child recreational user is 5×10^{-5} (Table 9.27), which is within EPA's target risk range. Aroclor-1254 and Aroclor-1260 have carcinogenic risks above 10^{-5}. Dieldrin, alpha-BHC, and 4,4'-DDE have carcinogenic risks above 10^{-6}.

Large Mouth Bass Fish

The total non-carcinogenic HI for the adult recreational user is 3, which is above the acceptable threshold of 1.0 (Table 9.28). Mercury (HQ=2.4) is the only COPC with an HQ greater than 1.0. The carcinogenic risk for the adult recreational user is 3×10^{-5} (Table 9.28), which is within EPA's target risk range. Aroclor-1254 has carcinogenic risks above 10^{-5}. Aldrin, dieldrin, and 4,4'-DDE have carcinogenic risks above 10^{-6}.

The total non-carcinogenic HI for the adolescent recreational user is 4, which is above the acceptable threshold of 1.0 (Table 9.29). Mercury (HQ=3.2) and Aroclor-1254 (HQ=1.2) are the only COPCs with an HQ greater than 1.0. The carcinogenic risk for the adult recreational user is 1×10^{-5} (Table 9.29), which is within EPA's target risk range. Aroclor-1254, aldrin, dieldrin, and 4,4'-DDE have carcinogenic risks above 10^{-6}.

The total non-carcinogenic HI for the child recreational user is 9, which is above the acceptable threshold of 1.0 (Table 9.30). Mercury (HQ=6.4) and Aroclor-1254 (HQ=2.3) are the only COPCs with an HQ greater than 1.0. The carcinogenic risk for the adult recreational user is 8×10^{-6} (Table 9.30), which is within EPA's target risk range. Aroclor-1254, aldrin, and dieldrin have carcinogenic risks above 10^{-6}.

3.4 FISH TISSUE – TOTAL PCB CONGENERS

In addition to the evaluation of individual Aroclors, PCB congeners were also analyzed within fish tissue. However, the dataset for PCB congeners was significantly smaller than that of the individual Aroclors. For all fish collected within the DRCS, 105 fish samples were tested for individual Aroclors and 20 were tested for PCB congeners. For many of the tissue samples, the individual Aroclors and PCB congener analysis was not performed on the same tissue sample. Therefore, the results for the PCB congeners were evaluated separately from other COPCs within fish tissue. The adult recreational user, adolescent recreational user, child recreational user, and adult subsistence fisher receptors were evaluated for PCB congener exposures through the consumption of fish. The evaluation of individual fish species was also not performed for the PCB congener evaluation due to the low number of samples analyzed for PCB congeners for each species (Tables 2.12 through 2.16).

Calculations are presented by receptor in Tables 7.34 through 7.37. Risks for total PCB congeners were evaluated assuming a high risk PCB. As a result, only carcinogenic toxicity values are available. An estimate of non-carcinogenic hazards is not available. The estimate of cumulative risks across all pathways for carcinogenic effects are presented in Tables 9.31 through 9.34. It is noted that these tables only contain the evaluation of potential risks total PCB congeners. As noted in Section 2.3.4, a group of PCB congeners is identified as dioxin-like congeners. These congeners were not evaluated separately from the total PCB congeners. The evaluation of the dioxin-like congeners separate from the total PCB congeners is presented in the Uncertainty Section 4.1.

The carcinogenic risk for the adult recreational user is 7×10^{-3} (Table 9.31), which is above the upper end of EPA's target risk range.

The carcinogenic risk for the adolescent recreational user is 4×10^{-3} (Table 9.32), which is above the upper end of EPA's target risk range.

The carcinogenic risk for the child recreational user is 2×10^{-3} (Table 9.33), which is above the upper end of EPA's target risk range.

The carcinogenic risk for the adult subsistence user is 3×10^{-2} (Table 9.34), which is above the upper end of EPA's target risk range.

4. RISK ASSESSMENT UNCERTAINTY

There are numerous uncertainties involved in the HHRA process. These are discussed briefly in the following sections.

4.1 RISK CHARACTERIZATION FOR PCB CONGENERS

As noted in Sections 2.3.4 and 3.4, the evaluation of PCB congeners did not include a breakdown of dioxin-like PCB congeners. The evaluation of dioxin-like PCB congeners was performed to determine if the overall conclusions of the HHRA are affected by evaluating only total PCB congeners.

A subset of 12 PCB congeners are considered dioxin-like. These PCB congeners were summed separately from the other PCB congeners and noted as Total Dioxin-Like PCB Congeners. These dioxin-like congeners require the use of the toxicity equivalency factors (TEFs) that relate the toxicity of these dioxin-like PCB congeners to the specific toxicity of the dioxin 2,3,7,8-tetrachlorodibenzo-para-dioxin (TCDD) (EPA 2010). These TEFs produce a dioxin/furan concentration representative of the cumulative toxicity of the congeners referred to as a TCDD TEQ for each sample. The HHRA evaluates the "Total Dioxin-Like PCB Congeners" as a TCDD TEQ, estimated using zero to represent non-detect compounds. The following table presents the PCB congeners and their TEF (EPA 2010). The following dioxin-like PCB congeners were detected within the 20 fish tissue samples analyzed for PCB congeners:

Compound	Toxicity Equivalency Factor
PCB 77 (3,3',4,4'-Tetrachlorinated Biphenyl)	0.0001
PCB 81 (3,4,4',5- Tetrachlorinated Biphenyl)	0.0003
PCB 105 (2,3,3',4,4'- Pentachlorinated Biphenyl)	0.00003
PCB 126 (3,3',4,4',5-Pentachlorinated Biphenyl)	0.1
PCB 169 (3,3',4,4',5,5'-Hexachlorinated Biphenyl)	0.03
PCB 114 (2,3,4,4',5-Pentachlorinated Biphenyl)	0.00003
PCB 118 (2,3',4,4',5-Pentachlorinated Biphenyl)	0.00003
PCB 123 (2',3,4,4',5-Pentachlorinated Biphenyl)	0.00003
PCB 156 (2,3,3',4,4',5-Hexachlorinated Biphenyl)	0.00003
PCB 157 (2,3,3',4,4',5'-Hexachlorinated Biphenyl)	0.00003
PCB 167 (2,3',4,4',5,5'-Hexachlorinated Biphenyl)	0.00003
PCB 189 (2,3,3',4,4',5,5'-Heptachlorinated Biphenyl)	0.00003

It is noted that not all of the PCB congeners identified in the table above were detected in every sample. The TCDD TEQ concentration was summed for each fish tissue sample analyzed for PCB congeners and then subtracted from the Total PCB concentration. This determination is presented in Attachment 4. An EPC (i.e., 95UCL) was determined for both TCDD TEQ and total PCB congeners using ProUCL. Outputs from ProUCL are also provided in Attachment 4. Cumulative risks were determined for TCDD TEQ and total PCB congeners for the adult recreational user, adolescent recreational user, child recreational user, and adult subsistence user.

These calculations are provided in Tables 10.1 through 10.4. The following table presents a summary of these risk results:

Receptor	Chemical of Potential Concern	Non-carcinogenic Hazard	Carcinogenic Risks
Adult recreational user	TCDD TEQ	55	1.8×10^{-3}
	Total PCB Congeners	NA	6.3×10^{-3}
	Total	**55**	**8.1×10^{-3}**
Adolescent recreational user	TCDD TEQ	72	9.4×10^{-4}
	Total PCB Congeners	NA	3.2×10^{-3}
	Total	**72**	**4.1×10^{-3}**
Child recreational user	TCDD TEQ	108	5.6×10^{-4}
	Total PCB Congeners	NA	1.9×10^{-3}
	Total	**108**	**2.5×10^{-3}**
Adult Subsistence user	TCDD TEQ	303	7.9×10^{-3}
	Total PCB Congeners	NA	2.7×10^{-2}
	Total	**303**	**3.5×10^{-2}**

As the risk results show, the primary contributor to overall carcinogenic risks is total PCB congeners. The total TCDD TEQ results do reveals risks above acceptable levels, including non-carcinogenic hazards. However, the total PCB congener risks are higher, and the analysis of the TCDD TEQ would not change the overall conclusions of the HHRA. It is noted that the risks for both TCDD TEQ and total PCB congeners are significantly influenced by the one maximum detect fish tissue concentration of 150 mg/kg total PCBs for sample location BUF-170-F. If this sample was not included in the congener dataset, than the resulting risks would be an order of magnitude lower than presented in the table above. Therefore, any risk management decisions for the control of PCBs would result in a similar decision for the dioxin-like congeners.

4.2 SAMPLING AND ANALYSIS UNCERTAINTIES

The sampling plan can have a significant impact on the results obtained in calculating human health risks at a site. Samples collected within the DRCS were collected from separate exposure areas that span the entire length of the site. As a result, this reduces the uncertainties associated with biased sampling. Additionally, samples for various media were also collected for a number of years. The number of samples and variance in the sample collection times aides in the statistical evaluation of EPCs. Uncertainties associated with sampling and analyses are expected to be low.

Specific canal segments along the DRCS revealed higher levels of PCBs. Figures 14 through 21 present the detected sediment concentrations along segments of the DRCS. Sediment samples within the LWMCU had the highest detections of PCBs within the entire DRCS. However, the evaluation of fish tissue results was based upon the collection of fish tissue along the entire DRCS (Figure 13). The evaluation of fish tissue along the entire length of the DRCS was completed primarily due to the mobility of fish across the system. Additionally, the objective of the HHRA is to evaluate potential risks for receptors across the entire DRCS expected over a long-term exposure and the fact that fishers are expected to use the entire DRCS and not remain in individual areas. To determine potential effects that sediment just after the siphon (i.e., LWMCU and LEMC) have on fish tissue results collected within these areas, fish tissue EPCs for these areas were determined and compared to the EPCs evaluated in the HHRA.

To evaluate the potential effects only evaluating fish tissue after the siphon, a 95UCL was determined for Aroclor-1254, Aroclor-1260, and total PCB congeners in fish tissue samples within the canal reaches directly after the siphon. The resulting 95UCLs for Aroclor-1254, Aroclor-1260, and total PCB congeners are 0.688 mg/kg, 0.226 mg/kg, and 92.6 mg/kg, respectively. The 95UCLs evaluated in the HHRA (Table 3.5 of the HHRA) for Aroclor-1254, Aroclor-1260, and total PCB congeners were 0.427 mg/kg, 0.225 mg/kg, and 29.4 mg/kg, respectively. The differences between the 95UCLs for Aroclor-1254 are approximately 1.6 times higher, equal for Aroclor-1260, and 3 times higher for total PCB congeners.

The resulting higher 95UCL for Aroclor-1254 would have increased the HHRA results for non-carcinogenic hazards and had minimal effects on carcinogenic risk results. Additionally, the higher 95UCL for total PCB congeners would increase the carcinogenic risks by a factor of 3. Non-carcinogenic hazards were not determined for total PCB congeners because an RfD is not available. The HHRA risk results revealed potential concerns for exposure to Aroclor-1254, Aroclor-1260, and total PCB congeners in fish tissue. The fish tissue 95UCLs for the canal segments immediately after the siphon reveal that sediments within these areas may impact fish within these areas. Additionally, these areas do present higher potential risks for fishers within the DRCS, but the entire DRCS presents potential risk concerns for fish consumption.

4.3 UNCERTAINTIES ANALYSIS OF EXPOSURE ASSESSMENT

An analysis of uncertainties is an important aspect of the exposure assessment. It provides the risk assessor and reviewer with information relevant to the individual uncertainties associated with exposure factor assumptions and their potential impact on the final assessment. Exposure to surface water and sediment within the DRCS was divided between multiple exposure areas. The division between the exposure areas allows for a more accurate representation of potential exposures and COPC concentrations and identification of areas of potential human health concerns. However, uncertainty is introduced when the site is divided into exposure areas. The intent of the HHRA is to determine potential concerns to human health based upon long-term contact to media of concern over an exposure period. Assuming contact with a single exposure area is generally not a reasonable long-term estimate since receptors can move freely along the DRCS. Surface water was evaluated for the entire site, which reduces the uncertainty associated with this media of concern.

4.3.1 Exposure Point Concentrations

An uncertainty exists with the basic approach used in arriving at EPCs for the COPCs. The EPA ProUCL program eliminates many uncertainties associated with EPC calculation; however, COPCs with low FODs or small sample dataset (less than 5 samples) still have uncertainties within ProUCL. For sample datasets less than 5, ProUCL will not perform any statistical methods. EPA notes, "Statistics (e.g., 95UCL) computed based upon only a few detected values (e.g., <4-6) cannot be considered reliable enough to estimate the EPC terms having potential impact on the human health and the environment. When the number of detected data is small, it is preferable to use simple ad hoc methods rather than using statistical methods to compute the EPC terms and other upper limits. Specifically, it is suggested that in cases when the detection frequency is low (e.g., <4-5 percent) and the number of detected observations is low, the project team and the decision makers together should make a decision on a site-specific basis on how to estimate the average exposure (EPC term) for the contaminant and area under consideration" (EPA 2010). For chemicals with a low FOD, the maximum detected concentration was used as the EPC. The use of the maximum detected concentration can result in an overestimate of potential risks when evaluating long-term exposures.

4.4 UNCERTAINTIES OF TOXICITY ASSESSMENT

There are numerous uncertainties associated with the toxicity assessment. These are generally due to the unavailability of data to thoroughly calculate the toxicity of COPC. These uncertainties are described in more detail in the following sections.

4.4.1 Uncertainties Associated with Non-Carcinogenic Effects

4.4.1.1 Interspecies Extrapolation

The majority of toxicological information comes from experiments with laboratory animals. Experimental animal data have been relied on by regulatory agencies to assess the hazards of chemical exposures to humans. Interspecies differences in chemical absorption, metabolism, excretion, and toxic response are not well understood; therefore, conservative assumptions are applied to animal data when extrapolating to humans. These probably result in an overestimation of toxicity.

4.4.1.2 Intraspecies Extrapolation

Differences in individual human susceptibilities to the effects of chemical exposures may be caused by such variables as genetic factors (e.g., glucose-6-phosphate dehydrogenase deficiency), lifestyle (e.g., cigarette smoking and alcohol consumption), age, hormonal status (e.g., pregnancy), and disease. To take into account the diversity of human populations and their differing susceptibilities to chemically induced injury or disease, a safety factor is used. EPA uses a factor between 1 and 10. This uncertainty may lead to overestimates of human health effects at given doses.

4.4.2 Exposure Routes

When experimental data available on one route of administration are different from the actual route of exposure that is of interest, route-to-route extrapolation must be performed before the risk can be assessed. Several criteria must be satisfied before route-to-route extrapolation can be undertaken. The most critical assumption is that a chemical injures the same organ(s) regardless of route, even though the injury can vary in degree. Another assumption is that the behavior of a substance in the body is similar by all routes of contact. This may not be the case when, for example, materials absorbed via the gastrointestinal tract pass through the liver prior to reaching the systemic circulation, whereas by inhalation the same chemical will reach other organs before the liver. However, when data are limited, these extrapolations are made and may result in overestimates of human toxicity.

4.4.3 Uncertainties Associated with Carcinogenic Effects

4.4.3.1 Interspecies Extrapolation

The majority of toxicological information for carcinogenic assessments comes from experiments with laboratory animals. There is uncertainty about whether animal carcinogens are also carcinogenic in humans. While many chemical substances are carcinogenic in one or more animal species, only a very small number of chemical substances are known to be human carcinogens. The fact that some chemicals are carcinogenic in some animal species, but not in others, raises the possibility that not all animal carcinogens are human carcinogens. Regulatory agencies assume that humans are as sensitive to carcinogens as the most sensitive animal species. This policy decision, designed to prevent underestimation of risk, introduces the potential to overestimate carcinogenic risk.

4.4.3.2 High-Dose to Low-Dose Extrapolation

Typical cancer bioassays provide limited low-dose data on responses in experimental animals for chemicals being assessed for carcinogenic or chronic effects. The usual dose regime involves three dose groups per assay. The first dose group is given the highest dose that can be tolerated, the second is exposed to one-half that dose, and the third group is unexposed (control group) (National Research Council 1983). Because this dosing method does not reflect how animals would react to much lower doses of a chemical, a dose-response assessment normally requires extrapolation from high to low doses using mathematical modeling that incorporates to varying degrees information about physiologic processes in the body (National Research Council 1983).

A central problem with the low-dose extrapolation models is that they often fit the data from animal bioassays equally well, and it is not possible to determine their validity based on goodness of fit. Several models may fit experimental data equally well, but all may not be equally plausible biologically. The dose-response curves derived from different models diverge substantially in the dose range of interest (National Research Council 1983). Therefore, low-dose extrapolation is more than a curve-fitting process, and considerations of biological plausibility of the models must be taken into account before choosing the best model for a particular set of data.

4.4.4 Modification for Mutagenic Compounds

Carcinogenic slope factors for compounds identified with a mutagenic mode of action for early-life exposure are modified by a default adjustment factor. The default adjustment factors are used because chemical-specific data are not available to directly assess cancer susceptibility from early-life exposure to a carcinogen acting through a mutagenic mode of action. The default adjustment factors are derived from a weighted geometric mean tumor incidence ratio. Therefore, the use of the default adjustment factors may both over-estimate and under-estimate the potential potency for early-life exposure for chemicals with a mutagenic mode of action for carcinogenesis (EPA 2005b). However, the analysis of potential exposure over a lifetime reduces the effects and uncertainty of the mutagenic adjustments on estimated lifetime cancer risk. Carcinogenic risks for receptors identified within the early-life exposure age range are determined based upon a lifetime exposure. The resulting uncertainty in the use of the mutagenic default adjustment factors is reduced but some uncertainty still remains in the use of default factors over a specified age range rather than chemical-specific data. However, this uncertainty is expected to be small and not have any effects on the overall conclusions of the HHRA.

5. HUMAN HEALTH RISK ASSESSMENT SUMMARY

The HHRA estimated the risk and hazard to potential human receptors for exposure to media within the DRCS. The site is located in south Texas near the United States border with Mexico. The site includes a system of lined and unlined canals, reservoirs, and adjacent waterways. The canals extend north from the Rio Grande River for approximately 17 miles with lateral branches that extend approximately five miles to the east and west (Figure 1). The DRCS includes the 400-acre Donna Reservoir and a system of lateral canals and pipes.

The canal segments are above grade, except for siphons to carry water under the Arroyo Colorado River and some roads. The canal levees are earthen construction with no liner, except for a 1.75 mile section immediately south of the reservoir systems which is concrete lined. Several concrete control structures are located along the canal and are used to direct and control the flow of water. Pumps at the reservoir system distribute water to the east and west main canals north of the reservoir system for further distribution. There is easy road access along most of the canals and reservoir shorelines, allowing for unrestricted fishing throughout the DRCS.

On 9 February 1994, the TDH issued Aquatic Life Order #9. This order prohibited possession of any fish species from the DRCS. Despite the possession ban, the DRCS remains a popular fishing spot for residents of Hidalgo County. Past site investigations have revealed elevated concentrations of PCBs in fish and sediment. In March 2008, the site was listed on the National Priorities List due to PCB contamination in fish.

The land use surrounding the reservoir and canal system is commercial farming and agricultural. Residential development is occurring immediately north of the Northwest Reservoir, while a combination of agriculture and residential areas exist north of the East and West Reservoirs. Irrigation water is provided by the Donna Irrigation District from the canal system for farming operations. The canal system, which is elevated above the surrounding cropland, provides water to other branching irrigation canals. Irrigation is primarily achieved by flooding the fields.

Samples collected from the DRCS and evaluated in the HHRA include ground water, surface water, sediment, soil, and fish tissue. Receptors include agricultural workers, commercial/industrial workers, residents, and recreational users. Figure 23 presents the potential receptors for the DRCS.

Potential receptors were selected based on the media of concern. Only the resident and agricultural worker were evaluated quantitatively for exposure to soil. Both of these receptors provide protective evaluation for all potential receptors who may contact soil. For surface water, sediment, and fish ingestion, all potential receptors are expected to have exposure to these media.

Exposure to surface water and sediment is primarily expected to occur during fishing. As a result, typical exposures for a resident to surface water, sediment, and fish are expected to be similar to that of a recreational user since the resident is expected to visit the DRCS for recreational activities not because the areas are part of the residence. Therefore, the recreational user is the primary receptor for exposure to these media. Similarly, agricultural workers are expected to use the DRCS for recreational fishing. The agricultural worker exposure while fishing is expected to be the same as the adult recreational user. Therefore, only the adult, adolescent, and child recreational user are evaluated quantitatively for exposure to surface water, sediment, and fish tissue from the DRCS. In addition to recreational users, EPA suggests that, along with ethnic characteristics and cultural practices of an area's population, the poverty rate could contribute to any determination of the rate of subsistence fishing in an area (EPA 2002c). Subsistence fishing, while not explicitly documented within the DRCS, likely occurs based on observations and site visits conducted by EPA, demographics discussed in Section 2.2.1, and media reports from local news agencies. Therefore, a subsistence fisher is a potential receptor at the DRCS. The subsistence fisher is expected to fish within the DRCS at rates significantly higher than the general population.

The HHRA results evaluate both carcinogenic risks and non-carcinogenic hazards. For carcinogens, risks are expressed as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the level of the carcinogen at the site. Excess lifetime cancer risk is calculated from the following equation:

$$\text{Risk} = \text{LADI} \times \text{SF}$$

where

Risk	=	Unit less probability of an exposed individual developing cancer
LADI	=	Lifetime cancer average daily intake (mg/kg/day)
SF	=	Cancer slope factor $(\text{mg/kg/day})^{-1}$.

The risks are probabilities that are expressed in scientific notation (e.g., 1×10^{-6}). A carcinogenic risk of 1×10^{-6} indicates that an individual experiencing the RME exposure estimate for the site has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an excess incremental lifetime cancer risk because it would be in addition to the risks of cancer individuals face from other causes. The chance of an individual developing cancer from all other causes has been estimated to be as high as one in three.

Because the SF is the statistical 95th percent upper-bound confidence limit on the dose-response slope, this method provides a conservative, upper-bound estimate of risk. It should be noted that the interpretation of the significance of the cancer risk estimate is based on the appropriate public policy. EPA in the NCP (40 Code of Federal Regulation Part 300) (EPA 1990a) states that:

> *"...For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6}."*

This risk range represents EPA's generally acceptable risk range for site-related exposures, or a 1 in 10,000 to 1 in 1,000,000 chance, respectively, of an individual developing cancer. Carcinogenic risks that are below the lower end of the acceptable risk range (i.e., 10^{-6}) are considered *de minimis* and require no action. Carcinogenic risks within the risk management range (i.e., between 10^{-4} and 10^{-6}) are subject to a risk management decision. It is noted that

TCEQ selects a carcinogenic risk of 10^{-5}, the midpoint of the EPA acceptable risk range, as the level that warrants additional consideration.

For non-carcinogens (systemic toxicants), potential effects are evaluated by comparing an exposure level over a specified time period (e.g., ED) with a RfD derived for a similar exposure period. An RfD represents a level to which an individual may be exposed and not expected to cause any harmful effect. The ratio of exposure to toxicity is called a hazard quotient (HQ). The HQ is calculated as follows:

$$HQ = \frac{ADI}{RfD}$$

where

HQ	=	Hazard Quotient; ratio of average daily intake level to acceptable daily intake level (unit less)
ADI	=	Calculated non-carcinogenic average daily intake (mg/kg/day or mg/m^3)
RfD	=	Reference dose (mg/kg/day).

An HQ of less than 1.0 indicates that a receptor's dose of a single contaminant is less than the RfD. As a result, there will be no concern that potential adverse systemic health effects will be observed in the exposed populations. However, if the sum of several HQs exceeds 1.0, and the COPC affect the same target organ, there may be concern that potential adverse systemic health effects will be observed in the exposed populations. In general, the greater the value of the HQ above 1.0, the greater the level of concern. However, the HQ does not represent a statistical probability that an adverse health effect will occur.

For consideration of exposures to more than one chemical causing systemic toxicity via several different pathways, the individual HQs are summed to provide an overall HI. If the HI is less than 1.0, then no adverse health effects are likely to be associated with exposures at the site. However, if the total HI is greater than 1.0, separate endpoint-specific HIs may be calculated based on toxic endpoint of concern or target organ (e.g., HQs for neurotoxins are summed separately from HQs for renal toxins). Only if an endpoint-specific HI is greater than 1.0 is there reason for concern about potential health effects for that endpoint.

A summary of the HHRA results are presented in the following tables.

Human Health Risk Assessment Summary of Results For Soil, Surface Water, and Sediment

Receptor	Carcinogenic Risks	Non-Carcinogenic Hazards	COPC Contributing Significantly to Results [1]	Risk Criteria
Soil				
Child Resident[2]	2×10^{-5}	1	Arsenic, Benzo(a)pyrene	Within risk management range
Adult Resident[2]	2×10^{-5}	0.1	Arsenic, Benzo(a)pyrene	Within risk management range
Agricultural Worker	3×10^{-6}	0.06	Arsenic	Within risk management range
Surface Water				
Adult Recreational User	5×10^{-6}	0.09	Arsenic, Bis(2-ethylhexyl)phthalate	Within risk management range
Adolescent Recreational User	3×10^{-6}	0.1	Bis(2-ethylhexyl)phthalate	Within risk management range
Child Recreational User	2×10^{-6}	0.3	Not Applicable	Within risk management range
Sediment – Exposure Area 2: The Siphon and Downstream (LWMCU, LWMCL, and LEMC)				
Adult Recreational User	1×10^{-7}	0.008	Not Applicable	No unacceptable risk
Adolescent Recreational User	1×10^{-7}	0.03	Not Applicable	No unacceptable risk
Child Recreational User	1×10^{-7}	0.05	Not Applicable	No unacceptable risk
Sediment – Exposure Area 4: Downstream of the Reservoirs (COMC)				
Adult Recreational User	1×10^{-5}	Not Applicable	Benz(a)anthracene, Benzo(b)fluoranthene, Benzo(a)pyrene, Dibenz(a,h)anthracene	Within risk management range
Adolescent Recreational User	4×10^{-5}	Not Applicable	Benz(a)anthracene, Benzo(b)fluoranthene, Benzo(a)pyrene, Dibenz(a,h)anthracene, Indeno(1,2,3-c,d)pyrene	Within risk management range
Child Recreational User	4×10^{-5}	Not Applicable	Benz(a)anthracene, Benzo(b)fluoranthene, Benzo(a)pyrene, Dibenz(a,h)anthracene, Indeno(1,2,3-c,d)pyrene	Within risk management range

Note:
1. COPC Contributing Significantly to Results as defined by an exceedance of 10^{-6} carcinogenic risk.
2. Cancer risk for the resident adult and child is presented as a total lifetime cumulative cancer risk.

As shown in the above table, all carcinogenic risks are within or below the EPA acceptable risk range of 10^{-6} to 10^{-4}. Non-carcinogenic hazards are equal to or below the acceptable threshold of 1. Therefore, the results indicate that there are no unacceptable human health concerns for exposure to soil, surface water, and sediment evaluated as part of the site. Soil results along the DRCS and within the agricultural fields surrounding the DRCS did not reveal concentrations of

PCBs that would cause potential human health concerns for direct contact with soil or uptake of PCBs from soil to plants within the fields. Additionally, the concentration of PCBs within surface water is not expected to cause concerns for use as irrigation water for plants within the agricultural fields surrounding the DRCS. The ability of plants to uptake PCBs from soil is limited. Based upon limited ability of PCB plant uptake and the concentration of PCBs in soil and surface water, uptake is not expected to be a complete exposure pathway.

The HHRA only quantitatively evaluated potential resident adult, child, and agricultural worker exposure to soil, and a recreational user exposure to surface water and sediment. Other potential receptors may contact these media. However, these receptors are not expected to have higher contact with the media evaluated. The evaluation of a resident and agricultural worker exposure to soil, and a recreational user exposure to surface water and sediment, provides a protective receptor that is expected to have higher contact with the media evaluated.

The primary exposure pathway for surface water was direct contact by a recreation user. The consumption of water within the DRCS was indirectly evaluated as a drinking water source by comparing MCLs and EPA tap water RSLs to detected concentrations, as discussed in the RI report. The concentration of PCBs (both Aroclors and total PCB congeners) in surface water from the reservoirs and the Donna Water Treatment Plant was compared to the EPA tap water RSLs and MCL for low risk PCBs. No Aroclors were detected in surface water within these areas of the DRCS. All detections of total PCB congeners were below the tap water RSL and MCL. This reveals that the consumption of drinking water poses no human health concerns for exposure to PCBs, including the consumption of local agricultural products irrigated from the canal system.

Human Health Risk Assessment Summary of Adult Recreational User Results for Fish Consumption

Media	Chemical	Cancer Risk	Non-Cancer Hazard Quotient	Total Cancer Risk	Above or Within EPA Acceptable Cancer Risk	Total Non-Cancer Hazard Index	Above or Below EPA Acceptable Hazard Index
All Fish Species	**Arsenic**	**2.0×10^{-5}**	—	**2.0×10^{-4}**	**ABOVE**	**8.5**	**ABOVE**
	Mercury	NA	**1.1**				
	alpha-BHC	5.5×10^{-6}	—				
	delta-BHC	1.1×10^{-6}	—				
	Aldrin	3.3×10^{-6}	—				
	Dieldrin	7.7×10^{-6}	—				
	DDE	2.7×10^{-6}	—				
	DDT	1.7×10^{-6}	—				
	Heptachlor epoxide	1.7×10^{-6}	—				
	Aroclor-1254	**1.0×10^{-4}**	**7.0**				
	Aroclor-1260	**5.5×10^{-5}**	NA				

Note: Bolded analytes or values exceed a cancer risk of 1×10^{-5} or a non-cancer hazard of 1.
— – cancer risk for this chemical is below 1×10^{-6} or the non-cancer hazard for this chemical is below 1.0.
NA – no cancer risk or non-cancer hazard associated with this chemical.

Human Health Risk Assessment Summary of Adolescent Recreational User Results for Fish Consumption

Media	Chemical	Cancer Risk	Non-Cancer Hazard Quotient	Total Cancer Risk	Above or Within EPA Acceptable Cancer Risk	Total Non-Cancer Hazard Index	Above or Below EPA Acceptable Hazard Index
All Fish Species	**Arsenic**	**1.0×10^{-5}**	—	**1.0×10^{-4}**	**ABOVE**	**11**	**ABOVE**
	Mercury	NA	**1.5**				
	alpha-BHC	2.8×10^{-6}	—				
	Aldrin	1.7×10^{-6}	—				
	Dieldrin	3.9×10^{-6}	—				
	DDE	1.4×10^{-6}	—				
	Aroclor-1254	**5.3×10^{-5}**	**9.3**				
	Aroclor-1260	**2.8×10^{-5}**	NA				

Note:
— – cancer risk for this chemical is below 1×10^{-6} or the non-cancer hazard for this chemical is below 1.0.
NA – no cancer risk or non-cancer hazard associated with this chemical
Bolded analytes or values exceed a cancer risk of 1×10^{-5} or a non-cancer hazard of 1.

Human Health Risk Assessment Summary of Child Recreational User Results for Fish Consumption

Media	Chemical	Cancer Risk	Non-Cancer Hazard Quotient	Total Cancer Risk	Above or Within EPA Acceptable Cancer Risk	Total Non-Cancer Hazard Index	Above or Below EPA Acceptable Hazard Index
All Fish Species	Arsenic	6.0×10^{-6}	—	6.2×10^{-5}	WITHIN	**23**	**ABOVE**
	Mercury	NA	**3.0**				
	alpha-BHC	1.7×10^{-6}	—				
	Aldrin	1.0×10^{-6}	—				
	Dieldrin	2.4×10^{-6}	—				
	Aroclor-1254	**3.2×10^{-5}**	**19**				
	Aroclor-1260	**1.7×10^{-5}**	NA				

Note:
— – cancer risk for this chemical is below 1×10^{-6} or the non-cancer hazard for this chemical is below 1.0.
NA – no cancer risk or non-cancer hazard associated with this chemical
Bolded analytes or values exceed a cancer risk of 1×10^{-5} or a non-cancer hazard of 1.

Human Health Risk Assessment Summary of Adult Subsistence Fisher Results for Fish Consumption

Media	Chemical	Cancer Risk	Non-Cancer Hazard Quotient	Total Cancer Risk	Above or Within EPA Acceptable Cancer Risk	Total Non-Cancer Hazard Index	Above or Below EPA Acceptable Hazard Index
All Fish Species	**Arsenic**	**8.4×10^{-5}**	—	**8.7×10^{-4}**	**ABOVE**	**47**	**ABOVE**
	Mercury	NA	**6.3**				
	alpha-BHC	**2.3×10^{-5}**	—				
	delta-BHC	4.6×10^{-6}	—				
	gamma-BHC	2.9×10^{-6}	—				
	Aldrin	**1.4×10^{-5}**	—				
	gamma-Chlordane	2.9×10^{-6}	—				
	Dieldrin	**3.3×10^{-5}**	—				
	DDE	**1.1×10^{-5}**	—				
	DDT	7.4×10^{-6}	—				
	Heptachlor epoxide	7.1×10^{-6}	—				
	Aroclor-1254	**4.5×10^{-4}**	**39**				
	Aroclor-1260	**2.3×10^{-4}**	NA				

Note:
— – cancer risk for this chemical is below 1×10^{-6} or the non-cancer hazard for this chemical is below 1.0.
NA – no cancer risk or non-cancer hazard associated with this chemical
Bolded analytes or values exceed a cancer risk of 1×10^{-5} or a non-cancer hazard of 1.

As shown in the above tables, carcinogenic risks for almost all receptors for the consumption of fish tissue are above the EPA acceptable risk range of 10^{-6} to 10^{-4}. Additionally, non-carcinogenic hazards for all receptors are above the acceptable threshold of 1. Therefore, based upon the results of the HHRA, there are potential human health concerns for consumption of fish from the DRCS. These risk levels reveal that if no remedial actions or other means of control are taken for the consumption of fish from the DRCS, there is a potential of increased probability of cancer above the EPA acceptable risk range and a potential for systemic effects.

The primary concerns were from Aroclor-1254 and Aroclor-1260. In addition, mercury also was a concern. However, only 10 fish tissue samples were analyzed for mercury, which reveals the results of the HHRA are based upon a limited dataset. For the Aroclors, the dataset included 105 tissue results. All detections of Aroclor-1254 and Aroclor-1260 in fish tissue were above the fish RSL of 0.0021 mg/kg, with approximately 40 percent of the detects above a 10^{-4} risk level of 0.21 mg/kg. Thirty-five fish fillets contained detectable concentrations of Aroclor-1254, of which 13 exceeded the 10^{-4} risk level of 0.21 mg/kg. Eighteen fish fillets contained detectable concentrations of Aroclor-1260, of which 7 exceeded the 10^{-4} risk level of 0.21 mg/kg.

Human Health Risk Assessment Summary of Specific Fish Species Results for Fish Consumption

Receptor Recreational User	Media	Cancer Risk	Non-Cancer Hazard Index	COPC Contributing Significantly to Results
Adult	Buffalo	**1×10^{-3}**	**28**	Aroclor-1254, Aroclor-1260
Adolescent		**7×10^{-4}**	**37**	Aroclor-1254, Aroclor-1260
Child		**4×10^{-4}**	**75**	Aroclor-1254, Aroclor-1260
Adult	Carp	**2×10^{-4}**	**4**	Aroclor-1254, Aroclor-1260
Adolescent		**8×10^{-5}**	**5**	Aroclor-1254
Child		**5×10^{-5}**	**10**	Mercury, Aroclor-1254
Adult	Gar	**3×10^{-4}**	**8**	Aroclor-1254, Aroclor-1260
Adolescent		**1×10^{-4}**	**11**	Aroclor-1254, Aroclor-1260
Child		**8×10^{-5}**	**21**	Mercury, Aroclor-1254, Aroclor-1260
Adult	Catfish	**1×10^{-4}**	**6**	Aroclor-1254, Aroclor-1260
Adolescent		**8×10^{-5}**	**8**	Aroclor-1254, Aroclor-1260
Child		**5×10^{-5}**	**17**	Aroclor-1254
Adult	Large Mouth Bass	**3×10^{-5}**	**3**	Mercury
Adolescent		**1×10^{-5}**	**4**	Mercury, Aroclor-1254
Child		8×10^{-6}	**9**	Mercury, Aroclor-1254

Note:
Bolded values exceed a cancer risk of 1×10^{-5} or a non-cancer hazard of 1.

To support potential risk management decisions, specific fish species were also evaluated. Each fish species evaluated also revealed potential human health concerns for potential consumption. It is noted that the buffalo fish revealed the highest potential risks. However, similar to mercury, precaution should be used in making full determination of potential human health risks based upon individual species due to smaller sample sizes. The buffalo fish (n=12 samples) did reveal some of the highest detections of Aroclor-1254 in relation to the other species. Sample BUF-153-F revealed Aroclor-1254 at 4.5 mg/kg, and BUF-SG2-F2 revealed Aroclor-1254 at 3 mg/kg. Both the buffalo fish (3.6 mg/kg) and gar fish (0.83 mg/kg) species revealed the highest detections of Aroclor-1260.

In addition to the evaluation of individual Aroclors, PCB congeners were also analyzed within fish tissue. However, the dataset for PCB congeners was significantly smaller than that of the individual Aroclors. Twenty fish tissue samples were analyzed for PCB congeners. For many of the tissue samples, the individual Aroclors and PCB congener analysis was not performed on the same tissue sample. Therefore, the results for the PCB congeners were evaluated separately from other COPCs within fish tissue. The evaluation of individual fish species was also not performed for the PCB congener evaluation due to the low number of samples analyzed for PCB congeners for each species. The following table presents a summary of the total PCB congeners HHRA results:

Human Health Risk Assessment Summary of Results
For Fish Consumption/Total PCB Congeners

Receptor	Carcinogenic Risks	Non-Carcinogenic Hazards	Risk Criteria
Entire DRCS Exposure Area			
Adult Recreational User	2×10^{-3}	Not Applicable	Above Acceptable Risk
Adolescent Recreational User	1×10^{-3}	Not Applicable	Above Acceptable Risk
Child Recreational User	8×10^{-4}	Not Applicable	Above Acceptable Risk
Adult Subsistence Fisher	3×10^{-2}	Not Applicable	Above Acceptable Risk

The evaluation of the total PCB congeners in fish tissue reveals similar results as the Aroclor evaluation, in that there are potential human health concerns for fish consumption from the DRCS. The two highest detects of total PCB congeners were in buffalo fish at 150 mg/kg (BUF-170-F) and 17 mg/kg (BUF-158-F). Both of these samples were only analyzed for the PCB congeners and not Aroclors; therefore, a correlation between the PCB congeners and Aroclors cannot be made for these samples. All detections of PCB congeners in fish tissue were above the fish RSL of 0.0021 mg/kg, with half of the samples above a 10^{-4} risk level of 0.21 mg/kg.

As noted in Section 4.2, specific canal segments along the DRCS revealed higher levels of PCBs. Figures 14 through 22 present the detected sediment concentrations along segments of the DRCS. Sediment samples within the LWMCU had the highest detections of PCBs within the entire DRCS. However, the evaluation of fish tissue results was based upon the collection of fish tissue along the entire DRCS. To determine potential effects that sediment just after the siphon (i.e., LWMCU and LEMC) have on fish tissue results collected within these areas, fish tissue EPCs for these areas were determined and compared to the EPCs evaluated in the HHRA.

To evaluate the potential effects only evaluating fish tissue after the siphon, a 95UCL was determined for Aroclor-1254, Aroclor-1260, and total PCB congeners in fish tissue samples within the canal reaches directly after the siphon. The resulting 95UCLs for Aroclor-1254, Aroclor-1260, and total PCB congeners are 0.688 mg/kg, 0.226 mg/kg, and 92.6 mg/kg, respectively. The 95UCLs evaluated in the HHRA (Table 3.5 of the HHRA) for Aroclor-1254, Aroclor-1260, and total PCB congeners were 0.427 mg/kg, 0.225 mg/kg, and 29.4 mg/kg, respectively. The differences between the 95UCLs for Aroclor-1254 are approximately 1.6 times higher, equal for Aroclor-1260, and three times higher for total PCB congeners.

The resulting higher 95UCLs for Aroclor-1254, Aroclor-1260, and total PCB congeners in fish tissue samples would increase the HHRA results for consumption of fish. However, the overall HHRA risk results revealed potential concerns for exposure to Aroclor-1254, Aroclor-1260, and total PCB congeners in fish tissue regardless of the area evaluated. The fish tissue 95UCLs for the canal segments immediately after the siphon reveal that sediments within these areas may impact fish within these areas. Additionally, these areas do present higher potential risks for fishers within the DRCS, but the entire DRCS presents potential risk concerns for fish consumption.

As noted in Sections 2.3.4 and 3.4, the evaluation of PCB congeners did not include a breakdown of dioxin-like PCB congeners. A subset of 12 PCB congeners are considered dioxin-like. An evaluation of dioxin-like PCB congeners was presented in Section 4.1 to determine if the overall conclusions of the HHRA are affected by evaluating only total PCB congeners.

The dioxin-like PCB congeners were summed separately from the other PCB congeners and noted as Total Dioxin-Like PCB Congeners. The following dioxin-like PCB congeners were detected within the 20 fish tissue samples analyzed for PCB congeners: PCB 77, PCB 81, PCB 105, PCB 126, PCB 169, PCB 114, PCB 118, PCB 123, PCB 156, PCB 157, PCB 167, and PCB 189. It is noted that not all of the dioxin-like PCB congeners were detected in every sample. Cumulative risks were determined for TCDD TEQ and total PCB congeners for the adult recreational user, adolescent recreational user, child recreational user, and adult subsistence user. These calculations are provided in Table 10.1 through 10.4.

Based upon the evaluation of both the dioxin-like PCBs and other PCB congeners, the primary contributor to overall carcinogenic risks is total PCB congeners. The total TCDD TEQ results do reveal risks above acceptable levels, including non-carcinogenic hazards. However, the total PCB congener risks are higher, and the analysis of the TCDD TEQ would not change the overall conclusions of the HHRA. It is noted that the risks for both TCDD TEQ and total PCB congeners are significantly influenced by the one maximum detect fish tissue concentration of 150 mg/kg total PCBs for sample location BUF-170F. If this sample was not included in the congener dataset, than the resulting risks would be an order of magnitude lower. Therefore, any risk management decisions for the control of PCBs would result in a similar decision for the dioxin-like congeners.

6. HUMAN HEALTH RISK MANAGEMENT DECISIONS

As discussed in the RI report, the siphon has been identified as the primary source of PCBs, which are the main chemicals driving site risks. However, the HHRA identified additional COPCs in site media located upstream and downstream of the siphon that fall within EPA's risk management range. Many of these additional COPCs are suspected to be ubiquitous regional contaminants related to historical activities and/or background concentrations rather than site-specific contaminants. This section provides: (1) a basis of understanding regarding carcinogenic and non-carcinogenic risks and EPA's risk management range, (2) a discussion of chemicals that fall above EPA's acceptable risk range, and (3) an evaluation of chemicals within EPA's risk management range based on spatial extent, magnitude of exceedance, and fate and transport considerations in order to determine an appropriate path forward within the context of risk management.

6.1.1 Basis of Understanding

Human health risks are evaluated by carcinogenic and non-carcinogenic risks as discussed in the subsections below.

6.1.1.1 Carcinogenic Risk

For carcinogens, risks are expressed as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the level of the carcinogen at the site. A carcinogenic risk of 10^{-6} indicates that an individual experiencing the RME estimate for the site has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an excess incremental lifetime cancer risk because it would be in addition to the risks of cancer individuals face from other causes. The chance of an individual developing cancer from all other causes has been estimated to be as high as 40 percent (Howlader et al., 2015).

Because the cancer slope factor (used to calculate excess lifetime carcinogenic risk) is the statistical 95th percent upper-bound confidence limit on the dose-response slope, this method provides a conservative, upper-bound estimate of risk. It should be noted that the interpretation of the significance of the cancer risk estimate is based on the appropriate public policy. EPA in the NCP (40 Code of Federal Regulation Part 300) (1990a) states that:

> *"...For known or suspected carcinogens, acceptable exposure levels are generally concentration levels that represent an excess upper bound lifetime cancer risk to an individual of between 10^{-4} and 10^{-6}."*

This risk range represents EPA's generally acceptable risk range for site-related exposures, or a 1 in 10,000 to 1 in 1,000,000 chance, respectively, of an individual developing cancer. Carcinogenic risks that are below the lower end of the acceptable risk range (i.e., 10^{-6}) are considered *de minimis* and require no action. Carcinogenic risks within the risk management range (i.e., between 10^{-4} and 10^{-6}) are subject to a risk management decision. Generally, only carcinogenic risks above the upper end of the acceptable risk range (i.e., 10^{-4}) warrant additional consideration. TCEQ selects a carcinogenic risk of 10^{-5}, the midpoint of the EPA acceptable risk range, as the level that warrants additional consideration.

6.1.1.2 Non-carcinogenic Risk

For non-carcinogens (systemic toxicants), potential effects are evaluated by comparing an exposure level over a specified time period (e.g., ED) with a reference dose derived for a similar exposure period. A reference dose represents a level to which an individual may be exposed and not expected to cause any harmful effect. A HQ (ratio of average daily intake level to acceptable daily intake level) of less than 1.0 indicates that a receptor's dose of a single contaminant is less than the reference dose. As a result, there will be no concern that potential adverse systemic health effects will be observed in the exposed populations. However, if the sum of several HQs exceeds 1.0, and the COPC affect the same target organ, there may be concern that potential adverse systemic health effects will be observed in the exposed populations. In general, the greater the value of the HQ above 1.0, the greater the level of concern. However, the HQ does not represent a statistical probability that an adverse health effect will occur.

For the consideration of exposures to more than one chemical causing systemic toxicity via several different pathways, the individual HQs are summed to provide an overall HI. If the HI is less than 1.0, then no adverse health effects are likely to be associated with exposures at the site. However, if the total HI is greater than 1.0, separate endpoint-specific HIs may be calculated based on toxic endpoint of concern or target organ (e.g., HQs for neurotoxins are summed separately from HQs for renal toxins). If an endpoint-specific HI is greater than 1.0, there is reason for concern about potential health effects for that endpoint.

6.1.2 Media and Chemicals Requiring Additional Consideration: Cancer Risks Above 10^{-4} or Non-cancer Risks Above a Hazard Index of 1.0

Media and chemicals requiring additional consideration because there are cancer risks above 10^{-4} or non-cancer risks above a HI of 1 are discussed below.

For the receptors evaluated for the ingestion of fish tissue, total PCBs (including Aroclors and PCB congeners) exceeded 10^{-4} and/or an HI of 1, and were the primary contributor to both cancer and non-cancer potential human health risk concerns. The Siphon has been identified as the primary source of PCBs at the site. Exposure to PCBs as Aroclors and PCB congeners from the ingestion of fish require further consideration for future remedial action at the site.

Mercury in fish tissue was identified with non-cancer HQ greater than 1 for the adolescent recreational user, child recreational user, and subsistence fisher. Mercury was detected in 22 of 22 fish samples (whole body and fillet), 61 of 61 sediment samples, and 1 of 56 surface water samples collected at the site during the RI. Mercury in sediment was identified as potentially associated with regional background levels or sources unrelated to the site because the sediment concentrations were consistent across the site, with the highest observed concentrations of mercury in the Arroyo Colorado River (0.22 J mg/kg) and Rio Grande River (0.15 mg/kg). Mercury is widely distributed in the environment due to both natural and anthropogenic processes (EPA 2000b). Regional issues of mercury are known in the area; the DSHS currently has a Freshwater Consumption Advisory in place for Arroyo Colorado, Llano Grande Lake, and the Main Floodway upstream of the Port of Harlingen in Cameron and Hidalgo counties for mercury and PCBs. Mercury has therefore been dismissed from further consideration for future remedial action at the site.

Human health concerns for exposure to site soil, surface water, or sediment are within or below the EPA's acceptable risk management range for carcinogenic risks, and are subject to a risk management decision as discussed in Section 6.1.3.

6.1.3 Media and Chemicals Subject to a Risk Management Decision: Cancer Risks Between 10^{-6} and 10^{-4}

Media and chemicals subject to a risk management decision because there are cancer risks between 10^{-6} and 10^{-4} are presented in the table below.

Chemicals Within EPA's Risk Management Range (10^{-6} to 10^{-4})

Receptor	Media	Chemical of Potential Concern
Adult Recreational User	Fish Tissue	Arsenic, alpha-BHC, delta-BHC, Aldrin, Dieldrin, DDE, DDT, Heptachlor epoxide
Adolescent Recreational User		Arsenic, alpha-BHC, Aldrin, Dieldrin, DDE
Child Recreational User		Arsenic, alpha-BHC, Aldrin, Dieldrin
Adult Subsistence Fisher		Arsenic, alpha-BHC, Aldrin, Dieldrin, DDE, delta-BHC, gamma-BHC, gamma-Chlordane, DDT, Heptachlor epoxide
Adult Resident	Surface Soil	Arsenic, Benzo(a)pyrene
Child Resident		Arsenic, Benzo(a)pyrene
Agricultural Worker		Arsenic
Adult Recreational	Surface Water	Arsenic, Bis(2-ethylhexyl)phthalate
Adolescent Recreational		Bis(2-ethylhexyl)phthalate
Child Recreational		*No Individual Chemicals
Adult Recreational	Sediment	Benzo(a)pyrene
Adolescent Recreational		Benzo(a)pyrene, Benz(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-c,d)pyrene
Child Recreational		Benzo(a)pyrene, Benz(a)anthracene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene, Indeno(1,2,3-c,d)pyrene

6.1.3.1 Arsenic

Arsenic in was identified as a COPC within EPA's risk management range. Arsenic was detected in 61 of 61 sediment samples (2.2 to 6.6 mg/kg), 68 of 68 soil samples (3.1 to 15.4 mg/kg), and 56 of 56 surface water samples (0.98 J to 15.1 µg/L). Sediment concentrations in the canal and reservoir system are below the Texas-Specific Soil Background Concentration of 5.9 mg/kg (TCEQ 2007). The five highest observed concentrations of arsenic in soil were collected from the Las Palomas Wildlife Management Area, the selected background soil sample location. Therefore, concentrations of arsenic detected at the site are considered to be consistent with background conditions. EPA policy does not support remediation of metals below background concentrations (EPA 2002b); arsenic has therefore been dismissed from further consideration for future remedial action at the site.

6.1.3.2 Pesticides

Nine pesticides (aldrin, alpha-BHC, delta-BHC, dieldrin, DDE, DDT, gamma-BHC, gamma-chlordane, and heptachlor epoxide) were identified in fish tissue as COPCs within EPA's risk management range. With the exception of DDE and DDT, pesticides were detected at a minimal number of sediment and soil locations as discussed in the RI report. Because the site is located in an agricultural area that is likely to have experienced historical use of pesticides via spraying, and because detected concentrations in sediment are consistent across the site and with soil, it is likely that concentrations of these pesticides are regionally elevated. As such, they are not considered related to site-specific sources and been dismissed from further consideration for future remedial action at the site.

6.1.3.3 Bis(2-ethylhexyl)phthalate

Bis(2-ethylhexyl)phthalate was identified as a COPC in surface water within EPA's risk management range. Bis(2-ethylhexyl)phthalate was detected in 4 of 28 surface water samples at estimated concentrations of 2.2, 3.1, and 3.3 µg/L, and a concentration of 140 µg/L. Three of the four samples were collected from the Arroyo Colorado River tributary, including the maximum detected concentration, and are therefore not considered to be associated with site-related sources of contamination. In addition, only one sample concentration exceeded screening criteria, indicating that the potential for exposure to elevated concentrations of bis(2-ethylhexyl)phthalate at the site is minimal. Bis(2-ethylhexyl)phthalate has therefore been dismissed from further consideration for future remedial action at the site.

6.1.3.4 Polycyclic Aromatic Hydrocarbons

PAHs benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene were detected in a few sediment samples (two to six samples per analyte) collected from the COMC, LWMCL, and MC. Samples with the highest detections were consistently collected from the COMC, downgradient from the relift pumping station at Reservoir No.3. Because the PAHs were only detected in a few samples at low concentrations, with no discernable spatial distribution, and the highest concentrations were observed in the COMC, they were identified as a result of sources unrelated to the site. In addition, only three sample locations had concentrations that exceeded screening criteria, indicating that the potential for exposure to elevated concentrations of PAHs at the site is considered minimal. PAHs in sediment have therefore been dismissed from further consideration for future remedial action at the site.

7. HUMAN HEALTH RISK ASSESSMENT CONCLUSIONS

The HHRA identified potential concerns for human health from the consumption of fish within the DRCS. The HHRA results reveal that if no remedial actions or other means of control are taken for the consumption of fish from the DRCS, then there is a potential for an increased probability of cancer for child, adolescent, and adult recreational users and adult subsistence fishers above the EPA acceptable risk range and a potential for systemic effects. Direct contact with other potentially affected media (i.e., soil, surface water, and sediment) does not reveal unacceptable human health concerns, which includes consumption of plants from the surrounding agricultural fields and consumption of drinking water from the DRCS. Based on the results of this analysis, Aroclor-1254, Aroclor-1260, and PCB congeners for the consumption of fish have been retained as the only site-related human health chemicals of concern that will be addressed in the feasibility study.

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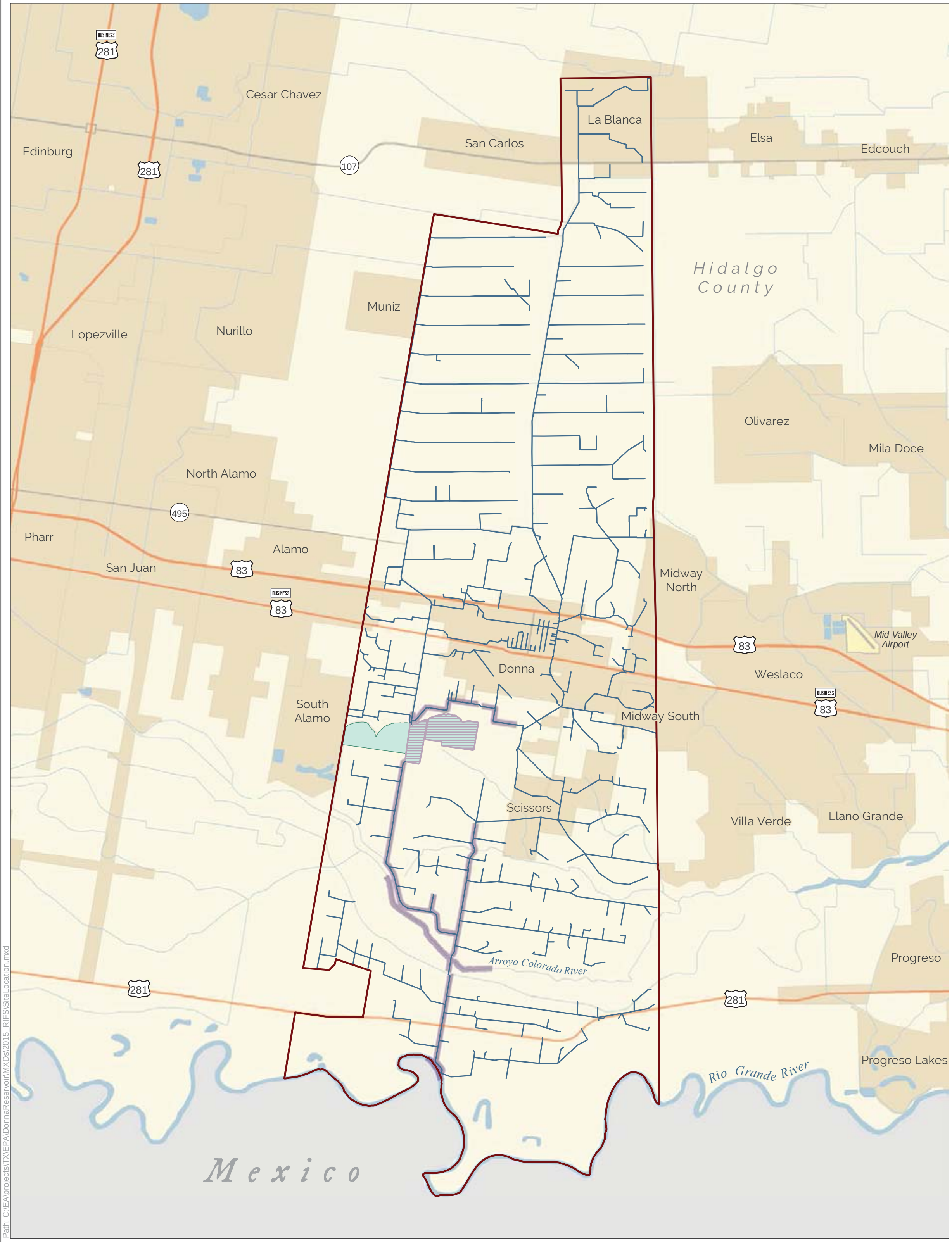
FIGURES



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Legend

- Canal/River Area Under Investigation
- Portion of Donna Reservoir Under Investigation
- Irrigation Network
- Donna Irrigation District - Hidalgo County No. 1
- Donna Reservoir

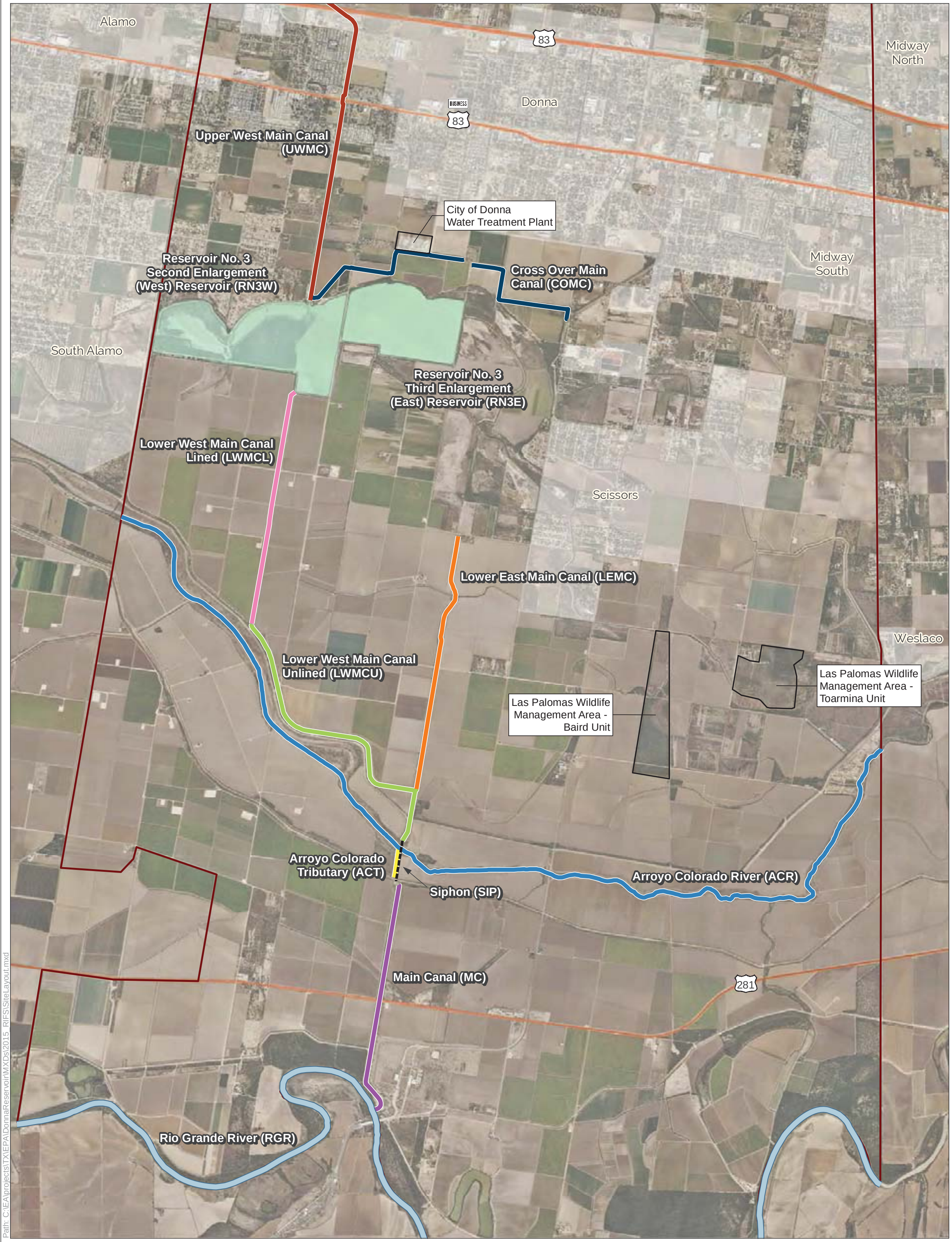
Data Sources: Esri 2006,
Texas A&M AgriLife Extension Service 2015, USGS 2014

0 0.5 1 2
Miles

Remedial Investigation/Feasibility Study
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 1.
Site Location

098126



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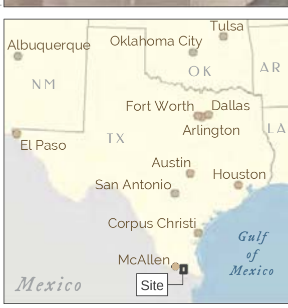


Legend

- Donna Irrigation District - Hidalgo County No. 1
- Donna Reservoir
- Upper West Main Canal
- Cross Over Main Canal
- Lower West Main Canal Lined
- Lower West Main Canal Unlined
- Lower East Main Canal
- Arroyo Colorado River
- Arroyo Colorado Tributary
- Siphon (Underground)
- Main Canal
- Rio Grande River

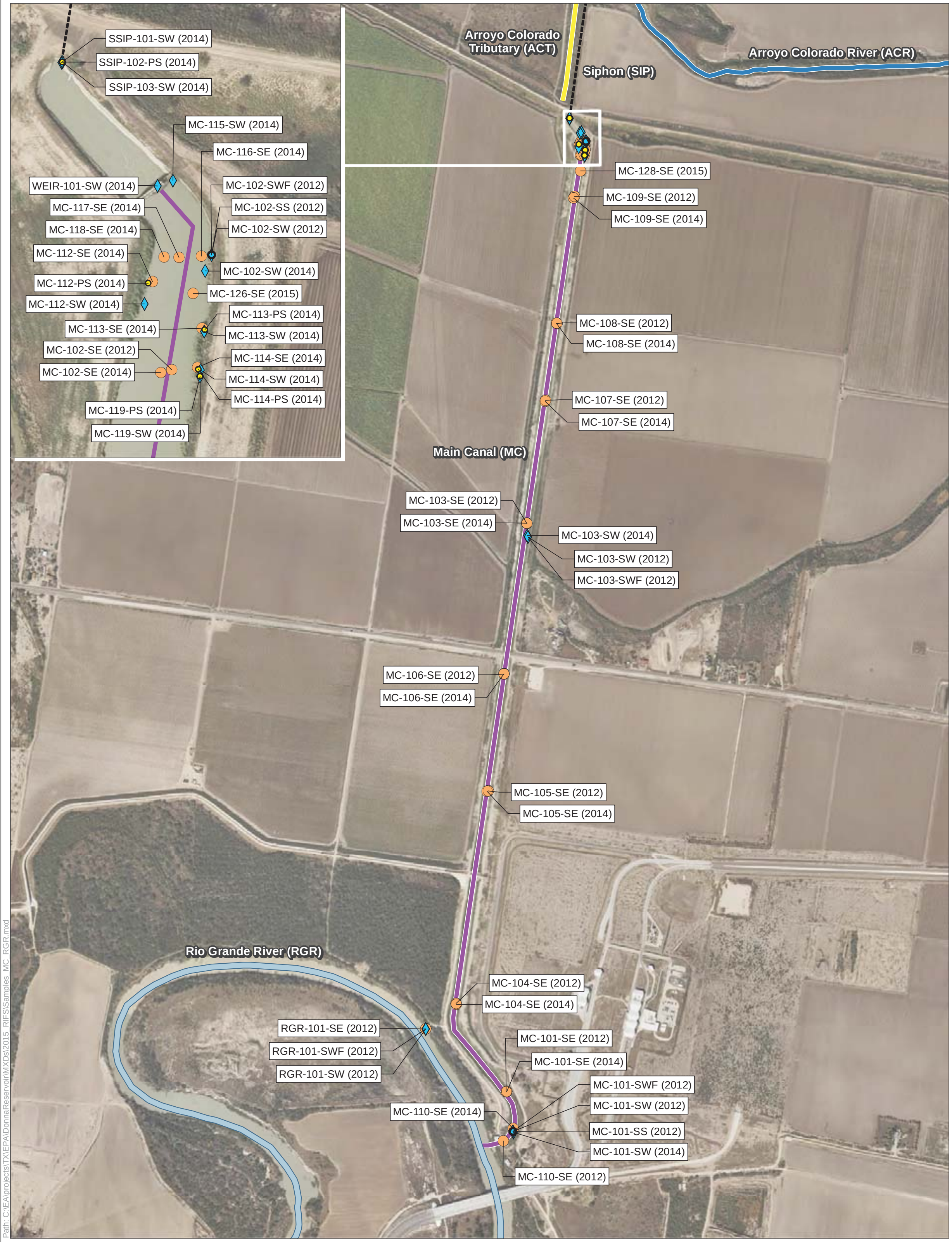
Data Sources: Esri 2006,
Texas A&M AgriLife Extension Service 2015, USGS 2014

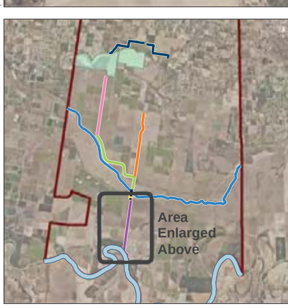
Feet 0 2,000 4,000

Remedial Investigation/Feasibility Study
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 2.
Site Layout

098127





Legend

- Arroyo Colorado River
- Arroyo Colorado Tributary
- Siphon (Underground)
- Main Canal
- Rio Grande River

Sample Locations by Matrix

- Sediment, SE (29)
- Semi-permeable Membrane Device, PS (5)
- Surface Water, SW or SWF (19)
- Suspended Sediment, SS (2)

Sample type can be determined by symbol or the third part of the sample identifier as specified above (e.g., sediment samples end in "-SE" followed by the year collected).

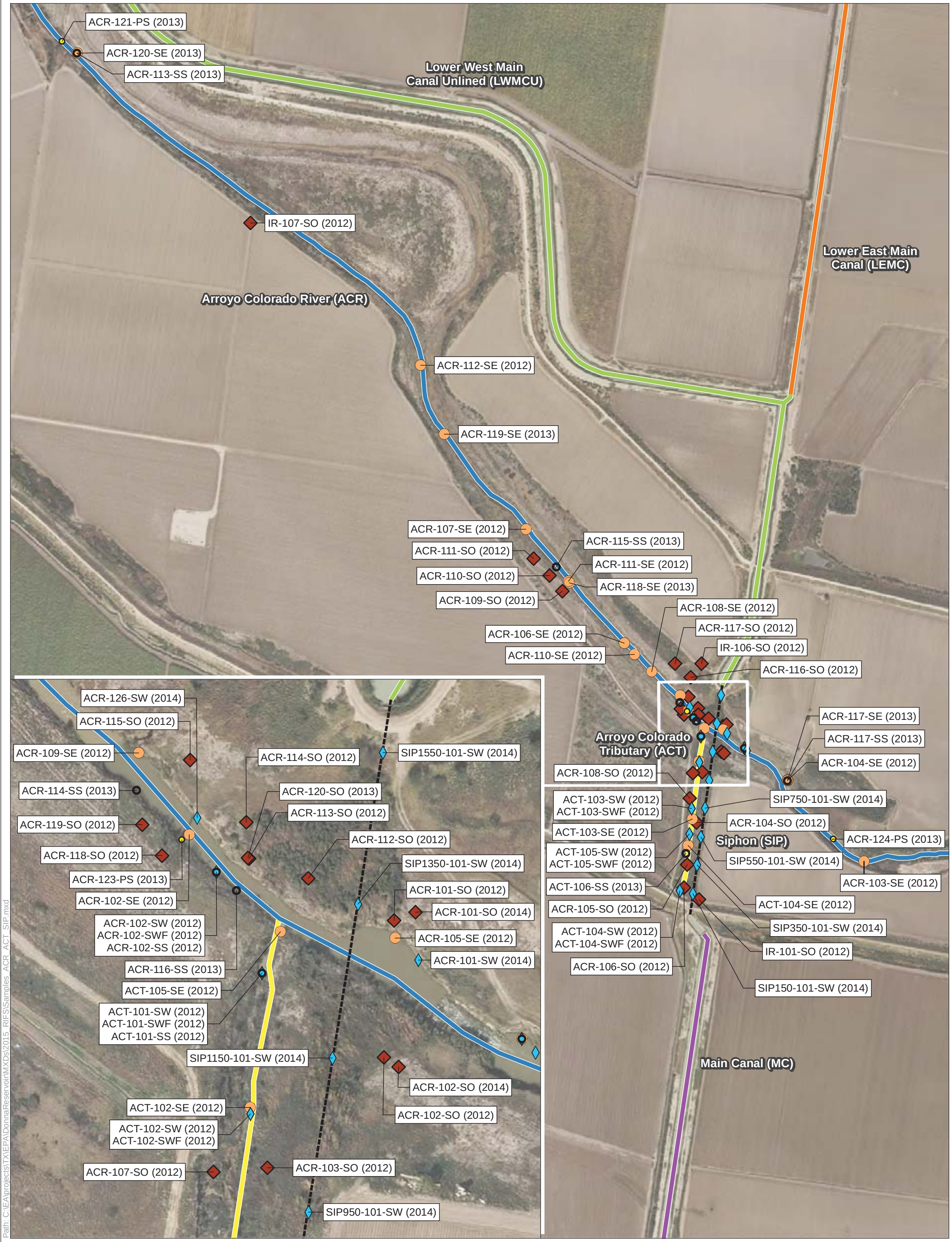
Data Sources: Esri 2006,
Texas A&M AgriLife Extension Service 2015, USGS 2014

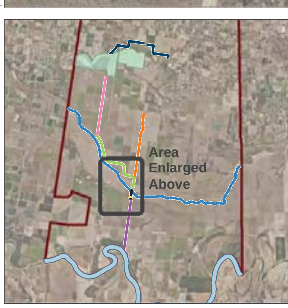
Feet 0 500 1,000

Remedial Investigation/Feasibility Study
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 3.
Main Canal and Rio Grande River
Sample Locations

098128





Legend

- Lower West Main Canal Unlined
- Lower East Main Canal
- Arroyo Colorado River
- Arroyo Colorado Tributary
- Siphon (Underground)
- Main Canal

Sample Locations by Matrix

- Sediment, SE (20)
- Semi-permeable Membrane Device, PS (3)
- Soil, SO (25)
- Surface Water, SW or SWF (25)
- Suspended Sediment, SS (9)

Note:
-Sample type can be determined by symbol or the third part of the sample identifier as specified above (e.g., sediment samples end in "-SE" followed by the year collected).
-Siphon (SIP) surface water samples were collected from within the siphon and their approximate locations of collection are projected to the surface in this figure.

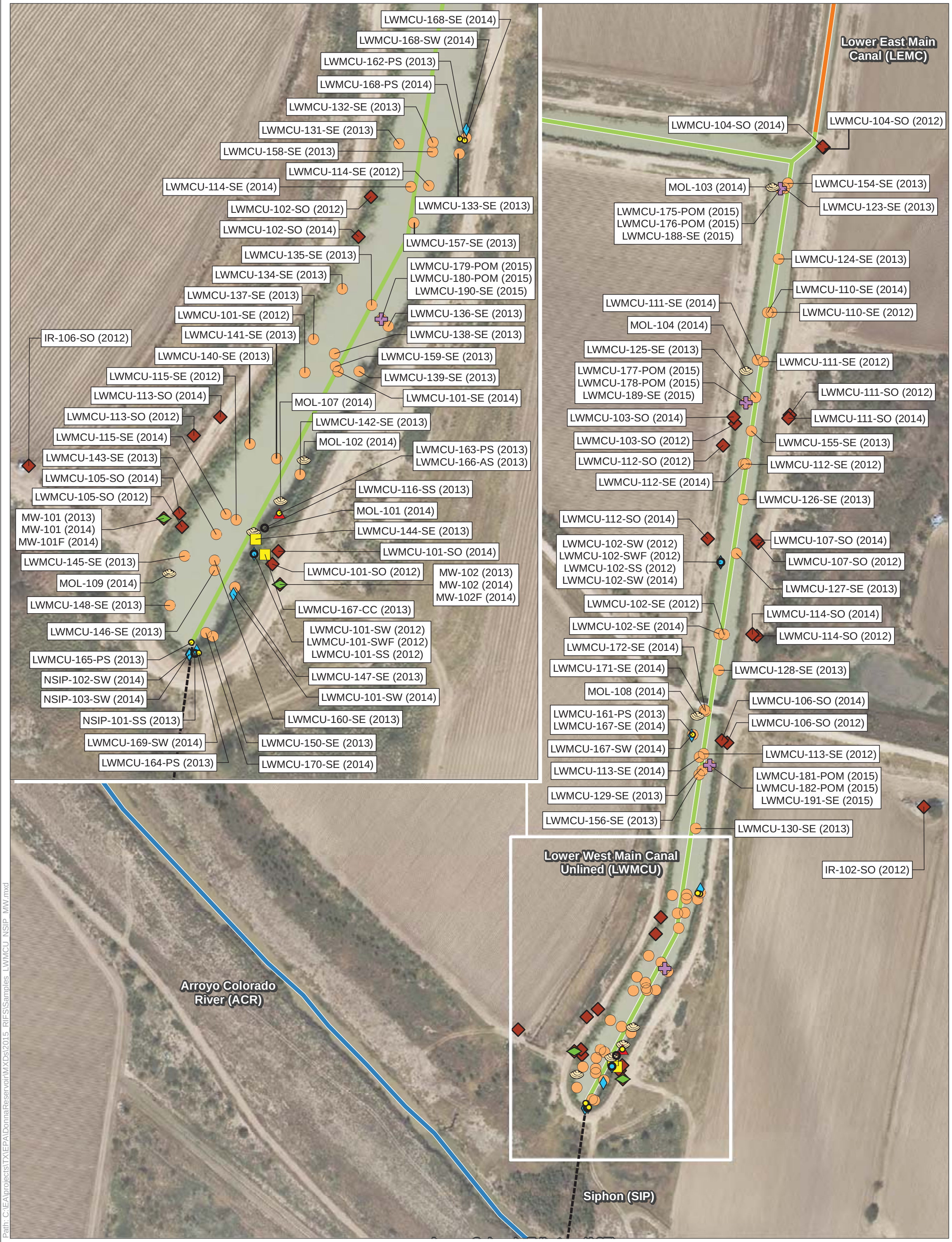
Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

0 500 1,000
Feet

Remedial Investigation/Feasibility Study
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 4.
Arroyo Colorado River and Tributary Sample Locations

098129



Legend

- Lower West Main Canal Unlined
- Lower East Main Canal
- Arroyo Colorado River
- Arroyo Colorado Tributary
- Siphon (Underground)

Sample Locations by Matrix

- Asphalt (1)
- Concrete (2)
- Ground Water, MW (4)
- Mollusks, MOL (7)
- Polyoxymethylene, POM (8)
- Sediment, SE (58)
- Semi-permeable Membrane Device, PS (6)
- Soil,SO (26)
- Surface Water, SW or SWF (11)
- Suspended Sediment, SS (4)

Sample type can be determined by symbol or the third part of the sample identifier as specified above (e.g., sediment samples end in "-SE" followed by the year collected).

Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

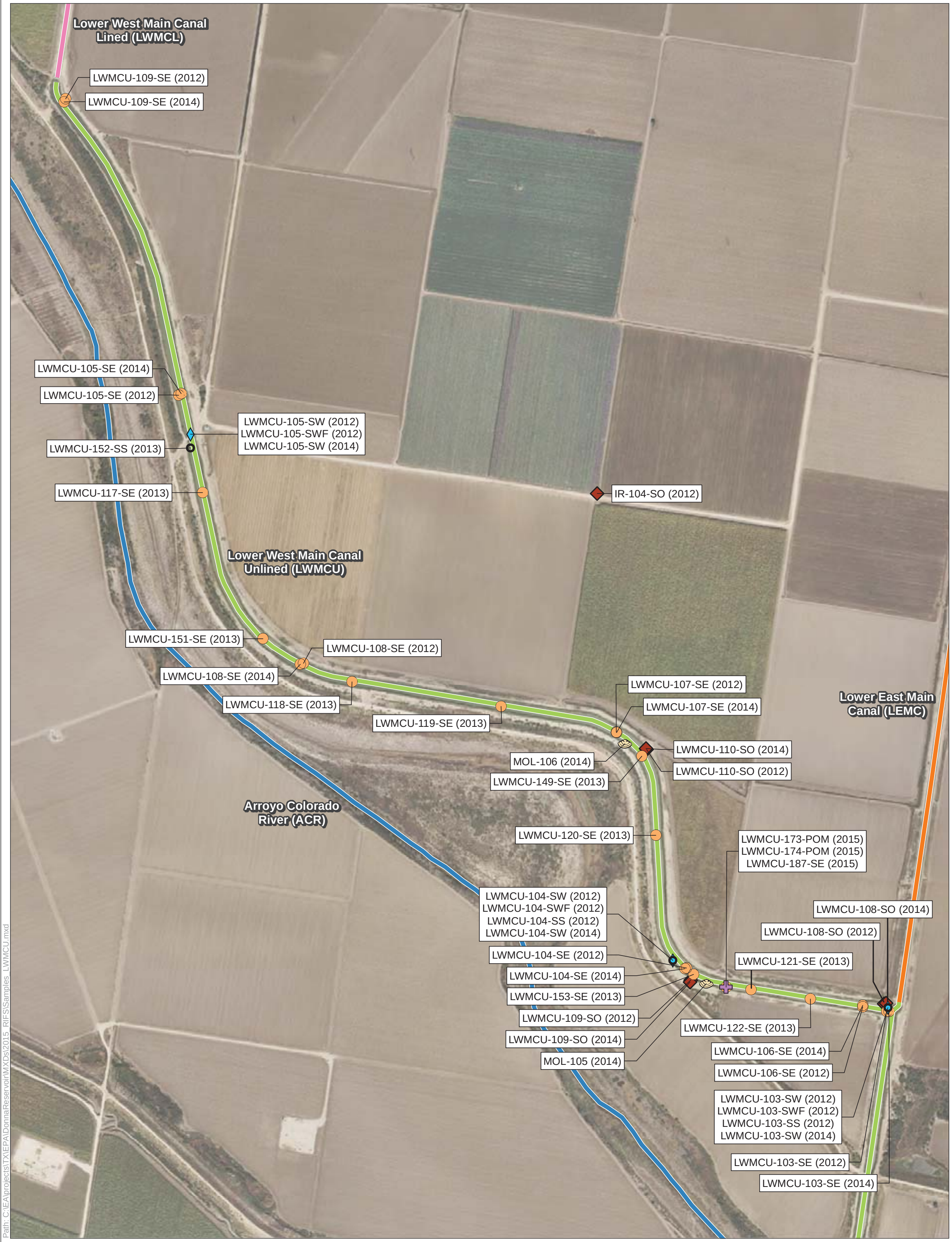
Feet 0 100 200

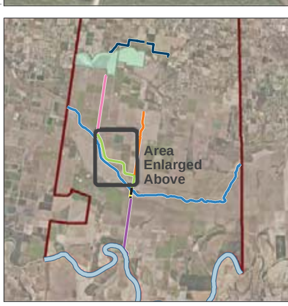
Remedial Investigation/Feasibility Study
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 5.
Lower West Main Canal Unlined South of 90 Degree Bend Sample Locations

Path: C:\EA\projects\TX\EPA\DonnaReservoir\MXDs\2015_RIFS\Samples_LWMCU_NSIP_MW.mxd

098130





Legend

- Lower West Main Canal Lined
- Lower West Main Canal Unlined
- Lower East Main Canal
- Arroyo Colorado River

Sample Locations by Matrix

- Mollusks, MOL (2)
- Polyoxymethylene, POM (2)
- Sediment, SE (24)
- Soil, SO (7)
- Surface Water, SW or SWF (9)
- Suspended Sediment, SS (3)

Sample type can be determined by symbol or the third part of the sample identifier as specified above (e.g., sediment samples end in "-SE" followed by the year collected).

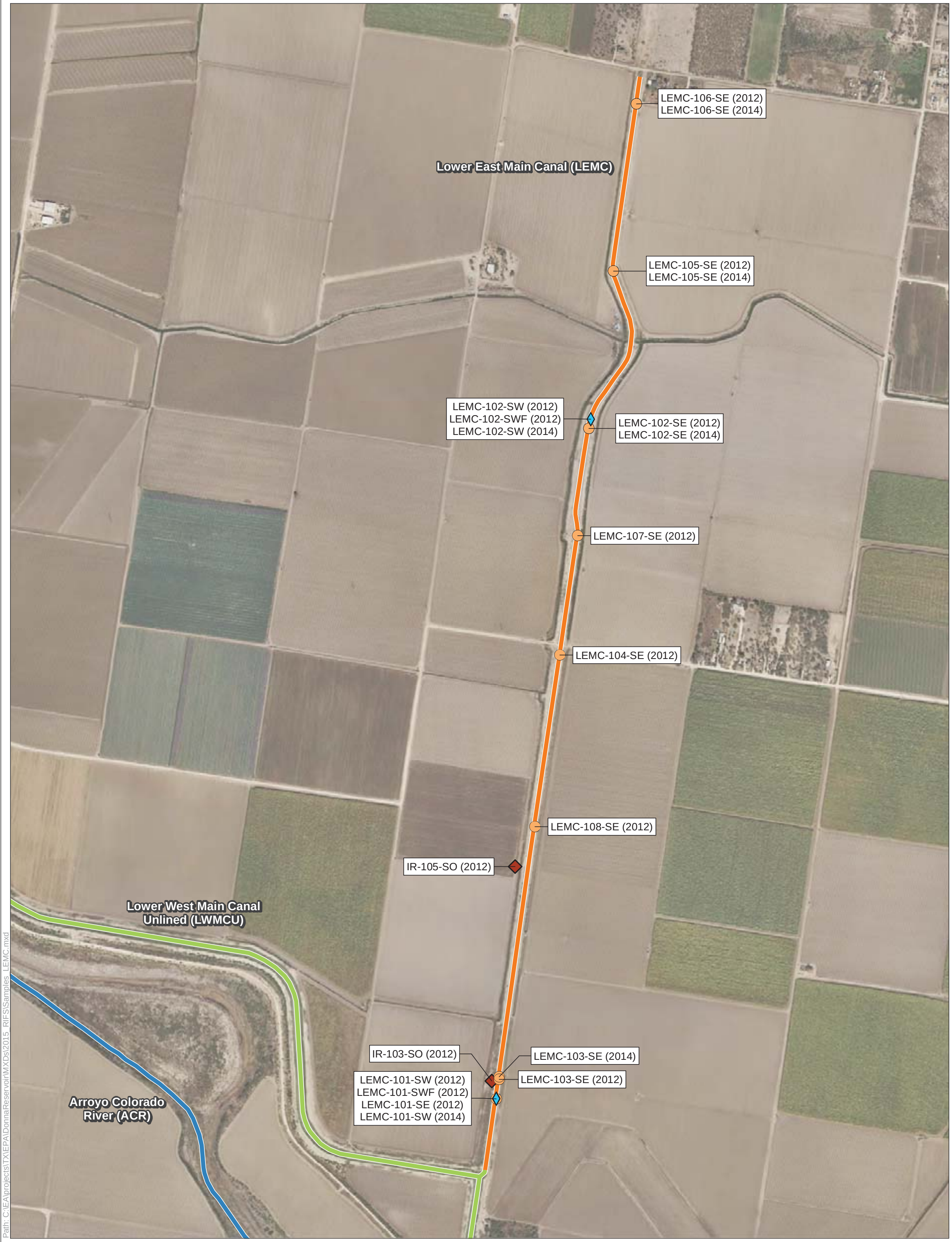
Data Sources: Esri 2006,
Texas A&M AgriLife Extension Service 2015, USGS 2014

0 500 1,000
Feet

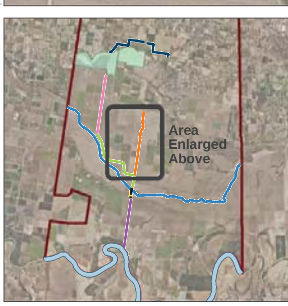
Remedial Investigation/Feasibility Study
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 6.
Lower West Main Canal Unlined North of 90 Degree Bend Sample Locations

098131



Path: C:\EA\projects\TX\EPA\DonnaReservoir\MXDs\2015_RIFS\Samples_LEMC.mxd



Legend

- Lower West Main Canal Unlined
- Lower East Main Canal
- Arroyo Colorado River

Sample Locations by Matrix

- Sediment, SE (12)
- Soil, SO (2)
- Surface Water, SW or SWF (6)

Sample type can be determined by symbol or the third part of the sample identifier as specified above (e.g., sediment samples end in "-SE" followed by the year collected).

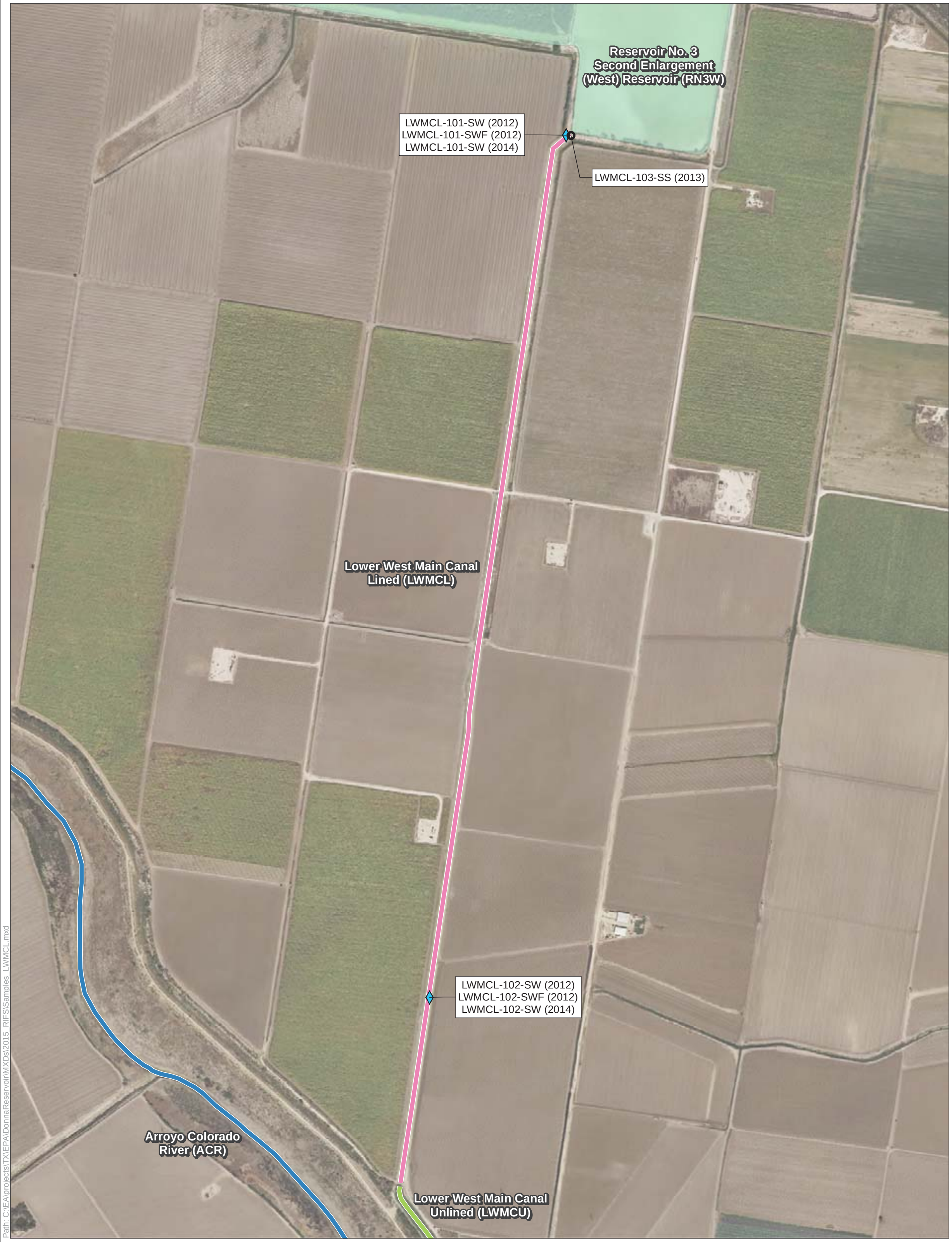
Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

Feet 0 500 1,000

Remedial Investigation/Feasibility Study
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 7.
Lower East Main Canal Sample Locations

098132



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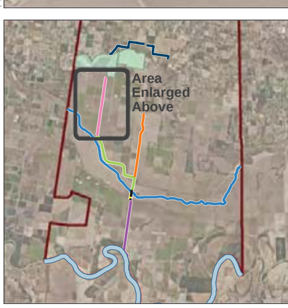


Legend

- Lower West Main Canal Lined
- Lower West Main Canal Unlined
- Arroyo Colorado River

Sample Locations by Matrix

- Surface Water, SW or SWF (6)
- Suspended Sediment, SS (1)

Sample type can be determined by symbol or the third part of the sample identifier as specified above (e.g., sediment samples end in "-SE" followed by the year collected).

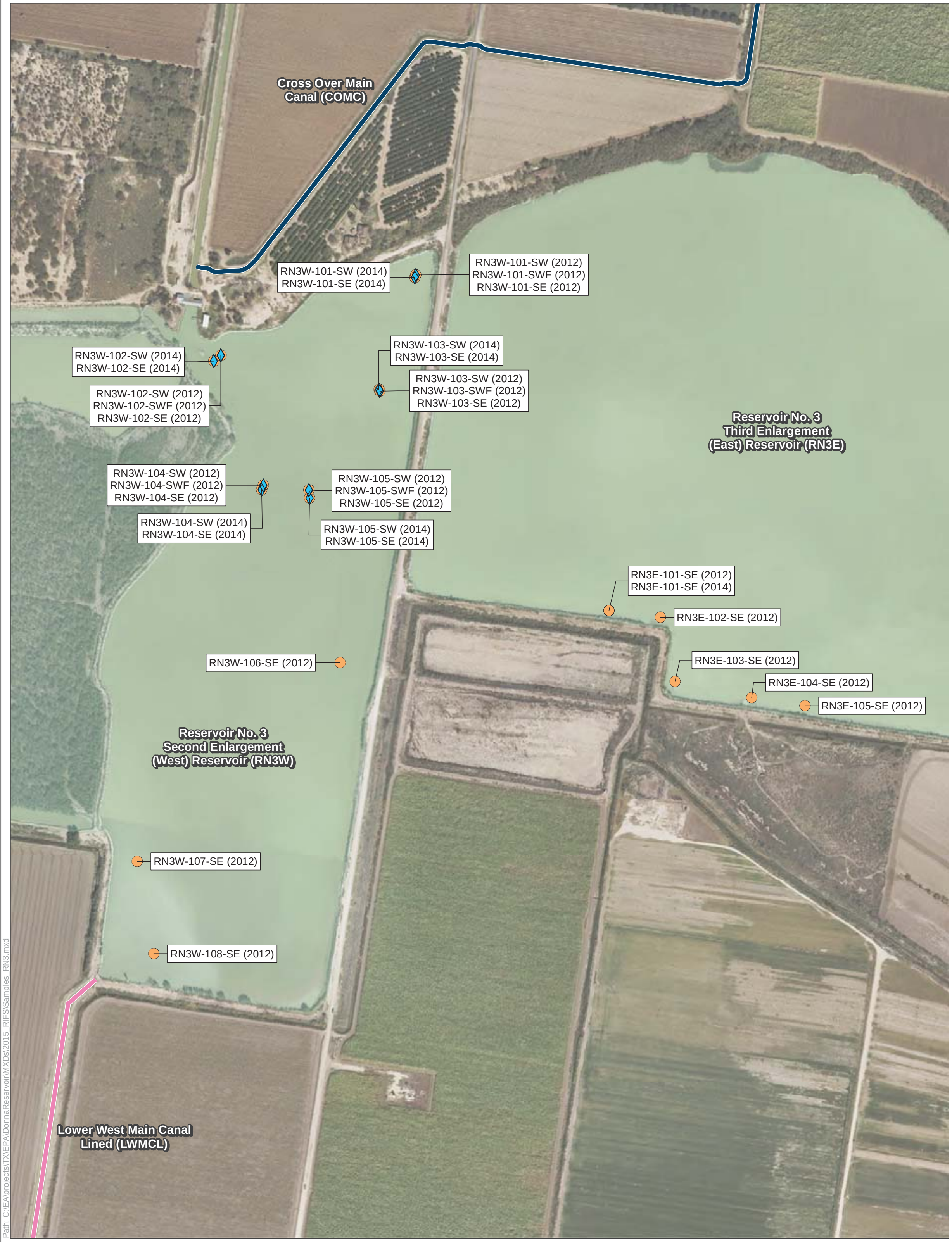
Data Sources: Esri 2006,
Texas A&M AgriLife Extension Service 2015, USGS 2014

0 500 1,000
Feet

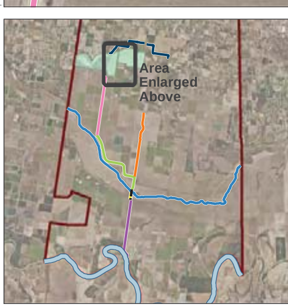
Remedial Investigation/Feasibility Study
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 8.
Lower West Main Canal Lined
Sample Locations

098133



Path: C:\EA\projects\TX\EPA\DonnaReservoir\MXDs\2015_RIFS\Samples_RN3.mxd



Legend

- Cross Over Main Canal
- Lower West Main Canal Lined

Sample Locations by Matrix

- Sediment, SE (19)
- Surface Water, SW or SWF (15)

Sample type can be determined by symbol or the third part of the sample identifier as specified above (e.g., sediment samples end in "-SE" followed by the year collected).

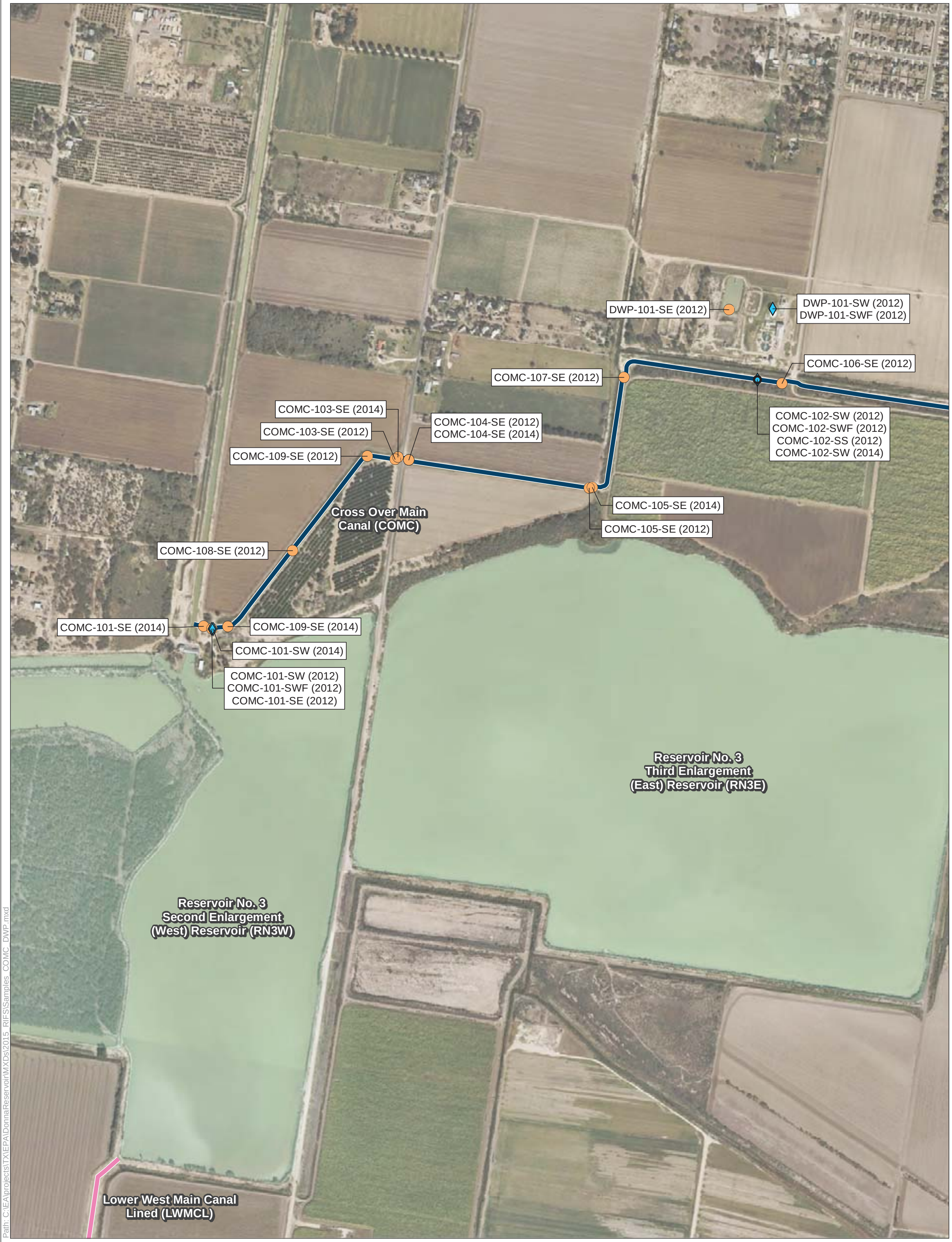
Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

Feet 0 400 800

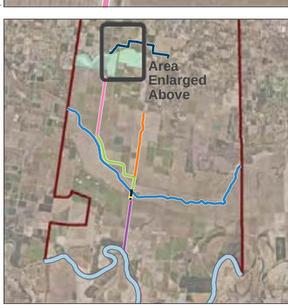
Remedial Investigation/Feasibility Study
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 9.
Reservoir No. 3 Sample Locations

098134



Path: C:\EA\projects\TX\EPA\DonnaReservoir\MXDs\2015_RIFS\Samples_COMC_DWP.mxd



Legend

- Cross Over Main Canal
- Lower West Main Canal Lined

Sample Locations by Matrix

- Sediment, SE (14)
- Surface Water, SW or SWF (8)
- Suspended Sediment, SS (1)

Sample type can be determined by symbol or the third part of the sample identifier as specified above (e.g., sediment samples end in "-SE" followed by the year collected).

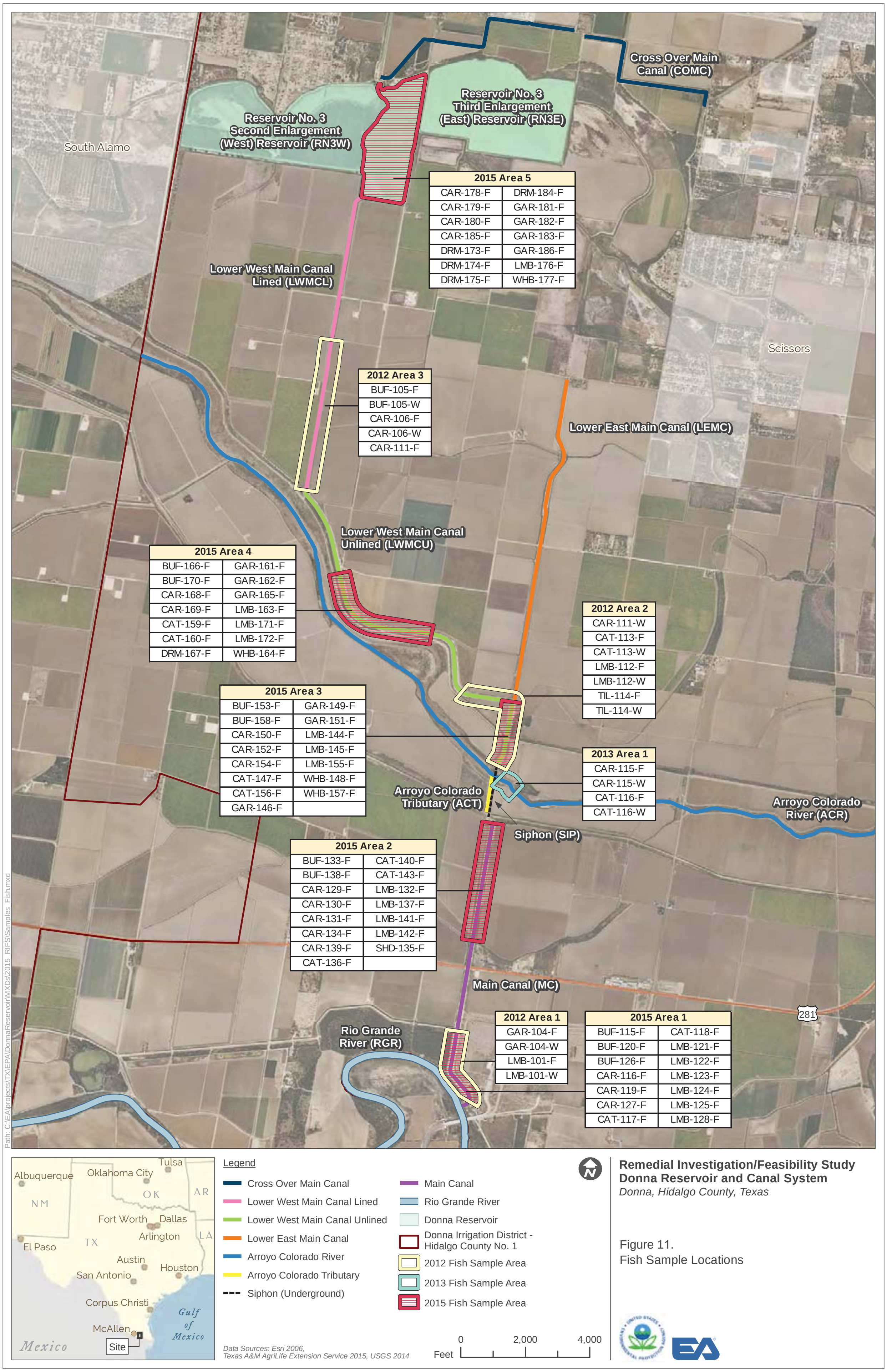
Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

Feet 0 400 800

Remedial Investigation/Feasibility Study
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 10.
Cross Over Main Canal and Water Treatment Plant Sample Locations

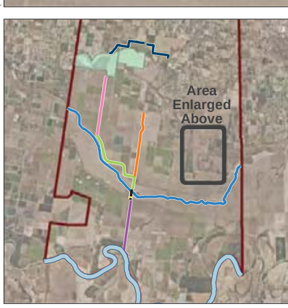
098135



Cross Over Main Canal (COMC)
Reservoir No. 3 Third Enlargement (East) Reservoir (RN3E)
Reservoir No. 3 Second Enlargement (West) Reservoir (RN3W)
South Alamo
2015 Area 5
CAR-178-F
DRM-184-F
CAR-179-F
GAR-181-F
CAR-180-F
GAR-182-F
CAR-185-F
GAR-183-F
DRM-173-F
GAR-186-F
DRM-174-F
LMB-176-F
DRM-175-F
WHB-177-F
Lower West Main Canal Lined (LWMCL)
Scissors
2012 Area 3
BUF-105-F
BUF-105-W
CAR-106-F
CAR-106-W
CAR-111-F
Lower East Main Canal (LEMC)
Lower West Main Canal Unlined (LWMCU)
2015 Area 4
BUF-166-F
GAR-161-F
BUF-170-F
GAR-162-F
CAR-168-F
GAR-165-F
CAR-169-F
LMB-163-F
CAT-159-F
LMB-171-F
CAT-160-F
LMB-172-F
DRM-167-F
WHB-164-F
2012 Area 2
CAR-111-W
CAT-113-F
CAT-113-W
LMB-112-F
LMB-112-W
TIL-114-F
TIL-114-W
2015 Area 3
BUF-153-F
GAR-149-F
BUF-158-F
GAR-151-F
CAR-150-F
LMB-144-F
CAR-152-F
LMB-145-F
CAR-154-F
LMB-155-F
CAT-147-F
WHB-148-F
CAT-156-F
WHB-157-F
GAR-146-F
2013 Area 1
CAR-115-F
CAR-115-W
CAT-116-F
CAT-116-W
Arroyo Colorado Tributary (ACT)
Arroyo Colorado River (ACR)
Siphon (SIP)
2015 Area 2
BUF-133-F
CAT-140-F
BUF-138-F
CAT-143-F
CAR-129-F
LMB-132-F
CAR-130-F
LMB-137-F
CAR-131-F
LMB-141-F
CAR-134-F
LMB-142-F
CAR-139-F
SHD-135-F
CAT-136-F
Main Canal (MC)
281
2012 Area 1
GAR-104-F
GAR-104-W
LMB-101-F
LMB-101-W
2015 Area 1
BUF-115-F
CAT-118-F
BUF-120-F
LMB-121-F
BUF-126-F
LMB-122-F
CAR-116-F
LMB-123-F
CAR-119-F
LMB-124-F
CAR-127-F
LMB-125-F
CAT-117-F
LMB-128-F
Rio Grande River (RGR)
Tulsa
Albuquerque
Oklahoma City
OK
AR
NM
Fort Worth
Dallas
Arlington
LA
El Paso
TX
Austin
Houston
San Antonio
Corpus Christi
Gulf of Mexico
McAllen
Mexico
Site
Legend
Cross Over Main Canal
Lower West Main Canal Lined
Lower West Main Canal Unlined
Lower East Main Canal
Arroyo Colorado River
Arroyo Colorado Tributary
Siphon (Underground)
Main Canal
Rio Grande River
Donna Reservoir
Donna Irrigation District - Hidalgo County No. 1
2012 Fish Sample Area
2013 Fish Sample Area
2015 Fish Sample Area
Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014
0
2,000
4,000
Feet
Remedial Investigation/Feasibility Study
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas
Figure 11.
Fish Sample Locations

098136

Path: C:\EA\projects\TX\EPA\DonnaReservoir\MXDs\2015_RIFS\Samples_BKG.mxd



Legend

Sample Locations by Matrix

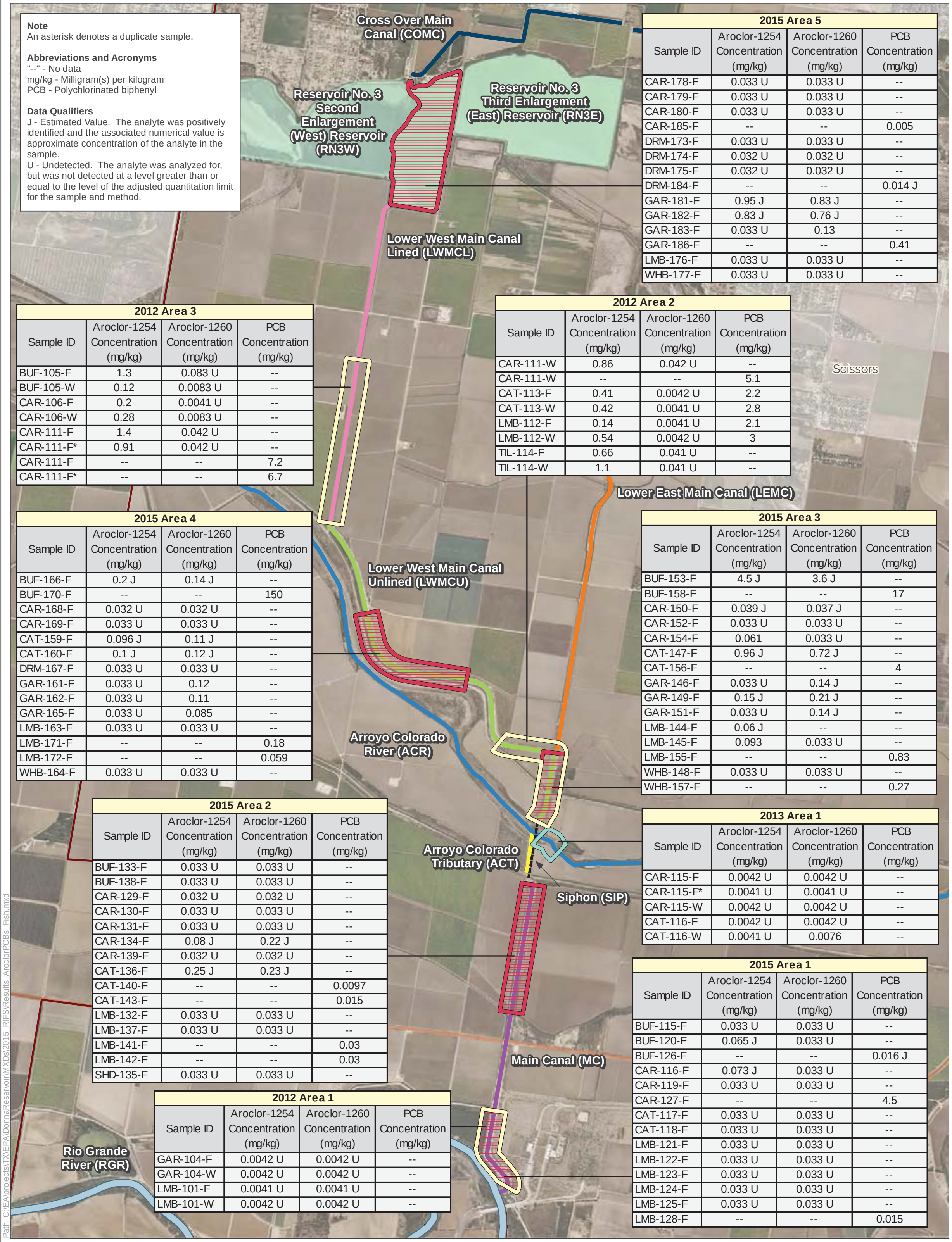
Soil (10)

Data Sources: Esri 2006,
Texas A&M AgriLife Extension Service 2015, USGS 2014

0 400 800
Feet

Remedial Investigation/Feasibility Study
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 12.
Ambient Soil Locations



Note
An asterisk denotes a duplicate sample.

Abbreviations and Acronyms
"--" - No data
mg/kg - Milligram(s) per kilogram
PCB - Polychlorinated biphenyl

Data Qualifiers
J - Estimated Value. The analyte was positively identified and the associated numerical value is approximate concentration of the analyte in the sample.
U - Undetected. The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted quantitation limit for the sample and method.

2015 Area 5

Sample ID	Aroclor-1254 Concentration (mg/kg)	Aroclor-1260 Concentration (mg/kg)	PCB Concentration (mg/kg)
CAR-178-F	0.033 U	0.033 U	--
CAR-179-F	0.033 U	0.033 U	--
CAR-180-F	0.033 U	0.033 U	--
CAR-185-F	--	--	0.005
DRM-173-F	0.033 U	0.033 U	--
DRM-174-F	0.032 U	0.032 U	--
DRM-175-F	0.032 U	0.032 U	--
DRM-184-F	--	--	0.014 J
GAR-181-F	0.95 J	0.83 J	--
GAR-182-F	0.83 J	0.76 J	--
GAR-183-F	0.033 U	0.13	--
GAR-186-F	--	--	0.41
LMB-176-F	0.033 U	0.033 U	--
WHB-177-F	0.033 U	0.033 U	--

2012 Area 3

Sample ID	Aroclor-1254 Concentration (mg/kg)	Aroclor-1260 Concentration (mg/kg)	PCB Concentration (mg/kg)
BUF-105-F	1.3	0.083 U	--
BUF-105-W	0.12	0.0083 U	--
CAR-106-F	0.2	0.0041 U	--
CAR-106-W	0.28	0.0083 U	--
CAR-111-F	1.4	0.042 U	--
CAR-111-F*	0.91	0.042 U	--
CAR-111-F	--	--	7.2
CAR-111-F*	--	--	6.7

2012 Area 2

Sample ID	Aroclor-1254 Concentration (mg/kg)	Aroclor-1260 Concentration (mg/kg)	PCB Concentration (mg/kg)
CAR-111-W	0.86	0.042 U	--
CAR-111-W	--	--	5.1
CAT-113-F	0.41	0.0042 U	2.2
CAT-113-W	0.42	0.0041 U	2.8
LMB-112-F	0.14	0.0041 U	2.1
LMB-112-W	0.54	0.0042 U	3
TIL-114-F	0.66	0.041 U	--
TIL-114-W	1.1	0.041 U	--

2015 Area 4

Sample ID	Aroclor-1254 Concentration (mg/kg)	Aroclor-1260 Concentration (mg/kg)	PCB Concentration (mg/kg)
BUF-166-F	0.2 J	0.14 J	--
BUF-170-F	--	--	150
CAR-168-F	0.032 U	0.032 U	--
CAR-169-F	0.033 U	0.033 U	--
CAT-159-F	0.096 J	0.11 J	--
CAT-160-F	0.1 J	0.12 J	--
DRM-167-F	0.033 U	0.033 U	--
GAR-161-F	0.033 U	0.12	--
GAR-162-F	0.033 U	0.11	--
GAR-165-F	0.033 U	0.085	--
LMB-163-F	0.033 U	0.033 U	--
LMB-171-F	--	--	0.18
LMB-172-F	--	--	0.059
WHB-164-F	0.033 U	0.033 U	--

2015 Area 3

Sample ID	Aroclor-1254 Concentration (mg/kg)	Aroclor-1260 Concentration (mg/kg)	PCB Concentration (mg/kg)
BUF-153-F	4.5 J	3.6 J	--
BUF-158-F	--	--	17
CAR-150-F	0.039 J	0.037 J	--
CAR-152-F	0.033 U	0.033 U	--
CAR-154-F	0.061	0.033 U	--
CAT-147-F	0.96 J	0.72 J	--
CAT-156-F	--	--	4
GAR-146-F	0.033 U	0.14 J	--
GAR-149-F	0.15 J	0.21 J	--
GAR-151-F	0.033 U	0.14 J	--
LMB-144-F	0.06 J	--	--
LMB-145-F	0.093	0.033 U	--
LMB-155-F	--	--	0.83
WHB-148-F	0.033 U	0.033 U	--
WHB-157-F	--	--	0.27

2015 Area 2

Sample ID	Aroclor-1254 Concentration (mg/kg)	Aroclor-1260 Concentration (mg/kg)	PCB Concentration (mg/kg)
BUF-133-F	0.033 U	0.033 U	--
BUF-138-F	0.033 U	0.033 U	--
CAR-129-F	0.032 U	0.032 U	--
CAR-130-F	0.033 U	0.033 U	--
CAR-131-F	0.033 U	0.033 U	--
CAR-134-F	0.08 J	0.22 J	--
CAR-139-F	0.032 U	0.032 U	--
CAT-136-F	0.25 J	0.23 J	--
CAT-140-F	--	--	0.0097
CAT-143-F	--	--	0.015
LMB-132-F	0.033 U	0.033 U	--
LMB-137-F	0.033 U	0.033 U	--
LMB-141-F	--	--	0.03
LMB-142-F	--	--	0.03
SHD-135-F	0.033 U	0.033 U	--

2013 Area 1

Sample ID	Aroclor-1254 Concentration (mg/kg)	Aroclor-1260 Concentration (mg/kg)	PCB Concentration (mg/kg)
CAR-115-F	0.0042 U	0.0042 U	--
CAR-115-F*	0.0041 U	0.0041 U	--
CAR-115-W	0.0042 U	0.0042 U	--
CAT-116-F	0.0042 U	0.0042 U	--
CAT-116-W	0.0041 U	0.0076	--

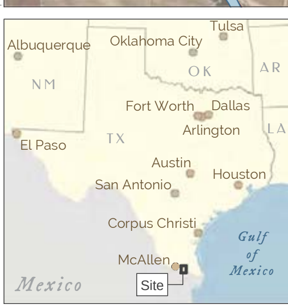
2015 Area 1

Sample ID	Aroclor-1254 Concentration (mg/kg)	Aroclor-1260 Concentration (mg/kg)	PCB Concentration (mg/kg)
BUF-115-F	0.033 U	0.033 U	--
BUF-120-F	0.065 J	0.033 U	--
BUF-126-F	--	--	0.016 J
CAR-116-F	0.073 J	0.033 U	--
CAR-119-F	0.033 U	0.033 U	--
CAR-127-F	--	--	4.5
CAT-117-F	0.033 U	0.033 U	--
CAT-118-F	0.033 U	0.033 U	--
LMB-121-F	0.033 U	0.033 U	--
LMB-122-F	0.033 U	0.033 U	--
LMB-123-F	0.033 U	0.033 U	--
LMB-124-F	0.033 U	0.033 U	--
LMB-125-F	0.033 U	0.033 U	--
LMB-128-F	--	--	0.015

2012 Area 1

Sample ID	Aroclor-1254 Concentration (mg/kg)	Aroclor-1260 Concentration (mg/kg)	PCB Concentration (mg/kg)
GAR-104-F	0.0042 U	0.0042 U	--
GAR-104-W	0.0042 U	0.0042 U	--
LMB-101-F	0.0041 U	0.0041 U	--
LMB-101-W	0.0042 U	0.0042 U	--

Path: C:\EA\projects\TX\EPA\DonnaReservoir\MXDs\2015_RIFS\Results_AroclorPCBs_Fish.mxd



Legend
- Cross Over Main Canal
- Lower West Main Canal Lined
- Lower West Main Canal Unlined
- Lower East Main Canal
- Arroyo Colorado River
- Arroyo Colorado Tributary
- Siphon (Underground)
- Main Canal
- Rio Grande River
- Donna Reservoir
- Donna Irrigation District - Hidalgo County No. 1
- 2012 Fish Sample Area
- 2013 Fish Sample Area
- 2015 Fish Sample Area

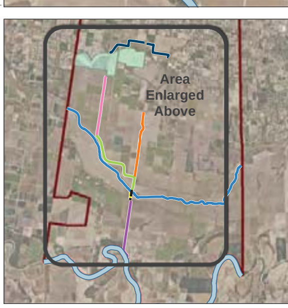
Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

0 2,000 4,000
Feet

Remedial Investigation/Feasibility Study
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 13.
Fish Concentrations of Aroclor-1254, Aroclor-1260, and Total Polychlorinated Biphenyl Congeners

098138



Legend

- Cross Over Main Canal
- Lower West Main Canal Lined
- Lower West Main Canal Unlined
- Lower East Main Canal
- Arroyo Colorado River
- Arroyo Colorado Tributary
- Siphon (Underground)
- Main Canal
- Rio Grande River

Total PCB Concentrations

- < 0.0003 mg/kg
- 0.0003 - 0.003 mg/kg
- 0.003 - 0.03 mg/kg
- > 0.03 mg/kg

Total PCB = Sum of Detectable Aroclors or Sum of Detectable PCB Congeners

mg/kg - Milligram(s) per kilogram
PCB - Polychlorinated Biphenyl

Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

Feet 0 2,000 4,000

Remedial Investigation/Feasibility Study
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 14.
Total Polychlorinated Biphenyls in Sediment

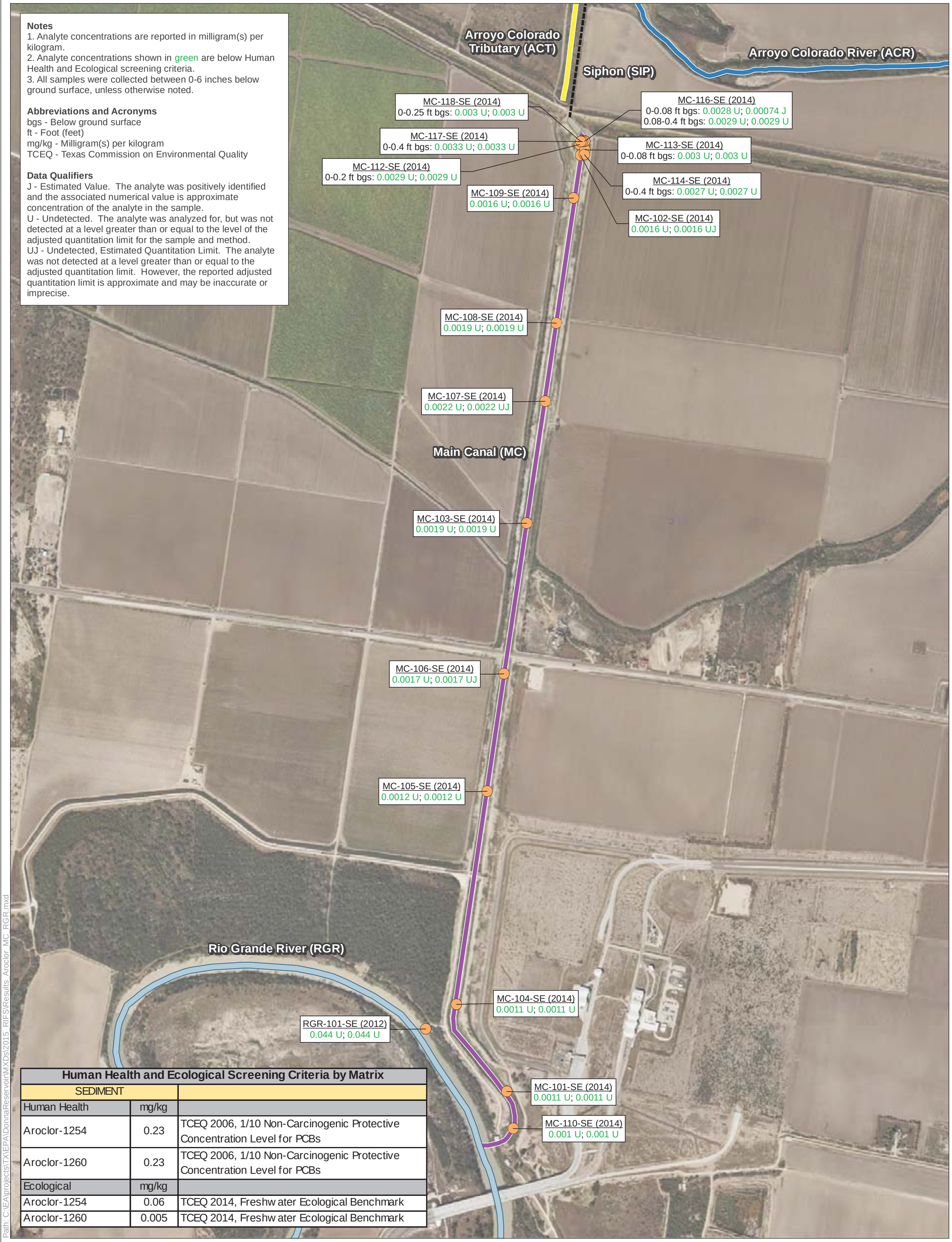
Path: C:\EA\projects\TX\EPA\DonnaReservoir\MXDs\2015_RIFS\Internal_ECO_PCB.mxd

098139

Notes
1. Analyte concentrations are reported in milligram(s) per kilogram.
2. Analyte concentrations shown in green are below Human Health and Ecological screening criteria.
3. All samples were collected between 0-6 inches below ground surface, unless otherwise noted.

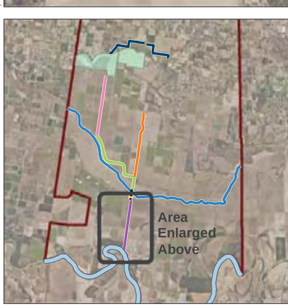
Abbreviations and Acronyms
bgs - Below ground surface
ft - Foot (feet)
mg/kg - Milligram(s) per kilogram
TCEQ - Texas Commission on Environmental Quality

Data Qualifiers
J - Estimated Value. The analyte was positively identified and the associated numerical value is approximate concentration of the analyte in the sample.
U - Undetected. The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted quantitation limit for the sample and method.
UJ - Undetected, Estimated Quantitation Limit. The analyte was not detected at a level greater than or equal to the adjusted quantitation limit. However, the reported adjusted quantitation limit is approximate and may be inaccurate or imprecise.



Human Health and Ecological Screening Criteria by Matrix		
SEDIMENT		
Human Health	mg/kg	
Aroclor-1254	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Aroclor-1260	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Ecological	mg/kg	
Aroclor-1254	0.06	TCEQ 2014, Freshwater Ecological Benchmark
Aroclor-1260	0.005	TCEQ 2014, Freshwater Ecological Benchmark

Path: C:\EA\projects\TX\EPA\DonnaReservoir\MXDs\2015_RIFS\Results_Aroclor_MC_RGR.mxd



Legend
Arroyo Colorado River
Arroyo Colorado Tributary
Siphon (Underground)
Main Canal
Rio Grande River
Sample Locations by Matrix
Sediment

Sample Identification
Sample Depth (if multiple depths): Aroclor-1254; Aroclor-1260 Results

Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

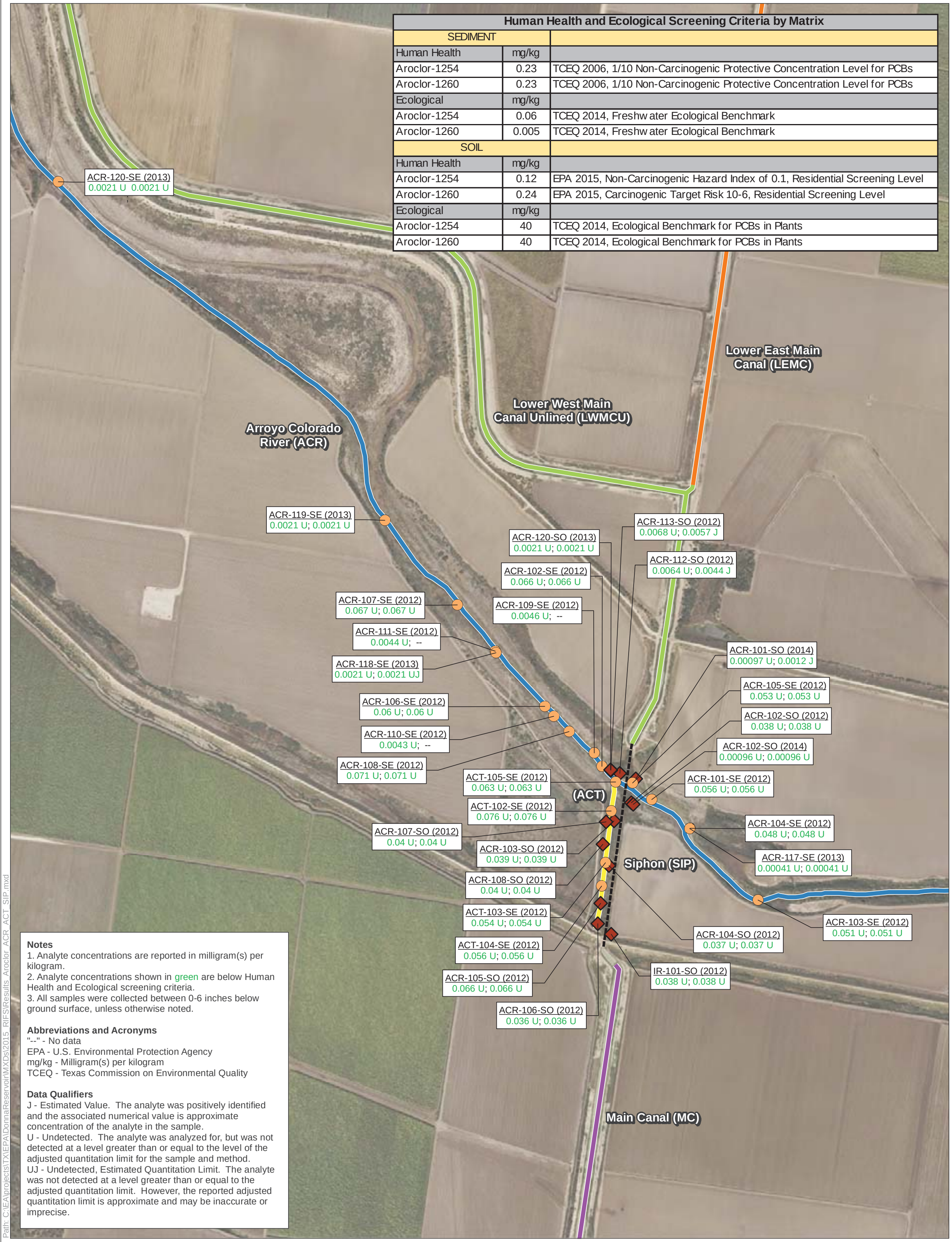
0 500 1,000
Feet

Remedial Investigation/Feasibility Study
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 15.
Concentrations of Aroclor-1254 and Aroclor-1260 in Sediment in the Main Canal and Rio Grande River

098140

Human Health and Ecological Screening Criteria by Matrix		
SEDIMENT		
Human Health	mg/kg	
Aroclor-1254	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Aroclor-1260	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Ecological	mg/kg	
Aroclor-1254	0.06	TCEQ 2014, Freshwater Ecological Benchmark
Aroclor-1260	0.005	TCEQ 2014, Freshwater Ecological Benchmark
SOIL		
Human Health	mg/kg	
Aroclor-1254	0.12	EPA 2015, Non-Carcinogenic Hazard Index of 0.1, Residential Screening Level
Aroclor-1260	0.24	EPA 2015, Carcinogenic Target Risk 10-6, Residential Screening Level
Ecological	mg/kg	
Aroclor-1254	40	TCEQ 2014, Ecological Benchmark for PCBs in Plants
Aroclor-1260	40	TCEQ 2014, Ecological Benchmark for PCBs in Plants

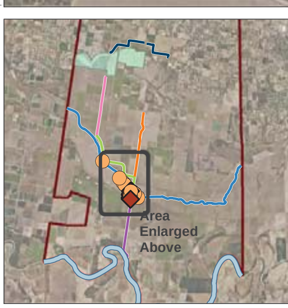


Notes
1. Analyte concentrations are reported in milligram(s) per kilogram.
2. Analyte concentrations shown in green are below Human Health and Ecological screening criteria.
3. All samples were collected between 0-6 inches below ground surface, unless otherwise noted.

Abbreviations and Acronyms
"--" - No data
EPA - U.S. Environmental Protection Agency
mg/kg - Milligram(s) per kilogram
TCEQ - Texas Commission on Environmental Quality

Data Qualifiers
J - Estimated Value. The analyte was positively identified and the associated numerical value is approximate concentration of the analyte in the sample.
U - Undetected. The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted quantitation limit for the sample and method.
UJ - Undetected, Estimated Quantitation Limit. The analyte was not detected at a level greater than or equal to the adjusted quantitation limit. However, the reported adjusted quantitation limit is approximate and may be inaccurate or imprecise.

Path: C:\EA\projects\TX\EPA\DonnaReservoir\MXDs\2015_RIFS\Results_Aroclor_ACR_ACT_SIP.mxd



Legend
- Lower West Main Canal Unlined
- Lower East Main Canal
- Arroyo Colorado River
- Arroyo Colorado Tributary
- Siphon (Underground)
- Main Canal

Sample Locations by Matrix
- Sediment
- Soil

Sample Identification
Sample Depth (if multiple depths): Aroclor-1254; Aroclor-1260 Results

Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

Feet 0 500 1,000

Remedial Investigation/Feasibility Study
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 16.
Concentrations of Aroclor-1254 and Aroclor-1260 in Sediment and Soil in the Arroyo Colorado River and Tributary

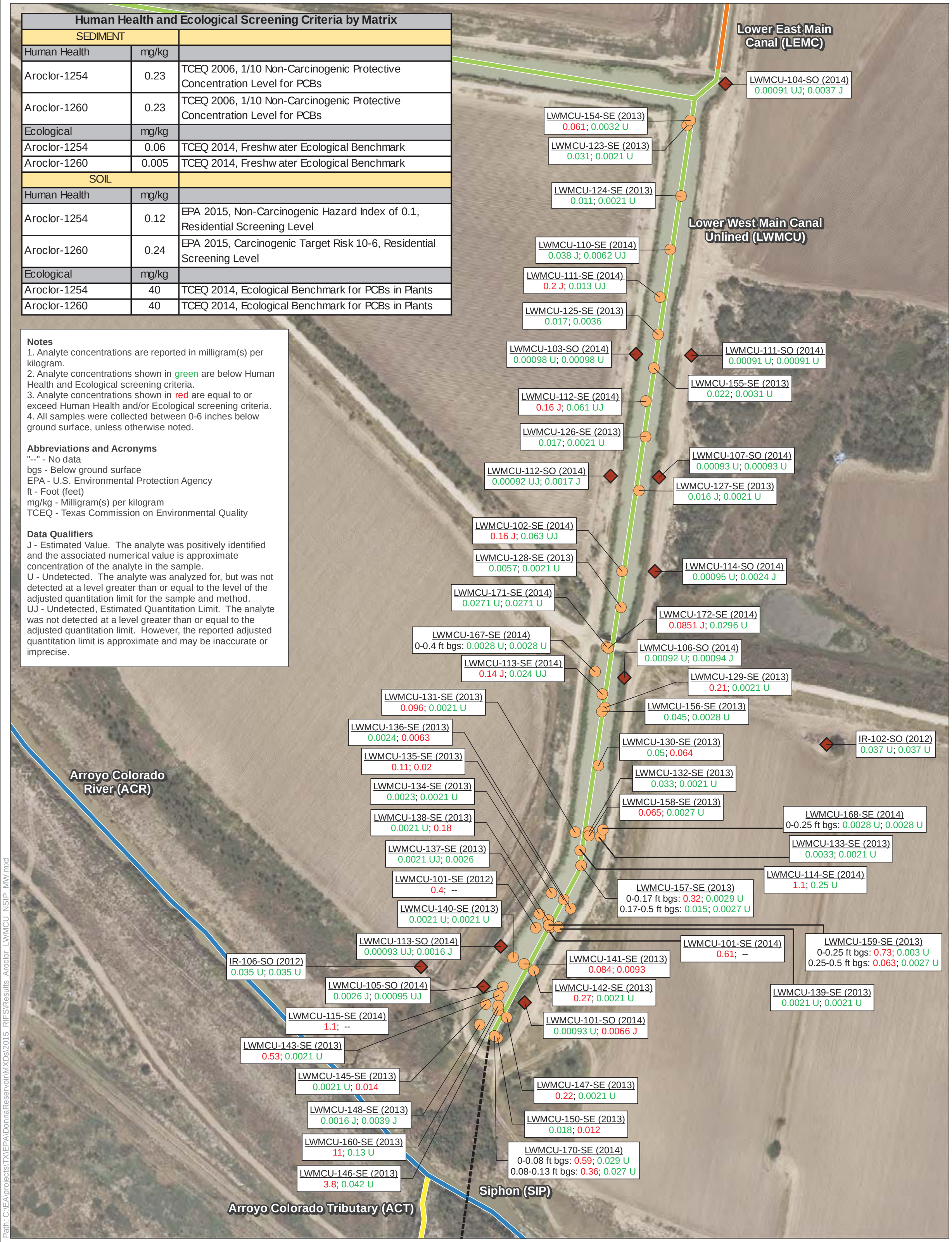
098141

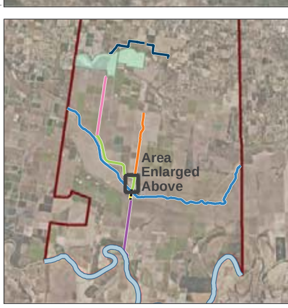
Human Health and Ecological Screening Criteria by Matrix		
SEDIMENT		
Human Health	mg/kg	
Aroclor-1254	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Aroclor-1260	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Ecological	mg/kg	
Aroclor-1254	0.06	TCEQ 2014, Freshwater Ecological Benchmark
Aroclor-1260	0.005	TCEQ 2014, Freshwater Ecological Benchmark
SOIL		
Human Health	mg/kg	
Aroclor-1254	0.12	EPA 2015, Non-Carcinogenic Hazard Index of 0.1, Residential Screening Level
Aroclor-1260	0.24	EPA 2015, Carcinogenic Target Risk 10-6, Residential Screening Level
Ecological	mg/kg	
Aroclor-1254	40	TCEQ 2014, Ecological Benchmark for PCBs in Plants
Aroclor-1260	40	TCEQ 2014, Ecological Benchmark for PCBs in Plants

Notes
1. Analyte concentrations are reported in milligram(s) per kilogram.
2. Analyte concentrations shown in green are below Human Health and Ecological screening criteria.
3. Analyte concentrations shown in red are equal to or exceed Human Health and/or Ecological screening criteria.
4. All samples were collected between 0-6 inches below ground surface, unless otherwise noted.

Abbreviations and Acronyms
"--" - No data
bgs - Below ground surface
EPA - U.S. Environmental Protection Agency
ft - Foot (feet)
mg/kg - Milligram(s) per kilogram
TCEQ - Texas Commission on Environmental Quality

Data Qualifiers
J - Estimated Value. The analyte was positively identified and the associated numerical value is approximate concentration of the analyte in the sample.
U - Undetected. The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted quantitation limit for the sample and method.
UJ - Undetected, Estimated Quantitation Limit. The analyte was not detected at a level greater than or equal to the adjusted quantitation limit. However, the reported adjusted quantitation limit is approximate and may be inaccurate or imprecise.





Legend
- Lower West Main Canal Unlined
- Lower East Main Canal
- Arroyo Colorado River
- Arroyo Colorado Tributary
- Siphon (Underground)

Sample Locations by Matrix
- Sediment
- Soil

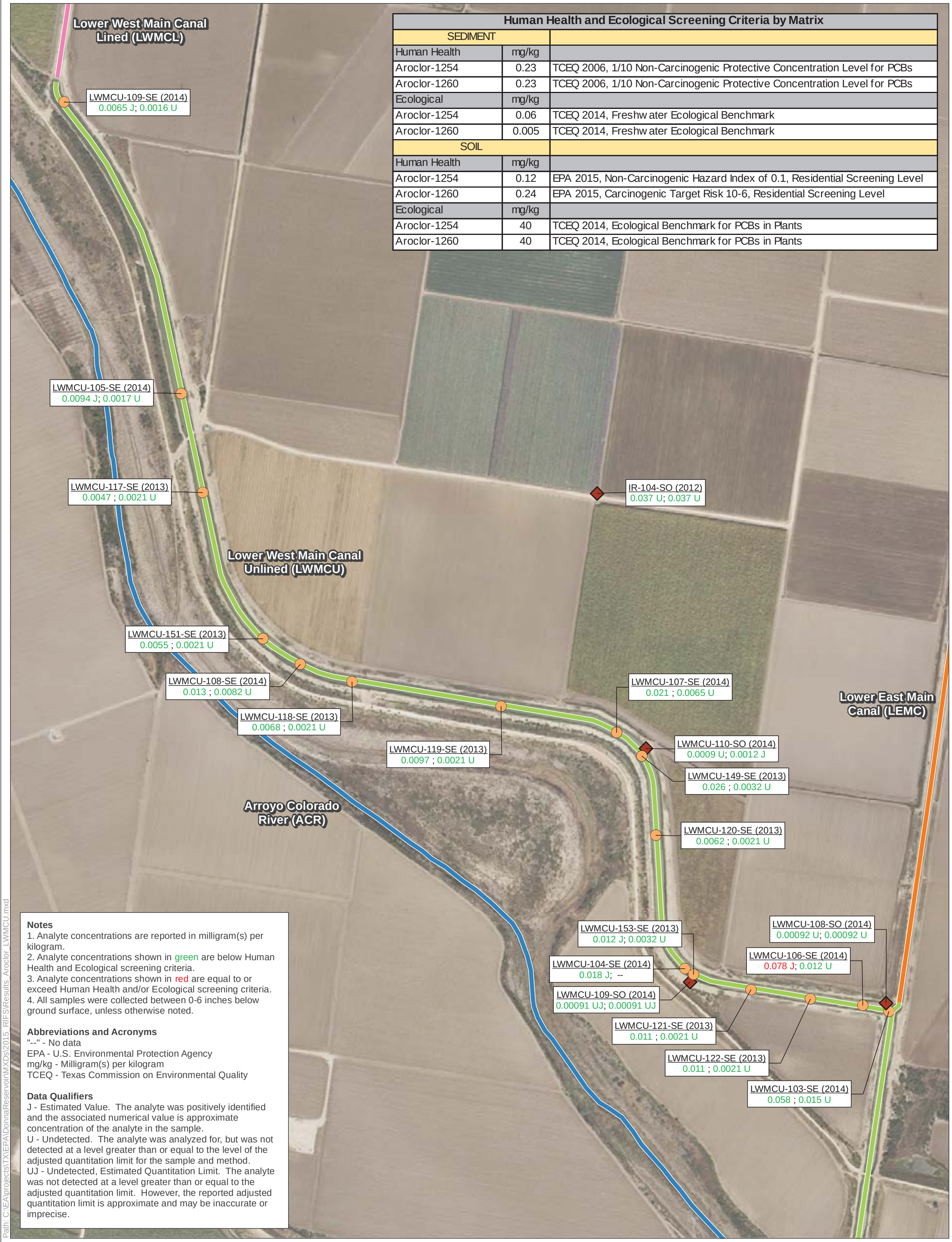
Sample Identification
Sample Depth (if multiple depths): Aroclor-1254; Aroclor-1260 Results (Exceedances in red)

Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

Feet 0 100 200

Remedial Investigation/Feasibility Study
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 17.
Concentrations of Aroclor-1254 and Aroclor-1260 in Sediment and Soil in the Lower West Main Canal Unlined South of 90 Degree Bend



Human Health and Ecological Screening Criteria by Matrix		
SEDIMENT		
Human Health	mg/kg	
Aroclor-1254	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Aroclor-1260	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Ecological	mg/kg	
Aroclor-1254	0.06	TCEQ 2014, Freshwater Ecological Benchmark
Aroclor-1260	0.005	TCEQ 2014, Freshwater Ecological Benchmark
SOIL		
Human Health	mg/kg	
Aroclor-1254	0.12	EPA 2015, Non-Carcinogenic Hazard Index of 0.1, Residential Screening Level
Aroclor-1260	0.24	EPA 2015, Carcinogenic Target Risk 10-6, Residential Screening Level
Ecological	mg/kg	
Aroclor-1254	40	TCEQ 2014, Ecological Benchmark for PCBs in Plants
Aroclor-1260	40	TCEQ 2014, Ecological Benchmark for PCBs in Plants

Notes

1. Analyte concentrations are reported in milligram(s) per kilogram.
2. Analyte concentrations shown in green are below Human Health and Ecological screening criteria.
3. Analyte concentrations shown in red are equal to or exceed Human Health and/or Ecological screening criteria.
4. All samples were collected between 0-6 inches below ground surface, unless otherwise noted.

Abbreviations and Acronyms

"--" - No data
EPA - U.S. Environmental Protection Agency
mg/kg - Milligram(s) per kilogram
TCEQ - Texas Commission on Environmental Quality

Data Qualifiers

J - Estimated Value. The analyte was positively identified and the associated numerical value is approximate concentration of the analyte in the sample.
U - Undetected. The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted quantitation limit for the sample and method.
UJ - Undetected, Estimated Quantitation Limit. The analyte was not detected at a level greater than or equal to the adjusted quantitation limit. However, the reported adjusted quantitation limit is approximate and may be inaccurate or imprecise.

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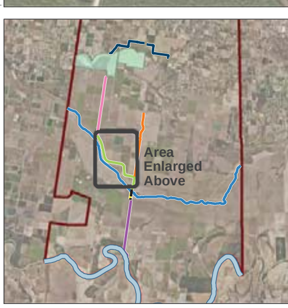


Legend
- Lower West Main Canal Lined
- Lower West Main Canal Unlined
- Lower East Main Canal
- Arroyo Colorado River

Sample Locations by Matrix
- Sediment
- Soil

Sample Identification
Sample Depth (if multiple depths): Aroclor-1254; Aroclor-1260 Results (Exceedances in red)

Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

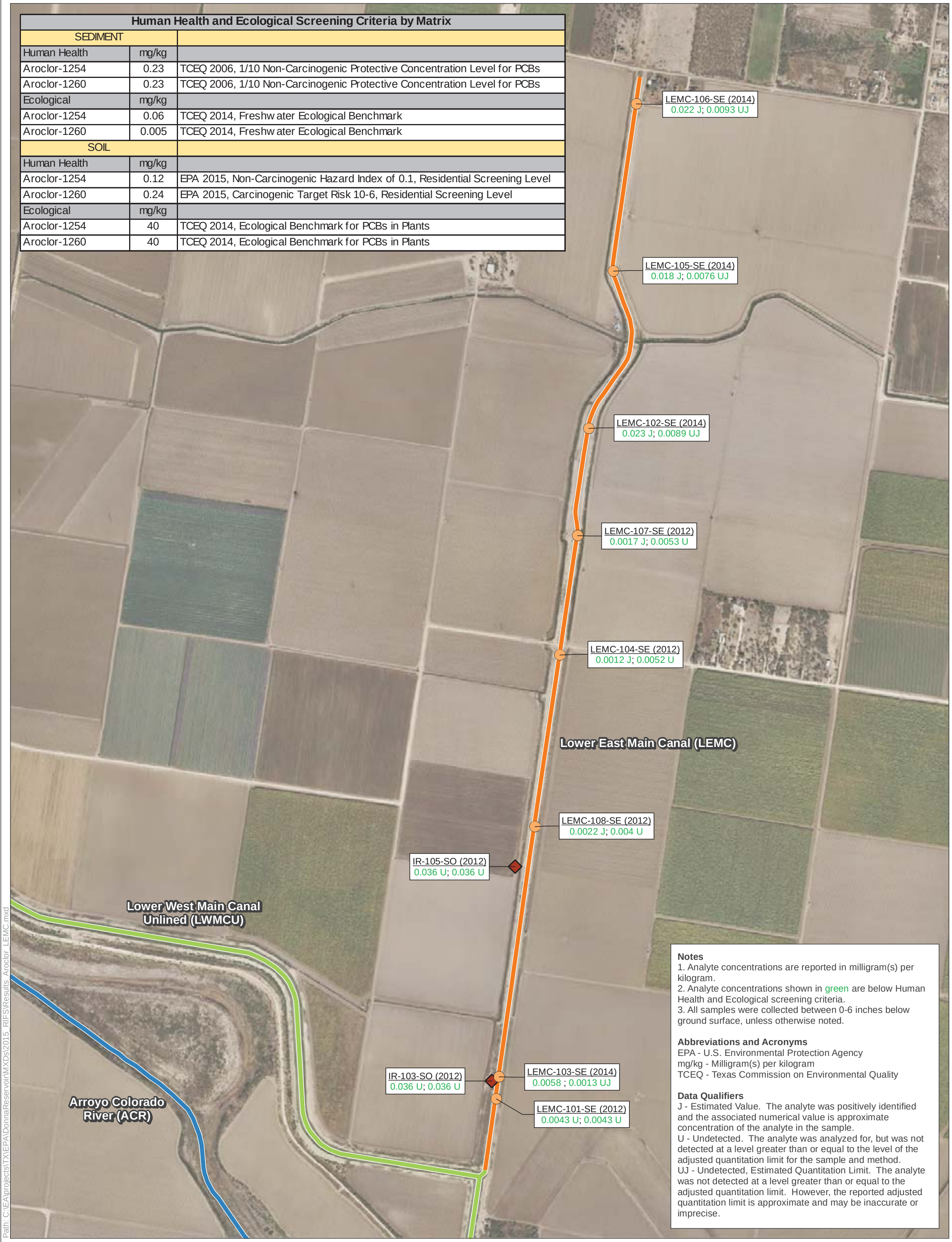
0 500 1,000
Feet

Remedial Investigation/Feasibility Study
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 18.
Concentrations of Aroclor-1254 and Aroclor-1260 in Sediment and Soil in the Lower West Main Canal Unlined North of 90 Degree Bend

098143

Human Health and Ecological Screening Criteria by Matrix		
SEDIMENT		
Human Health	mg/kg	
Aroclor-1254	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Aroclor-1260	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Ecological	mg/kg	
Aroclor-1254	0.06	TCEQ 2014, Freshw ater Ecological Benchmark
Aroclor-1260	0.005	TCEQ 2014, Freshw ater Ecological Benchmark
SOIL		
Human Health	mg/kg	
Aroclor-1254	0.12	EPA 2015, Non-Carcinogenic Hazard Index of 0.1, Residential Screening Level
Aroclor-1260	0.24	EPA 2015, Carcinogenic Target Risk 10-6, Residential Screening Level
Ecological	mg/kg	
Aroclor-1254	40	TCEQ 2014, Ecological Benchmark for PCBs in Plants
Aroclor-1260	40	TCEQ 2014, Ecological Benchmark for PCBs in Plants



Path: C:\EA\projects\TX\EPA\DonnaReservoir\MXDs\2015_RIFS\Results_Aroclor_LEMC.mxd

Notes
1. Analyte concentrations are reported in milligram(s) per kilogram.
2. Analyte concentrations shown in green are below Human Health and Ecological screening criteria.
3. All samples were collected between 0-6 inches below ground surface, unless otherwise noted.

Abbreviations and Acronyms
EPA - U.S. Environmental Protection Agency
mg/kg - Milligram(s) per kilogram
TCEQ - Texas Commission on Environmental Quality

Data Qualifiers
J - Estimated Value. The analyte was positively identified and the associated numerical value is approximate concentration of the analyte in the sample.
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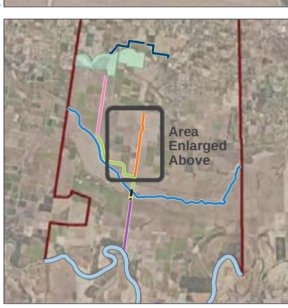
UJ - Undetected, Estimated Quantitation Limit. The analyte was not detected at a level greater than or equal to the adjusted quantitation limit. However, the reported adjusted quantitation limit is approximate and may be inaccurate or imprecise.



Legend
- Lower West Main Canal Unlined
- Lower East Main Canal
- Arroyo Colorado River

Sample Locations by Matrix
- Sediment
- Soil

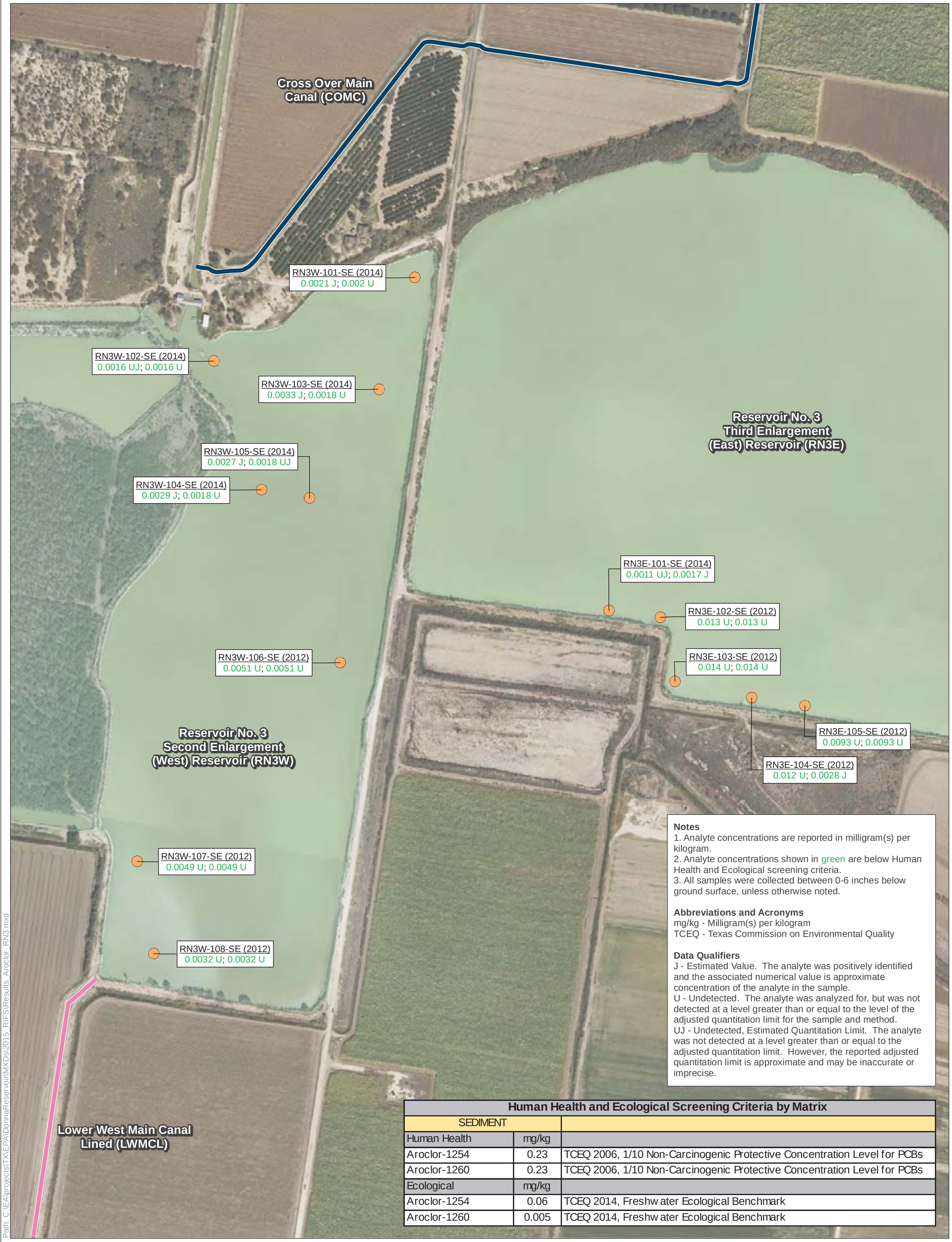
Sample Identification
Sample Depth (if multiple depths): Aroclor-1254; Aroclor-1260 Results

Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

Feet 0 500 1,000

Remedial Investigation/Feasibility Study
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 19.
Concentrations of Aroclor-1254 and Aroclor-1260 in Sediment and Soil in the Lower East Main Canal

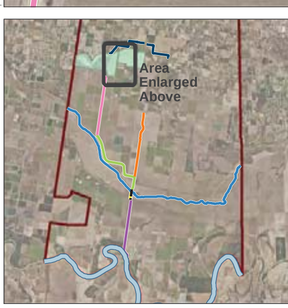


Notes
1. Analyte concentrations are reported in milligram(s) per kilogram.
2. Analyte concentrations shown in green are below Human Health and Ecological screening criteria.
3. All samples were collected between 0-6 inches below ground surface, unless otherwise noted.

Abbreviations and Acronyms
mg/kg - Milligram(s) per kilogram
TCEQ - Texas Commission on Environmental Quality

Data Qualifiers
J - Estimated Value. The analyte was positively identified and the associated numerical value is approximate concentration of the analyte in the sample.
U - Undetected. The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted quantitation limit for the sample and method.
UJ - Undetected, Estimated Quantitation Limit. The analyte was not detected at a level greater than or equal to the adjusted quantitation limit. However, the reported adjusted quantitation limit is approximate and may be inaccurate or imprecise.

Human Health and Ecological Screening Criteria by Matrix		
SEDIMENT		
Human Health	mg/kg	
Aroclor-1254	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Aroclor-1260	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Ecological	mg/kg	
Aroclor-1254	0.06	TCEQ 2014, Freshwater Ecological Benchmark
Aroclor-1260	0.005	TCEQ 2014, Freshwater Ecological Benchmark



Legend
Cross Over Main Canal
Lower West Main Canal Lined
Sample Locations by Matrix
Sediment

Sample Identification
Sample Depth (if multiple depths): Aroclor-1254; Aroclor-1260 Results

Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

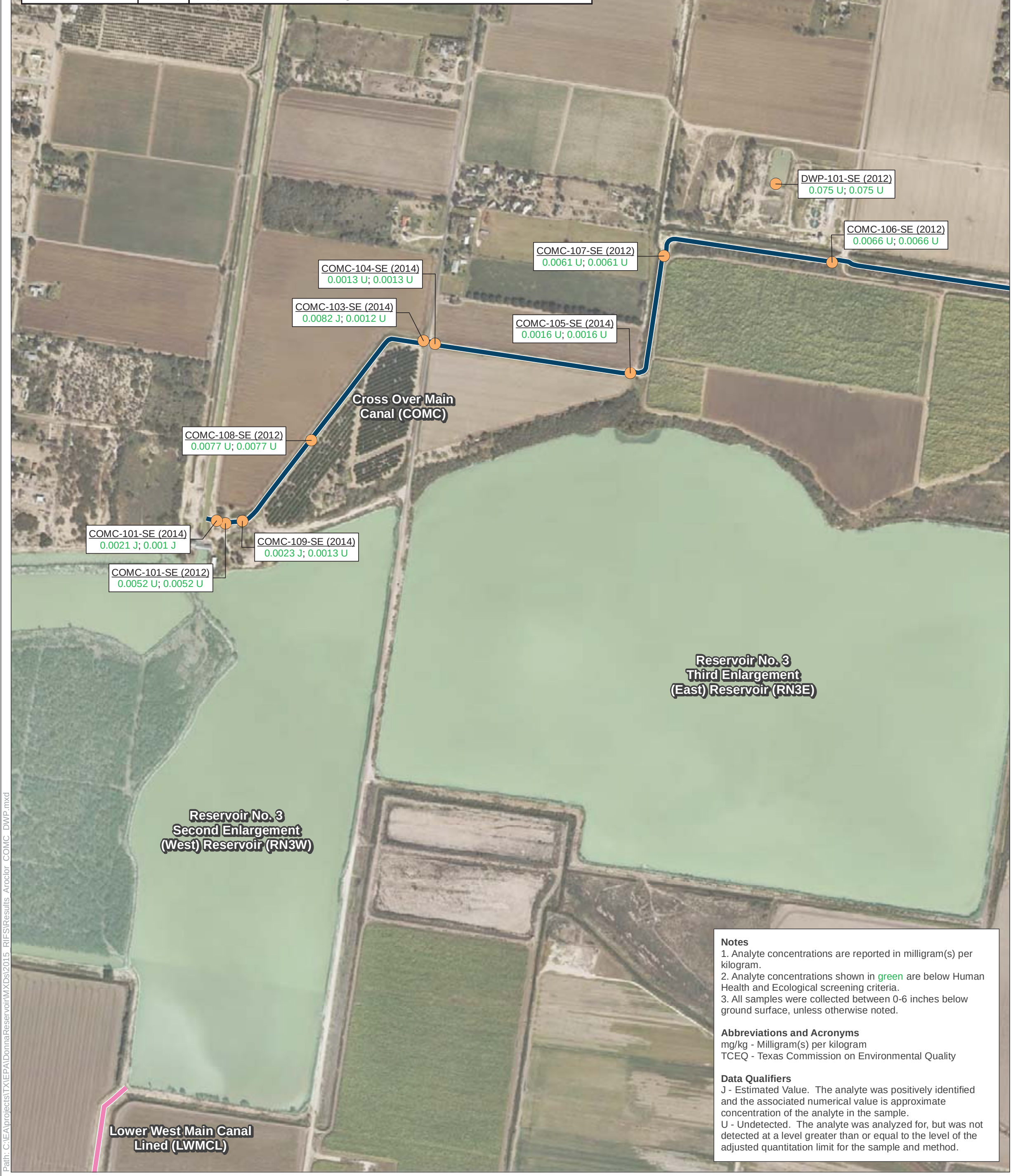
Feet 0 400 800

Remedial Investigation/Feasibility Study
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 20.
Concentrations of Aroclor-1254 and Aroclor-1260 in Sediment in Reservoir No. 3

098145

Human Health and Ecological Screening Criteria by Matrix		
SEDIMENT		
Human Health	mg/kg	
Aroclor-1254	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Aroclor-1260	0.23	TCEQ 2006, 1/10 Non-Carcinogenic Protective Concentration Level for PCBs
Ecological	mg/kg	
Aroclor-1254	0.06	TCEQ 2014, Freshw ater Ecological Benchmark
Aroclor-1260	0.005	TCEQ 2014, Freshw ater Ecological Benchmark

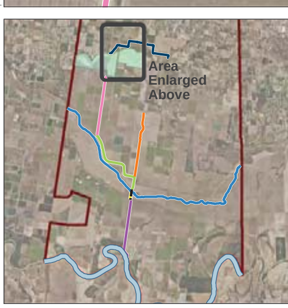


Path: C:\EA\projects\TX\EPA\DonnaReservoir\MXDs\2015_RIFS\Results_Aroclor_COMC_DWP.mxd

Notes
1. Analyte concentrations are reported in milligram(s) per kilogram.
2. Analyte concentrations shown in green are below Human Health and Ecological screening criteria.
3. All samples were collected between 0-6 inches below ground surface, unless otherwise noted.

Abbreviations and Acronyms
mg/kg - Milligram(s) per kilogram
TCEQ - Texas Commission on Environmental Quality

Data Qualifiers
J - Estimated Value. The analyte was positively identified and the associated numerical value is approximate concentration of the analyte in the sample.
U - Undetected. The analyte was analyzed for, but was not detected at a level greater than or equal to the level of the adjusted quantitation limit for the sample and method.



Legend
Cross Over Main Canal
Lower West Main Canal Lined
Sample Locations by Matrix
Sediment

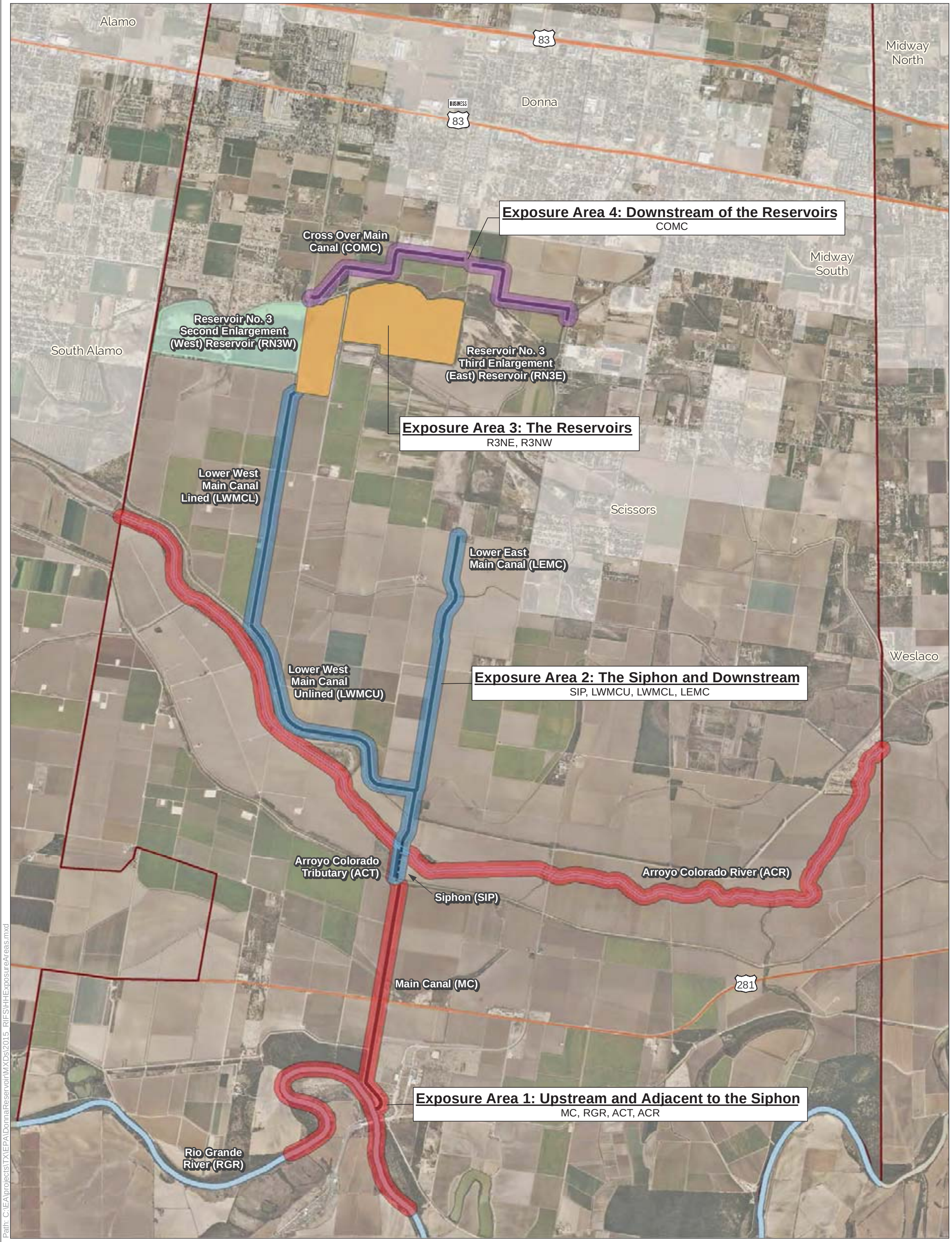
Sample Identification
Sample Depth (if multiple depths): Aroclor-1254; Aroclor-1260 Results

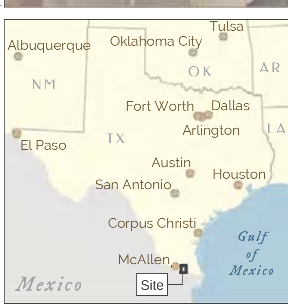
Data Sources: Esri 2006, Texas A&M AgriLife Extension Service 2015, USGS 2014

0 400 800
Feet

Remedial Investigation/Feasibility Study
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 21.
Concentrations of Aroclor-1254 and Aroclor-1260 in Sediment in the Cross Over Main Canal and Water Treatment Plant





Legend

- Donna Irrigation District - Hidalgo County No. 1
- Donna Reservoir
- Exposure Area 1: Upstream and Adjacent to the Siphon
- Exposure Area 2: The Siphon and Downstream
- Exposure Area 3: The Reservoirs
- Exposure Area 4: Downstream of the Reservoirs

Data Sources: Esri 2006,
Texas A&M AgriLife Extension Service 2015, USGS 2014

Feet 0 2,000 4,000

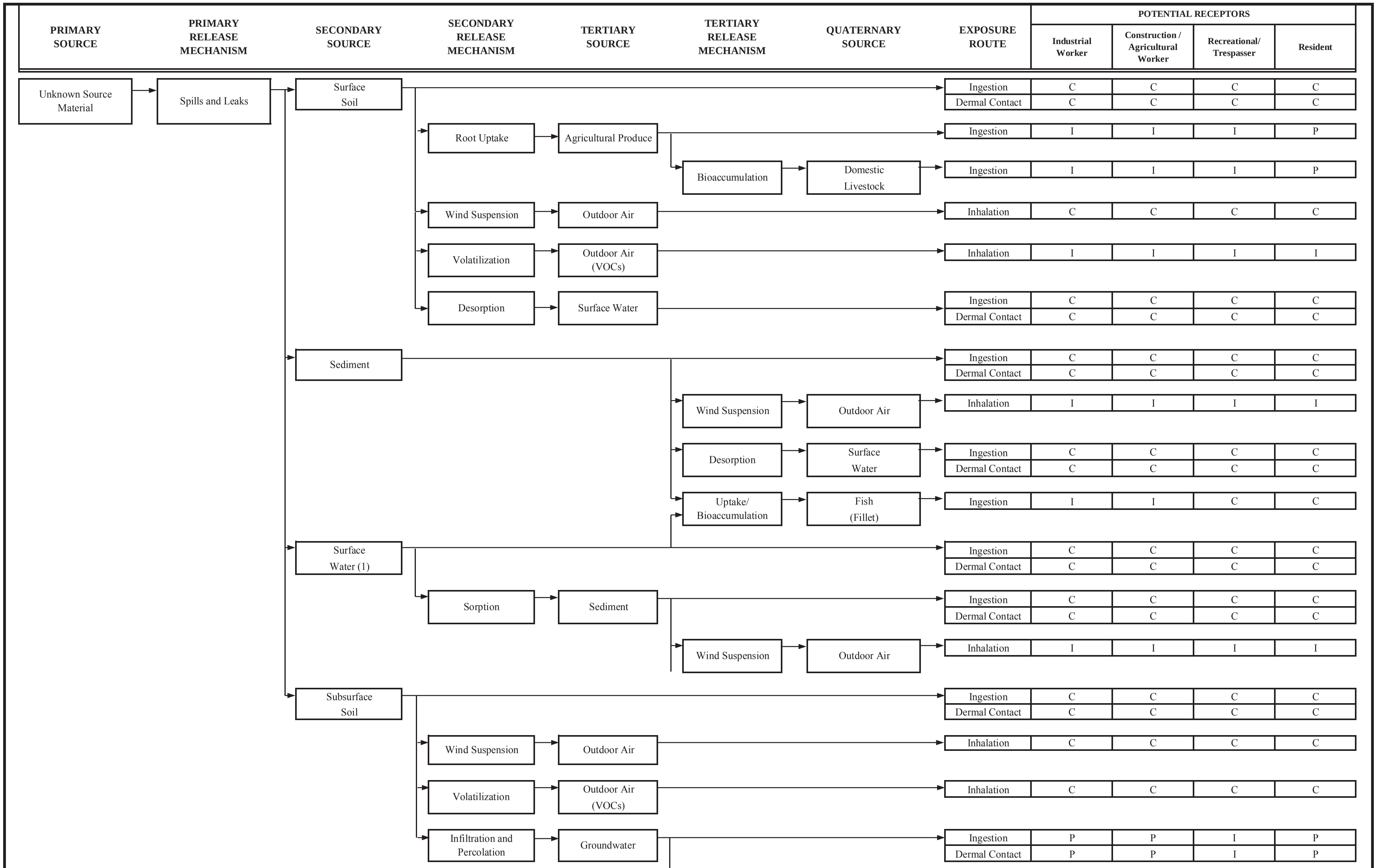
Remedial Investigation/Feasibility Study
Donna Reservoir and Canal System
Donna, Hidalgo County, Texas

Figure 22.
Human Health Surface Water and Sediment Combined Exposure Areas

098147

098148

FIGURE 23 HUMAN HEALTH CONCEPTUAL SITE MODEL, DONNA RESERVOIR AND CANAL SYSTEM



I Incomplete or negligible exposure pathway

C Potentially complete exposure pathway

P Potentially complete exposure pathway. Polychlorinated biphenyls do not typically migrate to groundwater or accumulate in vegetation.

(1) Possible sources of contamination could include herbicides, pesticides, or other contaminants (e.g., polychlorinated biphenyls) from the Rio Grande River or Arroyo Colorado

TABLES

EA Engineering, Science, and Technology, Inc., PBC

TABLE 2.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SURFACE SOIL (0 to 6 INCHES)

Scenario Timeframe: Current/Future
Medium: Surface soil
Exposure Medium: Surface soil
Exposure Point: Donna Reservoir and Canal System

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value	Potential ARAR/TBC Value (5)	Potential ARAR/TBC Source	COPC Flag	Rationale for (6) Contaminant Deletion or Selection
INORGANICS																
7429-90-5	**Aluminum**	**1.18E+04**		**2.55E+04**		**mg/kg**	**LWMCU-102-SO-0-6**	**29/29**	**3.51E+01 - 1.26E+02**	**2.55E+04**	**2.08E+04**	**6.45E+03 N**	**7.70E+03**	**RSL**	**Yes**	**ASL**
7440-38-2	**Arsenic**	**3.20E+00**		**7.50E+00**		**mg/kg**	**IR-104-SO-0-6**	**29/29**	**4.40E-01 - 7.80E-01**	**7.50E+00**	**1.54E+01**	**2.40E+00 N**	**6.70E-01**	**RSL**	**Yes**	**ASL**
7440-39-3	Barium	1.17E+02		3.59E+02		mg/kg	ACR-104-SO-0-6	29/29	4.40E+00 - 7.80E+00	3.59E+02	1.69E+02	8.10E+02 N	1.50E+03	RSL	No	BSL
7440-41-7	Beryllium	5.60E-01		1.10E+00		mg/kg	IR-105-SO-0-6	29/29	4.40E-01 - 7.80E-01	1.10E+00	1.20E+00	3.76E+00 N	1.60E+01	RSL	No	BSL
7440-43-9	Cadmium	3.70E-01	J	6.20E-01		mg/kg	IR-105-SO-0-6	16/29	3.80E-01 - 7.80E-01	6.20E-01	6.20E-01	5.24E+00 N	7.00E+00	RSL	No	BSL
7440-70-2	Calcium	7.01E+04		1.22E+05		mg/kg	LWMCU-102-SO-0-6	29/29	1.39E+03 - 4.45E+03	1.22E+05	NA	NA	NA	NA	No	NUT
7440-47-3	Chromium	8.40E+00		1.61E+01		mg/kg	IR-105-SO-0-6	29/29	7.60E-01 - 1.60E+00	1.61E+01	1.58E+01	3.26E+03 N	1.20E+04	RSL	No	BSL
7440-48-4	**Cobalt**	**4.50E+00**	**J**	**7.20E+00**		**mg/kg**	**IR-107-SO-0-6, IR-105-SO-0-6**	**29/29**	**3.80E-01 - 7.80E-01**	**7.20E+00**	**7.00E+00**	**2.07E+00 N**	**2.30E+00**	**RSL**	**Yes**	**ASL**
7440-50-8	Copper	7.90E+00	J	1.88E+01		mg/kg	LWMCU-106-SO-0-6	29/29	8.80E-01 - 1.60E+00	1.88E+01	3.76E+01	5.48E+01 N	3.10E+02	RSL	No	BSL
7439-89-6	Iron	1.43E+04		6.02E+04		mg/kg	IR-107-SO-0-6	29/29	8.80E+00 - 3.78E+01	6.02E+04	1.98E+04	NA	5.50E+03	RSL	No	BSL
7439-92-1	Lead	9.00E+00		7.42E+01		mg/kg	LWMCU-108-SO-0-6	29/29	4.40E-01 - 7.80E-01	7.42E+01	2.53E+01	5.00E+02 N	4.00E+02	RSL	No	BSL
7439-95-4	Magnesium	4.96E+03		1.04E+04		mg/kg	ACR-107-SO-0-6	29/29	3.78E+02 - 8.83E+02	1.04E+04	NA	NA	NA	NA	No	NUT
7439-96-5	**Manganese**	**2.21E+02**	**J**	**5.38E+02**		**mg/kg**	**IR-104-SO-0-6, IR-107-SO-0-6**	**29/29**	**4.40E-01 - 7.80E-01**	**5.38E+02**	**5.67E+02**	**3.65E+02 N**	**1.80E+02**	**RSL**	**Yes**	**ASL**
7439-97-6	Mercury	1.20E-02	J	9.40E-02	J	mg/kg	LWMCU-103-SO-0-6	28/29	9.40E-02 - 1.70E-01	9.40E-02	5.10E-02	3.65E-01 N	2.30E+00	RSL	No	BSL
7440-02-2	Nickel	9.50E+00	J	1.70E+01		mg/kg	LWMCU-106-SO-0-6	29/29	4.40E-01 - 7.80E-01	1.70E+01	1.86E+01	8.40E+01 N	NA	NA	No	BSL
7440-09-7	Potassium	3.31E+03		6.09E+03		mg/kg	IR-104-SO-0-6	29/29	3.78E+02 - 6.89E+02	6.09E+03	NA	NA	NA	NA	No	NUT
7782-49-2	Selenium	5.90E-02	J	2.60E-01	J	mg/kg	ACR-107-SO-0-6	9/29	1.90E+00 - 3.90E+00	2.60E-01	2.10E+00	3.09E+01 N	3.90E+01	RSL	No	BSL
7440-23-5	Sodium	1.86E+02	J	1.79E+04		mg/kg	ACR-108-SO-0-6, ACR-107-SO-0-6	20/29	3.78E+02 - 8.83E+02	1.79E+04	NA	NA	NA	NA	No	NUT
7440-62-2	**Vanadium**	**1.59E+01**		**2.77E+01**		**mg/kg**	**IR-105-SO-0-6**	**29/29**	**1.90E+00 - 3.90E+00**	**2.77E+01**	**2.65E+01**	**7.55E+00 N**	**3.90E+01**	**RSL**	**Yes**	**ASL**
7440-66-6	Zinc	3.57E+01	J	8.28E+01	J	mg/kg	LWMCU-111-SO-0-6	29/29	7.60E-01 - 1.60E+00	8.28E+01	8.74E+01	9.92E+02 N	2.30E+03	RSL	No	BSL
POLYAROMATIC HYDROCARBONS																
56-55-3	Benzo(a)anthracene	6.70E-02	J	1.50E-01	J	mg/kg	LWMCU-114-SO-0-6	2/29	1.80E-01 - 3.40E-01	1.50E-01	NA	5.65E+00 C	1.50E-01	RSL	No	BSL
50-32-8	**Benzo(a)pyrene**	**8.20E-02**	**J**	**1.10E-01**	**J**	**mg/kg**	**LWMCU-114-SO-0-6**	**2/29**	**1.80E-01 - 3.40E-01**	**1.10E-01**	**NA**	**5.64E-01 C**	**1.50E-02**	**RSL**	**Yes**	**ASL**
205-99-2	Benzo(b)fluoranthene	1.10E-01	J	1.70E-01	J	mg/kg	LWMCU-114-SO-0-6	2/29	1.80E-01 - 3.40E-01	1.70E-01	NA	5.71E+00 C	1.50E-01	RSL	No	BSL
191-24-2	Benzo(g,h,i)perylene	7.30E-02	J	7.40E-02	J	mg/kg	LWMCU-114-SO-0-6	2/29	1.80E-01 - 3.40E-01	7.40E-02	NA	1.78E+02 N	1.70E+02	RSL	No	BSL
207-08-9	Benzo(k)fluoranthene	7.30E-02	J	7.30E-02	J	mg/kg	LWMCU-114-SO-0-6	1/29	1.80E-01 - 3.40E-01	7.30E-02	NA	5.72E+01 C	1.50E+00	RSL	No	BSL
218-01-9	Chrysene	7.70E-02	J	1.50E-01	J	mg/kg	LWMCU-114-SO-0-6	2/29	1.80E-01 - 3.40E-01	1.50E-01	NA	5.61E+02 C	1.50E+01	RSL	No	BSL
206-44-0	Fluoranthene	9.00E-02	J	2.80E-01		mg/kg	LWMCU-114-SO-0-6	2/29	1.80E-01 - 3.40E-01	2.80E-01	NA	2.32E+02 N	2.30E+02	RSL	No	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	8.30E-02	J	8.80E-02	J	mg/kg	LWMCU-114-SO-0-6	2/29	1.80E-01 - 3.40E-01	8.80E-02	NA	5.72E+00 C	1.50E-01	RSL	No	BSL
85-01-8	Phenanthrene	3.70E-02	J	1.30E-01	J	mg/kg	LWMCU-114-SO-0-6	2/29	1.80E-01 - 3.40E-01	1.30E-01	NA	1.71E+02 N	1.70E+02	RSL	No	BSL
129-00-0	Pyrene	2.00E-01		2.00E-01		mg/kg	LWMCU-114-SO-0-6	1/29	1.80E-01 - 3.40E-01	2.00E-01	NA	1.70E+02 N	1.70E+02	RSL	No	BSL
POLYCHLORINATED BIPHENYLS																
12674-11-2	Aroclor-1016	3.40E-03	J	3.40E-03	J	mg/kg	LWMCU-105-SO-0-6	1/32	9.00E-04 - 6.60E-02	3.40E-03	NA	1.10E-01 N	4.00E-01	RSL	No	BSL
11097-69-1	Aroclor-1254	2.60E-03	J	1.10E-02		mg/kg	LWMCU-105-SO-0-6	2/32	9.00E-04 - 6.60E-02	1.10E-02	NA	1.10E-01 N	1.10E-01	RSL	No	BSL
11096-82-5	Aroclor-1260	8.20E-04	J	6.60E-03	J	mg/kg	LWMCU-101-SO-0-6	13/32	9.00E-04 - 6.60E-02	6.60E-03	NA	1.10E-01 N	2.40E-01	RSL	No	BSL
Total PCBs	Total PCBs Congeners	1.30E-04		4.50E-02		mg/kg	LWMCU-101-SO-0-6	14/14	1.10E+03 - 1.10E+03	4.50E-02	NA	1.10E-01 N	NA	NA	No	BSL
PESTICIDES																
72-54-8	4,4´-DDD	1.10E-03	J	1.10E-03	J	mg/kg	LWMCU-108-SO-0-6	1/29	3.50E-03 - 6.60E-03	1.10E-03	NA	1.42E+01 C	2.20E+00	RSL	No	BSL
72-55-9	4,4´-DDE	1.00E-03	J	7.40E-02		mg/kg	LWMCU-104-SO-0-6	25/29	3.50E-03 - 7.30E-03	7.40E-02	2.90E-01	1.02E+01 C	1.60E+00	RSL	No	BSL
50-29-3	4,4´-DDT	1.50E-03	J	6.10E-03	J	mg/kg	LWMCU-108-SO-0-6	9/29	3.50E-03 - 6.60E-03	6.10E-03	6.10E-03	5.42E+00 C	1.90E+00	RSL	No	BSL
60-57-1	Dieldrin	1.10E-03	J	1.10E-03	J	mg/kg	LWMCU-108-SO-0-6	1/29	3.50E-03 - 6.60E-03	1.10E-03	NA	1.46E-01 C	3.30E-02	RSL	No	BSL
33213-65-9	Endosulfan II	9.70E-04	J	2.30E-03	J	mg/kg	LWMCU-108-SO-0-6	3/29	3.50E-03 - 6.60E-03	2.30E-03	NA	2.72E+01 N	3.70E+01	RSL	No	BSL
1031-07-8	Endosulfan sulfate	2.60E-03	J	2.60E-03	J	mg/kg	LWMCU-108-SO-0-6	1/29	3.50E-03 - 6.60E-03	2.60E-03	NA	3.85E+01 N	3.70E+01	RSL	No	BSL
72-20-8	Endrin	9.40E-04	J	2.60E-03	J	mg/kg	LWMCU-108-SO-0-6	2/29	3.50E-03 - 6.60E-03	2.60E-03	NA	9.01E-01 N	1.80E+00	RSL	No	BSL
7421-93-4	Endrin aldehyde	1.70E-03	J	9.70E-03	J	mg/kg	LWMCU-108-SO-0-6	6/29	3.50E-03 - 6.60E-03	9.70E-03	NA	1.94E+00 N	1.80E+00	RSL	No	BSL
5103-74-2	gamma-Chlordane	7.70E-04	J	8.40E-04	J	mg/kg	LWMCU-114-SO-0-6	2/29	1.80E-03 - 3.40E-03	8.40E-04	NA	7.39E+00 C	1.80E+00	RSL	No	BSL
1024-57-3	Heptachlor epoxide	8.00E-04	J	8.00E-04	J	mg/kg	LWMCU-104-SO-0-6	1/29	1.80E-03 - 3.40E-03	8.00E-04	NA	2.39E-01 C	5.90E-02	RSL	No	BSL
72-43-5	Methoxychlor	4.30E-03	J	4.30E-03	J	mg/kg	LWMCU-108-SO-0-6	1/29	1.80E-02 - 3.40E-02	4.30E-03	NA	2.74E+01 N	3.10E+01	RSL	No	BSL
8001-35-2	Toxaphene	1.50E-01	J	1.50E-01	J	mg/kg	LWMCU-108-SO-0-6	1/29	1.80E-01 - 3.40E-01	1.50E-01	NA	1.24E+00 C	4.80E-01	RSL	No	BSL

TABLE 2.1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SURFACE SOIL (0 to 6 INCHES)

Scenario Timeframe: Current/Future
Medium: Surface soil
Exposure Medium: Surface soil
Exposure Point: Donna Reservoir and Canal System

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value	Potential ARAR/TBC Value (5)	Potential ARAR/TBC Source	COPC Flag	Rationale for (6) Contaminant Deletion or Selection
SEMI-VOLATILE ORGANIC COMPOUNDS																
117-81-7	Bis(2-ethylhexyl)phthalate	8.40E-02	J	5.20E+00		mg/kg	IR-104-SO-0-6	14/29	1.80E-01 - 9.70E-01	5.20E+00	NA	4.32E+01 C	3.80E+01	RSL	No	BSL
85-68-7	Butylbenzylphthalate	4.70E-01	J	4.70E-01	J	mg/kg	LWMCU-104-SO-0-6	1/29	1.80E-01 - 3.40E-01	4.70E-01	NA	1.61E+03 C	2.80E+02	RSL	No	BSL
84-74-2	Di-n-butyl phthalate	7.60E-02	J	7.70E-02	J	mg/kg	IR-105-SO-0-6	2/29	1.80E-01 - 3.40E-01	7.70E-02	NA	6.18E+02 N	6.20E+02	RSL	No	BSL
VOLATILE ORGANIC COMPOUNDS																
67-64-1	Acetone	1.22E-02		1.71E-02		mg/kg	LWMCU-103-SO-0-6	4/10	1.17E-02 - 1.70E-02	1.71E-02	NA	6.56E+03 N	6.10E+03	RSL	No	BSL
75-09-2	Methylene chloride	3.40E-03	J	3.60E-03	J	mg/kg	IR-102-SO-0-6	2/10	5.90E-03 - 8.50E-03	3.60E-03	NA	4.80E+01 N	3.50E+01	RSL	No	BSL

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.
(4) TCEQ Protective Concentration Levels (PCLs), November 2014, Tier 1 Residential Soil, Table 1 - Total Soil Combined assuming 0.5 acre source area. For non-carcinogens 1/10th the PCL is used.
(5) USEPA Regional Screening Levels (RSLs), June 2015. For non-carcinogens, value shown is equal to 1/10th the residential soil value. For carcinogens the value shown is equal to the residential soil value.
(6) Rationale Codes
Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Definitions:
C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
mg/kg = milligrams per kilogram

Data Qualifiers: J = Indicates an estimated value

Surrogates used: endosulfan for endosulfan II and endosulfan sulfate, chlordane for gamma-chlordane, endrin for endrin aldehyde.

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TABLE 2.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SURFACE SOIL (6 to 12 INCHES)

Scenario Timeframe: Current/Future
Medium: Surface soil
Exposure Medium: Surface soil
Exposure Point: Donna Reservoir and Canal System

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value		Potential ARAR/TBC Value (5)	Potential ARAR/TBC Source	COPC Flag	Rationale for (6) Contaminant Deletion or Selection
INORGANICS																	
7429-90-5	**Aluminum**	**1.04E+04**		**2.77E+04**		**mg/kg**	**IR-101-SO-6-12**	**29/29**	**3.47E+01 - 1.17E+02**	**2.77E+04**	**2.08E+04**	**6.45E+03**	**N**	**7.70E+03**	**RSL**	**Yes**	**ASL**
7440-38-2	**Arsenic**	**4.00E+00**		**7.60E+00**		**mg/kg**	**IR-102-SO-6-12**	**29/29**	**4.30E-01 - 6.30E-01**	**7.60E+00**	**1.54E+01**	**2.42E+00**	**N**	**6.70E-01**	**RSL**	**Yes**	**ASL**
7440-39-3	Barium	7.79E+01		3.04E+02		mg/kg	LWMCU-113-SO-6-12	29/29	4.30E+00 - 6.30E+00	3.04E+02	1.69E+02	8.10E+02	N	1.50E+03	RSL	No	BSL
7440-41-7	Beryllium	5.60E-01		1.20E+00		mg/kg	ACR-102-SO-6-12	29/29	4.30E-01 - 6.30E-01	1.20E+00	1.20E+00	3.76E+00	N	1.60E+01	RSL	No	BSL
7440-43-9	Cadmium	2.90E-01	J	6.40E-01		mg/kg	LWMCU-109-SO-6-12	14/29	4.30E-01 - 6.30E-01	6.40E-01	6.20E-01	5.24E+00	N	7.00E+00	RSL	No	BSL
7440-70-2	Calcium	7.42E+04		1.34E+05		mg/kg	LWMCU-113-SO-6-12	29/29	1.43E+03 - 5.15E+03	1.34E+05	NA	NA		NA	NA	No	NUT
7440-47-3	Chromium	8.50E+00		1.55E+01		mg/kg	IR-102-SO-6-12	29/29	8.60E-01 - 1.30E+00	1.55E+01	1.58E+01	3.26E+03	N	1.20E+04	RSL	No	BSL
7440-48-4	**Cobalt**	**4.30E+00**	**J**	**7.40E+00**		**mg/kg**	**IR-102-SO-6-12**	**29/29**	**4.30E-01 - 6.30E-01**	**7.40E+00**	**7.00E+00**	**2.07E+00**	**N**	**2.30E+00**	**RSL**	**Yes**	**ASL**
7440-50-8	Copper	7.10E+00		1.67E+01	J	mg/kg	IR-104-SO-6-12	29/29	8.60E-01 - 1.30E+00	1.67E+01	3.76E+01	5.48E+01	N	3.10E+02	RSL	No	BSL
7439-89-6	Iron	1.30E+04		3.86E+04		mg/kg	IR-107-SO-6-12	29/29	8.70E+00 - 5.60E+01	3.86E+04	1.98E+04	NA		5.50E+03	RSL	No	BSL
7439-92-1	Lead	7.10E+00		2.91E+01		mg/kg	LWMCU-108-SO-6-12	29/29	4.30E-01 - 6.30E-01	2.91E+01	2.53E+01	5.00E+02	N	4.00E+02	RSL	No	BSL
7439-95-4	Magnesium	4.34E+03		8.64E+03		mg/kg	IR-101-SO-6-12	29/29	4.09E+02 - 7.05E+02	8.64E+03	NA	NA		NA	NA	No	NUT
7439-96-5	**Manganese**	**2.63E+02**		**7.79E+02**		**mg/kg**	**IR-102-SO-6-12**	**29/29**	**4.30E-01 - 6.30E-01**	**7.79E+02**	**5.67E+02**	**3.65E+02**	**N**	**1.80E+02**	**RSL**	**Yes**	**ASL**
7439-97-6	Mercury	9.60E-03	J	8.00E-02	J	mg/kg	LWMCU-107-SO-6-12	29/29	9.30E-02 - 1.50E-01	8.00E-02	5.10E-02	3.65E+00	N	2.30E+00	RSL	No	BSL
7440-02-2	Nickel	9.20E+00		1.64E+01	J	mg/kg	IR-102-SO-6-12	29/29	4.30E-01 - 6.30E-01	1.64E+01	1.86E+01	8.40E+01	N	NA	NA	No	BSL
7440-09-7	Potassium	2.43E+03		6.27E+03		mg/kg	LWMCU-106-SO-6-12	29/29	4.09E+02 - 7.05E+02	6.27E+03	NA	NA		NA	NA	No	NUT
7782-49-2	Selenium	7.50E-02	J	1.90E-01	J	mg/kg	ACR-104-SO-6-12	3/29	2.10E+00 - 3.20E+00	1.90E-01	2.10E+00	3.09E+01	N	3.90E+01	RSL	No	BSL
7440-23-5	Sodium	1.89E+02	J	6.61E+03		mg/kg	ACR-108-SO-6-12	15/29	4.09E+02 - 7.05E+02	6.61E+03	NA	NA		NA	NA	No	NUT
7440-62-2	**Vanadium**	**1.68E+01**		**3.14E+01**		**mg/kg**	**ACR-101-SO-6-12**	**29/29**	**2.10E+00 - 3.20E+00**	**3.14E+01**	**2.65E+01**	**7.55E+00**	**N**	**3.90E+01**	**RSL**	**Yes**	**ASL**
7440-66-6	Zinc	3.09E+01	J	1.60E+02	J	mg/kg	IR-107-SO-6-12	29/29	8.60E-01 - 1.30E+00	1.60E+02	8.74E+01	9.92E+02	N	2.30E+03	RSL	No	BSL
POLYAROMATIC HYDROCARBONS																	
56-55-3	Benzo(a)anthracene	5.30E-02	J	5.30E-02	J	mg/kg	LWMCU-114-SO-6-12	1/29	1.80E-01 - 2.40E-01	5.30E-02	NA	5.65E+00	C	1.50E-01	RSL	No	BSL
50-32-8	Benzo(a)pyrene	4.30E-02	J	4.30E-02	J	mg/kg	LWMCU-114-SO-6-12	1/29	1.80E-01 - 2.40E-01	4.30E-02	NA	5.64E-01	C	1.50E-02	RSL	No	BSL
205-99-2	Benzo(b)fluoranthene	6.60E-02	J	6.60E-02	J	mg/kg	LWMCU-114-SO-6-12	1/29	1.80E-01 - 2.40E-01	6.60E-02	NA	5.71E+00	C	1.50E-01	RSL	No	BSL
218-01-9	Chrysene	5.90E-02	J	5.90E-02	J	mg/kg	LWMCU-114-SO-6-12	1/29	1.80E-01 - 2.40E-01	5.90E-02	NA	5.61E+02	C	1.50E+01	RSL	No	BSL
206-44-0	Fluoranthene	1.00E-01	J	1.00E-01	J	mg/kg	LWMCU-114-SO-6-12	1/29	1.80E-01 - 2.40E-01	1.00E-01	NA	2.32E+03	N	2.30E+02	RSL	No	BSL
85-01-8	Phenanthrene	5.80E-02	J	5.80E-02	J	mg/kg	LWMCU-114-SO-6-12	1/29	1.80E-01 - 2.40E-01	5.80E-02	NA	1.71E+03	N	1.70E+02	RSL	No	BSL
POLYCHLORINATED BIPHENYLS																	
11097-69-1	Aroclor-1254	9.80E-04	J	9.80E-04	J	mg/kg	LWMCU-107-SO-6-12	1/38	9.10E-04 - 4.70E-02	9.80E-04	NA	1.10E-01	N	1.10E-01	RSL	No	BSL
11096-82-5	Aroclor-1260	1.00E-03	J	1.00E-02	J	mg/kg	LWMCU-101-SO-6-12	14/38	9.10E-04 - 4.70E-02	1.00E-02	NA	1.10E-01	N	2.40E-01	RSL	No	BSL
Total PCBs	Total PCBs - Congeners	1.30E-04	J	3.40E-02		mg/kg	LWMCU-101-SO-6-12	10/10	1.10E+03 - 1.10E+03	3.40E-02	NA	1.10E-01	N	NA	NA	No	BSL
PESTICIDES																	
72-54-8	4,4´-DDD	7.40E-03	J	7.40E-03	J	mg/kg	LWMCU-108-SO-6-12	1/29	3.50E-03 - 4.70E-03	7.40E-03	NA	1.42E+01	C	2.20E+00	RSL	No	BSL
72-55-9	4,4´-DDE	7.70E-04	J	6.30E-02		mg/kg	LWMCU-108-SO-6-12	22/29	3.50E-03 - 7.50E-03	6.30E-02	2.90E-01	1.02E+01	C	1.60E+00	RSL	No	BSL
50-29-3	4,4´-DDT	1.30E-03	J	1.10E-02	J	mg/kg	LWMCU-108-SO-6-12	3/29	3.50E-03 - 4.70E-03	1.10E-02	6.10E-03	5.42E+00	C	1.90E+00	RSL	No	BSL
5103-71-9	alpha-Chlordane	2.30E-03	J	2.30E-03	J	mg/kg	LWMCU-108-SO-6-12	1/29	1.80E-03 - 2.40E-03	2.30E-03	NA	1.28E+01	C	1.80E+00	RSL	No	BSL
60-57-1	Dieldrin	1.40E-02		1.40E-02		mg/kg	LWMCU-108-SO-6-12	1/29	3.50E-03 - 4.70E-03	1.40E-02	NA	1.46E-01	C	3.30E-02	RSL	No	BSL
959-98-8	Endosulfan I	7.50E-04	J	7.50E-04	J	mg/kg	LWMCU-108-SO-6-12	1/29	1.80E-03 - 2.40E-03	7.50E-04	NA	9.08E+01	N	3.70E+01	RSL	No	BSL
33213-65-9	Endosulfan II	1.30E-03	J	1.70E-02		mg/kg	LWMCU-108-SO-6-12	2/29	3.50E-03 - 4.70E-03	1.70E-02	NA	2.72E+02	N	3.70E+01	RSL	No	BSL
1031-07-8	Endosulfan sulfate	1.30E-02		1.30E-02		mg/kg	LWMCU-108-SO-6-12	1/29	3.50E-03 - 4.70E-03	1.30E-02	NA	3.85E+02	N	3.70E+01	RSL	No	BSL
72-20-8	Endrin	6.90E-03	J	6.90E-03	J	mg/kg	LWMCU-108-SO-6-12	1/29	3.50E-03 - 4.70E-03	6.90E-03	NA	9.01E+00	N	1.80E+00	RSL	No	BSL
7421-93-4	Endrin aldehyde	1.70E-03	J	3.50E-02	J	mg/kg	LWMCU-108-SO-6-12	4/29	3.50E-03 - 4.70E-03	3.50E-02	NA	1.94E+01	N	1.80E+00	RSL	No	BSL
53494-70-5	Endrin ketone	2.10E-03	J	2.10E-03	J	mg/kg	LWMCU-108-SO-6-12	1/29	3.50E-03 - 4.70E-03	2.10E-03	NA	1.90E+01	N	1.80E+00	RSL	No	BSL
5103-74-2	gamma-Chlordane	1.40E-03	J	1.40E-03	J	mg/kg	LWMCU-108-SO-6-12	1/29	1.80E-03 - 2.40E-03	1.40E-03	NA	7.39E+00	C	1.80E+00	RSL	No	BSL
1024-57-3	Heptachlor epoxide	1.10E-03	J	1.10E-03	J	mg/kg	LWMCU-108-SO-6-12	1/29	1.80E-03 - 2.40E-03	1.10E-03	NA	2.39E-01	C	5.90E-02	RSL	No	BSL
72-43-5	Methoxychlor	1.10E-02	J	1.10E-02	J	mg/kg	LWMCU-108-SO-6-12	1/29	1.80E-02 - 2.40E-02	1.10E-02	NA	2.74E+02	N	3.10E+01	RSL	No	BSL
8001-35-2	Toxaphene	5.60E-01		5.60E-01		mg/kg	LWMCU-108-SO-6-12	1/29	1.80E-01 - 2.40E-01	5.60E-01	NA	1.24E+00	C	4.80E-01	RSL	No	BSL

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TABLE 2.2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SURFACE SOIL (6 to 12 INCHES)

Scenario Timeframe: Current/Future
Medium: Surface soil
Exposure Medium: Surface soil
Exposure Point: Donna Reservoir and Canal System

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value		Potential ARAR/TBC Value (5)	Potential ARAR/TBC Source	COPC Flag	Rationale for (6) Contaminant Deletion or Selection
SEMI-VOLATILE ORGANIC COMPOUNDS																	
117-81-7	Bis(2-ethylhexyl)phthalate	8.00E-02	J	4.70E-01		mg/kg	ACR-104-SO-6-12	8/29	1.80E-01 - 2.40E-01	4.70E-01	NA	4.32E+01	C	3.80E+01	RSL	No	BSL
84-74-2	Di-n-butyl phthalate	1.00E-01	J	1.00E-01	J	mg/kg	ACR-105-SO-6-12	1/29	1.80E-01 - 2.40E-01	1.00E-01	NA	6.18E+02	N	6.20E+02	RSL	No	BSL
VOLATILE ORGANIC COMPOUNDS																	
67-64-1	Acetone	1.16E-02		1.33E-02		mg/kg	LWMCU-103-SO-6-12	3/9	1.02E-02 - 1.30E-02	1.33E-02	NA	6.56E+04	N	6.10E+03	RSL	No	BSL
75-09-2	Methylene chloride	2.50E-03	J	2.80E-03	J	mg/kg	IR-101-SO-6-12	2/9	5.10E-03 - 6.50E-03	2.80E-03	NA	4.80E+02	N	3.50E+01	RSL	No	BSL

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.
(4) TCEQ Protective Concentration Levels (PCLs), November 2014, Tier 1 Residential Soil, Table 1 - Total Soil Combined assuming 0.5 acre source area. For non-carcinogens 1/10th the PCL is used.
(5) USEPA Regional Screening Levels (RSLs), June 2015. For non-carcinogens, value shown is equal to 1/10th the residential soil value. For carcinogens the value shown is equal to the residential soil value.
(6) Rationale Codes

Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Definitions:
C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
mg/kg = milligrams per kilogram

Data Qualifiers: J = Indicates an estimated value

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TABLE 2.3
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
GROUND WATER

Scenario Timeframe: Future
Medium: Ground water
Exposure Medium: Ground water
Exposure Point: Donna Reservoir and Canal System

CAS Number	Chemical	Minimum [(1)] Concentration	Minimum Qualifier	Maximum [(1)] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [(2)] Used for Screening	Background [(3)] Value	Screening [(4)] Toxicity Value	Potential [(5)] ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [(6)] Contaminant Deletion or Selection
							INORGANICS-DISSOLVED									
7440-38-2	**Arsenic**	**2.00E+00**		**2.00E+00**		**ug/L**	**MW-102F**	**1/2**	**2.00E+00 - 2.00E+00**	**2.00E+00**	**NA**	**5.20E-02 C**	**1.00E+01**	**PCL**	**Yes**	**ASL**
7440-39-3	Barium	1.12E+02		1.73E+02		ug/L	MW-102F	2/2	1.00E+01 - 1.00E+01	1.73E+02	NA	3.80E+02 N	2.00E+03	PCL	No	BSL
7440-70-2	Calcium	1.41E+05		3.02E+05		ug/L	MW-102F	2/2	5.00E+00 - 5.00E+00	3.02E+05	NA	NA	NA	NA	No	NUT
7439-89-6	Iron	8.90E+01		1.08E+02		ug/L	MW-101F	2/2	2.50E+01 - 2.50E+01	1.08E+02	NA	1.40E+03 N	NA	NA	No	BSL
7439-95-4	Magnesium	2.57E+04		6.17E+04		ug/L	MW-102F	2/2	1.50E+02 - 1.50E+02	6.17E+04	NA	NA	NA	NA	No	NUT
7439-96-5	**Manganese**	**7.69E+02**		**2.45E+03**		**ug/L**	**MW-102F**	**2/2**	**5.00E+00 - 5.00E+00**	**2.45E+03**	**NA**	**4.30E+01 N**	**3.40E+02**	**PCL**	**Yes**	**ASL**
7440-09-7	Potassium	8.37E+03		1.18E+04		ug/L	MW-102F	2/2	1.00E+03 - 1.00E+03	1.18E+04	NA	NA	NA	NA	No	NUT
7782-49-2	Selenium	7.70E+00		7.70E+00		ug/L	MW-102F	1/2	4.00E+00 - 4.00E+00	7.70E+00	NA	1.00E+01 N	5.00E+01	PCL	No	BSL
7440-23-5	Sodium	1.59E+05		3.35E+05		ug/L	MW-102F	2/2	5.00E+02 - 5.00E+02	3.35E+05	NA	NA	NA	NA	No	NUT
7440-62-2	**Vanadium**	**2.10E+01**		**2.10E+01**		**ug/L**	**MW-102F**	**1/2**	**2.00E+01 - 2.00E+01**	**2.10E+01**	**NA**	**8.60E+00 N**	**4.40E+01**	**PCL**	**Yes**	**ASL**
							INORGANICS-TOTAL									
7429-90-5	Aluminum	6.02E+02	J	6.02E+02	J	ug/L	MW-101	1/2	1.00E+02 - 1.00E+02	6.02E+02	NA	2.00E+03 N	2.40E+01	PCL	No	BSL
7440-38-2	**Arsenic**	**2.00E+00**		**2.00E+00**		**ug/L**	**MW-102**	**1/2**	**2.00E+00 - 2.00E+00**	**2.00E+00**	**NA**	**5.20E-02 C**	**1.00E+01**	**PCL**	**Yes**	**ASL**
7440-39-3	Barium	1.28E+02		1.74E+02		ug/L	MW-102	2/2	1.00E+01 - 1.00E+01	1.74E+02	NA	3.80E+02 N	2.00E+03	PCL	No	BSL
7440-70-2	Calcium	1.44E+05		2.86E+05		ug/L	MW-102	2/2	5.00E+00 - 5.00E+00	2.86E+05	NA	NA	NA	NA	No	NUT
7439-89-6	Iron	8.53E+01		6.66E+02	J	ug/L	MW-101	2/2	2.50E+01 - 2.50E+01	6.66E+02	NA	1.40E+03 N	NA	NA	No	BSL
7439-95-4	Magnesium	2.60E+04		5.75E+04		ug/L	MW-102	2/2	1.50E+02 - 1.50E+02	5.75E+04	NA	NA	3.40E+02	NA	No	NUT
7439-96-5	**Manganese**	**8.72E+02**		**2.24E+03**		**ug/L**	**MW-102**	**2/2**	**5.00E+00 - 5.00E+00**	**2.24E+03**	**NA**	**4.30E+01 N**	**3.40E+02**	**PCL**	**Yes**	**ASL**
7440-09-7	Potassium	8.52E+03		1.11E+04		ug/L	MW-102	2/2	1.00E+03 - 1.00E+03	1.11E+04	NA	NA	NA	NA	No	NUT
7782-49-2	Selenium	7.60E+00		7.60E+00		ug/L	MW-102	1/2	4.00E+00 - 4.00E+00	7.60E+00	NA	1.00E+01 N	5.00E+01	PCL	No	BSL
7440-23-5	Sodium	1.61E+05		3.21E+05		ug/L	MW-102	2/2	5.00E+02 - 5.00E+02	3.21E+05	NA	NA	NA	NA	No	NUT
							POLYCHLORINATED BIPHENYLS									
TotPCBSCalc	Total PCBs Calc	2.10E-05	J	3.70E-05		ug/L	MW-101	2/2	5.00E-01 - 5.00E-01	3.70E-05	NA	3.90E-02 C	5.00E-01	NA	No	BSL

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.
(4) USEPA Regional Screening Levels, June 2015. For non-carcinogens, value shown is equal to 1/10 the tap water value. For carcinogens the value shown is equal to the tap water value.
(5) TCEQ Protective Concentration Levels (PCLs), November 2014, Tier 1 Residential Groundwater, Table 3. For non-carcinogens 1/10th the PCL is used.
(6) Rationale Codes
Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Definitions: C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
ug/L = micrograms per liter

Data Qualifiers: J = Indicates an estimated value

EA Engineering, Science, and Technology, Inc., PBC

TABLE 2.4

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

EXPOSURE AREA 1: UPSTREAM AND ADJACENT TO THE SIPHON (RGR, MC, ACT, AND ACR) - SEDIMENT

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Upstream and Adjacent to the Siphon

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
							INORGANICS										
7429-90-5	**Aluminum**	**1.48E+03**		**2.40E+04**		**mg/kg**	**ACR-108-SE-0-6**	**25/25**	**1.96E+01 - 8.79E+01**	**2.40E+04**	**NA**	**1.53E+04**	**N**	**NA**	**NA**	**Yes**	**ASL**
7440-38-2	Arsenic	2.20E+00		6.60E+00		mg/kg	ACT-105-SE-0-6	25/25	5.10E-01 - 1.20E+00	6.60E+00	NA	1.15E+01	N	NA	NA	No	BSL
7440-39-3	Barium	3.17E+01		2.55E+02		mg/kg	ACR-101-SE-0-6	25/25	5.10E+00 - 1.16E+01	2.55E+02	NA	2.29E+03	N	NA	NA	No	BSL
7440-41-7	Beryllium	6.40E-01		9.80E-01		mg/kg	ACR-101-SE-0-6	9/25	5.10E-01 - 1.20E+00	9.80E-01	NA	2.66E+00	N	NA	NA	No	BSL
7440-43-9	Cadmium	2.40E-01	J	4.90E-01	J	mg/kg	ACR-102-SE-0-6	16/25	5.10E-01 - 1.20E+00	4.90E-01	NA	1.09E+02	N	NA	NA	No	BSL
7440-70-2	Calcium	2.53E+04		1.00E+05		mg/kg	ACR-108-SE-0-6	25/25	5.91E+02 - 2.20E+03	1.00E+05	NA	NA		NA	NA	No	NUT
7440-47-3	Chromium	1.50E+00		1.67E+01		mg/kg	ACR-106-SE-0-6	25/25	1.00E+00 - 2.30E+00	1.67E+01	NA	3.65E+03	N	NA	NA	No	BSL
7440-48-4	Cobalt	1.70E+00		7.20E+00		mg/kg	ACR-108-SE-0-6	25/25	5.10E-01 - 1.20E+00	7.20E+00	NA	3.20E+03	N	NA	NA	No	BSL
7440-50-8	Copper	3.70E+00		1.69E+01		mg/kg	ACR-108-SE-0-6	23/25	1.00E+00 - 2.30E+00	1.69E+01	NA	2.13E+03	N	NA	NA	No	BSL
7439-89-6	Iron	5.11E+03		2.19E+04		mg/kg	ACR-108-SE-0-6	25/25	9.80E+00 - 2.20E+01	2.19E+04	NA	NA		NA	NA	No	BSL
7439-92-1	Lead	3.30E+00		1.37E+01		mg/kg	ACR-108-SE-0-6	25/25	5.10E-01 - 1.20E+00	1.37E+01	NA	5.00E+01		NA	NA	No	BSL
7439-95-4	Magnesium	6.84E+02		8.35E+03		mg/kg	ACR-108-SE-0-6	25/25	4.89E+02 - 1.10E+03	8.35E+03	NA	NA		NA	NA	No	NUT
7439-96-5	Manganese	8.50E+01		1.18E+03		mg/kg	ACR-108-SE-0-6	25/25	5.10E-01 - 1.20E+00	1.18E+03	NA	1.40E+03	N	NA	NA	No	BSL
7439-97-6	Mercury	1.20E-02	J	2.20E-01	J	mg/kg	ACR-108-SE-0-6	24/25	1.20E-01 - 2.40E-01	2.20E-01	NA	3.43E+00	N	NA	NA	No	BSL
7440-02-2	Nickel	1.80E+00		1.49E+01		mg/kg	ACR-108-SE-0-6	25/25	5.10E-01 - 1.20E+00	1.49E+01	NA	1.40E+02	N	NA	NA	No	BSL
7440-09-7	Potassium	1.16E+03		5.62E+03		mg/kg	ACR-108-SE-0-6	23/25	4.89E+02 - 1.10E+03	5.62E+03	NA	NA		NA	NA	No	NUT
7440-23-5	Sodium	6.47E+02		2.12E+03		mg/kg	ACT-105-SE-0-6	15/25	4.89E+02 - 1.10E+03	2.12E+03	NA	NA		NA	NA	No	NUT
7440-62-2	Vanadium	5.70E+00		2.85E+01		mg/kg	ACT-104-SE-0-6	25/25	2.60E+00 - 5.80E+00	2.85E+01	NA	3.29E+01	N	NA	NA	No	BSL
7440-66-6	Zinc	9.40E+00	J	7.45E+01	J	mg/kg	ACR-108-SE-0-6	25/25	1.00E+00 - 2.30E+00	7.45E+01	NA	7.60E+03	N	NA	NA	No	BSL
							POLYAROMATIC HYDROCARBONS										
50-32-8	**Benzo(a)pyrene**	**1.90E-01**	**J**	**1.90E-01**	**J**	**mg/kg**	**MC-108-SE-14-24**	**1/27**	**2.10E-01 - 4.50E-01**	**1.90E-01**	**NA**	**1.59E-01**	**C**	**NA**	**NA**	**Yes**	**ASL**
205-99-2	Benzo(b)fluoranthene	7.90E-02	J	7.90E-02	J	mg/kg	MC-108-SE-14-24	1/27	2.10E-01 - 4.50E-01	7.90E-02	NA	1.59E+00	C	NA	NA	No	BSL
218-01-9	Chrysene	1.30E-01	J	1.30E-01	J	mg/kg	MC-108-SE-14-24	1/27	2.10E-01 - 4.50E-01	1.30E-01	NA	1.59E+02	C	NA	NA	No	BSL
206-44-0	Fluoranthene	3.20E-01		3.20E-01		mg/kg	MC-108-SE-14-24	1/27	2.10E-01 - 4.50E-01	3.20E-01	NA	4.95E+02	N	NA	NA	No	BSL
							POLYCHLORINATED BIPHENYLS										
11096-82-5	Aroclor-1260	6.90E-04	J	5.60E-03		mg/kg	ACR-111-SE-0-6	6/44	4.10E-04 - 7.60E-02	5.60E-03	NA	2.30E-01	N	NA	NA	No	BSL
Total PCBs	Total PCB Congeners	2.10E-05	J	1.20E-02		mg/kg	ACT-105-SE-0-6	14/14	4.90E-06 - 6.40E-03	1.20E-02	NA	2.30E-01	N	NA	NA	No	BSL
							PESTICIDES										
72-54-8	4,4′-DDD	1.40E-02		1.40E-02		mg/kg	MC-108-SE-14-24	1/27	4.10E-03 - 8.80E-03	1.40E-02	NA	1.23E+01	C	NA	NA	No	BSL
72-55-9	4,4′-DDE	1.20E-03	J	1.30E-02		mg/kg	ACT-102-SE-0-6, MC-108-SE-14-24	12/27	4.10E-03 - 8.80E-03	1.30E-02	NA	8.66E+00	C	NA	NA	No	BSL
50-29-3	4,4′-DDT	2.70E-02		2.70E-02		mg/kg	MC-108-SE-14-24	1/27	4.10E-03 - 8.80E-03	2.70E-02	NA	8.66E+00	C	NA	NA	No	BSL
319-86-8	delta-BHC	9.10E-04	J	9.10E-04	J	mg/kg	MC-102-SE-0-6	1/27	2.10E-03 - 4.50E-03	9.10E-04	NA	1.42E+00	C	NA	NA	No	BSL
							SEMI-VOLATILE ORGANIC COMPOUNDS										
117-81-7	Bis(2-ethylhexyl)phthalate	1.10E-01	J	6.10E-01		mg/kg	MC-107-SE-0-6	9/27	2.10E-01 - 4.50E-01	6.10E-01	NA	2.44E+01	C	NA	NA	No	BSL
108-95-2	Phenol	4.40E-02	J	6.70E-02	J	mg/kg	MC-108-SE-0-6	4/27	2.10E-01 - 4.50E-01	6.70E-02	NA	4.59E+03	N	NA	NA	No	BSL
							VOLATILE ORGANIC COMPOUNDS										
67-64-1	Acetone	4.80E-02		5.20E-02		mg/kg	RGR-101-SE-0-6	2/7	1.20E-02 - 1.20E+00	5.20E-02	NA	6.61E+04	N	NA	NA	No	BSL
98-86-2	Acetophenone	5.50E-02	J	8.30E-02	J	mg/kg	MC-109-SE-0-6	6/27	2.10E-01 - 4.50E-01	8.30E-02	NA	1.53E+03	N	NA	NA	No	BSL
75-09-2	Methylene chloride	4.40E-03	J	4.40E-03	J	mg/kg	RGR-101-SE-0-6	1/7	6.10E-03 - 2.39E-01	4.40E-03	NA	7.27E+02	C	NA	NA	No	BSL
108-88-3	Toluene	2.70E-03	J	2.70E-03	J	mg/kg	MC-102-SE-0-6	1/7	6.10E-03 - 2.39E-01	2.70E-03	NA	5.88E+03	N	NA	NA	No	BSL

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.
(4) TCEQ Protective Concentration Levels (PCLs), March 2006, Tier 1 Sediment, TotSedComb. For non-carcinogens 1/10th the PCL is used.
(5) Rationale Codes
Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Definitions:
C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
mg/kg = milligrams per kilogram

Data Qualifiers: J = Indicates an estimated value

TABLE 2.5

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

EXPOSURE AREA 1: UPSTREAM AND ADJACENT TO THE SIPHON (RGR, MC, ACT, AND ACR) - SURFACE WATER

Scenario Timeframe: Current
Medium: Surface water
Exposure Medium: Surface water
Exposure Point: Upstream and Adjacent to the Siphon

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
INORGANICS-TOTAL																
7429-90-5	Aluminum	5.14E+01	J	2.21E+03		ug/L	ACR-101-SW	11/11	2.00E+02 - 2.00E+02	2.21E+03	NA	NA	NA	NA	No	BSL
7440-38-2	**Arsenic**	**4.30E+00**		**1.51E+01**		**ug/L**	**ACT-105-SW**	**11/11**	**1.00E+00 - 1.00E+00**	**1.51E+01**	**NA**	**1.00E+01**	**NA**	**NA**	**Yes**	**ASL**
7440-39-3	Barium	9.12E+01		1.64E+02		ug/L	ACT-101-SW	11/11	1.00E+01 - 1.00E+01	1.64E+02	NA	2.00E+03	NA	NA	No	BSL
7440-43-9	Cadmium	1.70E-01	J	1.70E-01	J	ug/L	ACT-105-SW	1/11	1.00E+00 - 1.00E+00	1.70E-01	NA	5.00E+00	NA	NA	No	BSL
7440-70-2	Calcium	7.20E+04		2.19E+05		ug/L	ACR-101-SW	11/11	1.00E+00 - 1.00E+00	2.19E+05	NA	NA	NA	NA	No	NUT
7440-47-3	Chromium	6.30E-01	J	2.70E+00		ug/L	ACR-101-SW	3/11	2.00E+00 - 2.00E+00	2.70E+00	NA	5.02E+02	NA	NA	No	BSL
7440-48-4	Cobalt	1.20E+00	J	2.00E+00		ug/L	ACT-105-SW	3/11	1.00E+00 - 1.00E+00	2.00E+00	NA	NA	NA	NA	No	BSL
7440-50-8	Copper	2.10E+00	J	9.20E+00		ug/L	ACR-101-SW	10/11	2.00E+00 - 2.00E+00	9.20E+00	NA	1.30E+03	NA	NA	No	BSL
7439-89-6	Iron	2.84E+02		1.80E+03		ug/L	ACR-101-SW	10/11	1.00E+02 - 1.00E+02	1.80E+03	NA	NA	NA	NA	No	BSL
7439-92-1	Lead	2.50E-01	J	2.50E-01	J	ug/L	ACT-102-SWF	1/11	1.00E+00 - 1.00E+00	2.50E-01	NA	3.83E+00	NA	NA	No	BSL
7439-95-4	Magnesium	3.08E+04		7.61E+04		ug/L	ACR-102-SW	11/11	5.00E+03 - 5.00E+03	7.61E+04	NA	NA	NA	NA	No	NUT
7439-96-5	**Manganese**	**9.44E+01**		**3.42E+02**		**ug/L**	**ACT-105-SW**	**11/11**	**1.00E+00 - 1.00E+00**	**3.42E+02**	**NA**	**1.00E+02**	**NA**	**NA**	**Yes**	**ASL**
7439-97-6	**Mercury**	**6.00E-02**	**J**	**6.00E-02**	**J**	**ug/L**	**ACT-104-SW**	**1/11**	**2.00E-01 - 2.00E-01**	**6.00E-02**	**NA**	**2.10E-02**	**NA**	**NA**	**Yes**	**ASL**
7440-02-2	Nickel	1.30E+00	J	4.30E+00		ug/L	ACR-101-SW, ACT-105-SW	11/11	1.00E+00 - 1.00E+00	4.30E+00	NA	1.14E+03	NA	NA	No	BSL
7440-09-7	Potassium	6.85E+03		1.38E+04		ug/L	ACR-101-SW	11/11	5.00E+03 - 5.00E+03	1.38E+04	NA	NA	NA	NA	No	NUT
7782-49-2	Selenium	5.70E-01	J	5.60E+00		ug/L	ACR-101-SW, ACR-102-SW	5/11	5.00E+00 - 5.00E+00	5.60E+00	NA	4.20E+03	NA	NA	No	BSL
7440-23-5	Sodium	1.61E+05		5.62E+05		ug/L	ACR-102-SW	11/11	5.00E+03 - 1.00E+04	5.62E+05	NA	NA	NA	NA	No	NUT
7440-62-2	Vanadium	8.60E+00		1.58E+01		ug/L	ACT-105-SW	11/11	5.00E+00 - 5.00E+00	1.58E+01	NA	NA	NA	NA	No	BSL
7440-66-6	Zinc	3.10E+00		1.86E+01		ug/L	ACR-101-SW	11/11	2.00E+00 - 2.00E+00	1.86E+01	NA	2.60E+04	NA	NA	No	BSL
POLYCHLORINATED BIPHENYLS																
Total PCBs	**Total PCB Congeners**	**6.90E-05**	**J**	**1.20E-03**		**ug/L**	**ACR-101-SW**	**13/13**	**1.90E-05 - 5.00E-01**	**1.20E-03**	**NA**	**6.40E-04**	**NA**	**NA**	**Yes**	**ASL**
PESTICIDES																
58-89-9	gamma-BHC (Lindane)	1.70E-02	J	1.70E-02	J	ug/L	ACR-101-SW	1/11	4.60E-02 - 5.00E-02	1.70E-02	NA	2.00E-01	NA	NA	No	BSL
SEMI-VOLATILE ORGANIC COMPOUNDS																
117-81-7	**Bis(2-ethylhexyl)phthalate**	**2.20E+00**	**J**	**1.40E+02**		**ug/L**	**ACT-104-SW**	**3/11**	**4.60E+00 - 1.00E+01**	**1.40E+02**	**NA**	**4.10E+01**	**NA**	**NA**	**Yes**	**ASL**
84-66-2	Diethyl phthalate	1.10E+00	J	1.10E+00	J	ug/L	MC-103-SW	1/11	4.60E+00 - 5.00E+00	1.10E+00	NA	4.40E+04	NA	NA	No	BSL
VOLATILE ORGANIC COMPOUNDS																
98-86-2	Acetophenone	2.10E+00	J	2.10E+00	J	ug/L	ACT-104-SW	1/11	4.60E+00 - 5.00E+00	2.10E+00	NA	NA	NA	NA	No	BSL

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.
(4) Screening toxicity values taken from TCEQ Human Health Risk-Based Exposure Limits (RBELs), 2011. Screening criteria is for fish ingestion only.
(5) Rationale Codes
Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Definitions:
C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
ug/L = micrograms per liter

Data Qualifiers: J = Indicates an estimated value

EA Engineering, Science, and Technology, Inc., PBC

TABLE 2.6
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
EXPOSURE AREA 2: THE SIPHON AND DOWNSTREAM (LWMCU, LWMCL, and LEMC) - SEDIMENT

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: The Siphon and Downstream

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
							INORGANICS									
7429-90-5	**Aluminum**	**7.23E+03**		**2.19E+04**		**mg/kg**	**LWMCU-104-SE-6-12**	**22/22**	**1.90E+01 - 6.85E+01**	**2.19E+04**	**NA**	**1.53E+04 N**	**NA**	**NA**	**Yes**	**ASL**
7440-38-2	Arsenic	2.40E+00	J	4.90E+00		mg/kg	LWMCU-104-SE-6-12	22/22	5.10E-01 - 1.10E+00	4.90E+00	NA	1.15E+01 N	NA	NA	No	BSL
7440-39-3	Barium	1.20E+02		2.72E+02		mg/kg	LWMCU-101-SE-0-6	22/22	5.10E+00 - 1.07E+01	2.72E+02	NA	2.29E+03 N	NA	NA	No	BSL
7440-41-7	Beryllium	6.00E-01		6.00E-01		mg/kg	LWMCU-101-SE-0-6	1/22	5.10E-01 - 1.10E+00	6.00E-01	NA	2.66E+00 N	NA	NA	No	BSL
7440-43-9	Cadmium	1.80E-01	J	4.90E-01	J	mg/kg	LWMCU-109-SE-0-6	22/22	5.10E-01 - 1.10E+00	4.90E-01	NA	1.09E+02 N	NA	NA	No	BSL
7440-70-2	Calcium	5.82E+04		1.68E+05		mg/kg	LWMCU-115-SE-0-6	22/22	1.50E+03 - 6.54E+03	1.68E+05	NA	NA	NA	NA	No	NUT
7440-47-3	Chromium	5.70E+00		1.51E+01		mg/kg	LWMCU-109-SE-0-6	22/22	1.00E+00 - 2.10E+00	1.51E+01	NA	3.65E+03 N	NA	NA	No	BSL
7440-48-4	Cobalt	3.10E+00		7.70E+00		mg/kg	LWMCU-114-SE-0-6	22/22	5.10E-01 - 1.10E+00	7.70E+00	NA	3.20E+03 N	NA	NA	No	BSL
7440-50-8	Copper	5.60E+00		2.15E+01		mg/kg	LWMCU-115-SE-0-6	22/22	1.00E+00 - 2.10E+00	2.15E+01	NA	2.13E+03 N	NA	NA	No	BSL
7439-89-6	Iron	8.37E+03		2.21E+04		mg/kg	LWMCU-104-SE-6-12	22/22	9.50E+00 - 2.38E+01	2.21E+04	NA	NA	NA	NA	No	BSL
7439-92-1	Lead	5.50E+00	J	4.09E+01		mg/kg	LEMC-102-SE-0-6	22/22	5.10E-01 - 1.10E+00	4.09E+01	NA	5.00E+01	NA	NA	No	BSL
7439-95-4	Magnesium	2.96E+03		7.19E+03		mg/kg	LWMCU-104-SE-6-12	22/22	4.75E+02 - 1.19E+03	7.19E+03	NA	NA	NA	NA	No	NUT
7439-96-5	Manganese	2.72E+02		6.95E+02		mg/kg	LWMCU-101-SE-0-6	22/22	5.10E-01 - 1.10E+00	6.95E+02	NA	1.40E+03 N	NA	NA	No	BSL
7439-97-6	Mercury	3.00E-02	J	1.00E-01	J	mg/kg	LWMCU-105-SE-6-12	22/22	1.20E-01 - 2.50E-01	1.00E-01	NA	3.43E+00 N	NA	NA	No	BSL
7440-02-2	Nickel	5.20E+00		1.35E+01		mg/kg	LWMCU-109-SE-0-6	22/22	5.10E-01 - 1.10E+00	1.35E+01	NA	1.40E+02 N	NA	NA	No	BSL
7440-09-7	Potassium	1.67E+03		4.90E+03		mg/kg	LWMCU-109-SE-0-6	22/22	4.75E+02 - 1.19E+03	4.90E+03	NA	NA	NA	NA	No	NUT
7782-49-2	Selenium	2.30E-02	J	2.10E-01	J	mg/kg	LWMCU-102-SE-0-6	4/22	6.90E-01 - 5.40E+00	2.10E-01	NA	2.66E+02 N	NA	NA	No	BSL
7440-23-5	Sodium	4.24E+02	J	1.17E+03		mg/kg	LWMCU-115-SE-0-6	11/22	4.75E+02 - 1.19E+03	1.17E+03	NA	NA	NA	NA	No	NUT
7440-62-2	Vanadium	1.25E+01		2.66E+01		mg/kg	LEMC-105-SE-0-6	22/22	2.50E+00 - 5.40E+00	2.66E+01	NA	3.29E+01 N	NA	NA	No	BSL
7440-66-6	Zinc	2.98E+01	J	6.20E+01	J	mg/kg	LWMCU-109-SE-0-6	22/22	1.00E+00 - 2.10E+00	6.20E+01	NA	7.60E+03 N	NA	NA	No	BSL
							POLYAROMATIC HYDROCARBONS									
91-57-6	2-Methylnaphthalene	5.60E-02	J	5.60E-02	J	mg/kg	LWMCU-101-SE-0-6	1/25	2.30E-01 - 3.80E-01	5.60E-02	NA	4.95E+01 N	NA	NA	No	BSL
83-32-9	Acenaphthene	6.30E-02	J	6.30E-02	J	mg/kg	LWMCU-101-SE-0-6	1/25	2.30E-01 - 3.80E-01	6.30E-02	NA	7.42E+02 N	NA	NA	No	BSL
120-12-7	Anthracene	1.30E-01	J	1.30E-01	J	mg/kg	LWMCU-101-SE-0-6	1/25	2.30E-01 - 3.80E-01	1.30E-01	NA	3.71E+03 N	NA	NA	No	BSL
56-55-3	Benzo(a)anthracene	2.80E-01		2.80E-01		mg/kg	LWMCU-101-SE-0-6	1/25	2.30E-01 - 3.80E-01	2.80E-01	NA	1.59E+00 C	NA	NA	No	BSL
50-32-8	**Benzo(a)pyrene**	**2.30E-01**	**J**	**2.30E-01**	**J**	**mg/kg**	**LWMCU-101-SE-0-6**	**1/25**	**2.30E-01 - 3.80E-01**	**2.30E-01**	**NA**	**1.59E-01 C**	**NA**	**NA**	**Yes**	**ASL**
205-99-2	Benzo(b)fluoranthene	9.20E-02	J	3.50E-01		mg/kg	LWMCU-101-SE-0-6	2/25	2.30E-01 - 3.80E-01	3.50E-01	NA	1.59E+00 C	NA	NA	No	BSL
191-24-2	Benzo(g,h,i)perylene	1.40E-01	J	1.40E-01	J	mg/kg	LWMCU-101-SE-0-6	1/25	2.30E-01 - 3.80E-01	1.40E-01	NA	3.71E+02 N	NA	NA	No	BSL
207-08-9	Benzo(k)fluoranthene	1.20E-01	J	1.20E-01	J	mg/kg	LWMCU-101-SE-0-6	1/25	2.30E-01 - 3.80E-01	1.20E-01	NA	1.59E+01 C	NA	NA	No	BSL
218-01-9	Chrysene	4.40E-02	J	3.20E-01		mg/kg	LWMCU-101-SE-0-6	2/25	2.30E-01 - 3.80E-01	3.20E-01	NA	1.59E+02 C	NA	NA	No	BSL
53-70-3	Dibenzo(a,h)anthracene	6.60E-02	J	6.60E-02	J	mg/kg	LWMCU-101-SE-0-6	1/25	2.30E-01 - 3.80E-01	6.60E-02	NA	1.59E-01 C	NA	NA	No	BSL
206-44-0	Fluoranthene	4.40E-02	J	6.80E-01		mg/kg	LWMCU-101-SE-0-6	2/25	2.30E-01 - 3.80E-01	6.80E-01	NA	4.95E+02 N	NA	NA	No	BSL
86-73-7	Fluorene	9.10E-02	J	9.10E-02	J	mg/kg	LWMCU-101-SE-0-6	1/25	2.30E-01 - 3.80E-01	9.10E-02	NA	4.95E+02 N	NA	NA	No	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	1.60E-01	J	1.60E-01	J	mg/kg	LWMCU-101-SE-0-6	1/25	2.30E-01 - 3.80E-01	1.60E-01	NA	1.59E+00 C	NA	NA	No	BSL
91-20-3	Naphthalene	8.60E-02	J	8.60E-02	J	mg/kg	LWMCU-101-SE-0-6	1/25	2.30E-01 - 3.80E-01	8.60E-02	NA	2.47E+02 N	NA	NA	No	BSL
85-01-8	Phenanthrene	5.10E-01		5.10E-01		mg/kg	LWMCU-101-SE-0-6	1/25	2.30E-01 - 3.80E-01	5.10E-01	NA	3.71E+02 N	NA	NA	No	BSL
129-00-0	Pyrene	4.60E-01		4.60E-01		mg/kg	LWMCU-101-SE-0-6	1/25	2.30E-01 - 3.80E-01	4.60E-01	NA	3.71E+02 N	NA	NA	No	BSL
							POLYCHLORINATED BIPHENYLS									
11104-28-2	Aroclor-1221	2.10E-03		2.10E-03		mg/kg	LWMCU-130-SE-6-12	1/102	1.10E-03 - 2.50E-01	2.10E-03	NA	2.30E-01 N	NA	NA	No	BSL
53469-21-9	Aroclor-1242	1.70E-01		1.70E-01		mg/kg	LWMCU-138-SE-0-6	1/102	1.10E-03 - 2.50E-01	1.70E-01	NA	2.30E-01 N	NA	NA	No	BSL
12672-29-6	Aroclor-1248	1.00E-03	J	1.00E-03	J	mg/kg	LWMCU-137-SE-0-6	1/102	1.10E-03 - 2.50E-01	1.00E-03	NA	2.30E-01 N	NA	NA	No	BSL
11097-69-1	**Aroclor-1254**	**1.20E-03**	**J**	**1.10E+01**		**mg/kg**	**LWMCU-160-SE-0-6**	**84/102**	**1.20E-03 - 2.50E-01**	**1.10E+01**	**NA**	**2.30E-01 N**	**NA**	**NA**	**Yes**	**ASL**
11096-82-5	Aroclor-1260	2.60E-03		1.80E-01		mg/kg	LWMCU-138-SE-0-6	10/102	1.10E-03 - 2.50E-01	1.80E-01	NA	2.30E-01 N	NA	NA	No	BSL
Total PCBs	**Total PCB Congeners**	**3.30E-04**		**6.10E+00**		**mg/kg**	**LWMCU-160-SE-0-6**	**21/21**	**2.10E-06 - 2.21E-01**	**6.10E+00**	**NA**	**2.30E-01 N**	**NA**	**NA**	**Yes**	**ASL**

TABLE 2.6
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
EXPOSURE AREA 2: THE SIPHON AND DOWNSTREAM (LWMCU, LWMCL, and LEMC) - SEDIMENT

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: The Siphon and Downstream

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
PESTICIDES																	
72-55-9	4,4′-DDE	1.50E-03	J	1.70E-02		mg/kg	LWMCU-115-SE-0-6	24/25	4.40E-03 - 7.40E-03	1.70E-02	NA	8.66E+00	C	NA	NA	No	BSL
50-29-3	4,4′-DDT	2.00E-03	J	6.10E-02	J	mg/kg	LWMCU-115-SE-0-6	20/25	4.40E-03 - 7.40E-03	6.10E-02	NA	8.66E+00	C	NA	NA	No	BSL
5103-71-9	alpha-Chlordane	1.50E-03	J	2.40E-03	J	mg/kg	LWMCU-101-SE-0-6	3/25	2.30E-03 - 3.80E-03	2.40E-03	NA	4.06E+00	C	NA	NA	No	BSL
319-85-7	beta-BHC	2.10E-03	J	2.10E-03	J	mg/kg	LWMCU-103-SE-0-6	1/25	2.30E-03 - 3.80E-03	2.10E-03	NA	1.42E+00	C	NA	NA	No	BSL
319-86-8	delta-BHC	9.80E-04	J	9.90E-04	J	mg/kg	LWMCU-103-SE-0-6	2/25	2.30E-03 - 3.80E-03	9.90E-04	NA	1.42E+00	C	NA	NA	No	BSL
60-57-1	Dieldrin	1.90E-03	J	1.90E-02	J	mg/kg	LWMCU-101-SE-0-6	6/25	4.40E-03 - 7.40E-03	1.90E-02	NA	8.88E-02	C	NA	NA	No	BSL
959-98-8	Endosulfan I	8.30E-04	J	2.10E-03	J	mg/kg	LWMCU-115-SE-0-6	3/25	2.30E-03 - 3.80E-03	2.10E-03	NA	3.06E+01	N	NA	NA	No	BSL
33213-65-9	Endosulfan II	1.60E-03	J	6.10E-03	J	mg/kg	LWMCU-101-SE-0-6	6/25	4.40E-03 - 7.40E-03	6.10E-03	NA	9.19E+01	N	NA	NA	No	BSL
72-20-8	Endrin	1.50E-03	J	8.60E-03	J	mg/kg	LWMCU-101-SE-0-6	7/25	4.40E-03 - 7.40E-03	8.60E-03	NA	4.59E+00	N	NA	NA	No	BSL
7421-93-4	Endrin aldehyde	2.10E-03	J	6.50E-03		mg/kg	LWMCU-101-SE-0-6	5/25	4.40E-03 - 7.40E-03	6.50E-03	NA	4.59E+00	N	NA	NA	No	BSL
58-89-9	gamma-BHC (Lindane)	5.80E-04	J	5.80E-04	J	mg/kg	LWMCU-114-SE-0-6	1/25	2.30E-03 - 3.80E-03	5.80E-04	NA	1.96E+00	C	NA	NA	No	BSL
5103-74-2	gamma-Chlordane	8.20E-04	J	1.80E-02	J	mg/kg	LWMCU-115-SE-0-6	21/25	2.30E-03 - 3.80E-03	1.80E-02	NA	4.06E+00	C	NA	NA	No	BSL
1024-57-3	Heptachlor epoxide	7.40E-04	J	8.60E-03	J	mg/kg	LWMCU-115-SE-0-6	16/25	2.30E-03 - 3.80E-03	8.60E-03	NA	1.56E-01	C	NA	NA	No	BSL
SEMI-VOLATILE ORGANIC COMPOUNDS																	
117-81-7	Bis(2-ethylhexyl)phthalate	1.40E-01	J	8.10E+00		mg/kg	LEMC-106-SE-0-6	5/25	2.30E-01 - 1.10E+00	8.10E+00	NA	2.44E+01	C	NA	NA	No	BSL
86-74-8	Carbazole	8.60E-02	J	8.60E-02	J	mg/kg	LWMCU-101-SE-0-6	1/25	2.30E-01 - 3.80E-01	8.60E-02	NA	7.10E+01	C	NA	NA	No	BSL
84-74-2	Di-n-butyl phthalate	2.00E-01	J	2.00E-01	J	mg/kg	LWMCU-110-SE-0-6	1/25	2.30E-01 - 3.80E-01	2.00E-01	NA	1.53E+03	N	NA	NA	No	BSL
108-95-2	Phenol	4.30E-02	J	8.30E-02	J	mg/kg	LWMCU-110-SE-0-6	3/25	2.30E-01 - 3.80E-01	8.30E-02	NA	4.59E+03	N	NA	NA	No	BSL
VOLATILE ORGANIC COMPOUNDS																	
98-86-2	Acetophenone	5.60E-02	J	1.20E-01	J	mg/kg	LWMCU-110-SE-0-6	3/25	2.30E-01 - 3.80E-01	1.20E-01	NA	1.53E+03	N	NA	NA	No	BSL
108-88-3	Toluene	4.70E-03	J	4.70E-03	J	mg/kg	LEMC-102-SE-0-6	1/8	1.30E-02 - 2.25E-01	4.70E-03	NA	5.88E+03	N	NA	NA	No	BSL

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.
(4) TCEQ Protective Concentration Levels (PCLs), March 2006, Tier 1 Sediment, TotSedComb. For non-carcinogens 1/10th the PCL is used.
(5) Rationale Codes
Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Definitions:
C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
NA = Not Applicable

Data Qualifiers: J = Indicates an estimated value

Surrogates used: chlordane for alpha- and gamma-chlordane, endosulfan for endosulfan I and II, endrin for endrin aldehyde.

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TABLE 2.7
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
EXPOSURE AREA 2: THE SIPHON AND DOWNSTREAM (LWMCU, LWMCL, and LEMC) - SURFACE WATER

Scenario Timeframe: Current
Medium: Surface water
Exposure Medium: Surface water
Exposure Point: The Siphon and Downstream

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
							INORGANICS-TOTAL									
7429-90-5	Aluminum	1.08E+03		1.94E+03	J	ug/L	LWMCU-102-SW	8/9	2.00E+02 - 2.00E+02	1.94E+03	NA	NA	NA	NA	No	BSL
7440-38-2	Arsenic	3.90E+00		4.90E+00		ug/L	LEMC-101-SW, LWMCU-104-SW	9/9	1.00E+00 - 1.00E+00	4.90E+00	NA	1.00E+01	NA	NA	No	BSL
7440-39-3	Barium	1.27E+02		1.54E+02		ug/L	LWMCL-101-SW	9/9	1.00E+01 - 1.00E+01	1.54E+02	NA	2.00E+03	NA	NA	No	BSL
7440-70-2	Calcium	8.11E+04		8.94E+04		ug/L	LEMC-101-SW	9/9	1.00E+00 - 1.00E+00	8.94E+04	NA	NA	NA	NA	No	NUT
7440-50-8	Copper	2.10E+00		3.20E+00		ug/L	LWMCL-101-SW	9/9	2.00E+00 - 2.00E+00	3.20E+00	NA	1.30E+03	NA	NA	No	BSL
7439-89-6	Iron	1.02E+03		1.67E+03		ug/L	LWMCU-102-SW	8/9	1.00E+02 - 1.00E+02	1.67E+03	NA	NA	NA	NA	No	BSL
7439-92-1	Lead	2.20E+00		2.20E+00		ug/L	LEMC-102-SWF	1/9	1.00E+00 - 1.00E+00	2.20E+00	NA	3.83E+00	NA	NA	No	BSL
7439-95-4	Magnesium	3.03E+04		3.23E+04		ug/L	LEMC-101-SW	9/9	5.00E+03 - 5.00E+03	3.23E+04	NA	NA	NA	NA	No	NUT
7439-96-5	**Manganese**	**6.10E+00**		**1.26E+02**		**ug/L**	**LWMCU-102-SW**	**9/9**	**1.00E+00 - 1.00E+00**	**1.26E+02**	**NA**	**1.00E+02**	**NA**	**NA**	**Yes**	**ASL**
7440-02-2	Nickel	1.80E+00	J	2.30E+00		ug/L	LWMCL-101-SW	8/9	1.00E+00 - 1.00E+00	2.30E+00	NA	1.14E+03	NA	NA	No	BSL
7440-09-7	Potassium	6.63E+03		7.14E+03		ug/L	LEMC-101-SW	9/9	5.00E+03 - 5.00E+03	7.14E+03	NA	NA	NA	NA	No	NUT
7782-49-2	Selenium	4.70E-01	J	1.80E+00	J	ug/L	LEMC-101-SW	9/9	5.00E+00 - 5.00E+00	1.80E+00	NA	4.20E+03	NA	NA	No	BSL
7440-23-5	Sodium	1.57E+05		1.69E+05		ug/L	LEMC-101-SW	9/9	5.00E+03 - 5.00E+03	1.69E+05	NA	NA	NA	NA	No	NUT
7440-62-2	Vanadium	8.10E+00		1.11E+01		ug/L	LWMCU-102-SW	9/9	5.00E+00 - 5.00E+00	1.11E+01	NA	NA	NA	NA	No	BSL
7440-66-6	Zinc	1.50E+00	J	8.00E+00		ug/L	LWMCL-101-SW	9/9	2.00E+00 - 2.00E+00	8.00E+00	NA	2.60E+04	NA	NA	No	BSL
							POLYCHLORINATED BIPHENYLS									
11097-69-1	**Aroclor-1254**	**1.10E-02**		**1.10E-02**		**ug/L**	**NSIP-102-SW**	**1/26**	**9.30E-03 - 1.00E+00**	**1.10E-02**	**NA**	**6.40E-04**	**NA**	**NA**	**Yes**	**ASL**
Total PCBs	**Total PCB Congeners**	**1.90E-04**	**J**	**2.60E-02**	**J**	**ug/L**	**NSIP-102-SW**	**21/21**	**1.90E-05 - 5.00E-01**	**2.60E-02**	**NA**	**6.40E-04**	**NA**	**NA**	**Yes**	**ASL**
							PESTICIDES									
50-29-3	**4,4´-DDT**	**7.40E-02**	**J**	**7.40E-02**	**J**	**ug/L**	**LWMCU-105-SW**	**1/9**	**9.30E-02 - 9.50E-02**	**7.40E-02**	**NA**	**3.90E-03**	**NA**	**NA**	**Yes**	**ASL**
							SEMI-VOLATILE ORGANIC COMPOUNDS									
117-81-7	Bis(2-ethylhexyl)phthalate	3.10E+00	J	3.10E+00	J	ug/L	LWMCL-101-SW	1/9	4.50E+00 - 4.90E+00	3.10E+00	NA	4.10E+01	NA	NA	No	BSL

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.
(4) Screening toxicity values taken from TCEQ Human Health Risk-Based Exposure Limits (RBELs), 2011. Screening criteria is for fish ingestion only.
(5) Rationale Codes
Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Definitions:
C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
ug/L = micrograms per liter

Data Qualifiers: J = Indicates an estimated value

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TABLE 2.8
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
EXPOSURE AREA 3: THE RESERVOIRS (RN3E, RN3W) - SEDIMENT

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: The Reservoirs

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
							INORGANICS									
7429-90-5	**Aluminum**	**1.31E+04**		**2.32E+04**		**mg/kg**	**RN3W-101-SE-6-12**	**9/9**	**2.65E+01 - 8.43E+01**	**2.32E+04**	**NA**	**1.53E+04 N**	**NA**	**NA**	**Yes**	**ASL**
7440-38-2	Arsenic	4.00E+00		5.40E+00		mg/kg	RN3W-101-SE-6-12	9/9	5.90E-01 - 1.30E+00	5.40E+00	NA	1.15E+01 N	NA	NA	No	BSL
7440-39-3	Barium	1.43E+02		1.81E+02		mg/kg	RN3W-103-SE-0-6	9/9	5.90E+00 - 1.32E+01	1.81E+02	NA	2.29E+03 N	NA	NA	No	BSL
7440-43-9	Cadmium	3.20E-01	J	4.70E-01	J	mg/kg	RN3W-101-SE-6-12	9/9	5.90E-01 - 1.30E+00	4.70E-01	NA	1.09E+02 N	NA	NA	No	BSL
7440-70-2	Calcium	8.40E+04		2.11E+05		mg/kg	RN3W-103-SE-0-6	9/9	1.99E+03 - 6.03E+03	2.11E+05	NA	NA	NA	NA	No	NUT
7440-47-3	Chromium	8.50E+00		1.20E+01		mg/kg	RN3W-101-SE-6-12	9/9	1.20E+00 - 2.60E+00	1.20E+01	NA	3.65E+03 N	NA	NA	No	BSL
7440-48-4	Cobalt	4.70E+00		6.20E+00		mg/kg	RN3W-101-SE-6-12	9/9	5.90E-01 - 1.30E+00	6.20E+00	NA	3.20E+03 N	NA	NA	No	BSL
7440-50-8	Copper	8.50E+00		1.30E+01		mg/kg	RN3W-101-SE-6-12	9/9	1.20E+00 - 2.60E+00	1.30E+01	NA	2.13E+03 N	NA	NA	No	BSL
7439-89-6	Iron	1.40E+04		2.12E+04		mg/kg	RN3W-101-SE-6-12	9/9	1.33E+01 - 2.41E+01	2.12E+04	NA	NA	NA	NA	No	BSL
7439-92-1	Lead	8.80E+00	J	1.30E+01	J	mg/kg	RN3W-102-SE-6-12	9/9	5.90E-01 - 1.60E+00	1.30E+01	NA	5.00E+01	NA	NA	No	BSL
7439-95-4	Magnesium	4.80E+03		7.62E+03		mg/kg	RN3W-101-SE-6-12	9/9	6.63E+02 - 1.21E+03	7.62E+03	NA	NA	NA	NA	No	NUT
7439-96-5	Manganese	2.69E+02	J	4.51E+02	J	mg/kg	RN3W-105-SE-0-6	9/9	5.90E-01 - 1.30E+00	4.51E+02	NA	1.40E+03 N	NA	NA	No	BSL
7439-97-6	Mercury	2.70E-02	J	6.00E-02	J	mg/kg	RN3W-102-SE-6-12	8/9	1.70E-01 - 2.50E-01	6.00E-02	NA	3.43E+00 N	NA	NA	No	BSL
7440-02-2	Nickel	8.60E+00		1.23E+01		mg/kg	RN3W-101-SE-6-12	9/9	5.90E-01 - 1.30E+00	1.23E+01	NA	1.40E+02 N	NA	NA	No	BSL
7440-09-7	Potassium	3.10E+03		5.23E+03		mg/kg	RN3W-101-SE-6-12	9/9	6.63E+02 - 1.21E+03	5.23E+03	NA	NA	NA	NA	No	NUT
7782-49-2	Selenium	2.00E-01	J	3.10E-01	J	mg/kg	RN3W-101-SE-6-12	7/9	3.00E+00 - 6.60E+00	3.10E-01	NA	2.66E+02 N	NA	NA	No	BSL
7440-23-5	Sodium	3.65E+02	J	1.18E+03	J	mg/kg	RN3W-103-SE-0-6	9/9	6.63E+02 - 1.21E+03	1.18E+03	NA	NA	NA	NA	No	NUT
7440-62-2	Vanadium	1.66E+01		2.40E+01		mg/kg	RN3W-101-SE-6-12	9/9	3.00E+00 - 6.60E+00	2.40E+01	NA	3.29E+01 N	NA	NA	No	BSL
7440-66-6	Zinc	3.85E+01	J	5.38E+01	J	mg/kg	RN3W-101-SE-6-12	9/9	1.20E+00 - 2.60E+00	5.38E+01	NA	7.60E+03 N	NA	NA	No	BSL
							POLYCHLORINATED BIPHENYLS									
11097-69-1	Aroclor-1254	2.00E-03	J	3.30E-03	J	mg/kg	RN3W-103-SE-0-6	5/16	1.80E-03 - 1.40E-02	3.30E-03	NA	2.30E-01 N	NA	NA	No	BSL
11096-82-5	Aroclor-1260	1.70E-03	J	2.80E-03	J	mg/kg	RN3E-104-SE-0-6	2/16	1.80E-03 - 1.40E-02	2.80E-03	NA	2.30E-01 N	NA	NA	No	BSL
Total PCBs	Total PCB Congeners	2.80E-04	J	1.00E-02		mg/kg	RN3W-102-SE	6/6	2.90E-06 - 2.05E-01	1.00E-02	NA	2.30E-01 N	NA	NA	No	BSL
							PESTICIDES									
72-54-8	4,4´-DDD	3.70E-03	J	3.70E-03	J	mg/kg	RN3E-101-SE-0-6	1/9	4.60E-03 - 7.80E-03	3.70E-03	NA	1.23E+01 C	NA	NA	No	BSL
72-55-9	4,4´-DDE	1.80E-03	J	6.40E-02		mg/kg	RN3E-101-SE-0-6	7/9	4.60E-03 - 7.80E-03	6.40E-02	NA	8.66E+00 C	NA	NA	No	BSL
50-29-3	4,4´-DDT	3.50E-03	J	3.50E-03	J	mg/kg	RN3E-101-SE-0-6	1/9	4.60E-03 - 7.80E-03	3.50E-03	NA	8.66E+00 C	NA	NA	No	BSL
319-84-6	alpha-BHC	6.50E-04	J	6.50E-04	J	mg/kg	RN3E-101-SE-0-6	1/9	2.40E-03 - 4.00E-03	6.50E-04	NA	4.05E-01 C	NA	NA	No	BSL
5103-71-9	alpha-Chlordane	1.10E-03	J	1.10E-03	J	mg/kg	RN3E-101-SE-0-6	1/9	2.40E-03 - 4.00E-03	1.10E-03	NA	4.06E+00 C	NA	NA	No	BSL
60-57-1	Dieldrin	7.50E-03	J	7.50E-03	J	mg/kg	RN3E-101-SE-0-6	1/9	4.60E-03 - 7.80E-03	7.50E-03	NA	8.88E-02 C	NA	NA	No	BSL
7421-93-4	Endrin aldehyde	3.20E-03	J	3.20E-03	J	mg/kg	RN3E-101-SE-0-6	1/9	4.60E-03 - 7.80E-03	3.20E-03	NA	4.59E+00 N	NA	NA	No	BSL
5103-74-2	gamma-Chlordane	9.20E-04	J	2.90E-03		mg/kg	RN3E-101-SE-0-6	2/9	2.40E-03 - 4.00E-03	2.90E-03	NA	4.06E+00 C	NA	NA	No	BSL
1024-57-3	Heptachlor epoxide	7.80E-04	J	7.80E-04	J	mg/kg	RN3E-101-SE-0-6	1/9	2.40E-03 - 4.00E-03	7.80E-04	NA	1.56E-01 C	NA	NA	No	BSL
							SEMI-VOLATILE ORGANIC COMPOUNDS									
117-81-7	Bis(2-ethylhexyl)phthalate	1.10E-01	J	1.10E-01	J	mg/kg	RN3E-101-SE-0-6	1/9	2.40E-01 - 4.00E-01	1.10E-01	NA	2.44E+01 C	NA	NA	No	BSL
85-68-7	Butylbenzylphthalate	9.90E-01	J	9.90E-01	J	mg/kg	RN3E-101-SE-0-6	1/9	2.40E-01 - 4.00E-01	9.90E-01	NA	3.06E+03 N	NA	NA	No	BSL

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.
(4) TCEQ Protective Concentration Levels (PCLs), March 2006, Tier 1 Sediment, TotSedComb. For non-carcinogens 1/10th the PCL is used.
(5) Rationale Codes
Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Definitions:
C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
mg/kg = milligrams per kilogram

Data Qualifiers: J = Indicates an estimated value

Surrogates used: Chlordane for alpha-and gamma-chlordane, endrin for endrin aldehyde.

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TABLE 2.9
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
EXPOSURE AREA 3: THE RESERVOIRS (RN3E, RN3W) - SURFACE WATER

Scenario Timeframe: Current
Medium: Surface water
Exposure Medium: Surface water
Exposure Point: The Reservoirs

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
							INORGANICS-TOTAL									
7429-90-5	Aluminum	6.73E+02	J	1.04E+03	J	ug/L	RN3W-102-SW	5/5	2.00E+02 - 2.00E+02	1.04E+03	NA	NA	NA	NA	No	BSL
7440-38-2	Arsenic	4.50E+00		4.80E+00		ug/L	RN3W-103-SW, RN3W-105-SW	5/5	1.00E+00 - 1.00E+00	4.80E+00	NA	1.00E+01	NA	NA	No	BSL
7440-39-3	Barium	1.32E+02		1.36E+02		ug/L	RN3W-104-SW	5/5	1.00E+01 - 1.00E+01	1.36E+02	NA	2.00E+03	NA	NA	No	BSL
7440-70-2	Calcium	7.07E+04		7.93E+04		ug/L	RN3W-104-SW	5/5	1.00E+00 - 1.00E+00	7.93E+04	NA	NA	NA	NA	No	NUT
7440-47-3	Chromium	7.40E-01	J	7.60E-01	J	ug/L	RN3W-104-SW, RN3W-105-SW	3/5	2.00E+00 - 2.00E+00	7.60E-01	NA	5.02E+02	NA	NA	No	BSL
7440-50-8	Copper	2.20E+00		2.60E+00		ug/L	RN3W-102-SW	5/5	2.00E+00 - 2.00E+00	2.60E+00	NA	1.30E+03	NA	NA	No	BSL
7439-89-6	Iron	6.07E+02		9.10E+02		ug/L	RN3W-102-SW	5/5	1.00E+02 - 1.00E+02	9.10E+02	NA	NA	NA	NA	No	BSL
7439-95-4	Magnesium	3.05E+04		3.13E+04		ug/L	RN3W-102-SW	5/5	5.00E+03 - 5.00E+03	3.13E+04	NA	NA	NA	NA	No	NUT
7439-96-5	Manganese	5.40E+01		7.28E+01		ug/L	RN3W-102-SW	5/5	1.00E+00 - 1.00E+00	7.28E+01	NA	1.00E+02	NA	NA	No	BSL
7440-02-2	Nickel	1.60E+00		1.90E+00		ug/L	RN3W-102-SW	5/5	1.00E+00 - 1.00E+00	1.90E+00	NA	1.14E+03	NA	NA	No	BSL
7440-09-7	Potassium	6.56E+03		7.06E+03		ug/L	RN3W-105-SW, RN3W-102-SW	5/5	5.00E+03 - 5.00E+03	7.06E+03	NA	NA	NA	NA	No	NUT
7782-49-2	Selenium	6.90E-01	J	8.60E-01	J	ug/L	RN3W-101-SW	5/5	5.00E+00 - 5.00E+00	8.60E-01	NA	4.20E+03	NA	NA	No	BSL
7440-23-5	Sodium	1.57E+05		1.65E+05		ug/L	RN3W-102-SW	5/5	5.00E+03 - 5.00E+03	1.65E+05	NA	NA	NA	NA	No	NUT
7440-62-2	Vanadium	9.20E+00		9.90E+00		ug/L	RN3W-102-SW	5/5	5.00E+00 - 5.00E+00	9.90E+00	NA	NA	NA	NA	No	BSL
7440-66-6	Zinc	3.10E+00		4.70E+00		ug/L	RN3W-102-SW	5/5	2.00E+00 - 2.00E+00	4.70E+00	NA	2.60E+04	NA	NA	No	BSL
							POLYCHLORINATED BIPHENYLS									
Total PCBs	**Total PCB Congeners**	**8.70E-04**		**1.60E-03**		**ug/L**	**RN3W-102-SW**	**2/2**	**5.00E-01 - 5.00E-01**	**1.60E-03**	**NA**	**6.40E-04**	**NA**	**NA**	**Yes**	**ASL**
							PESTICIDES									
50-29-3	**4,4´-DDT**	**3.10E-02**	**J**	**3.10E-02**	**J**	**ug/L**	**RN3W-105-SW**	**1/5**	**9.30E-02 - 9.40E-02**	**3.10E-02**	**NA**	**3.90E-03**	**NA**	**NA**	**Yes**	**ASL**

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.
(4) Screening toxicity values taken from TCEQ Human Health Risk-Based Exposure Limits (RBELs), 2011. Screening criteria is for fish ingestion only.
(5) Rationale Codes
Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Definitions:
C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
ug/L = micrograms per liter

Data Qualifiers: J = Indicates an estimated value

TABLE 2.10
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
EXPOSURE AREA 4: DOWNSTREAM OF THE RESERVOIRS (COMC) - SEDIMENT

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Downstream of the Reservoirs

CAS Number	Chemical	Minimum [1] Concentration	Minimum Qualifier	Maximum [1] Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration [2] Used for Screening	Background [3] Value	Screening [4] Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for [5] Contaminant Deletion or Selection
							INORGANICS										
7429-90-5	**Aluminum**	**1.89E+04**	**J**	**2.62E+04**	**J**	**mg/kg**	**COMC-104-SE-0-6**	**5/5**	**5.89E+01 - 9.84E+01**	**2.62E+04**	**NA**	**1.53E+04**	**N**	**NA**	**NA**	**Yes**	**ASL**
7440-38-2	Arsenic	3.60E+00	J	4.30E+00	J	mg/kg	COMC-105-SE-0-6	5/5	4.60E-01 - 4.90E-01	4.30E+00	NA	1.15E+01	N	NA	NA	No	BSL
7440-39-3	Barium	1.67E+02	J	2.14E+02	J	mg/kg	COMC-105-SE-0-6	5/5	4.70E+00 - 8.60E+00	2.14E+02	NA	2.29E+03	N	NA	NA	No	BSL
7440-41-7	Beryllium	7.40E-01	J	1.00E+00	J	mg/kg	COMC-105-SE-0-6	5/5	4.70E-01 - 8.60E-01	1.00E+00	NA	2.66E+00	N	NA	NA	No	BSL
7440-43-9	Cadmium	3.90E-01	J	5.10E-01	J	mg/kg	COMC-105-SE-0-6	5/5	4.60E-01 - 4.90E-01	5.10E-01	NA	1.09E+02	N	NA	NA	No	BSL
7440-70-2	Calcium	8.02E+04	J	1.25E+05	J	mg/kg	COMC-105-SE-0-6	5/5	2.46E+03 - 5.00E+03	1.25E+05	NA	NA		NA	NA	No	NUT
7440-47-3	Chromium	1.18E+01	J	1.52E+01	J	mg/kg	COMC-105-SE-0-6	5/5	9.10E-01 - 9.80E-01	1.52E+01	NA	3.65E+03	N	NA	NA	No	BSL
7440-48-4	Cobalt	5.70E+00	J	6.60E+00	J	mg/kg	COMC-101-SE-0-6	5/5	4.70E-01 - 8.60E-01	6.60E+00	NA	3.20E+03	N	NA	NA	No	BSL
7440-50-8	Copper	1.05E+01	J	1.30E+01	J	mg/kg	COMC-101-SE-0-6	5/5	9.40E-01 - 1.70E+00	1.30E+01	NA	2.13E+03	N	NA	NA	No	BSL
7439-89-6	Iron	1.68E+04	J	2.34E+04	J	mg/kg	COMC-104-SE-0-6	5/5	1.90E+01 - 3.00E+01	2.34E+04	NA	NA		NA	NA	No	BSL
7439-92-1	Lead	1.59E+01	J	2.48E+01	J	mg/kg	COMC-103-SE-0-6	5/5	4.60E-01 - 4.90E-01	2.48E+01	NA	5.00E+01		NA	NA	No	BSL
7439-95-4	Magnesium	6.46E+03	J	9.00E+03	J	mg/kg	COMC-104-SE-0-6	5/5	4.76E+02 - 5.00E+02	9.00E+03	NA	NA		NA	NA	No	NUT
7439-96-5	Manganese	3.63E+02	J	5.09E+02	J	mg/kg	COMC-105-SE-0-6	5/5	4.60E-01 - 4.90E-01	5.09E+02	NA	1.40E+03	N	NA	NA	No	BSL
7439-97-6	Mercury	3.10E-02	J	4.60E-02	J	mg/kg	COMC-105-SE-0-6	5/5	9.90E-02 - 2.20E-01	4.60E-02	NA	3.43E+00	N	NA	NA	No	BSL
7440-02-2	Nickel	1.19E+01	J	1.45E+01	J	mg/kg	COMC-105-SE-0-6	5/5	4.70E-01 - 8.60E-01	1.45E+01	NA	1.40E+02	N	NA	NA	No	BSL
7440-09-7	Potassium	4.78E+03	J	6.03E+03	J	mg/kg	COMC-104-SE-0-6	5/5	4.76E+02 - 5.00E+02	6.03E+03	NA	NA		NA	NA	No	NUT
7782-49-2	Selenium	2.10E-01	J	4.80E-01	J	mg/kg	COMC-103-SE-0-6	5/5	2.30E+00 - 4.30E+00	4.80E-01	NA	2.66E+02	N	NA	NA	No	BSL
7440-23-5	Sodium	8.53E+02	J	1.03E+03	J	mg/kg	COMC-105-SE-0-6	5/5	4.76E+02 - 9.71E+02	1.03E+03	NA	NA		NA	NA	No	NUT
7440-62-2	Vanadium	2.13E+01	J	2.84E+01	J	mg/kg	COMC-105-SE-0-6	5/5	2.30E+00 - 2.50E+00	2.84E+01	NA	3.29E+01	N	NA	NA	No	BSL
7440-66-6	Zinc	5.04E+01	J	5.93E+01	J	mg/kg	COMC-105-SE-0-6	5/5	9.40E-01 - 1.70E+00	5.93E+01	NA	7.60E+03	N	NA	NA	No	BSL
							POLYAROMATIC HYDROCARBONS										
91-57-6	2-Methylnaphthalene	6.20E-02	J	6.20E-02	J	mg/kg	COMC-101-SE-0-6	1/5	2.20E-01 - 3.40E-01	6.20E-02	NA	4.95E+01	N	NA	NA	No	BSL
83-32-9	Acenaphthene	8.20E-01		8.20E-01		mg/kg	COMC-101-SE-0-6	1/5	2.20E-01 - 3.40E-01	8.20E-01	NA	7.42E+02	N	NA	NA	No	BSL
120-12-7	Anthracene	3.30E+00	J	3.30E+00	J	mg/kg	COMC-101-SE-0-6	1/5	2.20E-01 - 3.40E-01	3.30E+00	NA	3.71E+03	N	NA	NA	No	BSL
56-55-3	**Benzo(a)anthracene**	**7.10E-02**	**J**	**3.40E+01**		**mg/kg**	**COMC-101-SE-0-6**	**3/5**	**2.60E-01 - 2.20E+01**	**3.40E+01**	**NA**	**1.59E+00**	**C**	**NA**	**NA**	**Yes**	**ASL**
50-32-8	**Benzo(a)pyrene**	**5.50E-02**	**J**	**1.80E+01**	**J**	**mg/kg**	**COMC-101-SE-0-6**	**2/5**	**2.60E-01 - 2.20E+01**	**1.80E+01**	**NA**	**1.59E-01**	**C**	**NA**	**NA**	**Yes**	**ASL**
205-99-2	**Benzo(b)fluoranthene**	**8.80E-02**	**J**	**3.10E+01**		**mg/kg**	**COMC-101-SE-0-6**	**3/5**	**2.60E-01 - 2.20E+01**	**3.10E+01**	**NA**	**1.59E+00**	**C**	**NA**	**NA**	**Yes**	**ASL**
191-24-2	Benzo(g,h,i)perylene	5.00E+00	J	5.00E+00	J	mg/kg	COMC-101-SE-0-6	1/5	2.20E-01 - 3.40E-01	5.00E+00	NA	3.71E+02	N	NA	NA	No	BSL
207-08-9	**Benzo(k)fluoranthene**	**2.00E+01**	**J**	**2.00E+01**	**J**	**mg/kg**	**COMC-101-SE-0-6**	**1/5**	**2.20E-01 - 3.40E-01**	**2.00E+01**	**NA**	**1.59E+01**	**C**	**NA**	**NA**	**Yes**	**ASL**
218-01-9	Chrysene	6.40E-02	J	3.40E+01		mg/kg	COMC-101-SE-0-6	3/5	2.60E-01 - 2.20E+01	3.40E+01	NA	1.59E+02	C	NA	NA	No	BSL
53-70-3	**Dibenzo(a,h)anthracene**	**2.40E+00**	**J**	**2.40E+00**	**J**	**mg/kg**	**COMC-101-SE-0-6**	**1/5**	**2.20E-01 - 3.40E-01**	**2.40E+00**	**NA**	**1.59E-01**	**C**	**NA**	**NA**	**Yes**	**ASL**
206-44-0	Fluoranthene	6.60E-02	J	5.10E+01		mg/kg	COMC-101-SE-0-6	3/5	2.60E-01 - 2.20E+01	5.10E+01	NA	4.95E+02	N	NA	NA	No	BSL
86-73-7	Fluorene	5.10E-01		5.10E-01		mg/kg	COMC-101-SE-0-6	1/5	2.20E-01 - 3.40E-01	5.10E-01	NA	4.95E+02	N	NA	NA	No	BSL
193-39-5	**Indeno(1,2,3-cd)pyrene**	**8.70E+00**	**J**	**8.70E+00**	**J**	**mg/kg**	**COMC-101-SE-0-6**	**1/5**	**2.60E-01 - 2.20E+01**	**8.70E+00**	**NA**	**1.59E+00**	**C**	**NA**	**NA**	**Yes**	**ASL**
91-20-3	Naphthalene	4.00E-02	J	4.00E-02	J	mg/kg	COMC-101-SE-0-6	1/5	2.20E-01 - 3.40E-01	4.00E-02	NA	2.47E+02	N	NA	NA	No	BSL
85-01-8	Phenanthrene	7.10E-02	J	2.30E+01		mg/kg	COMC-101-SE-0-6	2/5	2.60E-01 - 2.20E+01	2.30E+01	NA	3.71E+02	N	NA	NA	No	BSL
129-00-0	Pyrene	3.60E+01		3.60E+01		mg/kg	COMC-101-SE-0-6	1/5	2.60E-01 - 2.20E+01	3.60E+01	NA	3.71E+02	N	NA	NA	No	BSL
							POLYCHLORINATED BIPHENYLS										
11097-69-1	Aroclor-1254	2.10E-03	J	8.20E-03	J	mg/kg	COMC-103-SE-0-6	3/8	1.20E-03 - 7.70E-03	8.20E-03	NA	2.30E-01	N	NA	NA	No	BSL
11096-82-5	Aroclor-1260	1.00E-03	J	1.00E-03	J	mg/kg	COMC-101-SE-0-6	1/8	1.10E-03 - 7.70E-03	1.00E-03	NA	2.30E-01	N	NA	NA	No	BSL
Total PCBs	Total PCB Congeners	1.60E-02		1.60E-02		mg/kg	COMC-101-SE-0-6	1/1	1.30E-05 - 1.30E-05	1.60E-02	NA	2.30E-01	N	NA	NA	No	BSL

TABLE 2.10
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
EXPOSURE AREA 4: DOWNSTREAM OF THE RESERVOIRS (COMC) - SEDIMENT

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Downstream of the Reservoirs

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
PESTICIDES																
72-54-8	4,4′-DDD	3.00E-03	J	3.00E-03	J	mg/kg	COMC-101-SE-0-6	1/5	4.20E-03 - 6.60E-03	3.00E-03	NA	1.23E+01 C	NA	NA	No	BSL
72-55-9	4,4′-DDE	1.40E-03	J	9.10E-02		mg/kg	COMC-103-SE-0-6	5/5	4.20E-03 - 9.90E-03	9.10E-02	NA	8.66E+00 C	NA	NA	No	BSL
50-29-3	4,4′-DDT	1.60E-03	J	5.70E-03		mg/kg	COMC-103-SE-0-6	2/5	4.20E-03 - 6.60E-03	5.70E-03	NA	8.66E+00 C	NA	NA	No	BSL
309-00-2	Aldrin	6.50E-04	J	6.50E-04	J	mg/kg	COMC-101-SE-0-6	1/5	2.10E-03 - 3.40E-03	6.50E-04	NA	8.36E-02 C	NA	NA	No	BSL
319-84-6	alpha-BHC	6.70E-04	J	6.70E-04	J	mg/kg	COMC-101-SE-0-6	1/5	2.10E-03 - 3.40E-03	6.70E-04	NA	4.05E-01 C	NA	NA	No	BSL
5103-71-9	alpha-Chlordane	8.20E-04	J	1.30E-03	J	mg/kg	COMC-101-SE-0-6	2/5	2.10E-03 - 3.40E-03	1.30E-03	NA	4.06E+00 C	NA	NA	No	BSL
319-86-8	delta-BHC	9.30E-04	J	3.00E-03		mg/kg	COMC-101-SE-0-6	2/5	2.20E-03 - 3.40E-03	3.00E-03	NA	1.42E+00 C	NA	NA	No	BSL
33213-65-9	Endosulfan II	2.30E-03	J	6.00E-03	J	mg/kg	COMC-101-SE-0-6	2/5	4.20E-03 - 6.60E-03	6.00E-03	NA	9.19E+01 N	NA	NA	No	BSL
1031-07-8	Endosulfan sulfate	1.70E-03	J	1.70E-03	J	mg/kg	COMC-101-SE-0-6	1/5	4.20E-03 - 6.60E-03	1.70E-03	NA	9.19E+01 N	NA	NA	No	BSL
72-20-8	Endrin	1.30E-03	J	1.30E-03	J	mg/kg	COMC-101-SE-0-6	1/5	4.10E-03 - 6.60E-03	1.30E-03	NA	4.59E+00 N	NA	NA	No	BSL
7421-93-4	Endrin aldehyde	3.80E-03	J	5.60E-03		mg/kg	COMC-103-SE-0-6	2/5	4.20E-03 - 6.60E-03	5.60E-03	NA	4.59E+00 N	NA	NA	No	BSL
53494-70-5	Endrin ketone	2.10E-02	J	2.10E-02	J	mg/kg	COMC-101-SE-0-6	1/5	4.20E-03 - 6.60E-03	2.10E-02	NA	4.59E+00 N	NA	NA	No	BSL
58-89-9	gamma-BHC (Lindane)	9.40E-04	J	9.40E-04	J	mg/kg	COMC-101-SE-0-6	1/5	2.10E-03 - 3.40E-03	9.40E-04	NA	1.96E+00 C	NA	NA	No	BSL
5103-74-2	gamma-Chlordane	1.20E-03	J	2.40E-03	J	mg/kg	COMC-101-SE-0-6	4/5	2.20E-03 - 3.40E-03	2.40E-03	NA	4.06E+00 C	NA	NA	No	BSL
76-44-8	Heptachlor	3.90E-03		3.90E-03		mg/kg	COMC-101-SE-0-6	1/5	2.20E-03 - 3.40E-03	3.90E-03	NA	3.16E-01 C	NA	NA	No	BSL
1024-57-3	Heptachlor epoxide	9.70E-04	J	1.80E-03	J	mg/kg	COMC-101-SE-0-6	3/5	2.10E-03 - 3.40E-03	1.80E-03	NA	1.56E-01 C	NA	NA	No	BSL
72-43-5	Methoxychlor	3.00E-02	J	3.00E-02	J	mg/kg	COMC-101-SE-0-6	1/5	2.20E-02 - 3.40E-02	3.00E-02	NA	7.65E+01 N	NA	NA	No	BSL
SEMI-VOLATILE ORGANIC COMPOUNDS																
86-74-8	Carbazole	2.40E+00	J	2.40E+00	J	mg/kg	COMC-101-SE-0-6	1/5	2.20E-01 - 3.40E-01	2.40E+00	NA	7.10E+01 C	NA	NA	No	BSL
132-64-9	Dibenzofuran	3.50E-01		3.50E-01		mg/kg	COMC-101-SE-0-6	1/5	2.20E-01 - 3.40E-01	3.50E-01	NA	6.12E+01 N	NA	NA	No	BSL

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.
(4) TCEQ Protective Concentration Levels (PCLs), March 2006, Tier 1 Sediment, TotSedComb. For non-carcinogens 1/10th the PCL is used.
(5) Rationale Codes
Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Definitions:
C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
mg/kg = milligrams per kilogram

Data Qualifiers: J = Indicates an estimated value

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TABLE 2.11
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
EXPOSURE AREA 4: DOWNSTREAM OF THE RESERVOIRS (COMC) - SURFACE WATER

Scenario Timeframe: Current
Medium: Surface water
Exposure Medium: Surface water
Exposure Point: Downstream of the Reservoirs

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
INORGANICS-TOTAL																
7429-90-5	Aluminum	2.33E+02	J	8.38E+02	J	ug/L	COMC-101-SW	2/2	2.00E+02 - 2.00E+02	8.38E+02	NA	NA	NA	NA	No	BSL
7440-38-2	Arsenic	4.50E+00		4.90E+00		ug/L	COMC-102-SW	2/2	1.00E+00 - 1.00E+00	4.90E+00	NA	1.00E+01	NA	NA	No	BSL
7440-39-3	Barium	1.26E+02		1.28E+02		ug/L	COMC-101-SW	2/2	1.00E+01 - 1.00E+01	1.28E+02	NA	2.00E+03	NA	NA	No	BSL
7440-70-2	Calcium	7.20E+04		7.40E+04		ug/L	COMC-102-SW	2/2	1.00E+00 - 1.00E+00	7.40E+04	NA	NA	NA	NA	No	NUT
7440-47-3	Chromium	7.40E-01	J	7.40E-01	J	ug/L	COMC-102-SW	1/2	2.00E+00 - 2.00E+00	7.40E-01	NA	5.02E+02	NA	NA	No	BSL
7440-50-8	Copper	2.10E+00		2.30E+00		ug/L	COMC-101-SW	2/2	2.00E+00 - 2.00E+00	2.30E+00	NA	1.30E+03	NA	NA	No	BSL
7439-89-6	Iron	1.76E+02		7.35E+02		ug/L	COMC-101-SW	2/2	1.00E+02 - 1.00E+02	7.35E+02	NA	NA	NA	NA	No	BSL
7439-95-4	Magnesium	3.07E+04		3.11E+04		ug/L	COMC-101-SW	2/2	5.00E+03 - 5.00E+03	3.11E+04	NA	NA	NA	NA	No	NUT
7439-96-5	Manganese	6.10E+01		9.33E+01		ug/L	COMC-102-SW	2/2	1.00E+00 - 1.00E+00	9.33E+01	NA	1.00E+02	NA	NA	No	BSL
7440-02-2	Nickel	1.30E+00	J	1.50E+00		ug/L	COMC-102-SW	2/2	1.00E+00 - 1.00E+00	1.50E+00	NA	1.14E+03	NA	NA	No	BSL
7440-09-7	Potassium	6.99E+03		7.29E+03		ug/L	COMC-101-SW	2/2	5.00E+03 - 5.00E+03	7.29E+03	NA	NA	NA	NA	No	NUT
7782-49-2	Selenium	6.00E-01	J	1.30E+00	J	ug/L	COMC-102-SW	2/2	5.00E+00 - 5.00E+00	1.30E+00	NA	4.20E+03	NA	NA	No	BSL
7440-23-5	Sodium	1.58E+05		1.65E+05		ug/L	COMC-101-SW	2/2	5.00E+03 - 5.00E+03	1.65E+05	NA	NA	NA	NA	No	NUT
7440-62-2	Vanadium	7.30E+00		8.60E+00		ug/L	COMC-101-SW	2/2	5.00E+00 - 5.00E+00	8.60E+00	NA	NA	NA	NA	No	BSL
7440-66-6	Zinc	2.00E+00	J	2.80E+00		ug/L	COMC-101-SW	2/2	2.00E+00 - 2.00E+00	2.80E+00	NA	2.60E+04	NA	NA	No	BSL
POLYCHLORINATED BIPHENYLS																
Total PCBs	**Total PCB Congeners**	**1.50E-03**	**J**	**1.50E-03**	**J**	**ug/L**	**COMC-101-SW**	**1/1**	**1.90E-05 - 1.90E-05**	**1.50E-03**	**NA**	**6.40E-04**	**NA**	**NA**	**Yes**	**ASL**

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.

Definitions:
C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
ug/L = micrograms per liter

(4) USEPA Regional Screening Levels, USEPA, November 2014. For non-carcinogens, value shown is equal to 1/10 the tap water value. For carcinogens the value shown is equal to the tap water value.
(5) Rationale Codes
Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Data Qualifiers: J = Indicates an estimated value

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TABLE 2.12
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
FISH FILLETS/ALL RESULTS

Scenario Timeframe: Current/Future
Medium: Tissue
Exposure Medium: Tissue
Exposure Point: Donna Reservoir and Canal System

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
INORGANICS																
7429-90-5	Aluminum	1.10E+00	J	5.70E+00	J	mg/kg	CAR-115-F	4/10	2.60E+00 - 3.00E+00	5.70E+00	NA	1.50E+02 N	NA	NA	No	BSL
7440-36-0	Antimony	4.50E-02	J	4.50E-02	J	mg/kg	CAR-111-F	1/10	1.70E-01 - 2.00E-01	4.50E-02	NA	6.20E-02 N	NA	NA	No	BSL
7440-38-2	**Arsenic**	**3.60E-02**	**J**	**2.00E-01**		**mg/kg**	**CAR-111-F**	**4/10**	**8.70E-02 - 9.90E-02**	**2.00E-01**	**NA**	**2.80E-03 C**	**NA**	**NA**	**Yes**	**ASL**
7440-39-3	Barium	5.40E-02	J	2.80E+00		mg/kg	GAR-104-F	10/10	8.70E-01 - 9.90E-01	2.80E+00	NA	3.10E+01 N	NA	NA	No	BSL
7440-70-2	Calcium	9.70E+01	J	3.10E+04	J	mg/kg	GAR-104-F	10/10	8.70E+00 - 9.90E+00	3.10E+04	NA	NA	NA	NA	No	NUT
7440-47-3	Chromium	2.50E-01		4.30E-01		mg/kg	GAR-104-F	8/10	1.70E-01 - 2.00E-01	4.30E-01	NA	2.30E+02 N	NA	NA	No	BSL
7440-48-4	**Cobalt**	**5.10E-03**	**J**	**6.40E-02**	**J**	**mg/kg**	**CAR-111-F**	**4/10**	**4.30E-02 - 5.00E-02**	**6.40E-02**	**NA**	**4.60E-02 N**	**NA**	**NA**	**Yes**	**ASL**
7440-50-8	Copper	2.40E-01		1.50E+00	J	mg/kg	CAR-111-F	10/10	1.70E-01 - 2.00E-01	1.50E+00	NA	6.20E+00 N	NA	NA	No	BSL
7439-89-6	Iron	6.70E+00		1.50E+01		mg/kg	CAR-106-F	5/10	4.30E+00 - 5.00E+00	1.50E+01	NA	1.10E+02 N	NA	NA	No	BSL
7439-92-1	Lead	3.50E-02	J	6.90E-02	J	mg/kg	CAR-111-F	3/10	8.70E-02 - 9.90E-02	6.90E-02	NA	NA	NA	NA	No	NSL
7439-95-4	Magnesium	2.20E+02		3.10E+03		mg/kg	GAR-104-F	10/10	8.70E+00 - 9.90E+00	3.10E+03	NA	NA	NA	NA	No	NUT
7439-96-5	Manganese	2.60E-01	J	4.40E+00		mg/kg	GAR-104-F	8/10	4.30E-01 - 5.00E-01	4.40E+00	NA	NA N	NA	NA	No	BSL
7439-97-6	**Mercury**	**4.30E-02**	**J**	**7.40E-01**	**J**	**mg/kg**	**LMB-101-F**	**10/10**	**3.00E-02 - 3.30E-02**	**7.40E-01**	**NA**	**1.50E-02 N**	**NA**	**NA**	**Yes**	**ASL**
7440-02-2	Nickel	1.60E-02	J	2.30E-01		mg/kg	GAR-104-F	9/10	8.70E-02 - 9.90E-02	2.30E-01	NA	3.10E+00 N	NA	NA	No	BSL
7440-09-7	Potassium	2.90E+03		3.80E+03		mg/kg	TIL-114-F	10/10	8.70E+00 - 9.90E+00	3.80E+03	NA	NA	NA	NA	No	NUT
7782-49-2	Selenium	9.30E-02	J	4.70E-01	J	mg/kg	GAR-104-F	10/10	4.30E-01 - 5.00E-01	4.70E-01	NA	7.70E-01 N	NA	NA	No	BSL
7440-23-5	Sodium	4.40E+02		8.80E+02		mg/kg	GAR-104-F	10/10	8.70E+00 - 9.90E+00	8.80E+02	NA	NA	NA	NA	No	NUT
7440-28-0	Thallium	1.30E-02	J	1.30E-02	J	mg/kg	CAR-111-F	1/10	8.70E-02 - 9.90E-02	1.30E-02	NA	1.50E-02 C	NA	NA	No	BSL
7440-62-2	Vanadium	3.80E-01		6.30E-01		mg/kg	GAR-104-F	8/10	8.70E-02 - 9.90E-02	6.30E-01	NA	7.80E-01 N	NA	NA	No	BSL
7440-66-6	Zinc	8.20E+00		4.20E+01		mg/kg	CAR-111-F	10/10	4.30E-01 - 5.00E-01	4.20E+01	NA	4.60E+01 N	NA	NA	No	BSL
POLYCHLORINATED BIPHENYLS																
11097-69-1	**Aroclor-1254**	**4.20E-03**	**JN**	**4.50E+00**	**J**	**mg/kg**	**BUF-153-F**	**35/105**	**4.10E-03 - 6.60E-01**	**4.50E+00**	**NA**	**2.10E-03 C**	**NA**	**NA**	**Yes**	**ASL**
11096-82-5	**Aroclor-1260**	**3.70E-02**	**J**	**3.60E+00**	**J**	**mg/kg**	**BUF-153-F**	**18/104**	**4.10E-03 - 6.60E-01**	**3.60E+00**	**NA**	**2.10E-03 C**	**NA**	**NA**	**Yes**	**ASL**
Total PCBs	**Total PCB Congeners**	**5.00E-03**		**1.50E+02**		**mg/kg**	**BUF-170-F**	**20/20**	**1.00E-06 - 1.60E-02**	**1.50E+02**	**NA**	**2.10E-03 C**	**NA**	**NA**	**Yes**	**ASL**
PESTICIDES																
72-54-8	4,4′-DDD	1.10E-04	J	2.30E-03	J	mg/kg	LMB-112-F	8/10	1.70E-04 - 8.30E-03	2.30E-03	NA	1.70E-02 C	NA	NA	No	BSL
72-55-9	**4,4′-DDE**	**1.40E-02**		**9.70E-02**		**mg/kg**	**CAT-113-F**	**10/10**	**1.70E-04 - 8.30E-03**	**9.70E-02**	**NA**	**1.20E-02 C**	**NA**	**NA**	**Yes**	**ASL**
50-29-3	**4,4′-DDT**	**1.80E-04**	**J**	**1.30E-01**		**mg/kg**	**CAR-111-F**	**7/10**	**1.70E-04 - 8.30E-03**	**1.30E-01**	**NA**	**1.20E-02 C**	**NA**	**NA**	**Yes**	**ASL**
309-00-2	**Aldrin**	**4.60E-05**	**J**	**3.90E-03**	**J**	**mg/kg**	**CAR-111-F**	**5/10**	**1.70E-04 - 8.30E-03**	**3.90E-03**	**NA**	**2.40E-04 C**	**NA**	**NA**	**Yes**	**ASL**
319-84-6	**alpha-BHC**	**7.10E-03**		**7.10E-03**		**mg/kg**	**CAT-116-F**	**1/10**	**1.70E-04 - 8.30E-03**	**7.10E-03**	**NA**	**6.60E-04 C**	**NA**	**NA**	**Yes**	**ASL**
5103-71-9	alpha-Chlordane	1.20E-04	J	8.30E-03	J	mg/kg	CAR-111-F	3/10	1.70E-04 - 8.30E-03	8.30E-03	NA	1.20E-02 C	NA	NA	No	BSL
319-85-7	beta-BHC	4.10E-04	J	4.10E-04	J	mg/kg	CAT-116-F	1/10	1.70E-04 - 8.30E-03	4.10E-04	NA	2.30E-03 C	NA	NA	No	BSL
319-86-8	**delta-BHC**	**4.90E-03**		**4.90E-03**		**mg/kg**	**CAT-116-F**	**1/10**	**1.70E-04 - 8.30E-03**	**4.90E-03**	**NA**	**2.30E-02 C**	**NA**	**NA**	**Yes**	**ASL**
60-57-1	**Dieldrin**	**1.70E-04**	**J**	**8.40E-03**		**mg/kg**	**CAR-111-F**	**7/10**	**1.70E-04 - 8.30E-03**	**8.40E-03**	**NA**	**2.60E-04 C**	**NA**	**NA**	**Yes**	**ASL**
959-98-8	Endosulfan I	6.30E-04	J	3.40E-03	J	mg/kg	CAR-111-F	5/10	1.70E-04 - 8.30E-03	3.40E-03	NA	9.30E-01 N	NA	NA	No	BSL
33213-65-9	Endosulfan II	4.30E-04	J	8.30E-03	J	mg/kg	CAR-111-F	4/10	1.70E-04 - 8.30E-03	8.30E-03	NA	9.30E-01 N	NA	NA	No	BSL
1031-07-8	Endosulfan sulfate	3.40E-05	J	7.60E-03	J	mg/kg	CAR-111-F	9/10	1.70E-04 - 8.30E-03	7.60E-03	NA	9.30E-01 N	NA	NA	No	BSL
72-20-8	**Endrin**	**1.80E-04**		**1.00E-01**		**mg/kg**	**CAR-111-F**	**8/10**	**1.70E-04 - 8.30E-03**	**1.00E-01**	**NA**	**4.60E-02 N**	**NA**	**NA**	**Yes**	**ASL**
7421-93-4	Endrin aldehyde	1.20E-04	J	5.50E-03		mg/kg	TIL-114-F	5/10	1.70E-04 - 8.30E-03	5.50E-03	NA	4.60E-02 N	NA	NA	No	BSL
53494-70-5	Endrin ketone	9.90E-05	J	1.00E-02		mg/kg	BUF-105-F	7/10	1.70E-04 - 8.30E-03	1.00E-02	NA	4.60E-02 N	NA	NA	No	BSL
58-89-9	**gamma-BHC (Lindane)**	**8.80E-05**	**J**	**5.00E-03**	**J**	**mg/kg**	**CAT-116-F**	**2/10**	**1.70E-04 - 8.30E-03**	**5.00E-03**	**NA**	**3.80E-03 C**	**NA**	**NA**	**Yes**	**ASL**
5103-74-2	**gamma-Chlordane**	**8.90E-05**	**J**	**3.70E-02**	**J**	**mg/kg**	**CAR-111-F**	**9/10**	**1.70E-04 - 8.30E-03**	**3.70E-02**	**NA**	**1.20E-02 C**	**NA**	**NA**	**Yes**	**ASL**
1024-57-3	**Heptachlor epoxide**	**5.20E-05**	**J**	**3.30E-03**	**J**	**mg/kg**	**CAR-111-F**	**7/10**	**1.70E-04 - 8.30E-03**	**3.30E-03**	**NA**	**4.60E-04 C**	**NA**	**NA**	**Yes**	**ASL**
72-43-5	Methoxychlor	9.90E-05	J	5.70E-02		mg/kg	CAR-111-F	8/10	3.30E-04 - 1.70E-02	5.70E-02	NA	7.70E-01 N	NA	NA	No	BSL

TABLE 2.12
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
FISH FILLETS/ALL RESULTS

Scenario Timeframe: Current/Future
Medium: Tissue
Exposure Medium: Tissue
Exposure Point: Donna Reservoir and Canal System

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
SEMI-VOLATILE ORGANIC COMPOUNDS																	
106-44-5	3-&4-Methylphenols	4.00E-03	J	4.00E-03	J	mg/kg	CAT-116-F	1/10	3.30E-02 - 2.00E-01	4.00E-03	NA	1.50E+01	N	NA	NA	No	BSL
100-52-7	Benzaldehyde	2.30E-02	J	3.20E-01	J	mg/kg	GAR-104-F	7/10	3.30E-02 - 2.00E-01	3.20E-01	NA	1.50E+01	N	NA	NA	No	BSL
117-81-7	Bis(2-ethylhexyl)phthalate	1.20E-02	J	8.40E-02	J	mg/kg	CAR-111-F	4/10	6.60E-02 - 4.00E-01	8.40E-02	NA	3.00E-01	C	NA	NA	No	BSL
105-60-2	Caprolactam	5.80E-02	J	5.80E-02	J	mg/kg	CAT-116-F	1/10	1.70E-01 - 1.00E+00	5.80E-02	NA	7.70E+01	N	NA	NA	No	BSL
84-66-2	Diethyl phthalate	4.00E-03	J	4.00E-01	J	mg/kg	CAR-111-F	4/10	3.30E-02 - 2.00E-01	4.00E-01	NA	1.20E+02	N	NA	NA	No	BSL
84-74-2	Di-n-butyl phthalate	4.90E-03	J	4.90E-03	J	mg/kg	CAT-116-F	1/10	3.30E-02 - 2.00E-01	4.90E-03	NA	1.50E+01	N	NA	NA	No	BSL
108-95-2	Phenol	8.70E-03		1.00E-02		mg/kg	CAT-116-F	2/10	6.70E-03 - 4.00E-02	1.00E-02	NA	4.60E+01	N	NA	NA	No	BSL
VOLATILE ORGANIC COMPOUNDS																	
98-86-2	Acetophenone	3.50E-03	J	3.70E-03	J	mg/kg	CAR-115-F	2/10	3.30E-02 - 2.00E-01	3.70E-03	NA	1.50E+01	N	NA	NA	No	BSL

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.
(4) USEPA Regional Screening Levels, USEPA, June 2015. For non-carcinogens, value shown is equal to 1/10 the tissue value. For carcinogens the value shown is equal to the tissue value.
(5) Rationale Codes
Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Definitions:
C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
NA = Not Applicable
mg/kg = milligrams per kilogram

Data Qualifiers: J = Indicates an estimated value

Surrogates used: methylmercury for mercury, chlordane for alpha and gamma chlordane, beta-BHC for delta-BHC, endosulfan for endosulfan I and II and endosulfan sulfate, endrin for endrin aldehyde and endrin ketone.

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TABLE 2.13
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
FISH FILLETS/BUFFALO

Scenario Timeframe: Current/Future
Medium: Tissue
Exposure Medium: Tissue
Exposure Point: Donna Reservoir and Canal System

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
							INORGANICS									
7440-38-2	**Arsenic**	**6.30E-02**	**J**	**6.30E-02**	**J**	**mg/kg**	**BUF-105-F**	**1/1**	**9.50E-02 - 9.50E-02**	**6.30E-02**	**NA**	**2.80E-03 C**	**NA**	**NA**	**Yes**	**ASL**
7440-39-3	Barium	8.80E-01	J	8.80E-01	J	mg/kg	BUF-105-F	1/1	9.50E-01 - 9.50E-01	8.80E-01	NA	3.10E+01 N	NA	NA	No	BSL
7440-70-2	Calcium	1.00E+03	J	1.00E+03	J	mg/kg	BUF-105-F	1/1	9.50E+00 - 9.50E+00	1.00E+03	NA	NA	NA	NA	No	NUT
7440-47-3	Chromium	2.60E-01		2.60E-01		mg/kg	BUF-105-F	1/1	1.90E-01 - 1.90E-01	2.60E-01	NA	2.30E+02 N	NA	NA	No	BSL
7440-50-8	Copper	4.70E-01		4.70E-01		mg/kg	BUF-105-F	1/1	1.90E-01 - 1.90E-01	4.70E-01	NA	6.20E+00 N	NA	NA	No	BSL
7439-95-4	Magnesium	2.30E+02		2.30E+02		mg/kg	BUF-105-F	1/1	9.50E+00 - 9.50E+00	2.30E+02	NA	NA	NA	NA	No	NUT
7439-96-5	Manganese	1.50E+00		1.50E+00		mg/kg	BUF-105-F	1/1	4.80E-01 - 4.80E-01	1.50E+00	NA	2.20E+01 N	NA	NA	No	BSL
7439-97-6	**Mercury**	**8.50E-02**	**J**	**8.50E-02**	**J**	**mg/kg**	**BUF-105-F**	**1/1**	**3.20E-02 - 3.20E-02**	**8.50E-02**	**NA**	**1.50E-02 N**	**NA**	**NA**	**Yes**	**ASL**
7440-02-2	Nickel	3.30E-02	J	3.30E-02	J	mg/kg	BUF-105-F	1/1	9.50E-02 - 9.50E-02	3.30E-02	NA	3.10E+00 N	NA	NA	No	BSL
7440-09-7	Potassium	3.20E+03		3.20E+03		mg/kg	BUF-105-F	1/1	9.50E+00 - 9.50E+00	3.20E+03	NA	NA	NA	NA	No	NUT
7782-49-2	Selenium	2.00E-01	J	2.00E-01	J	mg/kg	BUF-105-F	1/1	4.80E-01 - 4.80E-01	2.00E-01	NA	7.70E-01 N	NA	NA	No	BSL
7440-23-5	Sodium	5.60E+02		5.60E+02		mg/kg	BUF-105-F	1/1	9.50E+00 - 9.50E+00	5.60E+02	NA	NA	NA	NA	No	NUT
7440-62-2	Vanadium	4.80E-01		4.80E-01		mg/kg	BUF-105-F	1/1	9.50E-02 - 9.50E-02	4.80E-01	NA	7.80E-01 N	NA	NA	No	BSL
7440-66-6	Zinc	8.20E+00		8.20E+00		mg/kg	BUF-105-F	1/1	4.80E-01 - 4.80E-01	8.20E+00	NA	4.60E+01 N	NA	NA	No	BSL
							POLYCHLORINATED BIPHENYLS									
11097-69-1	**Aroclor-1254**	**6.50E-02**	**J**	**4.50E+00**	**J**	**mg/kg**	**BUF-153-F**	**8/12**	**3.30E-02 - 6.60E-01**	**4.50E+00**	**NA**	**2.10E-03 C**	**NA**	**NA**	**Yes**	**ASL**
11096-82-5	**Aroclor-1260**	**1.40E-01**	**J**	**3.60E+00**	**J**	**mg/kg**	**BUF-153-F**	**2/12**	**3.30E-02 - 6.60E-01**	**3.60E+00**	**NA**	**2.10E-03 C**	**NA**	**NA**	**Yes**	**ASL**
Total PCBs	**Total PCB Congeners**	**1.60E-02**	**J**	**1.50E+02**		**mg/kg**	**BUF-170-F**	**3/3**	**4.10E-06 - 1.60E-02**	**1.50E+02**	**NA**	**2.10E-03 C**	**NA**	**NA**	**Yes**	**ASL**
							PESTICIDES									
72-54-8	4,4′-DDD	1.30E-03	J	1.30E-03	J	mg/kg	BUF-105-F	1/1	1.70E-03 - 1.70E-03	1.30E-03	NA	1.70E-02 C	NA	NA	No	BSL
72-55-9	**4,4′-DDE**	**3.50E-02**	**J**	**3.50E-02**	**J**	**mg/kg**	**BUF-105-F**	**1/1**	**1.70E-03 - 1.70E-03**	**3.50E-02**	**NA**	**1.20E-02 C**	**NA**	**NA**	**Yes**	**ASL**
50-29-3	4,4′-DDT	1.10E-02	J	1.10E-02	J	mg/kg	BUF-105-F	1/1	1.70E-03 - 1.70E-03	1.10E-02	NA	1.20E-02 C	NA	NA	No	BSL
60-57-1	**Dieldrin**	**5.30E-03**		**5.30E-03**		**mg/kg**	**BUF-105-F**	**1/1**	**1.70E-03 - 1.70E-03**	**5.30E-03**	**NA**	**2.60E-04 C**	**NA**	**NA**	**Yes**	**ASL**
959-98-8	Endosulfan I	2.00E-03		2.00E-03		mg/kg	BUF-105-F	1/1	1.70E-03 - 1.70E-03	2.00E-03	NA	9.30E-01 N	NA	NA	No	BSL
33213-65-9	Endosulfan II	1.00E-03	J	1.00E-03	J	mg/kg	BUF-105-F	1/1	1.70E-03 - 1.70E-03	1.00E-03	NA	9.30E-01 N	NA	NA	No	BSL
1031-07-8	Endosulfan sulfate	3.20E-03	J	3.20E-03	J	mg/kg	BUF-105-F	1/1	1.70E-03 - 1.70E-03	3.20E-03	NA	9.30E-01 N	NA	NA	No	BSL
72-20-8	Endrin	4.30E-02		4.30E-02		mg/kg	BUF-105-F	1/1	1.70E-03 - 1.70E-03	4.30E-02	NA	4.60E-02 N	NA	NA	No	BSL
53494-70-5	Endrin ketone	1.00E-02		1.00E-02		mg/kg	BUF-105-F	1/1	1.70E-03 - 1.70E-03	1.00E-02	NA	4.60E-02 N	NA	NA	No	BSL
5103-74-2	**gamma-Chlordane**	**1.40E-02**	**J**	**1.40E-02**	**J**	**mg/kg**	**BUF-105-F**	**1/1**	**1.70E-03 - 1.70E-03**	**1.40E-02**	**NA**	**1.20E-02 C**	**NA**	**NA**	**Yes**	**ASL**
1024-57-3	**Heptachlor epoxide**	**1.30E-03**	**J**	**1.30E-03**	**J**	**mg/kg**	**BUF-105-F**	**1/1**	**1.70E-03 - 1.70E-03**	**1.30E-03**	**NA**	**4.60E-04 C**	**NA**	**NA**	**Yes**	**ASL**
72-43-5	Methoxychlor	2.40E-02		2.40E-02		mg/kg	BUF-105-F	1/1	3.30E-03 - 3.30E-03	2.40E-02	NA	7.70E-01 N	NA	NA	No	BSL
							SEMI-VOLATILE ORGANIC COMPOUNDS									
117-81-7	Bis(2-ethylhexyl)phthalate	7.50E-02	J	7.50E-02	J	mg/kg	BUF-105-F	1/1	4.00E-01 - 4.00E-01	7.50E-02	NA	3.00E-01 C	NA	NA	No	BSL

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.
(4) USEPA Regional Screening Levels, USEPA, June 2015. For non-carcinogens, value shown is equal to 1/10 the tissue value. For carcinogens the value shown is equal to the tissue value.
(5) Rationale Codes
Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Definitions:
C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
NA = Not Applicable
mg/kg = milligrams per kilogram

Data Qualifiers: J = Indicates an estimated value

Surrogates used: methylmercury for mercury, chlordane for alpha and gamma chlordane, endosulfan for endosulfan I and II and endosulfan sulfate, endrin for endrin ketone.

TABLE 2.14
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
FISH FILLETS/GAR

Scenario Timeframe: Current
Medium: Tissue
Exposure Medium: Tissue
Exposure Point: Donna Reservoir and Canal System

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
INORGANICS																
7440-39-3	Barium	2.80E+00		2.80E+00		mg/kg	GAR-104-F	1/1	9.90E-01 - 9.90E-01	2.80E+00	NA	3.10E+01 N	NA	NA	No	BSL
7440-70-2	Calcium	3.10E+04	J	3.10E+04	J	mg/kg	GAR-104-F	1/1	9.90E+00 - 9.90E+00	3.10E+04	NA	NA	NA	NA	No	NUT
7440-47-3	Chromium	4.30E-01		4.30E-01		mg/kg	GAR-104-F	1/1	2.00E-01 - 2.00E-01	4.30E-01	NA	2.30E+02 N	NA	NA	No	BSL
7440-48-4	**Cobalt**	**5.50E-02**		**5.50E-02**		**mg/kg**	**GAR-104-F**	**1/1**	**5.00E-02 - 5.00E-02**	**5.50E-02**	**NA**	**4.60E-02 N**	**NA**	**NA**	**Yes**	**ASL**
7440-50-8	Copper	2.80E-01		2.80E-01		mg/kg	GAR-104-F	1/1	2.00E-01 - 2.00E-01	2.80E-01	NA	6.20E+00 N	NA	NA	No	BSL
7439-89-6	Iron	1.30E+01		1.30E+01		mg/kg	GAR-104-F	1/1	5.00E+00 - 5.00E+00	1.30E+01	NA	1.10E+02 N	NA	NA	No	BSL
7439-95-4	Magnesium	3.10E+03		3.10E+03		mg/kg	GAR-104-F	1/1	9.90E+00 - 9.90E+00	3.10E+03	NA	NA	NA	NA	No	NUT
7439-96-5	Manganese	4.40E+00		4.40E+00		mg/kg	GAR-104-F	1/1	5.00E-01 - 5.00E-01	4.40E+00	NA	2.20E+01 N	NA	NA	No	BSL
7439-96-5	Manganese	4.40E+00		4.40E+00		mg/kg	GAR-104-F	1/1	5.00E-01 - 5.00E-01	4.40E+00	NA	NA N	NA	NA	No	BSL
7439-97-6	**Mercury**	**2.20E-01**	**J**	**2.20E-01**	**J**	**mg/kg**	**GAR-104-F**	**1/1**	**3.20E-02 - 3.20E-02**	**2.20E-01**	**NA**	**4.60E-02 N**	**NA**	**NA**	**Yes**	**ASL**
7440-02-2	Nickel	2.30E-01		2.30E-01		mg/kg	GAR-104-F	1/1	9.90E-02 - 9.90E-02	2.30E-01	NA	3.10E+00 N	NA	NA	No	BSL
7440-09-7	Potassium	3.10E+03		3.10E+03		mg/kg	GAR-104-F	1/1	9.90E+00 - 9.90E+00	3.10E+03	NA	NA	NA	NA	No	NUT
7782-49-2	Selenium	4.70E-01	J	4.70E-01	J	mg/kg	GAR-104-F	1/1	5.00E-01 - 5.00E-01	4.70E-01	NA	7.70E-01 N	NA	NA	No	BSL
7440-23-5	Sodium	8.80E+02		8.80E+02		mg/kg	GAR-104-F	1/1	9.90E+00 - 9.90E+00	8.80E+02	NA	NA	NA	NA	No	NUT
7440-62-2	Vanadium	6.30E-01		6.30E-01		mg/kg	GAR-104-F	1/1	9.90E-02 - 9.90E-02	6.30E-01	NA	7.80E-01 N	NA	NA	No	BSL
7440-66-6	Zinc	2.40E+01		2.40E+01		mg/kg	GAR-104-F	1/1	5.00E-01 - 5.00E-01	2.40E+01	NA	4.60E+01 N	NA	NA	No	BSL
POLYCHLORINATED BIPHENYLS																
11097-69-1	**Aroclor-1254**	**1.50E-01**	**J**	**9.50E-01**	**J**	**mg/kg**	**GAR-181-F**	**3/10**	**4.20E-03 - 1.60E-01**	**9.50E-01**	**NA**	**2.10E-03 C**	**NA**	**NA**	**Yes**	**ASL**
11096-82-5	**Aroclor-1260**	**8.50E-02**		**8.30E-01**	**J**	**mg/kg**	**GAR-181-F**	**9/10**	**4.20E-03 - 1.60E-01**	**8.30E-01**	**NA**	**2.10E-03 C**	**NA**	**NA**	**Yes**	**ASL**
Total PCBs	**Total PCB Congeners**	**4.10E-01**		**4.10E-01**		**mg/kg**	**GAR-186-F**	**1/1**	**8.00E-05 - 8.00E-05**	**4.10E-01**	**NA**	**2.10E-03 C**	**NA**	**NA**	**Yes**	**ASL**
PESTICIDES																
72-54-8	4,4'-DDD	4.10E-04	J	4.10E-04	J	mg/kg	GAR-104-F	1/1	1.70E-04 - 1.70E-04	4.10E-04	NA	1.70E-02 C	NA	NA	No	BSL
72-55-9	**4,4'-DDE**	**2.20E-02**		**2.20E-02**		**mg/kg**	**GAR-104-F**	**1/1**	**1.70E-04 - 1.70E-04**	**2.20E-02**	**NA**	**1.20E-02 C**	**NA**	**NA**	**Yes**	**ASL**
50-29-3	4,4'-DDT	5.20E-04	J	5.20E-04	J	mg/kg	GAR-104-F	1/1	1.70E-04 - 1.70E-04	5.20E-04	NA	1.20E-02 C	NA	NA	No	BSL
309-00-2	Aldrin	4.60E-05	J	4.60E-05	J	mg/kg	GAR-104-F	1/1	1.70E-04 - 1.70E-04	4.60E-05	NA	2.40E-04 C	NA	NA	No	BSL
1031-07-8	Endosulfan sulfate	1.30E-04	J	1.30E-04	J	mg/kg	GAR-104-F	1/1	1.70E-04 - 1.70E-04	1.30E-04	NA	9.30E-01 N	NA	NA	No	BSL
72-20-8	Endrin	1.10E-03		1.10E-03		mg/kg	GAR-104-F	1/1	1.70E-04 - 1.70E-04	1.10E-03	NA	4.60E-02 N	NA	NA	No	BSL
7421-93-4	Endrin aldehyde	1.20E-04	J	1.20E-04	J	mg/kg	GAR-104-F	1/1	1.70E-04 - 1.70E-04	1.20E-04	NA	4.60E-02 N	NA	NA	No	BSL
53494-70-5	Endrin ketone	4.20E-04	J	4.20E-04	J	mg/kg	GAR-104-F	1/1	1.70E-04 - 1.70E-04	4.20E-04	NA	4.60E-02 N	NA	NA	No	BSL
72-43-5	Methoxychlor	9.90E-05	J	9.90E-05	J	mg/kg	GAR-104-F	1/1	3.30E-04 - 3.30E-04	9.90E-05	NA	7.70E-01 N	NA	NA	No	BSL
SEMI-VOLATILE ORGANIC COMPOUNDS																
100-52-7	Benzaldehyde	3.20E-01	J	3.20E-01	J	mg/kg	GAR-104-F	1/1	2.00E-01 - 2.00E-01	3.20E-01	NA	1.50E+01 N	NA	NA	No	BSL

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.
(4) USEPA Regional Screening Levels, USEPA, June 2015. For non-carcinogens, value shown is equal to 1/10 the tissue value. For carcinogens the value shown is equal to the tissue value.
(5) Rationale Codes

Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Definitions:
C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
NA = Not Applicable
mg/kg = milligrams per kilogram

Data Qualifiers:

Surrogates used: methylmercury for mercury, endosulfan for endosulfan sulfate, endrin for endrin aldehyde and endrin ketone.

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TABLE 2.15
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
FISH FILLETS/CATFISH

Scenario Timeframe: Current/Future
Medium: Tissue
Exposure Medium: Tissue
Exposure Point: Donna Reservoir and Canal System

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
							INORGANICS										
7429-90-5	Aluminum	1.60E+00	J	1.60E+00	J	mg/kg	CAT-116-F	1/2	2.80E+00 - 2.90E+00	1.60E+00	NA	1.50E+02	N	NA	NA	No	BSL
7440-39-3	Barium	5.40E-02	J	1.30E-01	J	mg/kg	CAT-113-F	2/2	9.30E-01 - 9.60E-01	1.30E-01	NA	3.10E+01	N	NA	NA	No	BSL
7440-70-2	Calcium	9.70E+01	J	1.10E+02	J	mg/kg	CAT-113-F	2/2	9.30E+00 - 9.60E+00	1.10E+02	NA	NA		NA	NA	No	NUT
7440-47-3	Chromium	2.50E-01		2.50E-01		mg/kg	CAT-113-F	1/2	1.90E-01 - 1.90E-01	2.50E-01	NA	2.30E+02	N	NA	NA	No	BSL
7440-48-4	Cobalt	5.10E-03	J	5.10E-03	J	mg/kg	CAT-116-F	1/2	4.70E-02 - 4.80E-02	5.10E-03	NA	4.60E-02	N	NA	NA	No	BSL
7440-50-8	Copper	2.90E-01		3.10E-01		mg/kg	CAT-116-F	2/2	1.90E-01 - 1.90E-01	3.10E-01	NA	6.20E+00	N	NA	NA	No	BSL
7439-89-6	Iron	6.70E+00		6.70E+00		mg/kg	CAT-116-F	1/2	4.70E+00 - 4.80E+00	6.70E+00	NA	1.10E+02	N	NA	NA	No	BSL
7439-95-4	Magnesium	2.20E+02		2.20E+02		mg/kg	CAT-116-F, CAT-113-F	2/2	9.30E+00 - 9.60E+00	2.20E+02	NA	NA		NA	NA	No	NUT
7439-96-5	Manganese	2.60E-01	J	2.60E-01	J	mg/kg	CAT-116-F	1/2	4.70E-01 - 4.80E-01	2.60E-01	NA	NA	N	NA	NA	No	NSL
7439-97-6	**Mercury**	**1.40E-01**	**J**	**1.50E-01**	**J**	**mg/kg**	**CAT-116-F**	**2/2**	**3.20E-02 - 3.20E-02**	**1.50E-01**	**NA**	**1.50E-02**	**N**	**NA**	**NA**	**Yes**	**ASL**
7440-02-2	Nickel	1.60E-02	J	3.70E-02	J	mg/kg	CAT-113-F	2/2	9.30E-02 - 9.60E-02	3.70E-02	NA	3.10E+00	N	NA	NA	No	BSL
7440-09-7	Potassium	3.60E+03		3.60E+03		mg/kg	CAT-116-F, CAT-113-F	2/2	9.30E+00 - 9.60E+00	3.60E+03	NA	NA		NA	NA	No	NUT
7782-49-2	Selenium	9.30E-02	J	2.20E-01	J	mg/kg	CAT-113-F	2/2	4.70E-01 - 4.80E-01	2.20E-01	NA	7.70E-01	N	NA	NA	No	BSL
7440-23-5	Sodium	4.40E+02		4.50E+02		mg/kg	CAT-116-F	2/2	9.30E+00 - 9.60E+00	4.50E+02	NA	NA		NA	NA	No	NUT
7440-62-2	Vanadium	4.70E-01		4.70E-01		mg/kg	CAT-113-F	1/2	9.30E-02 - 9.60E-02	4.70E-01	NA	7.80E-01	N	NA	NA	No	BSL
7440-66-6	Zinc	1.10E+01	J	1.70E+01		mg/kg	CAT-113-F	2/2	4.70E-01 - 4.80E-01	1.70E+01	NA	4.60E+01	N	NA	NA	No	BSL
							POLYCHLORINATED BIPHENYLS										
11097-69-1	**Aroclor-1254**	**4.30E-02**	**P**	**9.60E-01**	**J**	**mg/kg**	**CAT-147-F**	**8/18**	**4.20E-03 - 1.60E-01**	**9.60E-01**	**NA**	**2.10E-03**	**C**	**NA**	**NA**	**Yes**	**ASL**
11096-82-5	**Aroclor-1260**	**5.50E-02**	**P**	**7.20E-01**	**J**	**mg/kg**	**CAT-147-F**	**5/18**	**4.20E-03 - 1.60E-01**	**7.20E-01**	**NA**	**2.10E-03**	**C**	**NA**	**NA**	**Yes**	**ASL**
Total PCBs	**Total PCB Congeners**	**9.70E-03**		**4.00E+00**		**mg/kg**	**CAT-156-F**	**4/4**	**2.10E-06 - 3.90E-04**	**4.00E+00**	**NA**	**2.10E-03**	**C**	**NA**	**NA**	**Yes**	**ASL**
							PESTICIDES										
72-54-8	4,4´-DDD	1.10E-04	J	1.40E-03	J	mg/kg	CAT-113-F	2/2	4.20E-04 - 1.70E-03	1.40E-03	NA	1.70E-02	C	NA	NA	No	BSL
72-55-9	**4,4´-DDE**	**1.40E-02**		**9.70E-02**		**mg/kg**	**CAT-113-F**	**2/2**	**4.20E-04 - 1.70E-03**	**9.70E-02**	**NA**	**1.20E-02**	**C**	**NA**	**NA**	**Yes**	**ASL**
50-29-3	4,4´-DDT	8.90E-03	J	8.90E-03	J	mg/kg	CAT-113-F	1/2	4.20E-04 - 1.70E-03	8.90E-03	NA	1.20E-02	C	NA	NA	No	BSL
319-84-6	**alpha-BHC**	**7.10E-03**		**7.10E-03**		**mg/kg**	**CAT-116-F**	**1/2**	**4.20E-04 - 1.70E-03**	**7.10E-03**	**NA**	**6.60E-04**	**C**	**NA**	**NA**	**Yes**	**ASL**
5103-71-9	alpha-Chlordane	1.20E-04	J	1.20E-04	J	mg/kg	CAT-116-F	1/2	4.20E-04 - 1.70E-03	1.20E-04	NA	1.20E-02	C	NA	NA	No	BSL
319-85-7	beta-BHC	4.10E-04	J	4.10E-04	J	mg/kg	CAT-116-F	1/2	4.20E-04 - 1.70E-03	4.10E-04	NA	2.30E-03	C	NA	NA	No	BSL
319-86-8	**delta-BHC**	**4.90E-03**		**4.90E-03**		**mg/kg**	**CAT-116-F**	**1/2**	**4.20E-04 - 1.70E-03**	**4.90E-03**	**NA**	**2.30E-03**	**C**	**NA**	**NA**	**Yes**	**ASL**
60-57-1	**Dieldrin**	**1.70E-04**	**J**	**1.50E-03**	**J**	**mg/kg**	**CAT-113-F**	**2/2**	**4.20E-04 - 1.70E-03**	**1.50E-03**	**NA**	**2.60E-04**	**C**	**NA**	**NA**	**Yes**	**ASL**
959-98-8	Endosulfan I	6.30E-04	J	6.30E-04	J	mg/kg	CAT-113-F	1/2	4.20E-04 - 1.70E-03	6.30E-04	NA	9.30E-01	N	NA	NA	No	BSL
33213-65-9	Endosulfan II	4.30E-04	J	4.30E-04	J	mg/kg	CAT-113-F	1/2	4.20E-04 - 1.70E-03	4.30E-04	NA	9.30E-01	N	NA	NA	No	BSL
1031-07-8	Endosulfan sulfate	2.80E-03	J	2.80E-03	J	mg/kg	CAT-113-F	1/2	4.20E-04 - 1.70E-03	2.80E-03	NA	9.30E-01	N	NA	NA	No	BSL
72-20-8	Endrin	3.30E-02		3.30E-02		mg/kg	CAT-113-F	1/2	4.20E-04 - 1.70E-03	3.30E-02	NA	4.60E-02	N	NA	NA	No	BSL
7421-93-4	Endrin aldehyde	2.00E-03	J	2.00E-03	J	mg/kg	CAT-113-F	1/2	4.20E-04 - 1.70E-03	2.00E-03	NA	4.60E-02	N	NA	NA	No	BSL
53494-70-5	Endrin ketone	7.70E-03		7.70E-03		mg/kg	CAT-113-F	1/2	4.20E-04 - 1.70E-03	7.70E-03	NA	4.60E-02	N	NA	NA	No	BSL
58-89-9	**gamma-BHC (Lindane)**	**5.00E-03**	**J**	**5.00E-03**	**J**	**mg/kg**	**CAT-116-F**	**1/2**	**4.20E-04 - 1.70E-03**	**5.00E-03**	**NA**	**3.80E-03**	**C**	**NA**	**NA**	**Yes**	**ASL**
5103-74-2	gamma-Chlordane	1.80E-04	J	9.90E-03		mg/kg	CAT-113-F	2/2	4.20E-04 - 1.70E-03	9.90E-03	NA	1.20E-02	C	NA	NA	No	BSL
1024-57-3	**Heptachlor epoxide**	**7.40E-04**	**J**	**7.40E-04**	**J**	**mg/kg**	**CAT-113-F**	**1/2**	**4.20E-04 - 1.70E-03**	**7.40E-04**	**NA**	**4.60E-04**	**C**	**NA**	**NA**	**Yes**	**ASL**
72-43-5	Methoxychlor	1.90E-02		1.90E-02		mg/kg	CAT-113-F	1/2	8.30E-04 - 3.30E-03	1.90E-02	NA	7.70E-01	N	NA	NA	No	BSL

TABLE 2.15
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
FISH FILLETS/CATFISH

Scenario Timeframe: Current/Future
Medium: Tissue
Exposure Medium: Tissue
Exposure Point: Donna Reservoir and Canal System

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
SEMI-VOLATILE ORGANIC COMPOUNDS																
106-44-5	3-&4-Methylphenols	4.00E-03	J	4.00E-03	J	mg/kg	CAT-116-F	1/2	3.30E-02 - 2.00E-01	4.00E-03	NA	1.50E+01 N	NA	NA	No	BSL
100-52-7	Benzaldehyde	2.40E-02	J	2.40E-02	J	mg/kg	CAT-116-F	1/2	3.30E-02 - 2.00E-01	2.40E-02	NA	1.50E+01 N	NA	NA	No	BSL
117-81-7	Bis(2-ethylhexyl)phthalate	4.60E-02	J	4.60E-02	J	mg/kg	CAT-113-F	1/2	6.70E-02 - 4.00E-01	4.60E-02	NA	3.00E-01 C	NA	NA	No	BSL
105-60-2	Caprolactam	5.80E-02	J	5.80E-02	J	mg/kg	CAT-116-F	1/2	1.70E-01 - 1.00E+00	5.80E-02	NA	7.70E+01 N	NA	NA	No	BSL
84-66-2	Diethyl phthalate	4.50E-03	J	4.50E-03	J	mg/kg	CAT-116-F	1/2	3.30E-02 - 2.00E-01	4.50E-03	NA	1.20E+02 N	NA	NA	No	BSL
84-74-2	Di-n-butyl phthalate	4.90E-03	J	4.90E-03	J	mg/kg	CAT-116-F	1/2	3.30E-02 - 2.00E-01	4.90E-03	NA	1.50E+01 N	NA	NA	No	BSL
108-95-2	Phenol	1.00E-02		1.00E-02		mg/kg	CAT-116-F	1/2	6.70E-03 - 4.00E-02	1.00E-02	NA	4.60E+01 N	NA	NA	No	BSL
VOLATILE ORGANIC COMPOUNDS																
98-86-2	Acetophenone	3.50E-03	J	3.50E-03	J	mg/kg	CAT-116-F	1/2	3.30E-02 - 2.00E-01	3.50E-03	NA	1.50E+01 N	NA	NA	No	BSL

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.
(4) USEPA Regional Screening Levels, USEPA, June 2015. For non-carcinogens, value shown is equal to 1/10 the tissue value. For carcinogens the value shown is equal to the tissue value.
(5) Rationale Codes
Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Definitions:
C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
NA = Not Applicable
mg/kg = milligrams per kilogram

Data Qualifiers:
J = Indicates an estimated value

Surrogates used: methylmercury for mercury, chlordane for alpha and gamma chlordane, beta-BHC for delta-BHC, endosulfan for endosulfan I and II and endosulfan sulfate, endrin for endrin aldehyde and endrin ketone.

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TABLE 2.16
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
FISH FILLETS/LARGE MOUTH BASS

Scenario Timeframe: Current/Future
Medium: Tissue
Exposure Medium: Tissue
Exposure Point: Donna Reservoir and Canal System

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
							INORGANICS									
7440-39-3	Barium	1.40E-01	J	3.00E-01	J	mg/kg	LMB-112-F	2/2	9.40E-01 - 9.80E-01	3.00E-01	NA	3.10E+01 N	NA	NA	No	BSL
7440-70-2	Calcium	5.40E+02	J	6.10E+03	J	mg/kg	LMB-112-F	2/2	9.40E+00 - 9.80E+00	6.10E+03	NA	NA	NA	NA	No	NUT
7440-47-3	Chromium	2.50E-01		2.50E-01		mg/kg	LMB-101-F, LMB-112-F	2/2	1.90E-01 - 2.00E-01	2.50E-01	NA	2.30E+02 N	NA	NA	No	BSL
7440-50-8	Copper	2.40E-01		2.60E-01		mg/kg	LMB-112-F	2/2	1.90E-01 - 2.00E-01	2.60E-01	NA	6.20E+00 N	NA	NA	No	BSL
7439-95-4	Magnesium	2.50E+02		3.80E+02		mg/kg	LMB-112-F	2/2	9.40E+00 - 9.80E+00	3.80E+02	NA	NA	NA	NA	No	NUT
7439-96-5	Manganese	4.50E-01	J	4.50E-01	J	mg/kg	LMB-112-F	1/2	4.70E-01 - 4.90E-01	4.50E-01	NA	2.20E+01 N	NA	NA	No	BSL
7439-96-5	Manganese	4.50E-01	J	4.50E-01	J	mg/kg	LMB-112-F	1/2	4.70E-01 - 4.90E-01	4.50E-01	NA	NA N	NA	NA	No	BSL
7439-97-6	**Mercury**	**4.50E-01**	**J**	**7.40E-01**	**J**	**mg/kg**	**LMB-101-F**	**2/2**	**3.10E-02 - 3.30E-02**	**7.40E-01**	**NA**	**4.60E-02 N**	**NA**	**NA**	**Yes**	**ASL**
7440-02-2	Nickel	3.00E-02	J	6.20E-02	J	mg/kg	LMB-112-F	2/2	9.40E-02 - 9.80E-02	6.20E-02	NA	3.10E+00 N	NA	NA	No	BSL
7440-09-7	Potassium	3.70E+03		3.70E+03		mg/kg	LMB-101-F, LMB-112-F	2/2	9.40E+00 - 9.80E+00	3.70E+03	NA	NA	NA	NA	No	NUT
7782-49-2	Selenium	9.90E-02	J	1.70E-01	J	mg/kg	LMB-101-F	2/2	4.70E-01 - 4.90E-01	1.70E-01	NA	7.70E-01 N	NA	NA	No	BSL
7440-23-5	Sodium	5.40E+02		6.10E+02		mg/kg	LMB-101-F	2/2	9.40E+00 - 9.80E+00	6.10E+02	NA	NA	NA	NA	No	NUT
7440-62-2	Vanadium	4.10E-01		4.50E-01		mg/kg	LMB-112-F	2/2	9.40E-02 - 9.80E-02	4.50E-01	NA	7.80E-01 N	NA	NA	No	BSL
7440-66-6	Zinc	8.50E+00		1.10E+01		mg/kg	LMB-112-F	2/2	4.70E-01 - 4.90E-01	1.10E+01	NA	4.60E+01 N	NA	NA	No	BSL
							POLYCHLORINATED BIPHENYLS									
11097-69-1	**Aroclor-1254**	**3.10E-02**	**NJQ**	**1.40E-01**		**mg/kg**	**LMB-112-F**	**4/19**	**4.10E-03 - 1.63E-01**	**1.40E-01**	**NA**	**2.10E-03 C**	**NA**	**NA**	**Yes**	**ASL**
Total PCBs	**Total PCBs Congeners**	**1.50E-02**		**2.10E+00**		**mg/kg**	**LMB-112-F**	**7/7**	**2.00E-06 - 1.60E-04**	**2.10E+00**	**NA**	**2.10E-03 C**	**NA**	**NA**	**Yes**	**ASL**
							PESTICIDES									
72-54-8	4,4´-DDD	3.00E-04	J	2.30E-03	J	mg/kg	LMB-112-F	2/2	1.70E-04 - 1.70E-03	2.30E-03	NA	1.70E-02 C	NA	NA	No	BSL
72-55-9	**4,4´-DDE**	**1.90E-02**		**8.60E-02**		**mg/kg**	**LMB-112-F**	**2/2**	**1.70E-04 - 1.70E-03**	**8.60E-02**	**NA**	**1.20E-02 C**	**NA**	**NA**	**Yes**	**ASL**
50-29-3	4,4´-DDT	1.80E-04	J	8.50E-03	J	mg/kg	LMB-112-F	2/2	1.70E-04 - 1.70E-03	8.50E-03	NA	1.20E-02 C	NA	NA	No	BSL
309-00-2	**Aldrin**	**4.90E-05**	**J**	**2.10E-03**		**mg/kg**	**LMB-112-F**	**2/2**	**1.70E-04 - 1.70E-03**	**2.10E-03**	**NA**	**2.40E-04 C**	**NA**	**NA**	**Yes**	**ASL**
60-57-1	**Dieldrin**	**2.90E-03**		**2.90E-03**		**mg/kg**	**LMB-112-F**	**1/2**	**1.70E-04 - 1.70E-03**	**2.90E-03**	**NA**	**2.60E-04 C**	**NA**	**NA**	**Yes**	**ASL**
959-98-8	Endosulfan I	8.00E-04	J	8.00E-04	J	mg/kg	LMB-112-F	1/2	1.70E-04 - 1.70E-03	8.00E-04	NA	9.30E-01 N	NA	NA	No	BSL
1031-07-8	Endosulfan sulfate	3.40E-05	J	2.60E-03	J	mg/kg	LMB-112-F	2/2	1.70E-04 - 1.70E-03	2.60E-03	NA	9.30E-01 N	NA	NA	No	BSL
72-20-8	Endrin	1.80E-04		3.20E-02		mg/kg	LMB-112-F	2/2	1.70E-04 - 1.70E-03	3.20E-02	NA	4.60E-02 N	NA	NA	No	BSL
7421-93-4	Endrin aldehyde	3.30E-03		3.30E-03		mg/kg	LMB-112-F	1/2	1.70E-04 - 1.70E-03	3.30E-03	NA	4.60E-02 N	NA	NA	No	BSL
53494-70-5	Endrin ketone	9.90E-05	J	2.50E-03	J	mg/kg	LMB-112-F	2/2	1.70E-04 - 1.70E-03	2.50E-03	NA	4.60E-02 N	NA	NA	No	BSL
5103-74-2	gamma-Chlordane	8.90E-05	J	9.10E-03	J	mg/kg	LMB-112-F	2/2	1.70E-04 - 1.70E-03	9.10E-03	NA	1.20E-02 C	NA	NA	No	BSL
1024-57-3	**Heptachlor epoxide**	**5.20E-05**	**J**	**8.00E-04**	**J**	**mg/kg**	**LMB-112-F**	**2/2**	**1.70E-04 - 1.70E-03**	**8.00E-04**	**NA**	**4.60E-04 C**	**NA**	**NA**	**Yes**	**ASL**
72-43-5	Methoxychlor	2.40E-04	J	1.90E-02		mg/kg	LMB-112-F	2/2	3.30E-04 - 3.30E-03	1.90E-02	NA	7.70E-01 N	NA	NA	No	BSL
							SEMI-VOLATILE ORGANIC COMPOUNDS									
100-52-7	Benzaldehyde	4.70E-02	J	9.10E-02	J	mg/kg	LMB-101-F	2/2	2.00E-01 - 2.00E-01	9.10E-02	NA	1.50E+01 N	NA	NA	No	BSL
84-66-2	Diethyl phthalate	3.50E-02	J	3.50E-02	J	mg/kg	LMB-101-F	1/2	2.00E-01 - 2.00E-01	3.50E-02	NA	1.20E+02 N	NA	NA	No	BSL

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.
(4) USEPA Regional Screening Levels, USEPA, June 2015. For non-carcinogens, value shown is equal to 1/10 the tissue value. For carcinogens the value shown is equal to the tissue value.
(5) Rationale Codes
Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Definitions: C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
NA = Not Applicable

Data Qualifiers: J = Indicates an estimated value

Surrogates used: methylmercury for mercury, chlordane for gamma chlordane, endosulfan for endosulfan I and endosulfan sulfate, endrin for endrin aldehyde and endrin ketone.

TABLE 2.17
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
FISH FILLETS/COMMON CARP

Scenario Timeframe: Current
Medium: Tissue
Exposure Medium: Tissue
Exposure Point: Donna Reservoir and Canal System

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
							INORGANICS									
7429-90-5	Aluminum	1.10E+00	J	5.70E+00	J	mg/kg	CAR-115-F	2/3	2.60E+00 - 2.90E+00	5.70E+00	NA	1.50E+02 N	NA	NA	No	BSL
7440-36-0	Antimony	4.50E-02	J	4.50E-02	J	mg/kg	CAR-111-F	1/3	1.70E-01 - 1.90E-01	4.50E-02	NA	6.20E-02 N	NA	NA	No	BSL
7440-38-2	Arsenic	3.60E-02	J	2.00E-01		mg/kg	CAR-111-F	2/3	8.70E-02 - 9.70E-02	2.00E-01	NA	2.80E-03 C	NA	NA	Yes	ASL
7440-39-3	Barium	5.30E-01	J	1.50E+00	J	mg/kg	CAR-111-F	3/3	8.70E-01 - 9.70E-01	1.50E+00	NA	3.10E+01 N	NA	NA	No	BSL
7440-70-2	Calcium	1.60E+03	J	9.40E+03	J	mg/kg	CAR-111-F	3/3	8.70E+00 - 9.70E+00	9.40E+03	NA	NA	NA	NA	No	NUT
7440-47-3	Chromium	2.70E-01		3.10E-01		mg/kg	CAR-111-F	2/3	1.70E-01 - 1.90E-01	3.10E-01	NA	2.30E+02 N	NA	NA	No	BSL
7440-48-4	Cobalt	3.90E-02	J	6.40E-02	J	mg/kg	CAR-111-F	2/3	4.30E-02 - 4.90E-02	6.40E-02	NA	4.60E-02 N	NA	NA	Yes	ASL
7440-50-8	Copper	2.40E-01		1.50E+00	J	mg/kg	CAR-111-F	3/3	1.70E-01 - 1.90E-01	1.50E+00	NA	6.20E+00 N	NA	NA	No	BSL
7439-89-6	Iron	9.30E+00		1.50E+01		mg/kg	CAR-106-F	3/3	4.30E+00 - 4.90E+00	1.50E+01	NA	1.10E+02 N	NA	NA	No	BSL
7439-92-1	Lead	3.50E-02	J	6.90E-02	J	mg/kg	CAR-111-F	3/3	8.70E-02 - 9.70E-02	6.90E-02	NA	NA	NA	NA	No	BSL
7439-95-4	Magnesium	2.50E+02		4.00E+02		mg/kg	CAR-111-F	3/3	8.70E+00 - 9.70E+00	4.00E+02	NA	NA	NA	NA	No	NUT
7439-96-5	Manganese	4.60E-01	J	1.40E+00	J	mg/kg	CAR-111-F	3/3	4.30E-01 - 4.90E-01	1.40E+00	NA	2.20E+01 N	NA	NA	No	BSL
7439-96-5	Manganese	4.60E-01	J	1.40E+00	J	mg/kg	CAR-111-F	3/3	4.30E-01 - 4.90E-01	1.40E+00	NA	NA N	NA	NA	No	BSL
7439-97-6	Mercury	8.60E-02	J	1.70E-01	J	mg/kg	CAR-106-F	3/3	3.10E-02 - 3.30E-02	1.70E-01	NA	4.60E-02 N	NA	NA	Yes	ASL
7440-02-2	Nickel	4.00E-02	J	1.00E-01	J	mg/kg	CAR-111-F	2/3	8.70E-02 - 9.70E-02	1.00E-01	NA	3.10E+00 N	NA	NA	No	BSL
7440-09-7	Potassium	2.90E+03		3.00E+03		mg/kg	CAR-111-F, CAR-115-F	3/3	8.70E+00 - 9.70E+00	3.00E+03	NA	NA	NA	NA	No	NUT
7782-49-2	Selenium	1.30E-01	J	2.70E-01	J	mg/kg	CAR-115-F	3/3	4.30E-01 - 4.90E-01	2.70E-01	NA	7.70E-01 N	NA	NA	No	BSL
7440-23-5	Sodium	5.60E+02		7.10E+02		mg/kg	CAR-115-F	3/3	8.70E+00 - 9.70E+00	7.10E+02	NA	NA	NA	NA	No	NUT
7440-28-0	Thallium	1.30E-02	J	1.30E-02	J	mg/kg	CAR-111-F	1/3	8.70E-02 - 9.70E-02	1.30E-02	NA	1.50E-02 C	NA	NA	No	BSL
7440-62-2	Vanadium	4.40E-01		4.90E-01		mg/kg	CAR-111-F	2/3	8.70E-02 - 9.70E-02	4.90E-01	NA	7.80E-01 N	NA	NA	No	BSL
7440-66-6	Zinc	1.50E+01	J	4.20E+01		mg/kg	CAR-111-F	3/3	4.30E-01 - 4.90E-01	4.20E+01	NA	4.60E+01 N	NA	NA	No	BSL
							POLYCHLORINATED BIPHENYLS									
11097-69-1	Aroclor-1254	4.20E-03	JN	1.40E+00		mg/kg	CAR-111-F	11/36	4.10E-03 - 4.20E-02	1.40E+00	NA	2.10E-03 C	NA	NA	Yes	ASL
11096-82-5	Aroclor-1260	3.70E-02	J	2.20E-01	J	mg/kg	CAR-134-F	2/36	4.10E-03 - 4.20E-02	2.20E-01	NA	2.10E-03 C	NA	NA	Yes	ASL
Total PCBs	Total PCB Congeners	5.00E-03		7.20E+00		mg/kg	CAR-111-F	3/3	1.00E-06 - 5.50E-04	7.20E+00	NA	2.10E-03 C	NA	NA	Yes	ASL
							PESTICIDES									
72-54-8	4,4´-DDD	5.20E-04	J	1.70E-03	J	mg/kg	CAR-106-F	2/3	4.20E-04 - 8.30E-03	1.70E-03	NA	1.70E-02 C	NA	NA	No	BSL
72-55-9	4,4´-DDE	3.70E-02		8.00E-02		mg/kg	CAR-106-F	3/3	4.20E-04 - 8.30E-03	8.00E-02	NA	1.20E-02 C	NA	NA	Yes	ASL
50-29-3	4,4´-DDT	3.30E-04	J	1.30E-01		mg/kg	CAR-111-F	2/3	4.20E-04 - 8.30E-03	1.30E-01	NA	1.20E-02 C	NA	NA	Yes	ASL
309-00-2	Aldrin	3.90E-03	J	3.90E-03	J	mg/kg	CAR-111-F	1/3	4.20E-04 - 8.30E-03	3.90E-03	NA	2.40E-04 C	NA	NA	Yes	ASL
5103-71-9	alpha-Chlordane	1.20E-03	J	8.30E-03	J	mg/kg	CAR-111-F	2/3	4.20E-04 - 8.30E-03	8.30E-03	NA	1.20E-02 C	NA	NA	No	BSL
60-57-1	Dieldrin	2.70E-04	J	8.40E-03		mg/kg	CAR-111-F	2/3	4.20E-04 - 8.30E-03	8.40E-03	NA	2.60E-04 C	NA	NA	Yes	ASL
959-98-8	Endosulfan I	3.40E-03	J	3.40E-03	J	mg/kg	CAR-111-F	1/3	4.20E-04 - 8.30E-03	3.40E-03	NA	9.30E-01 N	NA	NA	No	BSL
33213-65-9	Endosulfan II	8.30E-03	J	8.30E-03	J	mg/kg	CAR-111-F	1/3	4.20E-04 - 8.30E-03	8.30E-03	NA	9.30E-01 N	NA	NA	No	BSL
1031-07-8	Endosulfan sulfate	1.80E-04	J	7.60E-03	J	mg/kg	CAR-111-F	3/3	4.20E-04 - 8.30E-03	7.60E-03	NA	9.30E-01 N	NA	NA	No	BSL
72-20-8	Endrin	1.10E-02		1.00E-01		mg/kg	CAR-111-F	2/3	4.20E-04 - 8.30E-03	1.00E-01	NA	4.60E-02 N	NA	NA	Yes	ASL
7421-93-4	Endrin aldehyde	9.00E-04	J	9.00E-04	J	mg/kg	CAR-106-F	1/3	4.20E-04 - 8.30E-03	9.00E-04	NA	4.60E-02 N	NA	NA	No	BSL
53494-70-5	Endrin ketone	1.80E-04	J	2.70E-03	J	mg/kg	CAR-106-F	2/3	4.20E-04 - 8.30E-03	2.70E-03	NA	4.60E-02 N	NA	NA	No	BSL
58-89-9	gamma-BHC (Lindane)	8.80E-05	J	8.80E-05	J	mg/kg	CAR-115-F	1/3	4.20E-04 - 8.30E-03	8.80E-05	NA	3.80E-03 C	NA	NA	No	BSL
5103-74-2	gamma-Chlordane	1.70E-04	J	3.70E-02	J	mg/kg	CAR-111-F	3/3	4.20E-04 - 8.30E-03	3.70E-02	NA	1.20E-02 C	NA	NA	Yes	ASL
1024-57-3	Heptachlor epoxide	4.70E-04	J	3.30E-03	J	mg/kg	CAR-111-F	2/3	4.20E-04 - 8.30E-03	3.30E-03	NA	4.60E-04 C	NA	NA	Yes	ASL
72-43-5	Methoxychlor	6.50E-03		5.70E-02		mg/kg	CAR-111-F	2/3	8.30E-04 - 1.70E-02	5.70E-02	NA	7.70E-01 N	NA	NA	No	BSL
							SEMI-VOLATILE ORGANIC COMPOUNDS									
100-52-7	Benzaldehyde	2.30E-02	J	9.50E-02	J	mg/kg	CAR-106-F	2/3	3.30E-02 - 2.00E-01	9.50E-02	NA	1.50E+01 N	NA	NA	No	BSL
117-81-7	Bis(2-ethylhexyl)phthalate	1.20E-02	J	8.40E-02	J	mg/kg	CAR-111-F	2/3	6.60E-02 - 4.00E-01	8.40E-02	NA	3.00E-01 C	NA	NA	No	BSL
84-66-2	Diethyl phthalate	4.00E-03	J	4.00E-01	J	mg/kg	CAR-111-F	2/3	3.30E-02 - 2.00E-01	4.00E-01	NA	1.20E+02 N	NA	NA	No	BSL
108-95-2	Phenol	8.70E-03		8.70E-03		mg/kg	CAR-115-F	1/3	6.70E-03 - 4.00E-02	8.70E-03	NA	4.60E+01 N	NA	NA	No	BSL
							VOLATILE ORGANIC COMPOUNDS									
98-86-2	Acetophenone	3.70E-03	J	3.70E-03	J	mg/kg	CAR-115-F	1/3	3.30E-02 - 2.00E-01	3.70E-03	NA	1.50E+01 N	NA	NA	No	BSL

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.
(4) USEPA Regional Screening Levels, USEPA, June 2015. For non-carcinogens, value shown is equal to 1/10 the tissue value. For carcinogens the value shown is equal to the tissue value.
(5) Rationale Codes
Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Definitions:
C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
NA = Not Applicable
mg/kg = milligrams per kilogram

Data Qualifiers: J = Indicates an estimated value

Surrogates used: methylmercury for mercury, chlordane for alpha and gamma chlordane, endosulfan for endosulfan I and II and endosulfan sulfate, endrin for endrin aldehyde and endrin ketone.

TABLE 3.1
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
SURFACE SOIL

Scenario Timeframe: Current/Future
Medium: Surface soil
Exposure Medium: Surface soil
Exposure Point: Donna Reservoir and Canal System

Chemical of Potential Concern	Units	Mean Detected Concentration	95% UCLM	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
INORGANICS									
Aluminum	mg/kg	2.00E+04	2.08E+04	2.77E+04		mg/kg	2.08E+04	95%UCLM-N	ProUCL
Arsenic	mg/kg	5.40E+00	5.61E+00	7.60E+00		mg/kg	5.61E+00	95%UCLM-N	ProUCL
Cobalt	mg/kg	6.04E+00	6.20E+00	7.40E+00		mg/kg	6.20E+00	95%UCLM-N	ProUCL
Manganese	mg/kg	3.79E+02	3.96E+02	7.79E+02		mg/kg	3.96E+02	95%UCLM-G	ProUCL
Vanadium	mg/kg	2.26E+01	2.33E+01	3.14E+01		mg/kg	2.33E+01	95%UCLM-N	ProUCL
POLYAROMATIC HYDROCARBONS									
Benzo(a)pyrene	mg/kg	7.80E-02	NA	1.10E-01	J	mg/kg	1.10E-01	Max	Low # Detects

Note: Statistics calculated by the EPA program ProUCL.
95%UCLM-G indicates that the 95 percent upper confidence limit on the mean is based on the approximate or adjusted gamma distribution.
95%UCLM-N indicates that the 95 percent upper confidence limit on the mean is based on the student's t-test for normal distributions.
LOW #DETECTS indicates low number of detects so maximum detected value was used.

TABLE 3.2
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
SURFACE WATER

Scenario Timeframe: Current/Future
Medium: Surface water
Exposure Medium: Surface water
Exposure Point: Donna Reservoir and Canal System

Chemical of Potential Concern	Units	Mean Detected Concentration	95% UCLM	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
INORGANICS									
Arsenic	µg/L	6.46E+00	7.70E+00	1.51E+01		µg/L	7.70E+00	95%UCLM-N	ProUCL
Manganese	µg/L	1.14E+02	1.70E+02	3.42E+02		µg/L	1.70E+02	95%UCLM-C	ProUCL
Mercury	µg/L	NA	NA	6.00E-02		µg/L	6.00E-02	Max	Low # Detects
PESTICIDES/POLYCHLORINATED BIPHENYLS									
Aroclor 1254	µg/L	NA	NA	1.50E-02	J	µg/L	1.50E-02	Max	Low # Detects
Total PCB Congeners	µg/L	2.44E-03	5.88E-03	2.60E-02	J	µg/L	5.88E-03	95%UCLM-C	ProUCL
4,4-DDT	µg/L	5.25E-02	NA	7.40E-02	J	µg/L	7.40E-02	Max	Low # Detects
SEMI-VOLATILE ORGANIC COMPOUNDS									
Bis(2-ethylhexyl)phthalate	µg/L	4.85E+01	NA	1.40E+02	J	µg/L	1.40E+02	Max	Low # Detects

Note: Statistics calculated by the EPA program ProUCL.
95%UCLM-C indicates that the 95 percent upper confidence limit on the mean is based on the non-parametric Chebyshev test.
95%UCLM-N indicates that the 95 percent upper confidence limit on the mean is based on the student's t-test for normal distributions.
LOW #DETECTS indicates low number of detects so maximum detected value was used.

TABLE 3.3
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY - SEDIMENT
EXPOSURE AREA 2: THE SIPHON AND DOWNSTREAM (LWMCU, LWMCL, AND LEMC)

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: The Siphon and Downstream

Chemical of Potential Concern	Units	Mean Detected Concentration	95% UCLM	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
POLYCHLORINATED BIPHENYLS									
Aroclor 1254	mg/kg	2.88E-01	9.52E-01	1.10E+01	J	mg/kg	9.52E-01	95%UCLM-C	ProUCL

Note: Statistics calculated by the EPA program ProUCL.
95%UCLM-C indicates that the 95 percent upper confidence limit on the mean is based on the non-parametric Chebyshev test.

TABLE 3.4
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY - SEDIMENT
EXPOSURE AREA 4: DOWNSTREAM OF THE RESERVOIRS (COMC)

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Downstream of the Reservoirs

Chemical of Potential Concern	Units	Mean Detected Concentration	95% UCLM	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
POLYAROMATIC HYDROCARBONS									
Benzo(a)anthracene	mg/kg	1.14E+01	NA	3.40E+01	J	mg/kg	3.40E+01	Max	Low # Detects
Benzo(a)pyrene	mg/kg	9.03E+00	NA	1.80E+01	J	mg/kg	1.80E+01	Max	Low # Detects
Benzo(b)fluoranthene	mg/kg	1.04E+01	NA	3.10E+01	J	mg/kg	3.10E+01	Max	Low # Detects
Benzo(k)fluoranthene	mg/kg	NA	NA	2.00E+01	J	mg/kg	2.00E+01	Max	Low # Detects
Dibenz(a,h)anthracene	mg/kg	NA	NA	2.40E+00		mg/kg	2.40E+00	Max	Low # Detects
Indeno(1,2,3-cd)pyrene	mg/kg	NA	NA	8.70E+00	J	mg/kg	8.70E+00	Max	Low # Detects

Note: Statistics calculated by the EPA program ProUCL.
LOW #DETECTS indicates low number of detects so maximum detected value was used.

TABLE 3.5
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
ALL FISH TISSUE RESULTS

Scenario Timeframe: Current/Future
Medium: Tissue
Exposure Medium: Tissue
Exposure Point: Donna Reservoir and Canal System

Chemical of Potential Concern	Units	Mean Detected Concentration	95% UCLM	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
INORGANICS									
Arsenic	mg/kg	9.23E-02	1.07E-01	2.00E-01		mg/kg	1.07E-01	95%UCLM-KMp	ProUCL
Cobalt	mg/kg	4.08E-02	5.68E-02	6.40E-02	J	mg/kg	5.68E-02	95%UCLM-KMp	ProUCL
Mercury	mg/kg	2.24E-01	3.45E-01	7.40E-01	J	mg/kg	3.45E-01	95%UCLM-L	ProUCL
POLYCHLORINATED BIPHNEYLS									
Aroclor-1254	mg/kg	5.13E-01	4.27E-01	4.50E+00	J	mg/kg	4.27E-01	95%UCLM-KMC	ProUCL
Aroclor-1260	mg/kg	4.31E-01	2.25E-01	3.60E+00	J	mg/kg	2.25E-01	95%UCLM-BCA	ProUCL
Total PCB Congeners	mg/kg	9.44E+00	2.94E+01	1.50E+02		mg/kg	2.94E+01	95%UCLM-G	ProUCL
PESTICIDES									
4,4´-DDE	mg/kg	4.66E-02	6.47E-02	9.70E-02		mg/kg	6.47E-02	95%UCLM-N	ProUCL
4,4´-DDT	mg/kg	2.28E-02	4.17E-02	1.30E-01		mg/kg	4.17E-02	95%UCLM-BCA	ProUCL
Aldrin	mg/kg	1.28E-03	1.57E-03	3.90E-03	J	mg/kg	1.57E-03	95%UCLM-KMp	ProUCL
alpha-BHC	mg/kg	NA	NA	7.10E-03		mg/kg	7.10E-03	Max	Low # Samples/Detects
delta-BHC	mg/kg	NA	NA	4.90E-03		mg/kg	4.90E-03	Max	Low # Samples/Detects
Dieldrin	mg/kg	3.12E-03	3.95E-03	8.40E-03		mg/kg	3.95E-03	95%UCLM-KMp	ProUCL
Endrin	mg/kg	3.43E-02	4.65E-02	1.00E-01		mg/kg	4.65E-02	95%UCLM-KMt	ProUCL
gamma-BHC (Lindane)	mg/kg	2.50E-03	NA	5.00E-03	J	mg/kg	5.00E-03	Max	Low # Samples/Detects
gamma-Chlordane	mg/kg	1.05E-02	1.61E-02	3.70E-02	J	mg/kg	1.61E-02	95%UCLM-N	ProUCL
Heptachlor epoxide	mg/kg	1.19E-03	1.50E-03	3.30E-03	J	mg/kg	1.50E-03	95%UCLM-KMp	ProUCL

Note: Statistics calculated by the EPA program ProUCL.
95%UCLM-BCA indicates that the 95 percent upper confidence limit on the mean is based on the Kaplan-Meier (KM) Bias-Corrected Accelerated (BCA) percentile bootstrap test.
95%UCLM-G indicates that the 95 percent upper confidence limit on the mean is based on the approximate or adjusted gamma distribution.
95%UCLM-KMp indicates that the 95 percent upper confidence limit on the mean is based on the non-parametric Kaplan-Meier (KM) percentile bootstrap test.
95%UCLM-KMt indicates that the 95 percent upper confidence limit on the mean is based on the non-parametric Kaplan-Meier (KM) student's t-test.
95%UCLM-L indicates that the 95 percent upper confidence limit on the mean is based on the Land (H) statistic for lognormal distributions.
95%UCLM-N indicates that the 95 percent upper confidence limit on the mean is based on the student's t-test for normal distributions.
LOW # DETECTS indicates low number of detects, so maximum detected concentration used as the EPC.
LOW # SAMPLES indicates low number of samples (N<4), so maximum detected concentration used as the EPC.
NA = Not Applicable

TABLE 3.6
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
BUFFALO FISH TISSUE RESULTS

Scenario Timeframe: Current/Future
Medium: Tissue
Exposure Medium: Tissue
Exposure Point: Buffalo Fish

Chemical of Potential Concern	Units	Mean Detected Concentration	95% UCLM	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
INORGANICS									
Arsenic	mg/kg	NA	NA	6.30E-02		mg/kg	6.30E-02	Max	Low # Samples/Detects
Mercury	mg/kg	NA	NA	8.50E-02	J	mg/kg	8.50E-02	Max	Low # Samples/Detects
POLYCHLORINATED BIPHNEYLS									
Aroclor-1254	mg/kg	1.37E+00	1.69E+00	4.50E+00	J	mg/kg	1.69E+00	95%UCLM-N	ProUCL
Aroclor-1260	mg/kg	1.87E+00	4.34E+00	3.60E+00	J	mg/kg	3.60E+00	Max	UCLM>Max
Total PCB Congeners	mg/kg	5.57E+01	NA	1.50E+02		mg/kg	1.50E+02	Max	Low # Samples/Detects
PESTICIDES									
4,4´-DDE	mg/kg	NA	NA	9.70E-02		mg/kg	9.70E-02	Max	Low # Samples/Detects
Dieldrin	mg/kg	NA	NA	8.40E-03		mg/kg	8.40E-03	Max	Low # Samples/Detects
gamma-Chlordane	mg/kg	NA	NA	3.70E-02	J	mg/kg	3.70E-02	Max	Low # Samples/Detects
Heptachlor epoxide	mg/kg	NA	NA	3.30E-03	J	mg/kg	3.30E-03	Max	Low # Samples/Detects

Note: Statistics calculated by the EPA program ProUCL.
95%UCLM-N indicates that the 95 percent upper confidence limit on the mean is based on the student's t-test for normal distributions.
LOW # DETECTS indicates low number of detects, so maximum detected concentration used as the EPC.
LOW # SAMPLES indicates low number of samples (N<4), so maximum detected concentration used as the EPC.
UCLM>Maximum indicates that the recommended 95 UCL exceeds the maximum detected value, therefore the maximum detected value is used.

TABLE 3.7
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
GAR FISH TISSUE RESULTS

Scenario Timeframe: Current/Future
Medium: Tissue
Exposure Medium: Tissue
Exposure Point: Gar Fish

Chemical of Potential Concern	Units	Mean Detected Concentration	95% UCLM	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
INORGANICS									
Cobalt	mg/kg	NA	NA	5.50E-02		mg/kg	5.50E-02	Max	Low # Samples/Detects
Mercury	mg/kg	NA	NA	2.20E-01	J	mg/kg	2.20E-01	Max	Low # Samples/Detects
POLYCHLORINATED BIPHNEYLS									
Aroclor-1254	mg/kg	6.43E-01	4.45E-01	9.50E-01	J	mg/kg	4.45E-01	95%UCLM-N	ProUCL
Aroclor-1260	mg/kg	2.81E-01	6.56E-01	8.30E-01	J	mg/kg	6.56E-01	95%UCLM-KMC	ProUCL
Total PCB Congeners	mg/kg	NA	NA	4.10E-01		mg/kg	4.10E-01	Max	Low # Samples/Detects
PESTICIDES									
4,4´-DDE	mg/kg	NA	NA	2.20E-02		mg/kg	2.20E-02	Max	Low # Samples/Detects

Note: Statistics calculated by the EPA program ProUCL.
95%UCLM-KMC indicates that the 95 percent upper confidence limit on the mean is based on the non-parametric Kaplan-Meier (KM) Chebyshev test.
95%UCLM-N indicates that the 95 percent upper confidence limit on the mean is based on the student's t-test for normal distributions.
LOW # DETECTS indicates low number of detects, so maximum detected concentration used as the EPC.
LOW # SAMPLES indicates low number of samples (N<4), so maximum detected concentration used as the EPC.
NA = Not Applicable

TABLE 3.8
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
CATFISH FISH TISSUE RESULTS

Scenario Timeframe: Current/Future
Medium: Tissue
Exposure Medium: Tissue
Exposure Point: Catfish Fish

Chemical of Potential Concern	Units	Mean Detected Concentration	95% UCLM	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
INORGANICS									
Mercury	mg/kg	1.45E-01	NA	1.50E-01	J	mg/kg	1.50E-01	Max	Low # Samples/Detects
POLYCHLORINATED BIPHENYLS									
Aroclor-1254	mg/kg	2.54E-01	3.44E-01	9.60E-01	J	mg/kg	3.44E-01	95%UCLM-G	ProUCL
Aroclor-1260	mg/kg	2.47E-01	1.51E-01	7.20E-01	J	mg/kg	1.51E-01	95%UCLM-KMp	ProUCL
Total PCB Congeners	mg/kg	1.56E+00	3.83E+00	4.00E+00		mg/kg	3.83E+00	95%UCLM-N	ProUCL
PESTICIDES									
4,4´-DDE	mg/kg	5.55E-02	NA	9.70E-02		mg/kg	9.70E-02	Max	Low # Samples/Detects
alpha-BHC	mg/kg	NA	NA	7.10E-03		mg/kg	7.10E-03	Max	Low # Samples/Detects
delta-BHC	mg/kg	NA	NA	4.90E-03		mg/kg	4.90E-03	Max	Low # Samples/Detects
Dieldrin	mg/kg	8.35E-04	NA	8.40E-03	J	mg/kg	8.40E-03	Max	Low # Samples/Detects
gamma-BHC (Lindane)	mg/kg	NA	NA	5.00E-03	J	mg/kg	5.00E-03	Max	Low # Samples/Detects
Heptachlor epoxide	mg/kg	NA	NA	7.40E-04	J	mg/kg	7.40E-04	Max	Low # Samples/Detects

Note: Statistics calculated by the EPA program ProUCL.
95%UCLM-G indicates that the 95 percent upper confidence limit on the mean is based on the approximate or adjusted gamma distribution.
95%UCLM-KMp indicates that the 95 percent upper confidence limit on the mean is based on the non-parametric Kaplan-Meier (KM) percentile bootstrap test.
95%UCLM-N indicates that the 95 percent upper confidence limit on the mean is based on the student's t-test for normal distributions.
LOW # DETECTS indicates low number of detects, so maximum detected concentration used as the EPC.
LOW # SAMPLES indicates low number of samples (N<4), so maximum detected concentration used as the EPC.

TABLE 3.9
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
LARGE MOUTH BASS FISH TISSUE RESULTS

Scenario Timeframe: Current/Future
Medium: Tissue
Exposure Medium: Tissue
Exposure Point: Large Mouth Bass Fish

Chemical of Potential Concern	Units	Mean Detected Concentration	95% UCLM	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
INORGANICS									
Mercury	mg/kg	5.95E-01	NA	7.40E-01	J	mg/kg	7.40E-01	Max	Low # Samples/Detects
POLYCHLORINATED BIPHENYLS									
Aroclor-1254	mg/kg	8.10E-02	5.30E-02	1.40E-01		mg/kg	5.30E-02	95%UCLM-N	ProUCL
Total PCB Congeners	mg/kg	4.63E-01	3.35E+00	2.10E+00		mg/kg	2.10E+00	Max	UCLM>Max
PESTICIDES									
4,4´-DDE	mg/kg	5.25E-02	NA	8.60E-02		mg/kg	8.60E-02	Max	Low # Samples/Detects
Aldrin	mg/kg	1.10E-03	NA	2.10E-03		mg/kg	2.10E-03	Max	Low # Samples/Detects
Dieldrin	mg/kg	NA	NA	2.90E-03		mg/kg	2.90E-03	Max	Low # Samples/Detects
Heptachlor epoxide	mg/kg	4.26E-04	NA	8.00E-04	J	mg/kg	8.00E-04	Max	Low # Samples/Detects

Note: Statistics calculated by the EPA program ProUCL.
95%UCLM-N indicates that the 95 percent upper confidence limit on the mean is based on the student's t-test for normal distributions.
LOW # DETECTS indicates low number of detects, so maximum detected concentration used as the EPC.
LOW # SAMPLES indicates low number of samples (N<4), so maximum detected concentration used as the EPC.
UCLM>Maximum indicates that the recommended 95 UCL exceeds the maximum detected value, therefore the maximum detected value is used.
NA = Not Applicable

TABLE 3.10
MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
CARP FISH TISSUE RESULTS

Scenario Timeframe: Current/Future
Medium: Tissue
Exposure Medium: Tissue
Exposure Point: Carp Fish

Chemical of Potential Concern	Units	Mean Detected Concentration	95% UCLM	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
INORGANICS									
Arsenic	mg/kg	1.18E-01	NA	2.00E-01		mg/kg	2.00E-01	Max	Low # Samples/Detects
Cobalt	mg/kg	5.15E-02	NA	6.40E-02	J	mg/kg	6.40E-02	Max	Low # Samples/Detects
Mercury	mg/kg	1.39E-01	NA	1.70E-01	J	mg/kg	1.70E-01	Max	Low # Samples/Detects
POLYCHLORINATED BIPHNEYLS									
Aroclor-1254	mg/kg	1.87E-01	1.47E-01	1.40E+00		mg/kg	1.47E-01	95%UCLM-BCA	ProUCL
Aroclor-1260	mg/kg	1.29E-01	NA	2.20E-01	J	mg/kg	2.20E-01	Max	Low # Samples/Detects
Total PCB Congeners	mg/kg	3.90E+00	NA	7.20E+00		mg/kg	7.20E+00	Max	Low # Samples/Detects
PESTICIDES									
4,4´-DDE	mg/kg	5.80E-02	NA	8.00E-02		mg/kg	6.47E-02	Max	Low # Samples/Detects
4,4´-DDT	mg/kg	6.52E-02	NA	1.30E-01		mg/kg	4.17E-02	Max	Low # Samples/Detects
Aldrin	mg/kg	NA	NA	3.90E-03	J	mg/kg	1.57E-03	Max	Low # Samples/Detects
Dieldrin	mg/kg	4.34E-03	NA	8.40E-03		mg/kg	3.95E-03	Max	Low # Samples/Detects
Endrin	mg/kg	5.50E-02	NA	1.00E-01		mg/kg	4.65E-02	Max	Low # Samples/Detects
gamma-Chlordane	mg/kg	1.46E-02	NA	3.70E-02	J	mg/kg	1.61E-02	Max	Low # Samples/Detects
Heptachlor epoxide	mg/kg	1.89E-03	NA	3.30E-03	J	mg/kg	1.50E-03	Max	Low # Samples/Detects

Note: Statistics calculated by the EPA program ProUCL.
95%UCLM-BCA indicates that the 95 percent upper confidence limit on the mean is based on the Kaplan-Meier (KM) Bias-Corrected Accelerated (BCA) percentile bootstrap test.
LOW # DETECTS indicates low number of detects, so maximum detected concentration used as the EPC.
LOW # SAMPLES indicates low number of samples (N<4), so maximum detected concentration used as the EPC.
NA = Not Applicable

TABLE 4.1
VALUES USED FOR RESIDENT ADULT DAILY SOIL INTAKE EQUATIONS

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil, Air
Exposure Point: Donna Reservoir and Canal System
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation / Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	Chemical-Specific	Chemical-Specific	Chronic Daily Intake (CDI) (mg/kg/day) =
	CR	Ingestion Rate	mg/day	100	U.S. EPA 2011	CS x CR x EF x ED x CF / (BW x AT)
	EF	Exposure Frequency	day/yr	350	U.S. EPA 1991a	
	ED-NC	Exposure Duration - Noncancer	yr	20	U.S. EPA 2011	
	ED-C	Exposure Duration-Cancer	yr	20	U.S. EPA 2011	
	BW	Body Weight	kg	80	U.S. EPA 2011	Mutagenic Chronic Daily Intake (MCDI) (mg/kg/day) =
	AT-NC	Averaging time - Noncancer	days	7,300	U.S. EPA 1989	CS x EF x ([(ED_{6-16} x CR x 3) + (ED_{16-30} x CR x 1)]/BW) x CF / (AT)
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA 1989	
Dermal	CS	Chemical Concentration in Soil	mg/kg	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	SA	Surface Area for Contact	cm^2/event	6,032	U.S. EPA 2015a	CS x SA x AF x ABS x EF x ED x CF / (BW x AT)
	AF	Adherence Factor	mg/cm^2	0.07	U.S. EPA 2004 (1)	
	EF	Exposure Frequency	event/yr	350	U.S. EPA 1991a	
	ED-NC	Exposure Duration - Noncancer	yr	20	U.S. EPA 2011	
	ED-C	Exposure Duration - Cancer	yr	20	U.S. EPA 2011	Mutagenic Chronic Daily Intake (MCDI) (mg/kg/day) =
	BW	Body Weight	kg	80	U.S. EPA 2011	CS x EF x ABS x ([(ED_{6-16} x SA x AF x 3) + (ED_{16-30} x SA x AF x 1)]/BW) x CF / (AT)
	AT-NC	Averaging time - Noncancer	days	7,300	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA 1989	
	ABS	Dermal Absorption Fraction	unitless	Chemical-Specific	U.S. EPA 2004 (2)	
Inhalation	CA	Chemical Concentration in Air	mg/m^3	Chemical-Specific	Chemical-Specific	Exposure Concentration ($\mu g/m^3$ or mg/m^3) =
	CF_1	Conversion Factor	µg/mg	1,000	U.S. EPA 2009a	CA x CF_1 x ET x EF x ED / AT x CF_2
	ET	Exposure Time	hr/day	24	U.S. EPA 2009a	Note: CF_1 only used in carcinogenic intake calculations
	EF	Exposure Frequency	day/yr	350	U.S. EPA 1991a	
	ED-NC	Exposure Duration - Noncancer	yr	20	U.S. EPA 2011	
	ED-C	Exposure Duration - Cancer	yr	20	U.S. EPA 2011	Mutagenic Exposure Concentration (MEC) ($\mu g/m^3$) =
	AT-NC	Averaging time - Noncancer	days	7,300	U.S. EPA 1989	CA x ET x EF x [(ED_{6-16} x 3) + (ED_{16-30} x 1)] x CF_1 / (AT x CF_2)
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF_2	Conversion Factor	hr/day	24	U.S. EPA 2009a	

(1) Taken from Exhibit 3-5 of USEPA 2004.
(2) Taken from Exhibit 3-4 of USEPA 2004.

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake
mg/kg = milligrams per kilogram
kg/mg = kilograms per milligram

mg/cm^2 = milligrams per square centimeter
mg/day = milligrams per day
day/yr = days per year
RME = Reasonable Maximum Exposure
mg/m^3 = milligram per cubic meter

$\mu g/m^3$ = micrograms per cubic meter
cm^2 /event = square centimeters per event
µg/mg = microgram per milligram
kg = kilogram
hr/day = hours per day

TABLE 4.2
VALUES USED FOR RESIDENT CHILD DAILY SOIL INTAKE EQUATIONS

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil, Air
Exposure Point: Donna Reservoir and Canal System
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation / Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	Chemical-Specific	Chemical-Specific	Chronic Daily Intake (CDI) (mg/kg/day) =
	CR	Ingestion Rate	mg/day	200	U.S. EPA 2011	CS x CR x EF x ED x CF / (BW x AT)
	EF	Exposure Frequency	day/yr	350	U.S. EPA 1991a	
	ED-NC	Exposure Duration - Noncancer	yr	6	U.S. EPA 1991a	
	ED-C	Exposure Duration-Cancer	yr	6	U.S. EPA 1991a	
	BW	Body Weight	kg	15	U.S. EPA 1989	Mutagenic Chronic Daily Intake (MCDI) (mg/kg/day) =
	AT-NC	Averaging time - Noncancer	days	2,190	U.S. EPA 1989	CS x EF x ([($ED_{0\text{-}2}$ x CR x 10) + ($ED_{2\text{-}6}$ x CR x 3)]/BW) x CF / (AT)
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA 1989	
Dermal	CS	Chemical Concentration in Soil	mg/kg	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	SA	Surface Area for Contact	cm^2/event	2,373	U.S. EPA 2015a	CS x SA x AF x ABS x EF x ED x CF / (BW x AT)
	AF	Adherence Factor	mg/cm^2	0.2	U.S. EPA 2004 (1)	
	EF	Exposure Frequency	event/yr	350	U.S. EPA 1991a	
	ED-NC	Exposure Duration - Noncancer	yr	6	U.S. EPA 1991a	
	ED-C	Exposure Duration - Cancer	yr	6	U.S. EPA 1991a	
	BW	Body Weight	kg	15	U.S. EPA 1989	Mutagenic Chronic Daily Intake (MCDI) (mg/kg/day) =
	AT-NC	Averaging time - Noncancer	days	2,190	U.S. EPA 1989	CS x EF x ABS x ([($ED_{0\text{-}2}$ x SA x AF x 10) + ($ED_{2\text{-}6}$ x SA x AF x 3)]/BW) x CF / (AT)
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA 1989	
	ABS	Dermal Absorption Fraction	unitless	Chemical-Specific	U.S. EPA 2004 (2)	
Inhalation	CA	Chemical Concentration in Air	mg/m^3	Chemical-Specific	Chemical-Specific	Exposure Concentration ($\mu g/m^3$ or mg/m^3) =
	CF_1	Conversion Factor	µg/mg	1,000	U.S. EPA 2009a	CA x CF_1 x ET x EF x ED / AT x CF_2
	ET	Exposure Time	hr/day	24	U.S. EPA 2009a	Note: CF_1 only used in carcinogenic intake calculations
	EF	Exposure Frequency	day/yr	350	U.S. EPA 1991a	
	ED-NC	Exposure Duration - Noncancer	yr	6	U.S. EPA 1991a	
	ED-C	Exposure Duration - Cancer	yr	6	U.S. EPA 1991a	
	BW	Body Weight	kg	15	U.S. EPA 1989	Mutagenic Exposure Concentration (MEC) ($\mu g/m^3$) =
	AT-NC	Averaging time - Noncancer	days	2,190	U.S. EPA 1989	CA x ET x EF x [($ED_{0\text{-}2}$ x 10) + ($ED_{2\text{-}6}$ x 3)] x CF_1 / (AT x CF_2)
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF_2	Conversion Factor	hr/day	24	U.S. EPA 2009a	

(1) Taken from Exhibit 3-5 of USEPA 2004.
(2) Taken from Exhibit 3-4 of USEPA 2004.

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake
mg/kg = milligrams per kilogram
kg/mg = kilograms per milligram
mg/cm^2 = milligrams per square centimeter
mg/day = milligrams per day
day/yr = days per year
RME = Reasonable Maximum Exposure
mg/m^3 = milligram per cubic meter
$\mu g/m^3$ = micrograms per cubic meter
cm^2 /event = square centimeters per event
µg/mg = microgram per milligram
kg = kilogram
hr/day = hours per day

TABLE 4.3
VALUES USED FOR AGRICULTURAL WORKER DAILY SOIL INTAKE EQUATIONS

Scenario Timeframe: Current/Future
Medium: Soil
Exposure Medium: Soil, Air
Exposure Point: Donna Reservoir and Canal System
Receptor Population: Agricultural Worker
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation / Model Name
Ingestion	CS	Chemical Concentration in Soil	mg/kg	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	CR	Ingestion Rate	mg/day	100	U.S. EPA 2011	CS x CR x EF x ED x CF / (BW x AT)
	EF	Exposure Frequency	day/yr	250	U.S. EPA 1991a	
	ED	Exposure Duration	yr	25	U.S. EPA 1991a	
	BW	Body Weight	kg	80	U.S. EPA 2011	
	AT-NC	Averaging time - Noncancer	days	10,950	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA 1989	
Dermal	CS	Chemical Concentration in Soil	mg/kg	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	SA	Surface Area for Contact	cm^2/event	3,527	U.S. EPA 2015a	CS x SA x AF x ABS x EF x ED x CF / (BW x AT)
	AF	Adherence Factor	mg/cm^2	0.12	U.S. EPA 2004 (1)	
	EF	Exposure Frequency	event/yr	250	U.S. EPA 1991a	
	ED	Exposure Duration	yr	25	U.S. EPA 1991a	
	BW	Body Weight	kg	80	U.S. EPA 2011	
	AT-NC	Averaging time - Noncancer	days	10,950	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA 1989	
	ABS	Dermal Absorption Fraction	unitless	Chemical-Specific	U.S. EPA 2004 (2)	
Inhalation	CA	Chemical Concentration in Air	mg/m^3	Chemical-Specific	Chemical-Specific	Exposure Concentration ($\mu g/m^3$ or mg/m^3) =
	CF_1	Conversion Factor	µg/mg	1,000	U.S. EPA 2009a	CA x CF_1 x ET x EF x ED / AT x CF_2
	ET	Exposure Time	hr/day	8	U.S. EPA 2009a	Note: CF_1 only used in carcinogenic intake calculations
	EF	Exposure Frequency	day/yr	250	U.S. EPA 1991a	
	ED	Exposure Duration	yr	25	U.S. EPA 1991a	
	AT-NC	Averaging time - Noncancer	days	3,650	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF_2	Conversion Factor	hr/day	24	U.S. EPA 2009a	

(1) Taken from Exhibit 3-5 of USEPA 2004.
(2) Taken from Exhibit 3-4 of USEPA 2004.

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake
mg/kg = milligrams per kilogram
kg/mg = kilograms per milligram
mg/cm^2 = milligrams per square centimeter
mg/day = milligrams per day
day/yr = days per year
RME = Reasonable Maximum Exposure
mg/m^3 = milligram per cubic meter
$\mu g/m^3$ = micrograms per cubic meter
cm^2 /event = square centimeters per event
µg/mg = microgram per milligram
kg = kilogram
hr/day = hours per day

TABLE 4.4
VALUES USED FOR ADULT RECREATIONAL USER DAILY SURFACE WATER INTAKE EQUATIONS

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Donna Reservoir and Canal System
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation
Ingestion	CW	Concentration in Water	mg/L	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	CR	Ingestion Rate	L/day	0.043	U.S. EPA 2011 (1)	CW x CR x EF x ED / (BW x AT)
	EF	Exposure Frequency	day/yr	52	BPJ (2)	
	ED	Exposure Duration	yr	26	U.S. EPA 2011	
	BW	Body Weight	kg	80	U.S. EPA 2011	
	AT-NC	Averaging time-Noncancer	days	9,490	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
Dermal	CW	Concentration in Surface Water	mg/L	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	SA	Surface Area for Contact	cm^2	6,032	U.S. EPA 2011 (3)	CW x SA x PC x ET x EF x ED x CF / (BW x AT)
	PC	Permeability Coefficient	cm/hr	Chemical-Specific	Chemical-Specific	
	ET	Exposure Time	hr/day	4	U.S. EPA 2011 (1)	For organic compounds
	EF	Exposure Frequency	day/yr	52	BPJ (2)	CDI (mg/kg/day) =
	ED	Exposure Duration	yr	26	U.S. EPA 2011	DA_{event} x SA x EF x ED / (BW x AT)
	BW	Body Weight	kg	80	U.S. EPA 2011	
	AT-NC	Averaging Time - Noncancer	days	9,490	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	L/cm^3	0.001	U.S. EPA 1989	

(1) The incidental ingestion rate of surface water is taken from the USEPA *Exposure Factors Handbook* , Table 3-93. Ingestion of surface water is assumed during fishing activities, which has an ingestion rate of 10.8 mL/hr. Assuming an exposure time of 4 hour/day results in an ingestion rate of 43.2 mL/day.
(2) Assumes fishing will occur approximately 2 days per week for 6 months.
(3) Assumes contact with head, hands, forearms, lower legs, and feet.

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake
mg/L = milligrams per liter
day/yr = days per year
yr = year
kg = kilogram
RME = Reasonable Maximum Exposure
hr/day = hours per day
cm^2 = square centimeters
cm/hr = centimeter per hour
L/cm^3 = liters per cubic centimeter

TABLE 4.5
VALUES USED FOR ADOLESCENT RECREATIONAL USER DAILY SURFACE WATER INTAKE EQUATIONS

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Donna Reservoir and Canal System
Receptor Population: Recreational User
Receptor Age: Adolescent

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation
Ingestion	CW	Concentration in Water	mg/L	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day)=
	CR	Ingestion Rate	L/day	0.043	U.S. EPA 2011 (1)	CW x CR x EF x ED / (BW x AT)
	EF	Exposure Frequency	day/yr	52	BPJ (2)	
	ED	Exposure Duration	yr	10	BPJ (3)	
	BW	Body Weight	kg	45	U.S. EPA 2011	
	AT-NC	Averaging time-Noncancer	days	3,650	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
Dermal	CW	Concentration in Surface Water	mg/L	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	SA	Surface Area for Contact	cm^2	3,800	U.S. EPA 2011 (4)	CW x SA x PC x ET x EF x ED x CF / (BW x AT)
	PC	Permeability Coefficient	cm/hr	Chemical-Specific	Chemical-Specific	
	ET	Exposure Time	hr/day	4	U.S. EPA 2011 (1)	For organic compounds
	EF	Exposure Frequency	day/yr	52	BPJ (2)	CDI (mg/kg/day) =
	ED	Exposure Duration	yr	10	BPJ (3)	DA_{event} x SA x EF x ED / (BW x AT)
	BW	Body Weight	kg	45	U.S. EPA 2011	
	AT-NC	Averaging Time - Noncancer	days	3,650	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	L/cm^3	0.001	U.S. EPA 1989	

(1) The incidental ingestion rate of surface water is taken from the USEPA *Exposure Factors Handbook* , Table 3-93. Ingestion of surface water is assumed during fishing activities, which has an ingestion rate of 10.8 mL/hr. Assuming an exposure time of 4 hour/day results in an ingestion rate of 43.2 mL/day.
(2) Assumes fishing will occur approximately 2 days per week for 6 months.
(3) Assumes age range of adolescent is 6 to 16 years of age.
(4) Skin surface area is taken from Table 7-17 and Table 7-9 of 2011 EFH. Table 7-17 notes 29% of exposed skin surface available for 5 to 17 year old during outdoor activities. Table 7-9 presents the total skin surface area for 6 to <11 years of age and 11 to <16 years of age for male and female combined.

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake
mg/L = milligrams per liter
day/yr = days per year
yr = year
kg = kilogram
RME = Reasonable Maximum Exposure
hr/day = hours per day
cm^2 = square centimeters
cm/hr = centimeter per hour
L/cm^3 = liters per cubic centimeter

TABLE 4.6
VALUES USED FOR CHILD RECREATIONAL USER DAILY SURFACE WATER INTAKE EQUATIONS

Scenario Timeframe: Current/Future
Medium: Surface Water
Exposure Medium: Surface Water
Exposure Point: Donna Reservoir and Canal System
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation
Ingestion	CW	Concentration in Water	mg/L	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	CR	Ingestion Rate	L/day	0.043	U.S. EPA 2011 (1)	CW x CR x EF x ED / (BW x AT)
	EF	Exposure Frequency	day/yr	52	BPJ (2)	
	ED	Exposure Duration	yr	4	BPJ (3)	
	BW	Body Weight	kg	18	U.S. EPA 1989	
	AT-NC	Averaging time-Noncancer	days	1,460	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
Dermal	CW	Concentration in Surface Water	mg/L	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	SA	Surface Area for Contact	cm^2	2,373	U.S. EPA 2004	CW x SA x PC x ET x EF x ED x CF / (BW x AT)
	PC	Permeability Coefficient	cm/hr	Chemical-Specific	Chemical-Specific	
	ET	Exposure Time	hr/day	4	U.S. EPA 2011 (1)	For organic compounds
	EF	Exposure Frequency	day/yr	52	BPJ (2)	CDI (mg/kg/day) =
	ED	Exposure Duration	yr	4	BPJ (3)	DA_{event} x SA x EF x ED / (BW x AT)
	BW	Body Weight	kg	15	U.S. EPA 2011	
	AT-NC	Averaging Time - Noncancer	days	1,095	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	L/cm^3	0.001	U.S. EPA 1989	

(1) The incidental ingestion rate of surface water is taken from the USEPA *Exposure Factors Handbook* , Table 3-93. Ingestion of surface water is assumed during fishing activities, which has an ingestion rate of 10.8 mL/hr. Assuming an exposure time of 4 hour/day results in an ingestion rate of 43.2 mL/day.
(2) Assumes fishing will occur approximately 2 days per week for 6 months.
(3) Age range for child is assumed from 2 to 6 years. It is expected that children younger then 2 years will not have contact with surface water.

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake
mg/L = milligrams per liter
day/yr = days per year
yr = year
kg = kilogram
RME = Reasonable Maximum Exposure
hr/day = hours per day
cm^2 = square centimeters
cm/hr = centimeter per hour
L/cm^3 = liters per cubic centimeter

TABLE 4.7
VALUES USED FOR ADULT RECREATIONAL USER DAILY SEDIMENT INTAKE EQUATIONS

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Donna Reservoir and Canal System
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation
Ingestion	CS	Chemical Concentration in Sediment	mg/kg	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	CR	Ingestion Rate	mg/day	50	BPJ (1)	CS x CR x EF x ED x CF / (BW x AT)
	EF	Exposure Frequency	day/yr	52	BPJ (2)	
	ED	Exposure Duration	yr	26	U.S. EPA 2011	
	BW	Body Weight	kg	80	U.S. EPA 2011	
	AT-NC	Averaging time - Noncancer	days	9,490	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA 1989	
Dermal	CS	Chemical Concentration in Sediment	mg/kg	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	SA	Surface Area for Contact	cm^2/event	4,782	U.S. EPA 2011 (3)	CS x SA x AF x ABS x EF x ED x CF / (BW x AT)
	AF	Adherence Factor	mg/cm^2	0.07	U.S. EPA 2004 (4)	
	ABS	Dermal Absorption Fraction	Unitless	Chemical-Specific	U.S. EPA 2004	
	EF	Exposure Frequency	event/yr	52	BPJ (2)	
	ED	Exposure Duration	yr	26	U.S. EPA 2011	
	BW	Body Weight	kg	80	U.S. EPA 2011	
	AT-NC	Averaging Time - Noncancer	days	9,490	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA 1989	

(1) The incidental sediment ingestion rate is assumed to be equal to the soil ingestion rate presented in Table 5-1 of USEPA *Exposure Factors Handbook* and does not take into account dust ingestion.
(2) Assumes fishing will occur approximately 2 days per week for 6 months.
(3) Contact with sediment will be with the hands, forearms, feet and lower legs.
(4) The adherence factor is conservatively equal to the recommended factor for resident adult exposure to soil.

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake
mg/kg = milligrams per kilogram

mg/cm^2 = milligrams per square centimeter
mg/day = milligrams per day
day/yr = days per year
RME = Reasonable Maximum Exposure

kg/mg = kilograms per milligram
cm^2 /event = square centimeters per event
kg = kilogram

TABLE 4.8
VALUES USED FOR ADOLESCENT RECREATIONAL USER DAILY SEDIMENT INTAKE EQUATIONS

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Donna Reservoir and Canal System
Receptor Population: Recreational User
Receptor Age: Adolescent

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation
Ingestion	CS	Chemical Concentration in Sediment	Chemical-Specific	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	CR	Ingestion Rate	mg/day	50	BPJ (1)	CS x CR x EF x ED x CF / (BW x AT)
	EF	Exposure Frequency	day/yr	52	BPJ (2)	
	ED	Exposure Duration	yr	10	BPJ (3)	
	BW	Body Weight	kg	45	U.S. EPA 2011	
	AT-NC	Averaging time - Noncancer	days	2,920	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA 1989	
Dermal	CS	Chemical Concentration in Sediment	mg/kg	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	SA	Surface Area for Contact	cm^2/event	3,870	U.S. EPA 2011 (4)	CS x SA x AF x ABS x EF x ED x CF / (BW x AT)
	AF	Adherence Factor	mg/cm^2	0.2	U.S. EPA 2004 (5)	
	ABS	Dermal Absorption Fraction	Unitless	Chemical-Specific	U.S. EPA 2004	
	EF	Exposure Frequency	event/yr	52	BPJ (2)	
	ED	Exposure Duration	yr	10	BPJ (3)	
	BW	Body Weight	kg	45	U.S. EPA 2011	
	AT-NC	Averaging Time - Noncancer	days	3,650	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA 1989	

(1) The incidental sediment ingestion rate is assumed to be equal to the soil ingestion rate presented in Table 5-1 of USEPA *Exposure Factors Handbook* and does not take into account dust ingestion.
(2) Assumes fishing will occur approximately 2 days per week for 6 months.
(3) Assumes age range of adolescent is 6 to 16 years of age.
(4) Skin surface area is taken from Table 7-17 and Table 7-9 of 2011 EFH. Table 7-17 notes 29% of exposed skin surface available for 5 to 17 year old during outdoor activities. Table 7-9 presents the total skin surface area for 6 to <11 years of age and 11 to <16 years of age for male and female combined.
(5) The adherence factor is conservatively equal to the recommended factor for resident child exposure to soil.

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake
mg/kg = milligrams per kilogram
mg/cm^2 = milligrams per square centimeter
mg/day = milligrams per day
day/yr = days per year
RME = Reasonable Maximum Exposure
kg/mg = kilograms per milligram
cm^2 /event = square centimeters per event
kg = kilogram

TABLE 4.9
VALUES USED FOR CHILD RECREATIONAL USER DAILY SEDIMENT INTAKE EQUATIONS

Scenario Timeframe: Current/Future
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Donna Reservoir and Canal System
Receptor Population: Recreational User
Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation
Ingestion	CS	Chemical Concentration in Sediment	Chemical-Specific	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	CR	Ingestion Rate	mg/day	50	BPJ (1)	CS x CR x EF x ED x CF / (BW x AT)
	EF	Exposure Frequency	day/yr	52	BPJ (2)	
	ED	Exposure Duration	yr	4	BPJ (3)	
	BW	Body Weight	kg	15	U.S. EPA 2011	
	AT-NC	Averaging time - Noncancer	days	2,920	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA 1989	
Dermal	CS	Chemical Concentration in Sediment	mg/kg	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	SA	Surface Area for Contact	cm^2/event	2,373	U.S. EPA 2011 (4)	CS x SA x AF x ABS x EF x ED x CF / (BW x AT)
	AF	Adherence Factor	mg/cm^2	0.2	U.S. EPA 2004 (5)	
	ABS	Dermal Absorption Fraction	Unitless	Chemical-Specific	U.S. EPA 2004	
	EF	Exposure Frequency	event/yr	52	BPJ (2)	
	ED	Exposure Duration	yr	4	BPJ (3)	
	BW	Body Weight	kg	15	U.S. EPA 2011	
	AT-NC	Averaging Time - Noncancer	days	1,095	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	
	CF	Conversion Factor	kg/mg	1.0E-06	U.S. EPA 1989	

(1) The incidental sediment ingestion rate is assumed to be equal to the soil ingestion rate presented in Table 5-1 of USEPA *Exposure Factors Handbook* and does not take into account dust ingestion.
(2) Assumes fishing will occur approximately 2 days per week for 6 months.
(3) Age range for child is assumed from 2 to 6 years. It is expected that children younger then 2 years will not have contact with surface water.
(4) Contact with sediment is assumed similar to a resident child exposed area for soil.
(5) The adherence factor is conservatively equal to the recommended factor for resident child exposure to soil.

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake
mg/kg = milligrams per kilogram
mg/cm^2 = milligrams per square centimeter
mg/day = milligrams per day
day/yr = days per year
RME = Reasonable Maximum Exposure
kg/mg = kilograms per milligram
cm^2 /event = square centimeters per event
kg = kilogram

TABLE 4.10
VALUES USED FOR ADULT RECREATIONAL USER DAILY FISH INTAKE EQUATIONS

Scenario Timeframe: Current/Future
Medium: Surface Water/Sediment
Exposure Medium: Fish
Exposure Point: Donna Reservoir and Canal System
Receptor Population: Recreational User
Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation
Ingestion	CS	Chemical Concentration in Fish Fillets	mg/kg	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) = CS x CR x EF x ED / (BW x AT)
	CR	Ingestion Rate	kg/meal	0.0263	U.S. EPA 2000	
	EF	Exposure Frequency	meals/yr	365	U.S. EPA 2000	
	ED	Exposure Duration	yr	26	U.S. EPA 1989	
	BW	Body Weight	kg	80	U.S. EPA 1997b	
	AT-NC	Averaging time - Noncancer	days	9,490	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake

mg/kg = milligrams per kilogram
kg/meal = kilograms per meal

yr = year
kg = kilogram

TABLE 4.11
VALUES USED FOR ADOLESCENT RECREATIONAL USER DAILY FISH INTAKE EQUATIONS

Scenario Timeframe: Current/Future
Medium: Surface Water/Sediment
Exposure Medium: Fish
Exposure Point: Donna Reservoir and Canal System
Receptor Population: Recreational User
Receptor Age: Adolescent

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation
Ingestion	CS	Chemical Concentration in Fish Fillets	mg/kg	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	CR	Ingestion Rate	kg/meal	0.0196	U.S. EPA 2000	CS x CR x EF x ED / (BW x AT)
	EF	Exposure Frequency	meals/yr	365	U.S. EPA 2000	
	ED	Exposure Duration	yr	10	BPJ	
	BW	Body Weight	kg	45	U.S. EPA 1997b	
	AT-NC	Averaging time - Noncancer	days	3,650	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake

mg/kg = milligrams per kilogram
kg/meal = kilograms per meal

yr = year
kg = kilogram

TABLE 4.12
VALUES USED FOR CHILD RECREATIONAL USER DAILY FISH INTAKE EQUATIONS

Scenario Timeframe: Current/Future Medium: Surface Water/Sediment Exposure Medium: Fish Exposure Point: Donna Reservoir and Canal System Receptor Population: Recreational User Receptor Age: Child

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation
Ingestion	CS	Chemical Concentration in Fish Fillets	mg/kg	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	CR	Ingestion Rate	kg/meal	0.0098	U.S. EPA 2000	CS x CR x EF x ED / (BW x AT)
	EF	Exposure Frequency	meals/yr	365	U.S. EPA 2000	
	ED	Exposure Duration	yr	4	BPJ (1)	
	BW	Body Weight	kg	15	U.S. EPA 2008	
	AT-NC	Averaging time - Noncancer	days	1,095	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	

(1) Age range for child is assumed from 2 to 6 years. It is expected that children younger then 2 years will not consume significant amounts of fish.

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake

mg/kg = milligrams per kilogram
kg/meal = kilograms per meal

yr = year
kg = kilogram

TABLE 4.13
VALUES USED FOR ADULT SUBSISTENCE FISHER DAILY FISH INTAKE EQUATIONS

Scenario Timeframe: Current/Future Medium: Surface Water/Sediment Exposure Medium: Fish Exposure Point: Donna Reservoir and Canal System Receptor Population: Subsistence Receptor Age: Adult

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	Intake Equation / Model Name
Ingestion	CS	Chemical Concentration in Fish Fillets	mg/kg	Chemical-Specific	Chemical-Specific	CDI (mg/kg/day) =
	CR	Ingestion Rate	kg/meal	0.146	U.S. EPA 2000, BPJ	CS x CR x EF x ED / (BW x AT)
	EF	Exposure Frequency	meals/yr	365	U.S. EPA 2000	
	ED	Exposure Duration	yr	20	U.S. EPA 2011	
	BW	Body Weight	kg	80	U.S. EPA 2011	
	AT-NC	Averaging time - Noncancer	days	7,300	U.S. EPA 1989	
	AT-C	Averaging Time - Cancer	days	25,550	U.S. EPA 1989	

(1) The subsistence fisher is assumed to ingest an average of 146 grams of fish over an entire year.

BPJ = Best Professional Judgment
U.S. EPA = United States Environmental Protection Agency
CDI = chronic daily intake

mg/kg = milligrams per kilogram
kg/meal = kilograms per meal

yr = year
kg = kilogram

TABLE 5.1
NON-CANCER TOXICITY DATA - ORAL/DERMAL

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value (mg/kg-day)	Oral to Dermal Adjustment Factor (GI ABS) (1)	Adjusted Dermal RfD (2) (mg/kg bw-day)	Primary Target Organ	Combined Uncertainty/ Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ (3) (mm/dd/yy)
METALS								
ALUMINUM	Chronic	1.0E+00	1	1.0E+00	Central Nervous System	100/1	PPRTV	10/23/2006
ARSENIC	Chronic	3.0E-04	1	3.0E-04	Skin	3/1	IRIS	8/10/2015
COBALT	Chronic	3.0E-04	1	3.0E-04	Thyroid	3000/1	PPTRV	8/25/2008
MANGANESE	Chronic	2.4E-02	0.04	9.6E-04	Central Nervous System	1/3	IRIS	8/10/2015
MERCURY	Chronic	1.0E-04	1	1.0E-04	Central Nervous System	10/1	IRIS	8/10/2015
VANADIUM	Chronic	5.0E-03	0.026	1.3E-04	Hair	100/1	IRIS	8/10/2015
PAHS								
BENZO(A)ANTHRACENE	NA	NA	1	NA	NA	NA/NA	IRIS	8/10/2015
BENZO(B)FLUORANTHENE	NA	NA	1	NA	NA	NA/NA	IRIS	8/10/2015
BENZO(K)FLUORANTHENE	NA	NA	1	NA	NA	NA/NA	IRIS	8/10/2015
BENZO(A)PYRENE	NA	NA	1	NA	NA	NA/NA	IRIS	8/10/2015
DIBENZ(A,H)ANTHRACENE	NA	NA	1	NA	NA	NA/NA	IRIS	8/10/2015
INDENO(1,2,3-C,D)PYRENE	NA	NA	1	NA	NA	NA/NA	IRIS	8/10/2015
PESTICIDES/PCBs								
ALPHA-BHC	Chronic	8.0E-03	1	8.0E-03	Liver	100/1	ATSDR	4/1/2015
DELTA-BHC	NA	NA	1	NA	NA	NA/NA	IRIS	8/10/2015
GAMMA-BHC (LINDANE)	Chronic	3.0E-04	1	3.0E-04	Liver and Kidney	1000/1	IRIS	8/10/2015
ALDRIN	Chronic	3.0E-05	1	3.0E-05	Liver	1000/1	IRIS	8/10/2015
GAMMA-CHLORDANE	Chronic	5.0E-04	1	5.0E-04	Liver	300/1	IRIS	8/10/2015
DIELDRIN	Chronic	5.0E-05	1	5.0E-05	Liver	100/1	IRIS	8/10/2015
4,4'-DDE	NA	NA	1	NA	NA	NA/NA	IRIS	8/10/2015
4,4'-DDT	Chronic	5.0E-04	1	5.0E-04	Liver	100/1	IRIS	8/10/2015
ENDRIN	Chronic	3.0E-04	1	3.0E-04	Liver	100/1	IRIS	8/10/2015
HEPTACHLOR EPOXIDE	Chronic	1.3E-05	1	1.3E-05	Liver	1000/1	IRIS	8/10/2015
AROCLOR-1254	Chronic	2.0E-05	1	2.0E-05	Skin	300/1	IRIS	8/10/2015
AROCLOR-1260	NA	NA	1	NA	NA	NA/NA	IRIS	11/15/2009
TOTAL PCBs	NA	NA	1	NA	NA	NA/NA	IRIS	5/6/2010
SEMIVOLATILES								
BIS(2-ETHYLHEXYL)PHTHALATE	Chronic	2.00E-02	1	2.00E-02	Liver	1000/1	IRIS	8/10/2015

NA = Not Applicable
(1) Taken from USEPA 2004 Guidance.

(2) Dermal toxicological values adjusted from oral values using USEPA 2004 recommended chemical-specific gastrointestinal absorption factors (GI ABS). RfDs are multiplied by the GI ABS.
(3) IRIS - Integrated Risk Information System. For IRIS values, the date IRIS was searched is provided. PPRTV - Provisional Peer-Reviewed Toxicity Value. For PPRTV values, the date of the issue paper is provided. ATSDR - Agency for Toxic Substances and Disease Registry, Minimal Risk Level (MRL).

TABLE 5.2
CHEMICAL-SPECIFIC PARAMETERS

Chemical of Potential Concern	Absorption Factor	Reference	GI ABS	Reference	Permeability Constant (cm/hr)	Reference
Inorganics						
ALUMINUM	NA	U.S. EPA, 2004	1	U.S. EPA, 2004	1.00E-03	U.S. EPA, 2004
ARSENIC	0.03	U.S. EPA, 2004	1	U.S. EPA, 2004	1.00E-03	U.S. EPA, 2004
COBALT	NA	U.S. EPA, 2004	1	U.S. EPA, 2004	4.00E-04	U.S. EPA, 2004
MANGANESE	NA	U.S. EPA, 2004	0.04	U.S. EPA, 2004	1.00E-03	U.S. EPA, 2004
MERCURY	NA	U.S. EPA, 2004	1	U.S. EPA, 2004	1.00E-03	U.S. EPA, 2004
VANADIUM	NA	U.S. EPA, 2004	0.026	U.S. EPA, 2004	1.00E-03	U.S. EPA, 2004
PAHs						
BENZ(A)ANTHRACENE	0.13	U.S. EPA, 2004	1	U.S. EPA, 2004	5.50E-01	U.S. EPA, 2015
BENZO(B)FLUORANTHENE	0.13	U.S. EPA, 2004	1	U.S. EPA, 2004	4.20E-01	U.S. EPA, 2015
BENZO(K)FLUORANTHENE	0.13	U.S. EPA, 2004	1	U.S. EPA, 2004	6.91E-01	U.S. EPA, 2015
BENZO(A)PYRENE	0.13	U.S. EPA, 2004	1	U.S. EPA, 2004	7.00E-01	U.S. EPA, 2015
DIBENZ(A,H)ANTHRACENE	0.13	U.S. EPA, 2004	1	U.S. EPA, 2004	9.50E-01	U.S. EPA, 2015
INDENO(1,2,3-C,D)PYRENE	0.13	U.S. EPA, 2004	1	U.S. EPA, 2004	1.20E+00	U.S. EPA, 2015
Pesticides/PCBs						
ALPHA-BHC	0.1	U.S. EPA, 2004	1	U.S. EPA, 2004	2.79E-02	U.S. EPA, 2015
DELTA-BHC	0.1	U.S. EPA, 2004	1	U.S. EPA, 2004	2.79E-02	U.S. EPA, 2015
GAMMA-BHC (LINDANE)	0.04	U.S. EPA, 2004	1	U.S. EPA, 2004	2.79E-02	U.S. EPA, 2015
ALDRIN	0.1	U.S. EPA, 2004	1	U.S. EPA, 2004	1.40E-03	U.S. EPA, 2015
GAMMA-CHLORDANE	0.04	U.S. EPA, 2004	1	U.S. EPA, 2004	3.80E-02	U.S. EPA, 2015
DIELDRIN	0.1	U.S. EPA, 2004	1	U.S. EPA, 2004	1.20E-02	U.S. EPA, 2015
4,4'-DDE	0.03	U.S. EPA, 2004	1	U.S. EPA, 2004	1.60E-01	U.S. EPA, 2015
4,4'-DDT	0.03	U.S. EPA, 2004	1	U.S. EPA, 2004	2.70E-01	U.S. EPA, 2015
ENDRIN	0.1	U.S. EPA, 2004	1	U.S. EPA, 2004	4.45E-02	U.S. EPA, 2015
HEPTACHLOR EPOXIDE	0.1	U.S. EPA, 2004	1	U.S. EPA, 2004	2.76E-02	U.S. EPA, 2015
AROCLOR-1254	0.14	U.S. EPA, 2004	1	U.S. EPA, 2004	7.50E-01	U.S. EPA, 2015
AROCLOR-1260	0.14	U.S. EPA, 2004	1	U.S. EPA, 2004	9.90E-01	U.S. EPA, 2015
TOTAL PCB's	0.14	U.S. EPA, 2004	1	U.S. EPA, 2004	9.90E-01	U.S. EPA, 2015
Semivolatiles						
BIS(2-ETHYLHEXYL)PHTHALATE	0.1	U.S. EPA, 2004	1	U.S. EPA, 2004	2.50E-02	U.S. EPA, 2015

NA = Data not available.
GI ABS = Gastrointestinal Absorption factors
(1) Toxicity and Chemical-Specific Factors Database. Http://risk.lsd.ornl.gov/cgi-bin/tox. May 2010.
U.S. EPA, 2004 = U.S. Environmental Protection Agency, 2004. *Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment).* Final Guidance.

U.S. EPA, 2015 = Regional Screening Level for Superfund Sites Chemical-Specific Parameters Table. June. Available at: http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/Generic_Tables/index.htm.

TABLE 6
CANCER TOXICITY DATA - ORAL/DERMAL

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral Absorption Efficiency for Dermal (GI ABS)(1)	Absorbed Cancer Slope Factor for Dermal (2)	Units	Weight of Evidence/Cancer Guideline Description	Mutagenic Compound	Source	Date (3) (mm/dd/yy)
Inorganics								
ALUMINUM	NA	1	NA	per (mg/kg-day)	D		PPRTV	10/23/2006
ARSENIC	1.5E+00	1	1.5E+00	per (mg/kg-day)	A		IRIS	8/10/2015
COBALT	NA	1	NA	per (mg/kg-day)	B2		PPTRV	8/25/2008
MANGANESE	NA	0.04	NA	per (mg/kg-day)	D		IRIS	8/10/2015
MERCURY	NA	1	NA	per (mg/kg-day)	C		IRIS	8/10/2015
VANADIUM	NA	0.026	NA	per (mg/kg-day)	NA		IRIS	8/10/2015
PAHs								
BENZ(A)ANTHRACENE	7.3E-01	1	7.3E-01	per (mg/kg-day)	B2	M	IRIS	8/10/2015
BENZO(B)FLUORANTHENE	7.3E-01	1	7.3E-01	per (mg/kg-day)	B2	M	IRIS	8/10/2015
BENZO(K)FLUORANTHENE	7.3E-02	1	7.3E-02	per (mg/kg-day)	B2	M	IRIS	8/10/2015
BENZO(A)PYRENE	7.3E+00	1	7.3E+00	per (mg/kg-day)	B2	M	IRIS	8/10/2015
DIBENZ(A,H)ANTHRACENE	7.3E+00	1	7.3E+00	per (mg/kg-day)	B2	M	IRIS	8/10/2015
INDENO(1,2,3-C,D)PYRENE	7.3E-01	1	7.3E-01	per (mg/kg-day)	B2	M	IRIS	8/10/2015
Pesticides/PCBs								
ALPHA-BHC	6.3E+00	1	6.3E+00	per (mg/kg-day)	B2		IRIS	8/10/2015
DELTA-BHC	1.8E+00	1	1.8E+00	per (mg/kg-day)	C		IRIS	8/10/2015
GAMMA-BHC (LINDANE)	1.1E+00	1	1.1E+00	per (mg/kg-day)	B2		CalEPA	5/1/2009
ALDRIN	1.7E+01	1	1.7E+01	per (mg/kg-day)	B2		IRIS	8/10/2015
GAMMA-CHLORDANE	3.5E-01	1	3.5E-01	per (mg/kg-day)	B2		IRIS	8/10/2015
DIELDRIN	1.6E+01	1	1.6E+01	per (mg/kg-day)	B2		IRIS	8/10/2015
4,4'-DDE	3.4E-01	1	3.4E-01	per (mg/kg-day)	B2		IRIS	8/10/2015
4,4'-DDT	3.4E-01	1	3.4E-01	per (mg/kg-day)	B2		IRIS	8/10/2015
ENDRIN	NA	1	NA	per (mg/kg-day)	D		IRIS	8/10/2015
HEPTACHLOR EPOXIDE	9.1E+00	1	9.1E+00	per (mg/kg-day)	B2		IRIS	8/10/2015
AROCLOR-1254	2.0E+00	1	2.0E+00	per (mg/kg-day)	B2		IRIS	8/10/2015
AROCLOR-1260	2.0E+00	1	2.0E+00	per (mg/kg-day)	B2		IRIS	8/10/2015
TOTAL PCB's	2.0E+00	1	2.0E+00	per (mg/kg-day)	B2		IRIS	8/10/2015
Semivolatiles								
BIS(2-ETHYLHEXYL)PHTHALATE	1.40E-02	1	1.40E-02	per (mg/kg-day)	B2		IRIS	8/10/2015

M = Chemical has a mutagenic mode of action
NA = Not Applicable Not Applicable
(1) Taken from USEPA 2004 Guidance.
(2) Dermal Toxicological values adjusted from oral values using USEPA 2004 recommended chemical-specific gastrointestinal absorption factors (GI ABS). CSFs are divided by the GI ABS.
(3)IRIS - Integrated Risk Information System. For IRIS values, the date IRIS was searched is provided.
CalEPA - California Environmental Protection Agency.
PPRTV - Provisional Peer-Reviewed Toxicity Value. For PPRTV values, the date of the issue paper is provided.

Weight of Evidence: A - Human carcinogen
B1 - Probable human carcinogen - indicate that limited human data are available
B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans
C - Possible human carcinogen
D - Not classifiable as a human carcinogen
E - Evidence of noncarcinogenicity

TABLE 7.1
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE RESIDENT ADULT - SOIL

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DRCS	Ingestion	**METALS**												
				ALUMINUM	2.08E+04	(mg/kg)	7.14E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	2.50E-02	(mg/kg-day)	1.00E+00	(mg/kg-day)	2.5E-02
				ARSENIC	5.61E+00	(mg/kg)	1.92E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.9E-06	6.72E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.2E-02
				COBALT	6.20E+00	(mg/kg)	2.12E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	7.43E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.5E-02
				MANGANESE	3.96E+02	(mg/kg)	1.36E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	4.74E-04	(mg/kg-day)	2.40E-02	(mg/kg-day)	2.0E-02
				VANADIUM	2.33E+01	(mg/kg)	7.98E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	2.79E-05	(mg/kg-day)	5.00E-03	(mg/kg-day)	5.6E-03
				PAHS												
				BENZO(A)PYRENE	1.10E-01	(mg/kg)	6.78E-08	(mg/kg-day)	7.30E+00	per (mg/kg-day)	5.0E-07	1.32E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**3.4E-06**					**9.8E-02**
			Dermal[1]	**METALS**												
				ALUMINUM	2.08E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E+00	(mg/kg-day)	--
				ARSENIC	5.61E+00	(mg/kg)	2.43E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.7E-07	8.52E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.8E-03
				COBALT	6.20E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	3.96E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	9.60E-04	(mg/kg-day)	--
				VANADIUM	2.33E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.30E-04	(mg/kg-day)	--
				PAHS												
				BENZO(A)PYRENE	1.10E-01	(mg/kg)	3.72E-08	(mg/kg-day)	7.30E+00	per (mg/kg-day)	2.7E-07	7.24E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**6.4E-07**					**2.8E-03**
		Exposure Point Total									**4.0E-06**					**1.0E-01**
	Exposure Medium Total										**4.0E-06**					**1.0E-01**
	Air	DRCS	Inhalation	**METALS**												
				ALUMINUM	7.47E-05	(mg/m^3)	2.05E-02	(ug/m^3)	NA	per (ug/m^3)	--	7.16E-05	(mg/m^3)	5.00E-03	(mg/m^3)	1.4E-02
				ARSENIC	2.01E-08	(mg/m^3)	5.51E-06	(ug/m^3)	4.30E-03	per (ug/m^3)	2.4E-08	1.93E-08	(mg/m^3)	1.50E-05	(mg/m^3)	1.3E-03
				COBALT	2.22E-08	(mg/m^3)	6.09E-06	(ug/m^3)	9.00E-03	per (ug/m^3)	5.5E-08	2.13E-08	(mg/m^3)	6.00E-06	(mg/m^3)	3.6E-03
				MANGANESE	1.42E-06	(mg/m^3)	3.89E-04	(ug/m^3)	NA	per (ug/m^3)	--	1.36E-06	(mg/m^3)	5.00E-05	(mg/m^3)	2.7E-02
				VANADIUM	8.35E-08	(mg/m^3)	2.29E-05	(ug/m^3)	NA	per (ug/m^3)	--	8.00E-08	(mg/m^3)	1.00E-04	(mg/m^3)	8.0E-04
				PAHS												
				BENZO(A)PYRENE	3.94E-10	(mg/m^3)	1.94E-07	(ug/m^3)	1.10E-03	per (ug/m^3)	2.1E-10	3.78E-10	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**7.9E-08**					**4.7E-02**
		Exposure Point Total									**7.9E-08**					**4.7E-02**
	Exposure Medium Total										**7.9E-08**					**4.7E-02**
Soil Total											**4.1E-06**					**1.5E-01**
										Total of Receptor Risks Across All Media	**4.1E-06**				Total of Receptor Hazards Across All Media	**1.5E-01**

Note:
1) Dermal Intake is "NA" due to no recommended Dermal Absorption Fractions (ABS) for this chemical. Please See table 5.2.

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.2
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE RESIDENT CHILD - SOIL

Scenario Timeframe: Current
Receptor Population: Resident
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DRCS	Ingestion	**METALS**												
				ALUMINUM	2.08E+04	(mg/kg)	2.28E-02	(mg/kg-day)	NA	per (mg/kg-day)	--	2.67E-01	(mg/kg-day)	1.00E+00	(mg/kg-day)	2.7E-01
				ARSENIC	5.61E+00	(mg/kg)	6.15E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	9.2E-06	7.17E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.4E-01
				COBALT	6.20E+00	(mg/kg)	6.79E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	7.93E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.6E-01
				MANGANESE	3.96E+02	(mg/kg)	4.34E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	5.06E-03	(mg/kg-day)	2.40E-02	(mg/kg-day)	2.1E-01
				VANADIUM	2.33E+01	(mg/kg)	2.55E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.98E-04	(mg/kg-day)	5.00E-03	(mg/kg-day)	6.0E-02
				PAHS												
				BENZO(A)PYRENE	1.10E-01	(mg/kg)	6.39E-07	(mg/kg-day)	7.30E+00	per (mg/kg-day)	4.7E-06	1.41E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.4E-05**					**1.0E+00**
			Dermal[1]	**METALS**												
				ALUMINUM	2.08E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E+00	(mg/kg-day)	--
				ARSENIC	5.61E+00	(mg/kg)	4.38E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	6.6E-07	5.11E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.7E-02
				COBALT	6.20E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	3.96E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	9.60E-04	(mg/kg-day)	--
				VANADIUM	2.33E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.30E-04	(mg/kg-day)	--
				PAHS												
				BENZO(A)PYRENE	1.10E-01	(mg/kg)	1.97E-07	(mg/kg-day)	7.30E+00	per (mg/kg-day)	1.4E-06	4.34E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.1E-06**					**1.7E-02**
		Exposure Point Total									**1.6E-05**					**1.1E+00**
	Exposure Medium Total										**1.6E-05**					**1.1E+00**
	Air	DRCS	Inhalation	**METALS**												
				ALUMINUM	7.47E-05	(mg/m^3)	6.14E-03	(ug/m3)	NA	per (ug/m3)	--	7.16E-05	(mg/m^3)	5.00E-03	(mg/m^3)	1.4E-02
				ARSENIC	2.01E-08	(mg/m^3)	1.65E-06	(ug/m3)	4.30E-03	per (ug/m3)	7.1E-09	1.93E-08	(mg/m^3)	1.50E-05	(mg/m^3)	1.3E-03
				COBALT	2.22E-08	(mg/m^3)	1.83E-06	(ug/m3)	9.00E-03	per (ug/m3)	1.6E-08	2.13E-08	(mg/m^3)	6.00E-06	(mg/m^3)	3.6E-03
				MANGANESE	1.42E-06	(mg/m^3)	1.17E-04	(ug/m3)	NA	per (ug/m3)	--	1.36E-06	(mg/m^3)	5.00E-05	(mg/m^3)	2.7E-02
				VANADIUM	8.35E-08	(mg/m^3)	6.86E-06	(ug/m3)	NA	per (ug/m3)	--	8.00E-08	(mg/m^3)	1.00E-04	(mg/m^3)	8.0E-04
				PAHS												
				BENZO(A)PYRENE	3.94E-10	(mg/m^3)	1.72E-07	(ug/m3)	1.10E-03	per (ug/m3)	1.9E-10	3.78E-10	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**2.4E-08**					**4.7E-02**
		Exposure Point Total									**2.4E-08**					**4.7E-02**
	Exposure Medium Total										**2.4E-08**					**4.7E-02**
Soil Total											**1.6E-05**					**1.1E+00**
										Total of Receptor Risks Across All Media	**1.6E-05**				Total of Receptor Hazards Across All Media	**1.1E+00**

Note:
1) Dermal Intake is "NA" due to no recommended Dermal Absorption Fractions (ABS) for this chemical. Please See table 5.2.

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.3
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE AGRICULTURAL WORKER - SOIL

Scenario Timeframe: Current
Receptor Population: Agricultural Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Soil	Surface Soil	DRCS	Ingestion	**METALS**												
				ALUMINUM	2.08E+04	(mg/kg)	6.37E-03	(mg/kg-day)	NA	per (mg/kg-day)	--	1.49E-02	(mg/kg-day)	1.00E+00	(mg/kg-day)	1.5E-02
				ARSENIC	5.61E+00	(mg/kg)	1.72E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.6E-06	4.00E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.3E-02
				COBALT	6.20E+00	(mg/kg)	1.90E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	4.42E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-02
				MANGANESE	3.96E+02	(mg/kg)	1.21E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	2.82E-04	(mg/kg-day)	2.40E-02	(mg/kg-day)	1.2E-02
				VANADIUM	2.33E+01	(mg/kg)	7.12E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.66E-05	(mg/kg-day)	5.00E-03	(mg/kg-day)	3.3E-03
				PAHS												
				BENZO(A)PYRENE	1.10E-01	(mg/kg)	3.36E-08	(mg/kg-day)	7.30E+00	per (mg/kg-day)	2.5E-07	7.85E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.8E-06**					**5.8E-02**
			Dermal[1]	**METALS**												
				ALUMINUM	2.08E+04	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.00E+00	(mg/kg-day)	--
				ARSENIC	5.61E+00	(mg/kg)	2.18E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.3E-07	5.08E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.7E-03
				COBALT	6.20E+00	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	3.00E-04	(mg/kg-day)	--
				MANGANESE	3.96E+02	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	9.60E-04	(mg/kg-day)	--
				VANADIUM	2.33E+01	(mg/kg)	NA	(mg/kg-day)	NA	per (mg/kg-day)	--	NA	(mg/kg-day)	1.30E-04	(mg/kg-day)	--
				PAHS												
				BENZO(A)PYRENE	1.10E-01	(mg/kg)	1.85E-08	(mg/kg-day)	7.30E+00	per (mg/kg-day)	1.4E-07	4.32E-08	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**4.6E-07**					**1.7E-03**
		Exposure Point Total									**3.3E-06**					**6.0E-02**
	Exposure Medium Total										**3.3E-06**					**6.0E-02**
	Air	DRCS	Inhalation	**METALS**												
				ALUMINUM	7.47E-05	(mg/m^3)	6.09E-03	(ug/m^3)	NA	per (ug/m^3)	--	1.71E-06	(mg/m^3)	5.00E-03	(mg/m^3)	3.4E-04
				ARSENIC	2.01E-08	(mg/m^3)	1.64E-06	(ug/m^3)	4.30E-03	per (ug/m^3)	7.1E-09	4.59E-10	(mg/m^3)	1.50E-05	(mg/m^3)	3.1E-05
				COBALT	2.22E-08	(mg/m^3)	1.81E-06	(ug/m^3)	9.00E-03	per (ug/m^3)	1.6E-08	5.07E-10	(mg/m^3)	6.00E-06	(mg/m^3)	8.5E-05
				MANGANESE	1.42E-06	(mg/m^3)	1.16E-04	(ug/m^3)	NA	per (ug/m^3)	--	3.24E-08	(mg/m^3)	5.00E-05	(mg/m^3)	6.5E-04
				VANADIUM	8.35E-08	(mg/m^3)	6.81E-06	(ug/m^3)	NA	per (ug/m^3)	--	1.91E-09	(mg/m^3)	1.00E-04	(mg/m^3)	1.9E-05
				PAHS												
				BENZO(A)PYRENE	3.94E-10	(mg/m^3)	3.21E-08	(ug/m^3)	1.10E-03	per (ug/m^3)	3.5E-11	9.00E-12	(mg/m^3)	NA	(mg/m^3)	--
			Exp. Route Total								**2.3E-08**					**1.1E-03**
		Exposure Point Total									**2.3E-08**					**1.1E-03**
	Exposure Medium Total										**2.3E-08**					**1.1E-03**
Soil Total											**3.3E-06**					**6.1E-02**
										Total of Receptor Risks Across All Media	**3.3E-06**				Total of Receptor Hazards Across All Media	**6.1E-02**

Note:
1) Dermal Intake is "NA" due to no recommended Dermal Absorption Fractions (ABS) for this chemical. Please See table 5.2.

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.4
CALCULATIONS OF AIR CONCENTRATIONS DUE TO DUST ENTRAINMENT FROM SOIL

Model Equations:

Particulate Emission Factor	PEF = Q/C x [(3,600 s/h)/(.36 x (1- V) x (Um/Ut)^3 x F(x))] =	**2.79E+08**
Air Concentration	Cair = Csoil/PEF	

Where,

Q/C =	7.92E+01	g/m^2-s per kg/m^3	Inverse Mean Concentration at Center of 0.05 square source for Houston, TX, USEPA 1996
V =	5.00E-01	unitless	Default, USEPA 2014a
Um =	3.49E+00	m/s	Mean annual wind speed, Houston, TX, USEPA 1996
Ut =	1.13E+01	m/s	Equivalent threshold value of windspeed at 7 m, USEPA 2014a
F(x) =	1.94E-01	unitless	Default, USEPA 2014a

Reference for the model: USEPA Soil Screening Guidance: Technical Background Document. Office of Emergency and Remedial Response. U.S. EPA, 1996.

Chemical	**Csoil, Surface Soil** RME EPC mg/kg	**Cair, Surface Soil Particulate** RME EPC mg/m^3
METALS		
ALUMINUM	2.08E+04	7.47E-05
ARSENIC	5.61E+00	2.01E-08
COBALT	6.20E+00	2.22E-08
MANGANESE	3.96E+02	1.42E-06
VANADIUM	2.33E+01	8.35E-08
PAHS		
BENZO(A)PYRENE	1.10E-01	3.94E-10

TABLE 7.5
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT RECREATIONAL USER
EXPOSURE AREA 2: THE SIPHON AND DOWNSTREAM - SEDIMENT

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	Exposure Area 2: The Siphon and Downstream	Ingestion	**PESTICIDES/PCBs**												
				AROCLOR-1254	9.52E-01	(mg/kg)	3.15E-08	(mg/kg-day)	2.00E+00	per (mg/kg-day)	6.3E-08	8.48E-08	(mg/kg-day)	2.00E-05	(mg/kg-day)	4.2E-03
			Exp. Route Total								**6.3E-08**					**4.2E-03**
			Dermal[1]	**PESTICIDES/PCBs**												
				AROCLOR-1254	9.52E-01	(mg/kg)	2.95E-08	(mg/kg-day)	2.00E+00	per (mg/kg-day)	5.9E-08	7.94E-08	(mg/kg-day)	2.00E-05	(mg/kg-day)	4.0E-03
			Exp. Route Total								**5.9E-08**					**4.0E-03**
		Exposure Point Total									**1.2E-07**					**8.2E-03**
Sediment Total											**1.2E-07**					**8.2E-03**
										Total of Receptor Risks Across All Media	**1.2E-07**				Total of Receptor Hazards Across All Media	**8.2E-03**

Note:
1) Dermal Intake is "NA" due to no recommended Dermal Absorption Fractions (ABS) for this chemical. Please See table 5.2.

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.6
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADOLESCENT RECREATIONAL USER
EXPOSURE AREA 2: THE SIPHON AND DOWNSTREAM - SEDIMENT

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	Exposure Area 2: The Siphon and Downstream	Ingestion	**PESTICIDES/PCBs**												
				AROCLOR-1254	9.52E-01	(mg/kg)	2.15E-08	(mg/kg-day)	2.00E+00	per (mg/kg-day)	4.3E-08	1.88E-07	(mg/kg-day)	2.00E-05	(mg/kg-day)	9.4E-03
			Exp. Route Total								**4.3E-08**					**9.4E-03**
			Dermal[1]	**PESTICIDES/PCBs**												
				AROCLOR-1254	9.52E-01	(mg/kg)	4.67E-08	(mg/kg-day)	2.00E+00	per (mg/kg-day)	9.3E-08	3.27E-07	(mg/kg-day)	2.00E-05	(mg/kg-day)	1.6E-02
			Exp. Route Total								**9.3E-08**					**1.6E-02**
		Exposure Point Total									**1.4E-07**					**2.6E-02**
	Exposure Medium Total										**1.4E-07**					**2.6E-02**
Sediment Total											**1.4E-07**					**2.6E-02**
										Total of Receptor Risks Across All Media	**1.4E-07**				Total of Receptor Hazards Across All Media	**2.6E-02**

Note:
1) Dermal Intake is "NA" due to no recommended Dermal Absorption Fractions (ABS) for this chemical. Please See table 5.2.

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.7
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE CHILD RECREATIONAL USER
EXPOSURE AREA 2: THE SIPHON AND DOWNSTREAM - SEDIMENT

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	Exposure Area 2: The Siphon and Downstream	Ingestion	**PESTICIDES/PCBs**												
				AROCLOR-1254	9.52E-01	(mg/kg)	2.58E-08	(mg/kg-day)	2.00E+00	per (mg/kg-day)	5.2E-08	2.26E-07	(mg/kg-day)	2.00E-05	(mg/kg-day)	1.1E-02
			Exp. Route Total								**5.2E-08**					**1.1E-02**
			Dermal[1]	**PESTICIDES/PCBs**												
				AROCLOR-1254	9.52E-01	(mg/kg)	3.43E-08	(mg/kg-day)	2.00E+00	per (mg/kg-day)	6.9E-08	8.01E-07	(mg/kg-day)	2.00E-05	(mg/kg-day)	4.0E-02
			Exp. Route Total								**6.9E-08**					**4.0E-02**
		Exposure Point Total									**1.2E-07**					**5.1E-02**
	Exposure Medium Total										**1.2E-07**					**5.1E-02**
Sediment Total											**1.2E-07**					**5.1E-02**
										Total of Receptor Risks Across All Media	**1.2E-07**				Total of Receptor Hazards Across All Media	**5.1E-02**

Note:
1) Dermal Intake is "NA" due to no recommended Dermal Absorption Fractions (ABS) for this chemical. Please See table 5.2.

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.8
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT RECREATIONAL USER
EXPOSURE AREA 4: DOWNSTREAM OF THE RESERVOIRS - SEDIMENT

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	Exposure Area 4: Downstream of the Reservoirs	Ingestion	**PAHS**												
				BENZO(A)ANTHRACENE	3.40E+01	(mg/kg)	1.12E-06	(mg/kg-day)	7.30E-01	per (mg/kg-day)	8.2E-07	3.03E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.10E+01	(mg/kg)	1.03E-06	(mg/kg-day)	7.30E-01	per (mg/kg-day)	7.5E-07	2.76E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(K)FLUORANTHENE	2.00E+01	(mg/kg)	6.61E-07	(mg/kg-day)	7.30E-02	per (mg/kg-day)	4.8E-08	1.78E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.80E+01	(mg/kg)	5.95E-07	(mg/kg-day)	7.30E+00	per (mg/kg-day)	4.3E-06	1.60E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				DIBENZ(A,H)ANTHRACENE	2.40E+00	(mg/kg)	7.94E-08	(mg/kg-day)	7.30E+00	per (mg/kg-day)	5.8E-07	2.14E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	8.70E+00	(mg/kg)	2.88E-07	(mg/kg-day)	7.30E-01	per (mg/kg-day)	2.1E-07	7.75E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**6.8E-06**					**0.0E+00**
			Dermal[1]	**PAHS**												
				BENZO(A)ANTHRACENE	3.40E+01	(mg/kg)	9.79E-07	(mg/kg-day)	7.30E-01	per (mg/kg-day)	7.1E-07	2.63E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.10E+01	(mg/kg)	8.92E-07	(mg/kg-day)	7.30E-01	per (mg/kg-day)	6.5E-07	2.40E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(K)FLUORANTHENE	2.00E+01	(mg/kg)	5.76E-07	(mg/kg-day)	7.30E-02	per (mg/kg-day)	4.2E-08	1.55E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.80E+01	(mg/kg)	5.18E-07	(mg/kg-day)	7.30E+00	per (mg/kg-day)	3.8E-06	1.39E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				DIBENZ(A,H)ANTHRACENE	2.40E+00	(mg/kg)	6.91E-08	(mg/kg-day)	7.30E+00	per (mg/kg-day)	5.0E-07	1.86E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	8.70E+00	(mg/kg)	2.50E-07	(mg/kg-day)	7.30E-01	per (mg/kg-day)	1.8E-07	6.74E-07	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**5.9E-06**					**0.0E+00**
		Exposure Point Total									**1.3E-05**					**0.0E+00**
Sediment Total											**1.3E-05**					**0.0E+00**
										Total of Receptor Risks Across All Media	**1.3E-05**				Total of Receptor Hazards Across All Media	**0.0E+00**

Note:
1) Dermal Intake is "NA" due to no recommended Dermal Absorption Fractions (ABS) for this chemical. Please See table 5.2.

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.9
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADOLESCENT RECREATIONAL USER
EXPOSURE AREA 4: DOWNSTREAM OF THE RESERVOIRS - SEDIMENT

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	Exposure Area 4: Downstream of the Reservoirs	Ingestion	**PAHS**												
				BENZO(A)ANTHRACENE	3.40E+01	(mg/kg)	2.31E-06	(mg/kg-day)	7.30E-01	per (mg/kg-day)	1.7E-06	6.73E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.10E+01	(mg/kg)	2.10E-06	(mg/kg-day)	7.30E-01	per (mg/kg-day)	1.5E-06	6.13E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(K)FLUORANTHENE	2.00E+01	(mg/kg)	1.36E-06	(mg/kg-day)	7.30E-02	per (mg/kg-day)	9.9E-08	3.96E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.80E+01	(mg/kg)	1.22E-06	(mg/kg-day)	7.30E+00	per (mg/kg-day)	8.9E-06	3.56E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				DIBENZ(A,H)ANTHRACENE	2.40E+00	(mg/kg)	1.63E-07	(mg/kg-day)	7.30E+00	per (mg/kg-day)	1.2E-06	4.75E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	8.70E+00	(mg/kg)	5.90E-07	(mg/kg-day)	7.30E-01	per (mg/kg-day)	4.3E-07	1.72E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.4E-05**					**0.0E+00**
			Dermal[1]	**PAHS**												
				BENZO(A)ANTHRACENE	3.40E+01	(mg/kg)	4.64E-06	(mg/kg-day)	7.30E-01	per (mg/kg-day)	3.4E-06	1.08E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.10E+01	(mg/kg)	4.23E-06	(mg/kg-day)	7.30E-01	per (mg/kg-day)	3.1E-06	9.88E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(K)FLUORANTHENE	2.00E+01	(mg/kg)	2.73E-06	(mg/kg-day)	7.30E-02	per (mg/kg-day)	2.0E-07	6.37E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.80E+01	(mg/kg)	2.46E-06	(mg/kg-day)	7.30E+00	per (mg/kg-day)	1.8E-05	5.73E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				DIBENZ(A,H)ANTHRACENE	2.40E+00	(mg/kg)	3.28E-07	(mg/kg-day)	7.30E+00	per (mg/kg-day)	2.4E-06	7.65E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	8.70E+00	(mg/kg)	1.19E-06	(mg/kg-day)	7.30E-01	per (mg/kg-day)	8.7E-07	2.77E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.8E-05**					**0.0E+00**
		Exposure Point Total									**4.2E-05**					**0.0E+00**
	Exposure Medium Total										**4.2E-05**					**0.0E+00**
Sediment Total											**4.2E-05**					**0.0E+00**
										Total of Receptor Risks Across All Media	**4.2E-05**				Total of Receptor Hazards Across All Media	**0.0E+00**

Note:
1) Dermal Intake is "NA" due to no recommended Dermal Absorption Fractions (ABS) for this chemical. Please See table 5.2.

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.10
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE CHILD RECREATIONAL USER
EXPOSURE AREA 4: DOWNSTREAM OF THE RESERVOIRS - SEDIMENT

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
					Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	
Sediment	Sediment	Exposure Area 4: Downstream of the Reservoirs	Ingestion	**PAHS**												
				BENZO(A)ANTHRACENE	3.40E+01	(mg/kg)	2.77E-06	(mg/kg-day)	7.30E-01	per (mg/kg-day)	2.0E-06	8.07E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.10E+01	(mg/kg)	2.52E-06	(mg/kg-day)	7.30E-01	per (mg/kg-day)	1.8E-06	7.36E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(K)FLUORANTHENE	2.00E+01	(mg/kg)	1.63E-06	(mg/kg-day)	7.30E-02	per (mg/kg-day)	1.2E-07	4.75E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.80E+01	(mg/kg)	1.47E-06	(mg/kg-day)	7.30E+00	per (mg/kg-day)	1.1E-05	4.27E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				DIBENZ(A,H)ANTHRACENE	2.40E+00	(mg/kg)	1.95E-07	(mg/kg-day)	7.30E+00	per (mg/kg-day)	1.4E-06	5.70E-07	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	8.70E+00	(mg/kg)	7.08E-07	(mg/kg-day)	7.30E-01	per (mg/kg-day)	5.2E-07	2.07E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.7E-05**					**0.0E+00**
			Dermal[1]	**PAHS**												
				BENZO(A)ANTHRACENE	3.40E+01	(mg/kg)	3.42E-06	(mg/kg-day)	7.30E-01	per (mg/kg-day)	2.5E-06	2.66E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(B)FLUORANTHENE	3.10E+01	(mg/kg)	3.11E-06	(mg/kg-day)	7.30E-01	per (mg/kg-day)	2.3E-06	2.42E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(K)FLUORANTHENE	2.00E+01	(mg/kg)	2.01E-06	(mg/kg-day)	7.30E-02	per (mg/kg-day)	1.5E-07	1.56E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				BENZO(A)PYRENE	1.80E+01	(mg/kg)	1.81E-06	(mg/kg-day)	7.30E+00	per (mg/kg-day)	1.3E-05	1.41E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				DIBENZ(A,H)ANTHRACENE	2.40E+00	(mg/kg)	2.41E-07	(mg/kg-day)	7.30E+00	per (mg/kg-day)	1.8E-06	1.88E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				INDENO(1,2,3-C,D)PYRENE	8.70E+00	(mg/kg)	8.74E-07	(mg/kg-day)	7.30E-01	per (mg/kg-day)	6.4E-07	6.80E-06	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.1E-05**					**0.0E+00**
		Exposure Point Total									**3.7E-05**					**0.0E+00**
	Exposure Medium Total										**3.7E-05**					**0.0E+00**
Sediment Total											**3.7E-05**					**0.0E+00**
										Total of Receptor Risks Across All Media	**3.7E-05**				Total of Receptor Hazards Across All Media	**0.0E+00**

Note:
1) Dermal Intake is "NA" due to no recommended Dermal Absorption Fractions (ABS) for this chemical. Please See table 5.2.

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.11
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT RECREATIONAL USER - SURFACE WATER

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	DRCS	Ingestion	**METALS**												
				ARSENIC	7.70E-03	(mg/L)	8.80E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.3E-06	2.37E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.9E-03
				MANGANESE	1.70E-01	(mg/L)	1.94E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	5.23E-05	(mg/kg-day)	2.40E-02	(mg/kg-day)	2.2E-03
				MERCURY	6.00E-05	(mg/L)	6.86E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	1.85E-08	(mg/kg-day)	1.00E-04	(mg/kg-day)	1.8E-04
				PESTICIDES/PCBs												
				4,4'-DDT	7.40E-05	(mg/L)	8.46E-09	(mg/kg-day)	3.40E-01	per (mg/kg-day)	2.9E-09	2.28E-08	(mg/kg-day)	5.00E-04	(mg/kg-day)	4.6E-05
				AROCLOR-1254	1.50E-05	(mg/L)	1.71E-09	(mg/kg-day)	2.00E+00	per (mg/kg-day)	3.4E-09	4.62E-09	(mg/kg-day)	2.00E-05	(mg/kg-day)	2.3E-04
				SEMIVOLATILES												
				BIS(2-ETHYLHEXYL)PHTHALATE	1.40E-01	(mg/L)	1.60E-05	(mg/kg-day)	1.40E-02	per (mg/kg-day)	2.2E-07	4.31E-05	(mg/kg-day)	2.00E-02	(mg/kg-day)	2.2E-03
			Exp. Route Total								**1.6E-06**					**1.3E-02**
			Dermal	**METALS**												
				ARSENIC	7.70E-03	(mg/L)	1.23E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.8E-07	3.31E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.1E-03
				MANGANESE	1.70E-01	(mg/L)	2.71E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	7.30E-06	(mg/kg-day)	9.60E-04	(mg/kg-day)	7.6E-03
				MERCURY	6.00E-05	(mg/L)	9.58E-10	(mg/kg-day)	NA	per (mg/kg-day)	--	2.58E-09	(mg/kg-day)	1.00E-04	(mg/kg-day)	2.6E-05
				PESTICIDES/PCBs												
				4,4'-DDT	7.40E-05	(mg/L)	1.62E-06	(mg/kg-day)	3.40E-01	per (mg/kg-day)	5.5E-07	4.37E-06	(mg/kg-day)	5.00E-04	(mg/kg-day)	8.7E-03
				AROCLOR-1254	1.50E-05	(mg/L)	2.33E-07	(mg/kg-day)	2.00E+00	per (mg/kg-day)	4.7E-07	6.28E-07	(mg/kg-day)	2.00E-05	(mg/kg-day)	3.1E-02
				SEMIVOLATILES												
				BIS(2-ETHYLHEXYL)PHTHALATE	1.40E-01	(mg/L)	1.76E-04	(mg/kg-day)	1.40E-02	per (mg/kg-day)	2.5E-06	4.73E-04	(mg/kg-day)	2.00E-02	(mg/kg-day)	2.4E-02
			Exp. Route Total								**3.7E-06**					**7.3E-02**
		Exposure Point Total									**5.2E-06**					**8.5E-02**
	Exposure Medium Total										**5.2E-06**					**8.5E-02**
Surface Water Total											**5.2E-06**					**8.5E-02**
										Total of Receptor Risks Across All Media	**5.2E-06**				Total of Receptor Hazards Across All Media	**8.5E-02**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.12
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADOLESCENT RECREATIONAL USER - SURFACE WATER

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	DRCS	Ingestion	**METALS**												
				ARSENIC	7.70E-03	(mg/L)	6.02E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	9.0E-07	4.21E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.4E-02
				MANGANESE	1.70E-01	(mg/L)	1.33E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	9.30E-05	(mg/kg-day)	2.40E-02	(mg/kg-day)	3.9E-03
				MERCURY	6.00E-05	(mg/L)	4.69E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	3.28E-08	(mg/kg-day)	1.00E-04	(mg/kg-day)	3.3E-04
				PESTICIDES/PCBs												
				4,4'-DDT	7.40E-05	(mg/L)	5.78E-09	(mg/kg-day)	3.40E-01	per (mg/kg-day)	2.0E-09	4.05E-08	(mg/kg-day)	5.00E-04	(mg/kg-day)	8.1E-05
				AROCLOR-1254	1.50E-05	(mg/L)	1.17E-09	(mg/kg-day)	2.00E+00	per (mg/kg-day)	2.3E-09	8.21E-09	(mg/kg-day)	2.00E-05	(mg/kg-day)	4.1E-04
				SEMIVOLATILES												
				BIS(2-ETHYLHEXYL)PHTHALATE	1.40E-01	(mg/L)	1.09E-05	(mg/kg-day)	1.40E-02	per (mg/kg-day)	1.5E-07	7.66E-05	(mg/kg-day)	2.00E-02	(mg/kg-day)	3.8E-03
			Exp. Route Total								**1.1E-06**					**2.3E-02**
			Dermal	**METALS**												
				ARSENIC	7.70E-03	(mg/L)	5.29E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	7.9E-08	3.71E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.2E-03
				MANGANESE	1.70E-01	(mg/L)	1.17E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	8.18E-06	(mg/kg-day)	9.60E-04	(mg/kg-day)	8.5E-03
				MERCURY	6.00E-05	(mg/L)	4.12E-10	(mg/kg-day)	NA	per (mg/kg-day)	--	2.89E-09	(mg/kg-day)	1.00E-04	(mg/kg-day)	2.9E-05
				PESTICIDES/PCBs												
				4,4'-DDT	7.40E-05	(mg/L)	6.99E-07	(mg/kg-day)	3.40E-01	per (mg/kg-day)	2.4E-07	4.89E-06	(mg/kg-day)	5.00E-04	(mg/kg-day)	9.8E-03
				AROCLOR-1254	1.50E-05	(mg/L)	1.01E-07	(mg/kg-day)	2.00E+00	per (mg/kg-day)	2.0E-07	7.04E-07	(mg/kg-day)	2.00E-05	(mg/kg-day)	3.5E-02
				SEMIVOLATILES												
				BIS(2-ETHYLHEXYL)PHTHALATE	1.40E-01	(mg/L)	7.57E-05	(mg/kg-day)	1.40E-02	per (mg/kg-day)	1.1E-06	5.30E-04	(mg/kg-day)	2.00E-02	(mg/kg-day)	2.6E-02
			Exp. Route Total								**1.6E-06**					**8.1E-02**
		Exposure Point Total									**2.6E-06**					**1.0E-01**
	Exposure Medium Total										**2.6E-06**					**1.0E-01**
Surface Water Total											**2.6E-06**					**1.0E-01**
										Total of Receptor Risks Across All Media	**2.6E-06**				Total of Receptor Hazards Across All Media	**1.0E-01**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.13
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE CHILD RECREATIONAL USER - SURFACE WATER

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Surface Water	DRCS	Ingestion	**METALS**												
				ARSENIC	7.70E-03	(mg/L)	6.02E-07	(mg/kg-day)	1.50E+00	per (mg/kg-day)	9.0E-07	1.05E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.5E-02
				MANGANESE	1.70E-01	(mg/L)	1.33E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.33E-04	(mg/kg-day)	2.40E-02	(mg/kg-day)	9.7E-03
				MERCURY	6.00E-05	(mg/L)	4.69E-09	(mg/kg-day)	NA	per (mg/kg-day)	--	8.21E-08	(mg/kg-day)	1.00E-04	(mg/kg-day)	8.2E-04
				PESTICIDES/PCBs												
				4,4'-DDT	7.40E-05	(mg/L)	5.78E-09	(mg/kg-day)	3.40E-01	per (mg/kg-day)	2.0E-09	1.01E-07	(mg/kg-day)	5.00E-04	(mg/kg-day)	2.0E-04
				AROCLOR-1254	1.50E-05	(mg/L)	1.17E-09	(mg/kg-day)	2.00E+00	per (mg/kg-day)	2.3E-09	2.05E-08	(mg/kg-day)	2.00E-05	(mg/kg-day)	1.0E-03
				SEMIVOLATILES												
				BIS(2-ETHYLHEXYL)PHTHALATE	1.40E-01	(mg/L)	1.09E-05	(mg/kg-day)	1.40E-02	per (mg/kg-day)	1.5E-07	1.91E-04	(mg/kg-day)	2.00E-02	(mg/kg-day)	9.6E-03
			Exp. Route Total								**1.1E-06**					**5.6E-02**
			Dermal	**METALS**												
				ARSENIC	7.70E-03	(mg/L)	3.97E-08	(mg/kg-day)	1.50E+00	per (mg/kg-day)	6.0E-08	9.26E-07	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.1E-03
				MANGANESE	1.70E-01	(mg/L)	8.76E-07	(mg/kg-day)	NA	per (mg/kg-day)	--	2.04E-05	(mg/kg-day)	9.60E-04	(mg/kg-day)	2.1E-02
				MERCURY	6.00E-05	(mg/L)	3.09E-10	(mg/kg-day)	NA	per (mg/kg-day)	--	7.21E-09	(mg/kg-day)	1.00E-04	(mg/kg-day)	7.2E-05
				PESTICIDES/PCBs												
				4,4'-DDT	7.40E-05	(mg/L)	5.24E-07	(mg/kg-day)	3.40E-01	per (mg/kg-day)	1.8E-07	1.22E-05	(mg/kg-day)	5.00E-04	(mg/kg-day)	2.4E-02
				AROCLOR-1254	1.50E-05	(mg/L)	7.53E-08	(mg/kg-day)	2.00E+00	per (mg/kg-day)	1.5E-07	1.76E-06	(mg/kg-day)	2.00E-05	(mg/kg-day)	8.8E-02
				SEMIVOLATILES												
				BIS(2-ETHYLHEXYL)PHTHALATE	1.40E-01	(mg/L)	5.67E-05	(mg/kg-day)	1.40E-02	per (mg/kg-day)	7.9E-07	1.32E-03	(mg/kg-day)	2.00E-02	(mg/kg-day)	6.6E-02
			Exp. Route Total								**1.2E-06**					**2.0E-01**
		Exposure Point Total									**2.2E-06**					**2.6E-01**
	Exposure Medium Total										**2.2E-06**					**2.6E-01**
Surface Water Total											**2.2E-06**					**2.6E-01**
										Total of Receptor Risks Across All Media	**2.2E-06**				Total of Receptor Hazards Across All Media	**2.6E-01**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.14
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT RECREATIONAL USER - ALL FISH TISSUE RESULTS

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Fish	DRCS	Ingestion	**METALS**												
		All Results		ARSENIC	1.07E-01	(mg/kg)	1.31E-05	(mg/kg-day)	1.50E+00	per (mg/kg-day)	2.0E-05	3.52E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.2E-01
				COBALT	5.68E-02	(mg/kg)	6.94E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.87E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.2E-02
				MERCURY	3.45E-01	(mg/kg)	4.21E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.13E-04	(mg/kg-day)	1.00E-04	(mg/kg-day)	1.1E+00
				PESTICIDES/PCBs												
				ALPHA-BHC	7.10E-03	(mg/kg)	8.67E-07	(mg/kg-day)	6.30E+00	per (mg/kg-day)	5.5E-06	2.33E-06	(mg/kg-day)	8.00E-03	(mg/kg-day)	2.9E-04
				DELTA-BHC	4.90E-03	(mg/kg)	5.98E-07	(mg/kg-day)	1.80E+00	per (mg/kg-day)	1.1E-06	1.61E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				GAMMA-BHC (LINDANE)	5.00E-03	(mg/kg)	6.11E-07	(mg/kg-day)	1.10E+00	per (mg/kg-day)	6.7E-07	1.64E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.5E-03
				ALDRIN	1.57E-03	(mg/kg)	1.92E-07	(mg/kg-day)	1.70E+01	per (mg/kg-day)	3.3E-06	5.16E-07	(mg/kg-day)	3.00E-05	(mg/kg-day)	1.7E-02
				GAMMA-CHLORDANE	1.61E-02	(mg/kg)	1.97E-06	(mg/kg-day)	3.50E-01	per (mg/kg-day)	6.9E-07	5.29E-06	(mg/kg-day)	5.00E-04	(mg/kg-day)	1.1E-02
				DIELDRIN	3.95E-03	(mg/kg)	4.82E-07	(mg/kg-day)	1.60E+01	per (mg/kg-day)	7.7E-06	1.30E-06	(mg/kg-day)	5.00E-05	(mg/kg-day)	2.6E-02
				4,4'-DDE	6.47E-02	(mg/kg)	7.90E-06	(mg/kg-day)	3.40E-01	per (mg/kg-day)	2.7E-06	2.13E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				4,4'-DDT	4.17E-02	(mg/kg)	5.09E-06	(mg/kg-day)	3.40E-01	per (mg/kg-day)	1.7E-06	1.37E-05	(mg/kg-day)	5.00E-04	(mg/kg-day)	2.7E-02
				ENDRIN	4.65E-02	(mg/kg)	5.68E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.53E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.1E-02
				HEPTACHLOR EPOXIDE	1.50E-03	(mg/kg)	1.83E-07	(mg/kg-day)	9.10E+00	per (mg/kg-day)	1.7E-06	4.93E-07	(mg/kg-day)	1.30E-05	(mg/kg-day)	3.8E-02
				AROCLOR-1254	4.27E-01	(mg/kg)	5.21E-05	(mg/kg-day)	2.00E+00	per (mg/kg-day)	1.0E-04	1.40E-04	(mg/kg-day)	2.00E-05	(mg/kg-day)	7.0E+00
				AROCLOR-1260	2.25E-01	(mg/kg)	2.75E-05	(mg/kg-day)	2.00E+00	per (mg/kg-day)	5.5E-05	7.40E-05	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.0E-04**					**8.5E+00**
		Exposure Point Total									**2.0E-04**					**8.5E+00**
	Exposure Medium Total										**2.0E-04**					**8.5E+00**
Fish Total											**2.0E-04**					**8.5E+00**
										Total of Receptor Risks Across All Media	**2.0E-04**				Total of Receptor Hazards Across All Media	**8.5E+00**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.15
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADOLESCENT RECREATIONAL USER - ALL FISH TISSUE RESULTS

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Fish	DRCS	Ingestion	**METALS**												
		All Results		ARSENIC	1.07E-01	(mg/kg)	6.66E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.0E-05	4.66E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.6E-01
				COBALT	5.68E-02	(mg/kg)	3.53E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	2.47E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.2E-02
				MERCURY	3.45E-01	(mg/kg)	2.15E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.50E-04	(mg/kg-day)	1.00E-04	(mg/kg-day)	1.5E+00
				PESTICIDES/PCBs												
				ALPHA-BHC	7.10E-03	(mg/kg)	4.42E-07	(mg/kg-day)	6.30E+00	per (mg/kg-day)	2.8E-06	3.09E-06	(mg/kg-day)	8.00E-03	(mg/kg-day)	3.9E-04
				DELTA-BHC	4.90E-03	(mg/kg)	3.05E-07	(mg/kg-day)	1.80E+00	per (mg/kg-day)	5.5E-07	2.13E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				GAMMA-BHC (LINDANE)	5.00E-03	(mg/kg)	3.11E-07	(mg/kg-day)	1.10E+00	per (mg/kg-day)	3.4E-07	2.18E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.3E-03
				ALDRIN	1.57E-03	(mg/kg)	9.77E-08	(mg/kg-day)	1.70E+01	per (mg/kg-day)	1.7E-06	6.84E-07	(mg/kg-day)	3.00E-05	(mg/kg-day)	2.3E-02
				GAMMA-CHLORDANE	1.61E-02	(mg/kg)	1.00E-06	(mg/kg-day)	3.50E-01	per (mg/kg-day)	3.5E-07	7.01E-06	(mg/kg-day)	5.00E-04	(mg/kg-day)	1.4E-02
				DIELDRIN	3.95E-03	(mg/kg)	2.46E-07	(mg/kg-day)	1.60E+01	per (mg/kg-day)	3.9E-06	1.72E-06	(mg/kg-day)	5.00E-05	(mg/kg-day)	3.4E-02
				4,4'-DDE	6.47E-02	(mg/kg)	4.03E-06	(mg/kg-day)	3.40E-01	per (mg/kg-day)	1.4E-06	2.82E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				4,4'-DDT	4.17E-02	(mg/kg)	2.59E-06	(mg/kg-day)	3.40E-01	per (mg/kg-day)	8.8E-07	1.82E-05	(mg/kg-day)	5.00E-04	(mg/kg-day)	3.6E-02
				ENDRIN	4.65E-02	(mg/kg)	2.89E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	2.03E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.8E-02
				HEPTACHLOR EPOXIDE	1.50E-03	(mg/kg)	9.33E-08	(mg/kg-day)	9.10E+00	per (mg/kg-day)	8.5E-07	6.53E-07	(mg/kg-day)	1.30E-05	(mg/kg-day)	5.0E-02
				AROCLOR-1254	4.27E-01	(mg/kg)	2.66E-05	(mg/kg-day)	2.00E+00	per (mg/kg-day)	5.3E-05	1.86E-04	(mg/kg-day)	2.00E-05	(mg/kg-day)	9.3E+00
				AROCLOR-1260	2.25E-01	(mg/kg)	1.40E-05	(mg/kg-day)	2.00E+00	per (mg/kg-day)	2.8E-05	9.80E-05	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.0E-04**					**1.1E+01**
		Exposure Point Total									**1.0E-04**					**1.1E+01**
	Exposure Medium Total										**1.0E-04**					**1.1E+01**
Fish Total											**1.0E-04**					**1.1E+01**
										Total of Receptor Risks Across All Media	**1.0E-04**				Total of Receptor Hazards Across All Media	**1.1E+01**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.16
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE CHILD RECREATIONAL USER - ALL FISH TISSUE RESULTS

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Fish	DRCS	Ingestion	**METALS**												
		All Results		ARSENIC	1.07E-01	(mg/kg)	3.99E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	6.0E-06	9.32E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.1E-01
				COBALT	5.68E-02	(mg/kg)	2.12E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	4.95E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.6E-01
				MERCURY	3.45E-01	(mg/kg)	1.29E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	3.01E-04	(mg/kg-day)	1.00E-04	(mg/kg-day)	3.0E+00
				PESTICIDES/PCBs												
				ALPHA-BHC	7.10E-03	(mg/kg)	2.65E-07	(mg/kg-day)	6.30E+00	per (mg/kg-day)	1.7E-06	6.18E-06	(mg/kg-day)	8.00E-03	(mg/kg-day)	7.7E-04
				DELTA-BHC	4.90E-03	(mg/kg)	1.83E-07	(mg/kg-day)	1.80E+00	per (mg/kg-day)	3.3E-07	4.27E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				GAMMA-BHC (LINDANE)	5.00E-03	(mg/kg)	1.87E-07	(mg/kg-day)	1.10E+00	per (mg/kg-day)	2.1E-07	4.36E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-02
				ALDRIN	1.57E-03	(mg/kg)	5.86E-08	(mg/kg-day)	1.70E+01	per (mg/kg-day)	1.0E-06	1.37E-06	(mg/kg-day)	3.00E-05	(mg/kg-day)	4.6E-02
				GAMMA-CHLORDANE	1.61E-02	(mg/kg)	6.01E-07	(mg/kg-day)	3.50E-01	per (mg/kg-day)	2.1E-07	1.40E-05	(mg/kg-day)	5.00E-04	(mg/kg-day)	2.8E-02
				DIELDRIN	3.95E-03	(mg/kg)	1.47E-07	(mg/kg-day)	1.60E+01	per (mg/kg-day)	2.4E-06	3.44E-06	(mg/kg-day)	5.00E-05	(mg/kg-day)	6.9E-02
				4,4'-DDE	6.47E-02	(mg/kg)	2.42E-06	(mg/kg-day)	3.40E-01	per (mg/kg-day)	8.2E-07	5.64E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				4,4'-DDT	4.17E-02	(mg/kg)	1.56E-06	(mg/kg-day)	3.40E-01	per (mg/kg-day)	5.3E-07	3.63E-05	(mg/kg-day)	5.00E-04	(mg/kg-day)	7.3E-02
				ENDRIN	4.65E-02	(mg/kg)	1.74E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	4.05E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.4E-01
				HEPTACHLOR EPOXIDE	1.50E-03	(mg/kg)	5.60E-08	(mg/kg-day)	9.10E+00	per (mg/kg-day)	5.1E-07	1.31E-06	(mg/kg-day)	1.30E-05	(mg/kg-day)	1.0E-01
				AROCLOR-1254	4.27E-01	(mg/kg)	1.59E-05	(mg/kg-day)	2.00E+00	per (mg/kg-day)	3.2E-05	3.72E-04	(mg/kg-day)	2.00E-05	(mg/kg-day)	1.9E+01
				AROCLOR-1260	2.25E-01	(mg/kg)	8.40E-06	(mg/kg-day)	2.00E+00	per (mg/kg-day)	1.7E-05	1.96E-04	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**6.2E-05**					**2.3E+01**
		Exposure Point Total									**6.2E-05**					**2.3E+01**
	Exposure Medium Total										**6.2E-05**					**2.3E+01**
Fish Total											**6.2E-05**					**2.3E+01**
										Total of Receptor Risks Across All Media	**6.2E-05**				Total of Receptor Hazards Across All Media	**2.3E+01**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.17
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT SUBSISTENCE FISHER - ALL FISH TISSUE RESULTS

Scenario Timeframe: Current
Receptor Population: Subsistence Fisher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Fish	DRCS	Ingestion	**METALS**												
		All Results		ARSENIC	1.07E-01	(mg/kg)	5.58E-05	(mg/kg-day)	1.50E+00	per (mg/kg-day)	8.4E-05	1.95E-04	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.5E-01
				COBALT	5.68E-02	(mg/kg)	2.96E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	1.04E-04	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.5E-01
				MERCURY	3.45E-01	(mg/kg)	1.80E-04	(mg/kg-day)	NA	per (mg/kg-day)	--	6.30E-04	(mg/kg-day)	1.00E-04	(mg/kg-day)	6.3E+00
				PESTICIDES/PCBs												
				ALPHA-BHC	7.10E-03	(mg/kg)	3.70E-06	(mg/kg-day)	6.30E+00	per (mg/kg-day)	2.3E-05	1.30E-05	(mg/kg-day)	8.00E-03	(mg/kg-day)	1.6E-03
				DELTA-BHC	4.90E-03	(mg/kg)	2.56E-06	(mg/kg-day)	1.80E+00	per (mg/kg-day)	4.6E-06	8.94E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				GAMMA-BHC (LINDANE)	5.00E-03	(mg/kg)	2.61E-06	(mg/kg-day)	1.10E+00	per (mg/kg-day)	2.9E-06	9.13E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	3.0E-02
				ALDRIN	1.57E-03	(mg/kg)	8.19E-07	(mg/kg-day)	1.70E+01	per (mg/kg-day)	1.4E-05	2.87E-06	(mg/kg-day)	3.00E-05	(mg/kg-day)	9.6E-02
				GAMMA-CHLORDANE	1.61E-02	(mg/kg)	8.40E-06	(mg/kg-day)	3.50E-01	per (mg/kg-day)	2.9E-06	2.94E-05	(mg/kg-day)	5.00E-04	(mg/kg-day)	5.9E-02
				DIELDRIN	3.95E-03	(mg/kg)	2.06E-06	(mg/kg-day)	1.60E+01	per (mg/kg-day)	3.3E-05	7.21E-06	(mg/kg-day)	5.00E-05	(mg/kg-day)	1.4E-01
				4,4'-DDE	6.47E-02	(mg/kg)	3.37E-05	(mg/kg-day)	3.40E-01	per (mg/kg-day)	1.1E-05	1.18E-04	(mg/kg-day)	NA	(mg/kg-day)	--
				4,4'-DDT	4.17E-02	(mg/kg)	2.17E-05	(mg/kg-day)	3.40E-01	per (mg/kg-day)	7.4E-06	7.61E-05	(mg/kg-day)	5.00E-04	(mg/kg-day)	1.5E-01
				ENDRIN	4.65E-02	(mg/kg)	2.42E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	8.49E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.8E-01
				HEPTACHLOR EPOXIDE	1.50E-03	(mg/kg)	7.82E-07	(mg/kg-day)	9.10E+00	per (mg/kg-day)	7.1E-06	2.74E-06	(mg/kg-day)	1.30E-05	(mg/kg-day)	2.1E-01
				AROCLOR-1254	4.27E-01	(mg/kg)	2.23E-04	(mg/kg-day)	2.00E+00	per (mg/kg-day)	4.5E-04	7.79E-04	(mg/kg-day)	2.00E-05	(mg/kg-day)	3.9E+01
				AROCLOR-1260	2.25E-01	(mg/kg)	1.17E-04	(mg/kg-day)	2.00E+00	per (mg/kg-day)	2.3E-04	4.11E-04	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**8.7E-04**					**4.7E+01**
		Exposure Point Total									**8.7E-04**					**4.7E+01**
	Exposure Medium Total										**8.7E-04**					**4.7E+01**
Fish Total											**8.7E-04**					**4.7E+01**
										Total of Receptor Risks Across All Media	**8.7E-04**				Total of Receptor Hazards Across All Media	**4.7E+01**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.18
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT RECREATIONAL USER - BUFFALO FISH TISSUE RESULTS

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Fish	DRCS	Ingestion	**METALS**												
		Buffalo		ARSENIC	6.30E-02	(mg/kg)	7.69E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.2E-05	2.07E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.9E-02
				MERCURY	8.50E-02	(mg/kg)	1.04E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.79E-05	(mg/kg-day)	1.00E-04	(mg/kg-day)	2.8E-01
				PESTICIDES/PCBs												
				GAMMA-CHLORDANE	3.70E-02	(mg/kg)	4.52E-06	(mg/kg-day)	3.50E-01	per (mg/kg-day)	1.6E-06	1.22E-05	(mg/kg-day)	5.00E-04	(mg/kg-day)	2.4E-02
				DIELDRIN	8.40E-03	(mg/kg)	1.03E-06	(mg/kg-day)	1.60E+01	per (mg/kg-day)	1.6E-05	2.76E-06	(mg/kg-day)	5.00E-05	(mg/kg-day)	5.5E-02
				4,4'-DDE	9.70E-02	(mg/kg)	1.18E-05	(mg/kg-day)	3.40E-01	per (mg/kg-day)	4.0E-06	3.19E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				HEPTACHLOR EPOXIDE	3.00E-03	(mg/kg)	3.66E-07	(mg/kg-day)	9.10E+00	per (mg/kg-day)	3.3E-06	9.86E-07	(mg/kg-day)	1.30E-05	(mg/kg-day)	7.6E-02
				AROCLOR-1254	1.69E+00	(mg/kg)	2.06E-04	(mg/kg-day)	2.00E+00	per (mg/kg-day)	4.1E-04	5.56E-04	(mg/kg-day)	2.00E-05	(mg/kg-day)	2.8E+01
				AROCLOR-1260	3.60E+00	(mg/kg)	4.40E-04	(mg/kg-day)	2.00E+00	per (mg/kg-day)	8.8E-04	1.18E-03	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.3E-03**					**2.8E+01**
		Exposure Point Total									**1.3E-03**					**2.8E+01**
	Exposure Medium Total										**1.3E-03**					**2.8E+01**
Fish Total											**1.3E-03**					**2.8E+01**
										Total of Receptor Risks Across All Media	**1.3E-03**				Total of Receptor Hazards Across All Media	**2.8E+01**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.19
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADOLESCENT RECREATIONAL USER - BUFFALO FISH TISSUE RESULTS

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Fish	DRCS	Ingestion	**METALS**												
		Buffalo		ARSENIC	6.30E-02	(mg/kg)	3.92E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	5.9E-06	2.74E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	9.1E-02
				MERCURY	8.50E-02	(mg/kg)	5.29E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	3.70E-05	(mg/kg-day)	1.00E-04	(mg/kg-day)	3.7E-01
				PESTICIDES/PCBs												
				GAMMA-CHLORDANE	3.70E-02	(mg/kg)	2.30E-06	(mg/kg-day)	3.50E-01	per (mg/kg-day)	8.1E-07	1.61E-05	(mg/kg-day)	5.00E-04	(mg/kg-day)	3.2E-02
				DIELDRIN	8.40E-03	(mg/kg)	5.23E-07	(mg/kg-day)	1.60E+01	per (mg/kg-day)	8.4E-06	3.66E-06	(mg/kg-day)	5.00E-05	(mg/kg-day)	7.3E-02
				4,4'-DDE	9.70E-02	(mg/kg)	6.04E-06	(mg/kg-day)	3.40E-01	per (mg/kg-day)	2.1E-06	4.22E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				HEPTACHLOR EPOXIDE	3.00E-03	(mg/kg)	1.87E-07	(mg/kg-day)	9.10E+00	per (mg/kg-day)	1.7E-06	1.31E-06	(mg/kg-day)	1.30E-05	(mg/kg-day)	1.0E-01
				AROCLOR-1254	1.69E+00	(mg/kg)	1.05E-04	(mg/kg-day)	2.00E+00	per (mg/kg-day)	2.1E-04	7.36E-04	(mg/kg-day)	2.00E-05	(mg/kg-day)	3.7E+01
				AROCLOR-1260	3.60E+00	(mg/kg)	2.24E-04	(mg/kg-day)	2.00E+00	per (mg/kg-day)	4.5E-04	1.57E-03	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**6.8E-04**					**3.7E+01**
		Exposure Point Total									**6.8E-04**					**3.7E+01**
	Exposure Medium Total										**6.8E-04**					**3.7E+01**
Fish Total											**6.8E-04**					**3.7E+01**
										Total of Receptor Risks Across All Media	**6.8E-04**				Total of Receptor Hazards Across All Media	**3.7E+01**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.20
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE CHILD RECREATIONAL USER - BUFFALO FISH TISSUE RESULTS

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Fish	DRCS	Ingestion	**METALS**												
		Buffalo		ARSENIC	6.30E-02	(mg/kg)	2.35E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.5E-06	5.49E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.8E-01
				MERCURY	8.50E-02	(mg/kg)	3.17E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	7.40E-05	(mg/kg-day)	1.00E-04	(mg/kg-day)	7.4E-01
				PESTICIDES/PCBs												
				GAMMA-CHLORDANE	3.70E-02	(mg/kg)	1.38E-06	(mg/kg-day)	3.50E-01	per (mg/kg-day)	4.8E-07	3.22E-05	(mg/kg-day)	5.00E-04	(mg/kg-day)	6.4E-02
				DIELDRIN	8.40E-03	(mg/kg)	3.14E-07	(mg/kg-day)	1.60E+01	per (mg/kg-day)	5.0E-06	7.32E-06	(mg/kg-day)	5.00E-05	(mg/kg-day)	1.5E-01
				4,4'-DDE	9.70E-02	(mg/kg)	3.62E-06	(mg/kg-day)	3.40E-01	per (mg/kg-day)	1.2E-06	8.45E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				HEPTACHLOR EPOXIDE	3.00E-03	(mg/kg)	1.12E-07	(mg/kg-day)	9.10E+00	per (mg/kg-day)	1.0E-06	2.61E-06	(mg/kg-day)	1.30E-05	(mg/kg-day)	2.0E-01
				AROCLOR-1254	1.69E+00	(mg/kg)	6.31E-05	(mg/kg-day)	2.00E+00	per (mg/kg-day)	1.3E-04	1.47E-03	(mg/kg-day)	2.00E-05	(mg/kg-day)	7.4E+01
				AROCLOR-1260	3.60E+00	(mg/kg)	1.34E-04	(mg/kg-day)	2.00E+00	per (mg/kg-day)	2.7E-04	3.14E-03	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**4.1E-04**					**7.5E+01**
		Exposure Point Total									**4.1E-04**					**7.5E+01**
	Exposure Medium Total										**4.1E-04**					**7.5E+01**
Fish Total											**4.1E-04**					**7.5E+01**
										Total of Receptor Risks Across All Media	**4.1E-04**				Total of Receptor Hazards Across All Media	**7.5E+01**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.21
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT RECREATIONAL USER - CARP FISH TISSUE RESULTS

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Fish	DRCS	Ingestion	**METALS**												
		Carp		ARSENIC	2.00E-01	(mg/kg)	2.44E-05	(mg/kg-day)	1.50E+00	per (mg/kg-day)	3.7E-05	6.58E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.2E-01
				COBALT	6.40E-02	(mg/kg)	7.81E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	2.10E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.0E-02
				MERCURY	1.70E-01	(mg/kg)	2.08E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	5.59E-05	(mg/kg-day)	1.00E-04	(mg/kg-day)	5.6E-01
				PESTICIDES/PCBs												
				ALDRIN	3.90E-03	(mg/kg)	4.76E-07	(mg/kg-day)	1.70E+01	per (mg/kg-day)	8.1E-06	1.28E-06	(mg/kg-day)	3.00E-05	(mg/kg-day)	4.3E-02
				GAMMA-CHLORDANE	1.61E-02	(mg/kg)	1.97E-06	(mg/kg-day)	3.50E-01	per (mg/kg-day)	6.9E-07	5.29E-06	(mg/kg-day)	5.00E-04	(mg/kg-day)	1.1E-02
				DIELDRIN	8.40E-03	(mg/kg)	1.03E-06	(mg/kg-day)	1.60E+01	per (mg/kg-day)	1.6E-05	2.76E-06	(mg/kg-day)	5.00E-05	(mg/kg-day)	5.5E-02
				4,4'-DDE	8.00E-02	(mg/kg)	9.77E-06	(mg/kg-day)	3.40E-01	per (mg/kg-day)	3.3E-06	2.63E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				4,4'-DDT	1.30E-01	(mg/kg)	1.59E-05	(mg/kg-day)	3.40E-01	per (mg/kg-day)	5.4E-06	4.27E-05	(mg/kg-day)	5.00E-04	(mg/kg-day)	8.5E-02
				ENDRIN	1.00E-01	(mg/kg)	1.22E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	3.29E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.1E-01
				HEPTACHLOR EPOXIDE	3.30E-03	(mg/kg)	4.03E-07	(mg/kg-day)	9.10E+00	per (mg/kg-day)	3.7E-06	1.08E-06	(mg/kg-day)	1.30E-05	(mg/kg-day)	8.3E-02
				AROCLOR-1254	1.47E-01	(mg/kg)	1.79E-05	(mg/kg-day)	2.00E+00	per (mg/kg-day)	3.6E-05	4.83E-05	(mg/kg-day)	2.00E-05	(mg/kg-day)	2.4E+00
				AROCLOR-1260	2.20E-01	(mg/kg)	2.69E-05	(mg/kg-day)	2.00E+00	per (mg/kg-day)	5.4E-05	7.23E-05	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.6E-04**					**3.7E+00**
		Exposure Point Total									**1.6E-04**					**3.7E+00**
	Exposure Medium Total										**1.6E-04**					**3.7E+00**
Fish Total											**1.6E-04**					**3.7E+00**
										Total of Receptor Risks Across All Media	**1.6E-04**				Total of Receptor Hazards Across All Media	**3.7E+00**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.22
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADOLESCENT RECREATIONAL USER - CARP FISH TISSUE RESULTS

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Fish	DRCS Carp	Ingestion	**METALS**												
				ARSENIC	2.00E-01	(mg/kg)	1.24E-05	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.9E-05	8.71E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.9E-01
				MERCURY	1.70E-01	(mg/kg)	1.06E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	7.40E-05	(mg/kg-day)	1.00E-04	(mg/kg-day)	7.4E-01
				PESTICIDES/PCBs												
				ALDRIN	3.90E-03	(mg/kg)	2.43E-07	(mg/kg-day)	1.70E+01	per (mg/kg-day)	4.1E-06	1.70E-06	(mg/kg-day)	3.00E-05	(mg/kg-day)	5.7E-02
				GAMMA-CHLORDANE	1.61E-02	(mg/kg)	1.00E-06	(mg/kg-day)	3.50E-01	per (mg/kg-day)	3.5E-07	7.01E-06	(mg/kg-day)	5.00E-04	(mg/kg-day)	1.4E-02
				DIELDRIN	8.40E-03	(mg/kg)	5.23E-07	(mg/kg-day)	1.60E+01	per (mg/kg-day)	8.4E-06	3.66E-06	(mg/kg-day)	5.00E-05	(mg/kg-day)	7.3E-02
				4,4'-DDE	8.00E-02	(mg/kg)	4.98E-06	(mg/kg-day)	3.40E-01	per (mg/kg-day)	1.7E-06	3.48E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				4,4'-DDT	1.30E-01	(mg/kg)	8.09E-06	(mg/kg-day)	3.40E-01	per (mg/kg-day)	2.8E-06	5.66E-05	(mg/kg-day)	5.00E-04	(mg/kg-day)	1.1E-01
				ENDRIN	1.00E-01	(mg/kg)	6.22E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	4.36E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-01
				HEPTACHLOR EPOXIDE	3.30E-03	(mg/kg)	2.05E-07	(mg/kg-day)	9.10E+00	per (mg/kg-day)	1.9E-06	1.44E-06	(mg/kg-day)	1.30E-05	(mg/kg-day)	1.1E-01
				AROCLOR-1254	1.47E-01	(mg/kg)	9.15E-06	(mg/kg-day)	2.00E+00	per (mg/kg-day)	1.8E-05	6.40E-05	(mg/kg-day)	2.00E-05	(mg/kg-day)	3.2E+00
				AROCLOR-1260	2.20E-01	(mg/kg)	1.37E-05	(mg/kg-day)	2.00E+00	per (mg/kg-day)	2.7E-05	9.58E-05	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**8.3E-05**					**4.8E+00**
		Exposure Point Total									**8.3E-05**					**4.8E+00**
	Exposure Medium Total										**8.3E-05**					**4.8E+00**
Fish Total											**8.3E-05**					**4.8E+00**
										Total of Receptor Risks Across All Media	**8.3E-05**				Total of Receptor Hazards Across All Media	**4.8E+00**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.23
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE CHILD RECREATIONAL USER - CARP FISH TISSUE RESULTS

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Fish	DRCS Carp	Ingestion	**METALS**												
				ARSENIC	2.00E-01	(mg/kg)	7.47E-06	(mg/kg-day)	1.50E+00	per (mg/kg-day)	1.1E-05	1.74E-04	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.8E-01
				COBALT	6.40E-02	(mg/kg)	2.39E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	5.58E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.9E-01
				MERCURY	1.70E-01	(mg/kg)	6.35E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.48E-04	(mg/kg-day)	1.00E-04	(mg/kg-day)	1.5E+00
				PESTICIDES/PCBs												
				ALDRIN	3.90E-03	(mg/kg)	1.46E-07	(mg/kg-day)	1.70E+01	per (mg/kg-day)	2.5E-06	3.40E-06	(mg/kg-day)	3.00E-05	(mg/kg-day)	1.1E-01
				GAMMA-CHLORDANE	1.61E-02	(mg/kg)	6.01E-07	(mg/kg-day)	3.50E-01	per (mg/kg-day)	2.1E-07	1.40E-05	(mg/kg-day)	5.00E-04	(mg/kg-day)	2.8E-02
				DIELDRIN	8.40E-03	(mg/kg)	3.14E-07	(mg/kg-day)	1.60E+01	per (mg/kg-day)	5.0E-06	7.32E-06	(mg/kg-day)	5.00E-05	(mg/kg-day)	1.5E-01
				4,4'-DDE	8.00E-02	(mg/kg)	2.99E-06	(mg/kg-day)	3.40E-01	per (mg/kg-day)	1.0E-06	6.97E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				4,4'-DDT	1.30E-01	(mg/kg)	4.85E-06	(mg/kg-day)	3.40E-01	per (mg/kg-day)	1.7E-06	1.13E-04	(mg/kg-day)	5.00E-04	(mg/kg-day)	2.3E-01
				ENDRIN	1.00E-01	(mg/kg)	3.73E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	8.71E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	2.9E-01
				HEPTACHLOR EPOXIDE	3.30E-03	(mg/kg)	1.23E-07	(mg/kg-day)	9.10E+00	per (mg/kg-day)	1.1E-06	2.87E-06	(mg/kg-day)	1.30E-05	(mg/kg-day)	2.2E-01
				AROCLOR-1254	1.47E-01	(mg/kg)	5.49E-06	(mg/kg-day)	2.00E+00	per (mg/kg-day)	1.1E-05	1.28E-04	(mg/kg-day)	2.00E-05	(mg/kg-day)	6.4E+00
				AROCLOR-1260	2.20E-01	(mg/kg)	8.21E-06	(mg/kg-day)	2.00E+00	per (mg/kg-day)	1.6E-05	1.92E-04	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**5.0E-05**					**9.7E+00**
		Exposure Point Total									**5.0E-05**					**9.7E+00**
	Exposure Medium Total										**5.0E-05**					**9.7E+00**
Fish Total											**5.0E-05**					**9.7E+00**
										Total of Receptor Risks Across All Media	**5.0E-05**				Total of Receptor Hazards Across All Media	**9.7E+00**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.24
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT RECREATIONAL USER - GAR FISH TISSUE RESULTS

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Fish	DRCS	Ingestion	**METALS**												
		Gar		COBALT	5.50E-02	(mg/kg)	6.72E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.81E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	6.0E-02
				MERCURY	2.20E-01	(mg/kg)	2.69E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	7.23E-05	(mg/kg-day)	1.00E-04	(mg/kg-day)	7.2E-01
				PESTICIDES/PCBs												
				4,4'-DDE	2.20E-02	(mg/kg)	2.69E-06	(mg/kg-day)	3.40E-01	per (mg/kg-day)	9.1E-07	7.23E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				AROCLOR-1254	4.45E-01	(mg/kg)	5.43E-05	(mg/kg-day)	2.00E+00	per (mg/kg-day)	1.1E-04	1.46E-04	(mg/kg-day)	2.00E-05	(mg/kg-day)	7.3E+00
				AROCLOR-1260	6.56E-01	(mg/kg)	8.01E-05	(mg/kg-day)	2.00E+00	per (mg/kg-day)	1.6E-04	2.16E-04	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.7E-04**					**8.1E+00**
		Exposure Point Total									**2.7E-04**					**8.1E+00**
	Exposure Medium Total										**2.7E-04**					**8.1E+00**
Fish Total											**2.7E-04**					**8.1E+00**
										Total of Receptor Risks Across All Media	**2.7E-04**				Total of Receptor Hazards Across All Media	**8.1E+00**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.25
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADOLESCENT RECREATIONAL USER - GAR FISH TISSUE RESULTS

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Fish	DRCS	Ingestion	**METALS**												
		Gar		COBALT	5.50E-02	(mg/kg)	3.42E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	2.40E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	8.0E-02
				MERCURY	2.20E-01	(mg/kg)	1.37E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	9.58E-05	(mg/kg-day)	1.00E-04	(mg/kg-day)	9.6E-01
				PESTICIDES/PCBs												
				4,4'-DDE	2.20E-02	(mg/kg)	1.37E-06	(mg/kg-day)	3.40E-01	per (mg/kg-day)	4.7E-07	9.58E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				AROCLOR-1254	4.45E-01	(mg/kg)	2.77E-05	(mg/kg-day)	2.00E+00	per (mg/kg-day)	5.5E-05	1.94E-04	(mg/kg-day)	2.00E-05	(mg/kg-day)	9.7E+00
				AROCLOR-1260	6.56E-01	(mg/kg)	4.08E-05	(mg/kg-day)	2.00E+00	per (mg/kg-day)	8.2E-05	2.86E-04	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.4E-04**					**1.1E+01**
		Exposure Point Total									**1.4E-04**					**1.1E+01**
	Exposure Medium Total										**1.4E-04**					**1.1E+01**
Fish Total											**1.4E-04**					**1.1E+01**
										Total of Receptor Risks Across All Media	**1.4E-04**				Total of Receptor Hazards Across All Media	**1.1E+01**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.26
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE CHILD RECREATIONAL USER - GAR FISH TISSUE RESULTS

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Fish	DRCS	Ingestion	**METALS**												
		Gar		COBALT	5.50E-02	(mg/kg)	2.05E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	4.79E-05	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.6E-01
				MERCURY	2.20E-01	(mg/kg)	8.21E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.92E-04	(mg/kg-day)	1.00E-04	(mg/kg-day)	1.9E+00
				PESTICIDES/PCBs												
				4,4'-DDE	2.20E-02	(mg/kg)	8.21E-07	(mg/kg-day)	3.40E-01	per (mg/kg-day)	2.8E-07	1.92E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				AROCLOR-1254	4.45E-01	(mg/kg)	1.66E-05	(mg/kg-day)	2.00E+00	per (mg/kg-day)	3.3E-05	3.88E-04	(mg/kg-day)	2.00E-05	(mg/kg-day)	1.9E+01
				AROCLOR-1260	6.56E-01	(mg/kg)	2.45E-05	(mg/kg-day)	2.00E+00	per (mg/kg-day)	4.9E-05	5.71E-04	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**8.2E-05**					**2.1E+01**
		Exposure Point Total									**8.2E-05**					**2.1E+01**
	Exposure Medium Total										**8.2E-05**					**2.1E+01**
Fish Total											**8.2E-05**					**2.1E+01**
										Total of Receptor Risks Across All Media	**8.2E-05**				Total of Receptor Hazards Across All Media	**2.1E+01**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.27
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT RECREATIONAL USER - CATFISH TISSUE RESULTS

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Fish	DRCS Catfish	Ingestion	**METALS**												
				MERCURY	1.50E-01	(mg/kg)	1.83E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	4.93E-05	(mg/kg-day)	1.00E-04	(mg/kg-day)	4.9E-01
				PESTICIDES/PCBs												
				ALPHA-BHC	7.10E-03	(mg/kg)	8.67E-07	(mg/kg-day)	6.30E+00	per (mg/kg-day)	5.5E-06	2.33E-06	(mg/kg-day)	8.00E-03	(mg/kg-day)	2.9E-04
				DELTA-BHC	4.90E-03	(mg/kg)	5.98E-07	(mg/kg-day)	1.80E+00	per (mg/kg-day)	1.1E-06	1.61E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				GAMMA-BHC (LINDANE)	5.00E-03	(mg/kg)	6.11E-07	(mg/kg-day)	1.10E+00	per (mg/kg-day)	6.7E-07	1.64E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	5.5E-03
				DIELDRIN	8.40E-03	(mg/kg)	1.03E-06	(mg/kg-day)	1.60E+01	per (mg/kg-day)	1.6E-05	2.76E-06	(mg/kg-day)	5.00E-05	(mg/kg-day)	5.5E-02
				4,4'-DDE	9.70E-02	(mg/kg)	1.18E-05	(mg/kg-day)	3.40E-01	per (mg/kg-day)	4.0E-06	3.19E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				HEPTACHLOR EPOXIDE	7.40E-04	(mg/kg)	9.04E-08	(mg/kg-day)	9.10E+00	per (mg/kg-day)	8.2E-07	2.43E-07	(mg/kg-day)	1.30E-05	(mg/kg-day)	1.9E-02
				AROCLOR-1254	3.44E-01	(mg/kg)	4.20E-05	(mg/kg-day)	2.00E+00	per (mg/kg-day)	8.4E-05	1.13E-04	(mg/kg-day)	2.00E-05	(mg/kg-day)	5.7E+00
				AROCLOR-1260	1.51E-01	(mg/kg)	1.84E-05	(mg/kg-day)	2.00E+00	per (mg/kg-day)	3.7E-05	4.96E-05	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**1.5E-04**					**6.2E+00**
		Exposure Point Total									**1.5E-04**					**6.2E+00**
	Exposure Medium Total										**1.5E-04**					**6.2E+00**
Fish Total											**1.5E-04**					**6.2E+00**
										Total of Receptor Risks Across All Media	**1.5E-04**				Total of Receptor Hazards Across All Media	**6.2E+00**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.28
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADOLESCENT RECREATIONAL USER - CATFISH TISSUE RESULTS

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Cancer Risk Calculations: Intake Value	Intake Units	CSF Value	CSF Units	Cancer Risk	Non-Cancer Hazard Calculations: Intake Value	Intake Units	RfD Value	RfD Units	Hazard Quotient
Surface Water	Fish	DRCS Catfish	Ingestion	**METALS**												
				MERCURY	1.50E-01	(mg/kg)	9.33E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	6.53E-05	(mg/kg-day)	1.00E-04	(mg/kg-day)	6.5E-01
				PESTICIDES/PCBs												
				ALPHA-BHC	7.10E-03	(mg/kg)	4.42E-07	(mg/kg-day)	6.30E+00	per (mg/kg-day)	2.8E-06	3.09E-06	(mg/kg-day)	8.00E-03	(mg/kg-day)	3.9E-04
				DELTA-BHC	4.90E-03	(mg/kg)	3.05E-07	(mg/kg-day)	1.80E+00	per (mg/kg-day)	5.5E-07	2.13E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				GAMMA-BHC (LINDANE)	5.00E-03	(mg/kg)	3.11E-07	(mg/kg-day)	1.10E+00	per (mg/kg-day)	3.4E-07	2.18E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	7.3E-03
				DIELDRIN	8.40E-03	(mg/kg)	5.23E-07	(mg/kg-day)	1.60E+01	per (mg/kg-day)	8.4E-06	3.66E-06	(mg/kg-day)	5.00E-05	(mg/kg-day)	7.3E-02
				4,4'-DDE	9.70E-02	(mg/kg)	6.04E-06	(mg/kg-day)	3.40E-01	per (mg/kg-day)	2.1E-06	4.22E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				HEPTACHLOR EPOXIDE	7.40E-04	(mg/kg)	4.60E-08	(mg/kg-day)	9.10E+00	per (mg/kg-day)	4.2E-07	3.22E-07	(mg/kg-day)	1.30E-05	(mg/kg-day)	2.5E-02
				AROCLOR-1254	3.44E-01	(mg/kg)	2.14E-05	(mg/kg-day)	2.00E+00	per (mg/kg-day)	4.3E-05	1.50E-04	(mg/kg-day)	2.00E-05	(mg/kg-day)	7.5E+00
				AROCLOR-1260	1.51E-01	(mg/kg)	9.40E-06	(mg/kg-day)	2.00E+00	per (mg/kg-day)	1.9E-05	6.58E-05	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**7.6E-05**					**8.3E+00**
		Exposure Point Total									**7.6E-05**					**8.3E+00**
	Exposure Medium Total										**7.6E-05**					**8.3E+00**
Fish Total											**7.6E-05**					**8.3E+00**
										Total of Receptor Risks Across All Media	**7.6E-05**				Total of Receptor Hazards Across All Media	**8.3E+00**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.29
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE CHILD RECREATIONAL USER - CATFISH TISSUE RESULTS

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Fish	DRCS Catfish	Ingestion	**METALS**												
				MERCURY	1.50E-01	(mg/kg)	5.60E-06	(mg/kg-day)	NA	per (mg/kg-day)	--	1.31E-04	(mg/kg-day)	1.00E-04	(mg/kg-day)	1.3E+00
				PESTICIDES/PCBs												
				ALPHA-BHC	7.10E-03	(mg/kg)	2.65E-07	(mg/kg-day)	6.30E+00	per (mg/kg-day)	1.7E-06	6.18E-06	(mg/kg-day)	8.00E-03	(mg/kg-day)	7.7E-04
				DELTA-BHC	4.90E-03	(mg/kg)	1.83E-07	(mg/kg-day)	1.80E+00	per (mg/kg-day)	3.3E-07	4.27E-06	(mg/kg-day)	NA	(mg/kg-day)	--
				GAMMA-BHC (LINDANE)	5.00E-03	(mg/kg)	1.87E-07	(mg/kg-day)	1.10E+00	per (mg/kg-day)	2.1E-07	4.36E-06	(mg/kg-day)	3.00E-04	(mg/kg-day)	1.5E-02
				DIELDRIN	8.40E-03	(mg/kg)	3.14E-07	(mg/kg-day)	1.60E+01	per (mg/kg-day)	5.0E-06	7.32E-06	(mg/kg-day)	5.00E-05	(mg/kg-day)	1.5E-01
				4,4'-DDE	9.70E-02	(mg/kg)	3.62E-06	(mg/kg-day)	3.40E-01	per (mg/kg-day)	1.2E-06	8.45E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				HEPTACHLOR EPOXIDE	7.40E-04	(mg/kg)	2.76E-08	(mg/kg-day)	9.10E+00	per (mg/kg-day)	2.5E-07	6.45E-07	(mg/kg-day)	1.30E-05	(mg/kg-day)	5.0E-02
				AROCLOR-1254	3.44E-01	(mg/kg)	1.28E-05	(mg/kg-day)	2.00E+00	per (mg/kg-day)	2.6E-05	3.00E-04	(mg/kg-day)	2.00E-05	(mg/kg-day)	1.5E+01
				AROCLOR-1260	1.51E-01	(mg/kg)	5.64E-06	(mg/kg-day)	2.00E+00	per (mg/kg-day)	1.1E-05	1.32E-04	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**4.6E-05**					**1.7E+01**
		Exposure Point Total									**4.6E-05**					**1.7E+01**
	Exposure Medium Total										**4.6E-05**					**1.7E+01**
Fish Total											**4.6E-05**					**1.7E+01**
										Total of Receptor Risks Across All Media	**4.6E-05**				Total of Receptor Hazards Across All Media	**1.7E+01**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.30
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT RECREATIONAL USER - LARGE MOUTH BASS TISSUE RESULTS

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Fish	DRCS	Ingestion	**METALS**												
		Large Mouth Bass		MERCURY	7.40E-01	(mg/kg)	9.04E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	2.43E-04	(mg/kg-day)	1.00E-04	(mg/kg-day)	2.4E+00
				PESTICIDES/PCBs												
				ALDRIN	2.10E-03	(mg/kg)	2.56E-07	(mg/kg-day)	1.70E+01	per (mg/kg-day)	4.4E-06	6.90E-07	(mg/kg-day)	3.00E-05	(mg/kg-day)	2.3E-02
				DIELDRIN	2.90E-03	(mg/kg)	3.54E-07	(mg/kg-day)	1.60E+01	per (mg/kg-day)	5.7E-06	9.53E-07	(mg/kg-day)	5.00E-05	(mg/kg-day)	1.9E-02
				4,4'-DDE	8.60E-02	(mg/kg)	1.05E-05	(mg/kg-day)	3.40E-01	per (mg/kg-day)	3.6E-06	2.83E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				HEPTACHLOR EPOXIDE	8.00E-04	(mg/kg)	9.77E-08	(mg/kg-day)	9.10E+00	per (mg/kg-day)	8.9E-07	2.63E-07	(mg/kg-day)	1.30E-05	(mg/kg-day)	2.0E-02
				AROCLOR-1254	5.30E-02	(mg/kg)	6.47E-06	(mg/kg-day)	2.00E+00	per (mg/kg-day)	1.3E-05	1.74E-05	(mg/kg-day)	2.00E-05	(mg/kg-day)	8.7E-01
			Exp. Route Total								**2.7E-05**					**3.4E+00**
		Exposure Point Total									**2.7E-05**					**3.4E+00**
	Exposure Medium Total										**2.7E-05**					**3.4E+00**
Fish Total											**2.7E-05**					**3.4E+00**
										Total of Receptor Risks Across All Media	**2.7E-05**				Total of Receptor Hazards Across All Media	**3.4E+00**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.31
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADOLESCENT RECREATIONAL USER - LARGE MOUTH BASS FISH TISSUE RESULTS

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Fish	DRCS Large Mouth Bass	Ingestion	**METALS**												
				MERCURY	7.40E-01	(mg/kg)	4.60E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	3.22E-04	(mg/kg-day)	1.00E-04	(mg/kg-day)	3.2E+00
				PESTICIDES/PCBs												
				ALDRIN	2.10E-03	(mg/kg)	1.31E-07	(mg/kg-day)	1.70E+01	per (mg/kg-day)	2.2E-06	9.15E-07	(mg/kg-day)	3.00E-05	(mg/kg-day)	3.0E-02
				DIELDRIN	2.90E-03	(mg/kg)	1.80E-07	(mg/kg-day)	1.60E+01	per (mg/kg-day)	2.9E-06	1.26E-06	(mg/kg-day)	5.00E-05	(mg/kg-day)	2.5E-02
				4,4'-DDE	8.60E-02	(mg/kg)	5.35E-06	(mg/kg-day)	3.40E-01	per (mg/kg-day)	1.8E-06	3.75E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				HEPTACHLOR EPOXIDE	8.00E-04	(mg/kg)	4.98E-08	(mg/kg-day)	9.10E+00	per (mg/kg-day)	4.5E-07	3.48E-07	(mg/kg-day)	1.30E-05	(mg/kg-day)	2.7E-02
				AROCLOR-1254	5.30E-02	(mg/kg)	3.30E-06	(mg/kg-day)	2.00E+00	per (mg/kg-day)	6.6E-06	2.31E-05	(mg/kg-day)	2.00E-05	(mg/kg-day)	1.2E+00
			Exp. Route Total								**1.4E-05**					**4.5E+00**
		Exposure Point Total									**1.4E-05**					**4.5E+00**
	Exposure Medium Total										**1.4E-05**					**4.5E+00**
Fish Total											**1.4E-05**					**4.5E+00**
										Total of Receptor Risks Across All Media	**1.4E-05**				Total of Receptor Hazards Across All Media	**4.5E+00**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.32
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE CHILD RECREATIONAL USER - LARGE MOUTH BASS FISH TISSUE RESULTS

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Fish	DRCS	Ingestion	**METALS**												
		Large Mouth Bass		MERCURY	7.40E-01	(mg/kg)	2.76E-05	(mg/kg-day)	NA	per (mg/kg-day)	--	6.45E-04	(mg/kg-day)	1.00E-04	(mg/kg-day)	6.4E+00
				PESTICIDES/PCBs												
				ALDRIN	2.10E-03	(mg/kg)	7.84E-08	(mg/kg-day)	1.70E+01	per (mg/kg-day)	1.3E-06	1.83E-06	(mg/kg-day)	3.00E-05	(mg/kg-day)	6.1E-02
				DIELDRIN	2.90E-03	(mg/kg)	1.08E-07	(mg/kg-day)	1.60E+01	per (mg/kg-day)	1.7E-06	2.53E-06	(mg/kg-day)	5.00E-05	(mg/kg-day)	5.1E-02
				4,4'-DDE	8.60E-02	(mg/kg)	3.21E-06	(mg/kg-day)	3.40E-01	per (mg/kg-day)	1.1E-06	7.49E-05	(mg/kg-day)	NA	(mg/kg-day)	--
				HEPTACHLOR EPOXIDE	8.00E-04	(mg/kg)	2.99E-08	(mg/kg-day)	9.10E+00	per (mg/kg-day)	2.7E-07	6.97E-07	(mg/kg-day)	1.30E-05	(mg/kg-day)	5.4E-02
				AROCLOR-1254	5.30E-02	(mg/kg)	1.98E-06	(mg/kg-day)	2.00E+00	per (mg/kg-day)	4.0E-06	4.62E-05	(mg/kg-day)	2.00E-05	(mg/kg-day)	2.3E+00
			Exp. Route Total								**8.4E-06**					**8.9E+00**
		Exposure Point Total									**8.4E-06**					**8.9E+00**
	Exposure Medium Total										**8.4E-06**					**8.9E+00**
Fish Total											**8.4E-06**					**8.9E+00**
										Total of Receptor Risks Across All Media	**8.4E-06**				Total of Receptor Hazards Across All Media	**8.9E+00**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.33
CALCULATION OF DERMALLY ABSORBED DOSE FROM SURFACE WATER
RECREATIONAL USER

Contaminant of Potential Concern	EPC (ug/L)	K_p (cm/hr)	Log K_p	MW (g/mole)	Log K_{ow}	B (unit less)	D_{sc} (cm^2/hr)	τ_{event} (hr)	b	c	t* (hr)	DA(1) (mg/cm^2-event)
4,4'-DDT	7.40E-02	6.30E-01	2.31E-01	354.50	7.60	4.56E+00	1.64E-08	1.02E+01	1.51E+01	4.62E+00	4.43E+01	4.1E-07
BIS(2-ETHYLHEXYL)PHTHALATE	1.40E+02	2.50E-02	2.88E-02	390.57	7.60	1.90E-01	1.03E-08	1.62E+01	4.31E-01	4.70E-01	3.88E+01	4.4E-05
AROCLOR-1254	1.50E-02	7.50E-01	5.82E-02	326.40	7.10	5.21E+00	2.36E-08	7.07E+00	1.93E+01	5.27E+00	3.11E+01	5.8E-08

Notes:

(1)Dermal exposure from organics during swimming was evaluated for those chemicals with a permeability coefficient greater than 1E-02 cm/hr (U.S. EPA 2004).
(2)Please refer to U.S. EPA 2004, Risk Assessment Guidance for Superfund, Volume 1: Human Health Evaluation (Part E. Supplemental Guidance for Dermal Risk Assessment) for all equations to calculate Log K_p, B, D_{sc}, τ_{event}t, b, c, t*, and DA.
-- = Not applicable
B = Ratio of the permeability coefficient of a compound through the stratum corneum relative to its permeability coefficient across the viable epidermis

cm/hr = Centimeter per hour
cm^2/hr = Square centimeter per hour
DA = Dose absorbed per event per area of skin exposed for the adult and child resident scenario
D_{sc} = Effective diffusivity for chemical transfer through the skin
U.S. EPA = U.S. Environmental Protection Agency
EPC = Exposure point concentration (see Table 6.3.2)
g/mol = Gram per mole
hr = Hour
K_p = Dermal permeability coefficient of compound in water; per U.S. EPA 2004, Appendix B for organics
Log K_{ow} = Log octanol/water partition coefficient (Primary source: U.S. EPA 2004)
Log K_p = Log of the dermal permeability coefficient

ug/L = Microgram per liter
mg/cm^2-event = Milligram per square centimeter per event
MW = Molecular weight
τ_{event} = Lag time per event
t* = Time it takes to reach steady-state

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TABLE 7.34
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT RECREATIONAL USER - TOTAL PCB CALCULATIONS

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Cancer Risk Calculations: Intake Value	Intake Units	CSF Value	CSF Units	Cancer Risk	Non-Cancer Hazard Calculations: Intake Value	Intake Units	RfD Value	RfD Units	Hazard Quotient
Surface Water	Fish	Fish All Results	Ingestion	**PCBs**												
				TOTAL PCBs	2.94E+01	(mg/kg)	3.59E-03	(mg/kg-day)	2.00E+00	per (mg/kg-day)	7.2E-03	9.67E-03	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**7.2E-03**					**0.0E+00**
		Exposure Point Total									**7.2E-03**					**0.0E+00**
	Exposure Medium Total										**7.2E-03**					**0.0E+00**
Fish Total											**7.2E-03**					**0.0E+00**
										Total of Receptor Risks Across All Media	**7.2E-03**				Total of Receptor Hazards Across All Media	**0.0E+00**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.35
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADOLESCENT RECREATIONAL USER - TOTAL PCB CALCULATIONS

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	DRCS	Fish All Results	Ingestion	**PCBs**												
				TOTAL PCBs	2.94E+01	(mg/kg)	1.83E-03	(mg/kg-day)	2.00E+00	per (mg/kg-day)	3.7E-03	1.28E-02	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**3.7E-03**					**0.0E+00**
		Exposure Point Total									**3.7E-03**					**0.0E+00**
	Exposure Medium Total										**3.7E-03**					**0.0E+00**
Fish Total											**3.7E-03**					**0.0E+00**
										Total of Receptor Risks Across All Media	**3.7E-03**				Total of Receptor Hazards Across All Media	**0.0E+00**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

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TABLE 7.36
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE CHILD RECREATIONAL USER - TOTAL PCB CALCULATIONS

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
							Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
					Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Fish	Fish All Results	Ingestion	**PCBs**												
				TOTAL PCBs	2.94E+01	(mg/kg)	1.10E-03	(mg/kg-day)	2.00E+00	per (mg/kg-day)	2.2E-03	1.92E-02	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.2E-03**					**0.0E+00**
		Exposure Point Total									**2.2E-03**					**0.0E+00**
	Exposure Medium Total										**2.2E-03**					**0.0E+00**
Surface Water Total											**2.2E-03**					**0.0E+00**
										Total of Receptor Risks Across All Media	**2.2E-03**				Total of Receptor Hazards Across All Media	**0.0E+00**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 7.37
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT SUBSISTENCE FISHER - TOTAL PCB CALCULATIONS

Scenario Timeframe: Current
Receptor Population: Subsistence Fisher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Fish	Fish All Results	Ingestion	**PCBs**												
				TOTAL PCBs	2.94E+01	(mg/kg)	1.53E-02	(mg/kg-day)	2.00E+00	per (mg/kg-day)	3.1E-02	5.37E-02	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**3.1E-02**					**0.0E+00**
		Exposure Point Total									**3.1E-02**					**0.0E+00**
	Exposure Medium Total										**3.1E-02**					**0.0E+00**
Fish Total											**3.1E-02**					**0.0E+00**
										Total of Receptor Risks Across All Media	**3.1E-02**				Total of Receptor Hazards Across All Media	**0.0E+00**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 9.1
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE RESIDENT ADULT AND CHILD - SOIL

Location: Donna Reservoir and Canal System
Scenario Timeframe: Future
Receptor Population: Resident
Receptor Age: Child and Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DRCS (Child)	**METALS**					**METALS**					
			ALUMINUM	--	--	--	NA	ALUMINUM	Central Nervous System	2.7E-01	--	1.4E-02	2.8E-01
			ARSENIC	9.2E-06	6.6E-07	7.1E-09	9.9E-06	ARSENIC	Blood glucose and cholesterol	2.4E-01	1.7E-02	1.3E-03	2.6E-01
			COBALT	--	--	1.6E-08	1.6E-08	COBALT	None	2.6E-01	--	3.6E-03	2.7E-01
			MANGANESE	--	--	--	NA	MANGANESE	None	2.1E-01	--	2.7E-02	2.4E-01
			VANADIUM	--	--	--	NA	VANADIUM	Liver	6.0E-02	--	8.0E-04	6.0E-02
			PAHS					**PAHS**					
			BENZO(A)PYRENE	4.7E-06	1.4E-06	1.9E-10	6.1E-06	BENZO(A)PYRENE	NA	--	--	--	NA
			(Total for Child)	1.4E-05	2.1E-06	2.4E-08	1.6E-05		(Total for Child)	1.0E+00	1.7E-02	4.7E-02	1.1E+00
	Surface Soil	DRCS (Adult)	**METALS**					**METALS**					
			ALUMINUM	--	--	--	NA	ALUMINUM	Central Nervous System	2.5E-02	--	1.4E-02	3.9E-02
			ARSENIC	2.9E-06	3.7E-07	2E-08	3.3E-06	ARSENIC	Blood glucose and cholesterol	2.2E-02	2.8E-03	1.3E-03	2.7E-02
			COBALT	--	--	5E-08	5.5E-08	COBALT	None	2.5E-02	--	3.6E-03	2.8E-02
			MANGANESE	--	--	--	NA	MANGANESE	None	2.0E-02	--	2.7E-02	4.7E-02
			VANADIUM	--	--	--	NA	VANADIUM	Liver	5.6E-03	--	8.0E-04	6.4E-03
			PAHS					**PAHS**					
			BENZO(A)PYRENE	5.0E-07	2.7E-07	2E-10	7.7E-07	BENZO(A)PYRENE	NA	--	--	--	NA
			(Total for Adult)	3.4E-06	6.4E-07	7.9E-08	4.1E-06		(Total for Adult)	9.8E-02	2.8E-03	4.7E-02	1.5E-01
	Surface Soil	DRCS (Adult + Child)	**METALS**										
			ARSENIC	1.2E-05	1.0E-06	3.1E-08	1.3E-05						
			COBALT	NA	NA	7.1E-08	7.1E-08						
			PAHS										
			BENZO(A)PYRENE	5.2E-06	1.7E-06	4.0E-10	6.9E-06						
			(Total for Child + Adult)	1.7E-05	2.7E-06	1.0E-07	2.0E-05	**Total Hazard Index Across Surface Soil (Child)**					**1.1E+00**
						Total Risk Across Surface Soil	**2.0E-05**	**Total Hazard Index Across Surface Soil (Adult)**					**1.5E-01**
						Total Risk Across All Media and All Exposure Routes	**2E-05**	**Total Hazard Index Across All Media and All Exposure Routes (Child)**					**1**
								Total Hazard Index Across All Media and All Exposure Routes (Adult)					**0.1**

Total Hazard Index, Central Nervous System (Child)	**0.5**
Total Hazard Index, Skin (Child)	**0.3**
Total Hazard Index, Hair (Child)	**0.06**
Total Hazard Index, Blood (Child)	**0.3**

TABLE 9.2
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE AGRICULTURAL WORKER - SOIL

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current
Receptor Population: Agricultural Worker
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Soil	Surface Soil	DRCS	**METALS**					**METALS**	#REF!				
			ALUMINUM	--	--	--	NA	ALUMINUM	Central Nervous System	1.5E-02	--	3.4E-04	1.5E-02
			ARSENIC	2.6E-06	3.3E-07	7.1E-09	2.9E-06	ARSENIC	Blood glucose and cholesterol	1.3E-02	1.7E-03	3.1E-05	1.5E-02
			COBALT	--	--	1.6E-08	1.6E-08	COBALT	None	1.5E-02	--	8.5E-05	1.5E-02
			MANGANESE	--	--	--	NA	MANGANESE	None	1.2E-02	--	6.5E-04	1.2E-02
			VANADIUM	--	--	--	NA	VANADIUM	Liver	3.3E-03	--	1.9E-05	3.3E-03
			PAHS					**PAHS**	Blood				
			BENZO(A)PYRENE	2.5E-07	1.4E-07	3.5E-11	3.8E-07	BENZO(A)PYRENE	NA	--	--	--	NA
			(Total)	2.8E-06	4.6E-07	2.3E-08	3.3E-06		(Total)	5.8E-02	1.7E-03	1.1E-03	6.1E-02
				Total Risk Across Surface Soil			**3.3E-06**		**Total Hazard Index Across Surface Soil**				**6.1E-02**
				Total Risk Across All Media and All Exposure Routes			**3E-06**		**Total Hazard Index Across All Media and All Exposure Routes**				**0.06**

TABLE 9.3
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT RECREATIONAL USER
EXPOSURE AREA 2: THE SIPHON AND DOWNSTREAM - SEDIMENT

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current Receptor Population: Recreational User Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	Exposure Area 2: The Siphon and Downstream	**PESTICIDES/PCBs**					**PESTICIDES/PCBs**	Kidneys				
			AROCLOR-1254	6.3E-08	5.9E-08	--	1.2E-07	AROCLOR-1254	Skin	4.2E-03	4.0E-03	--	8.2E-03
			(Total)	6.3E-08	5.9E-08	---	1.2E-07		(Total)	4.2E-03	4.0E-03	---	8.2E-03
						Total Risk Across Sediment	**1.2E-07**					**Total Hazard Index Across Sediment**	**8.2E-03**
						Total Risk Across All Media and All Exposure Routes	**1E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.008**

TABLE 9.4
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADOLESCENT RECREATIONAL USER
EXPOSURE AREA 2: THE SIPHON AND DOWNSTREAM - SEDIMENT

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current Receptor Population: Recreational User Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	Exposure Area 2: The Siphon and Downstream	**PESTICIDES/PCBs**					**PESTICIDES/PCBs**	Kidneys				
			AROCLOR-1254	4.3E-08	9.3E-08	--	1.4E-07	AROCLOR-1254	Skin	9.4E-03	1.6E-02	--	2.6E-02
			(Total)	4.3E-08	9.3E-08	---	1.4E-07		(Total)	9.4E-03	1.6E-02	---	2.6E-02
						Total Risk Across Sediment	**1.4E-07**					**Total Hazard Index Across Sediment**	**2.6E-02**
						Total Risk Across All Media and All Exposure Routes	**1E-07**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.03**

TABLE 9.5
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE CHILD RECREATIONAL USER
EXPOSURE AREA 2: THE SIPHON AND DOWNSTREAM - SEDIMENT

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	Exposure Area 2: The Siphon and Downstream	**PESTICIDES/PCBs**					**PESTICIDES/PCBs**	Kidneys				
			AROCLOR-1254	5.2E-08	6.9E-08	--	1.2E-07	AROCLOR-1254	Skin	1.1E-02	4.0E-02	--	5.1E-02
			(Total)	5.2E-08	6.9E-08	---	1.2E-07		(Total)	1.1E-02	4.0E-02	---	5.1E-02
Total Risk Across Sediment							**1.2E-07**	**Total Hazard Index Across Sediment**					**5.1E-02**
Total Risk Across All Media and All Exposure Routes							**1E-07**	**Total Hazard Index Across All Media and All Exposure Routes**					**0.05**

TABLE 9.6
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT RECREATIONAL USER
EXPOSURE AREA 4: DOWNSTREAM OF THE RESERVOIRS - SEDIMENT

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	Exposure Area 4: Downstream of the Reservoirs	**PAHS**					**PAHS**	Blood				
			BENZO(A)ANTHRACENE	8.2E-07	7.1E-07	--	1.5E-06	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	7.5E-07	6.5E-07	--	1.4E-06	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(K)FLUORANTHENE	4.8E-08	4.2E-08	--	9.0E-08	BENZO(K)FLUORANTHENE	Kidneys	--	--	--	NA
			BENZO(A)PYRENE	4.3E-06	3.8E-06	--	8.1E-06	BENZO(A)PYRENE	NA	--	--	--	NA
			DIBENZ(A,H)ANTHRACENE	5.8E-07	5.0E-07	--	1.1E-06	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	2.1E-07	1.8E-07	--	3.9E-07	INDENO(1,2,3-C,D)PYRENE	Liver	--	--	--	NA
			(Total)	6.8E-06	5.9E-06	---	1.3E-05		(Total)	---	---	---	---
						Total Risk Across Sediment	**1.3E-05**					**Total Hazard Index Across Sediment**	**0.0E+00**
						Total Risk Across All Media and All Exposure Routes	**1E-05**					**Total Hazard Index Across All Media and All Exposure Routes**	**0**

TABLE 9.7
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADOLESCENT RECREATIONAL USER
EXPOSURE AREA 4: DOWNSTREAM OF THE RESERVOIRS - SEDIMENT

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current Receptor Population: Recreational User Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	Exposure Area 4: Downstream of the Reservoirs	**PAHS**					**PAHS**	Blood				
			BENZO(A)ANTHRACENE	1.7E-06	3.4E-06	--	5.1E-06	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	1.5E-06	3.1E-06	--	4.6E-06	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(K)FLUORANTHENE	9.9E-08	2.0E-07	--	3.0E-07	BENZO(K)FLUORANTHENE	Kidneys	--	--	--	NA
			BENZO(A)PYRENE	8.9E-06	1.8E-05	--	2.7E-05	BENZO(A)PYRENE	NA	--	--	--	NA
			DIBENZ(A,H)ANTHRACENE	1.2E-06	2.4E-06	--	3.6E-06	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	4.3E-07	8.7E-07	--	1.3E-06	INDENO(1,2,3-C,D)PYRENE	Liver	--	--	--	NA
			(Total)	1.4E-05	2.8E-05	---	4.2E-05		(Total)	---	---	---	---
						Total Risk Across Sediment	**4.2E-05**					**Total Hazard Index Across Sediment**	**0.0E+00**
						Total Risk Across All Media and All Exposure Routes	**4E-05**					**Total Hazard Index Across All Media and All Exposure Routes**	**0**

TABLE 9.8
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE CHILD RECREATIONAL USER
EXPOSURE AREA 4: DOWNSTREAM OF THE RESERVOIRS - SEDIMENT

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Sediment	Sediment	Exposure Area 4: Downstream of the Reservoirs	**PAHS**					**PAHS**	Blood				
			BENZO(A)ANTHRACENE	2.0E-06	2.5E-06	--	4.5E-06	BENZO(A)ANTHRACENE	NA	--	--	--	NA
			BENZO(B)FLUORANTHENE	1.8E-06	2.3E-06	--	4.1E-06	BENZO(B)FLUORANTHENE	NA	--	--	--	NA
			BENZO(K)FLUORANTHENE	1.2E-07	1.5E-07	--	2.7E-07	BENZO(K)FLUORANTHENE	Kidneys	--	--	--	NA
			BENZO(A)PYRENE	1.1E-05	1.3E-05	--	2.4E-05	BENZO(A)PYRENE	NA	--	--	--	NA
			DIBENZ(A,H)ANTHRACENE	1.4E-06	1.8E-06	--	3.2E-06	DIBENZ(A,H)ANTHRACENE	NA	--	--	--	NA
			INDENO(1,2,3-C,D)PYRENE	5.2E-07	6.4E-07	--	1.2E-06	INDENO(1,2,3-C,D)PYRENE	Liver	--	--	--	NA
			(Total)	1.7E-05	2.1E-05	---	3.7E-05		(Total)	---	---	---	---
Total Risk Across Sediment							**3.7E-05**	**Total Hazard Index Across Sediment**					**0.0E+00**
Total Risk Across All Media and All Exposure Routes							**4E-05**	**Total Hazard Index Across All Media and All Exposure Routes**					**0**

TABLE 9.9
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT RECREATIONAL USER - SURFACE WATER

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Surface Water	DRCS	**METALS**					**METALS**	#REF!				
			ARSENIC	1.3E-06	1.8E-07	--	1.5E-06	ARSENIC	Skin	7.9E-03	1.1E-03	--	9.0E-03
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	2.2E-03	7.6E-03	--	9.8E-03
			MERCURY	--	--	--	NA	MERCURY	Central Nervous System	1.8E-04	2.6E-05	--	2.1E-04
			PESTICIDES/PCBs					**PESTICIDES/PCBs**					
			4,4'-DDT	2.9E-09	5.5E-07	--	5.5E-07	4,4'-DDT	Liver	4.6E-05	8.7E-03	--	8.8E-03
			AROCLOR-1254	3.4E-09	4.7E-07	--	4.7E-07	AROCLOR-1254	Skin	2.3E-04	3.1E-02	--	3.2E-02
			SEMIVOLATILES					**SEMIVOLATILES**					
			BIS(2-ETHYLHEXYL)PHTHALATE	2.2E-07	2.5E-06	--	2.7E-06	BIS(2-ETHYLHEXYL)PHTHALATE	Liver	2.2E-03	2.4E-02	--	2.6E-02
			(Total)	1.6E-06	3.7E-06	---	5.2E-06		(Total)	1.3E-02	7.3E-02	---	8.5E-02
						Total Risk Across Surface Water	**5.2E-06**					**Total Hazard Index Across Surface Water**	**8.5E-02**
						Total Risk Across All Media and All Exposure Routes	**5E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.09**

TABLE 9.10
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADOLESCENT RECREATIONAL USER - SURFACE WATER

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Surface Water	DRCS	**METALS**					**METALS**	#REF!				
			ARSENIC	9.0E-07	7.9E-08	--	9.8E-07	ARSENIC	Skin	1.4E-02	1.2E-03	--	1.5E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	3.9E-03	8.5E-03	--	1.2E-02
			MERCURY	--	--	--	NA	MERCURY	Central Nervous System	3.3E-04	2.9E-05	--	3.6E-04
			PESTICIDES/PCBs					**PESTICIDES/PCBs**					
			4,4'-DDT	2.0E-09	2.4E-07	--	2.4E-07	4,4'-DDT	Liver	8.1E-05	9.8E-03	--	9.9E-03
			AROCLOR-1254	2.3E-09	2.0E-07	--	2.0E-07	AROCLOR-1254	Skin	4.1E-04	3.5E-02	--	3.6E-02
			SEMIVOLATILES					**SEMIVOLATILES**					
			BIS(2-ETHYLHEXYL)PHTHALATE	1.5E-07	1.1E-06	--	1.2E-06	BIS(2-ETHYLHEXYL)PHTHALATE	Liver	3.8E-03	2.6E-02	--	3.0E-02
			(Total)	1.1E-06	1.6E-06	---	2.6E-06		(Total)	2.3E-02	8.1E-02	---	1.0E-01
						Total Risk Across Surface Water	**2.6E-06**					**Total Hazard Index Across Surface Water**	**1.0E-01**
						Total Risk Across All Media and All Exposure Routes	**3E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.1**

TABLE 9.11
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE CHILD RECREATIONAL USER - SURFACE WATER

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Surface Water	DRCS	**METALS**					**METALS**	#REF!				
			ARSENIC	9.0E-07	6.0E-08	--	9.6E-07	ARSENIC	Skin	3.5E-02	3.1E-03	--	3.8E-02
			MANGANESE	--	--	--	NA	MANGANESE	Central Nervous System	9.7E-03	2.1E-02	--	3.1E-02
			MERCURY	--	--	--	NA	MERCURY	Central Nervous System	8.2E-04	7.2E-05	--	8.9E-04
			PESTICIDES/PCBs					**PESTICIDES/PCBs**					
			4,4'-DDT	2.0E-09	1.8E-07	--	1.8E-07	4,4'-DDT	Liver	2.0E-04	2.4E-02	--	2.5E-02
			AROCLOR-1254	2.3E-09	1.5E-07	--	1.5E-07	AROCLOR-1254	Skin	1.0E-03	8.8E-02	--	8.9E-02
			SEMIVOLATILES					**SEMIVOLATILES**					
			BIS(2-ETHYLHEXYL)PHTHALATE	1.5E-07	7.9E-07	--	9.5E-07	BIS(2-ETHYLHEXYL)PHTHALATE	Liver	9.6E-03	6.6E-02	--	7.6E-02
			(Total)	1.1E-06	1.2E-06	---	2.2E-06		(Total)	5.6E-02	2.0E-01	---	2.6E-01
						Total Risk Across Surface Water	**2.2E-06**					**Total Hazard Index Across Surface Water**	**2.6E-01**
						Total Risk Across All Media and All Exposure Routes	**2E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**0.3**

TABLE 9.12
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT RECREATIONAL USER - ALL FISH TISSUE RESULTS

Location: Donna Reservoir and Canal System

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS	**METALS**					**METALS**					
		All Results	ARSENIC	2.0E-05	--	--	2.0E-05	ARSENIC	Skin	1.2E-01	--	--	1.2E-01
			COBALT	--	--	--	NA	COBALT	Thyroid	6.2E-02	--	--	6.2E-02
			MERCURY	--	--	--	NA	MERCURY	Central Nervous System	1.1E+00	--	--	1.1E+00
			PESTICIDES/PCBs					**PESTICIDES/PCBs**					
			ALPHA-BHC	5.5E-06	--	--	5.5E-06	ALPHA-BHC	Liver	2.9E-04	--	--	2.9E-04
			DELTA-BHC	1.1E-06	--	--	1.1E-06	DELTA-BHC	NA	--	--	--	NA
			GAMMA-BHC (LINDANE)	6.7E-07	--	--	6.7E-07	GAMMA-BHC (LINDANE)	Liver and Kidney	5.5E-03	--	--	5.5E-03
			ALDRIN	3.3E-06	--	--	3.3E-06	ALDRIN	Liver	1.7E-02	--	--	1.7E-02
			GAMMA-CHLORDANE	6.9E-07	--	--	6.9E-07	GAMMA-CHLORDANE	Liver	1.1E-02	--	--	1.1E-02
			DIELDRIN	7.7E-06	--	--	7.7E-06	DIELDRIN	Liver	2.6E-02	--	--	2.6E-02
			4,4'-DDE	2.7E-06	--	--	2.7E-06	4,4'-DDE	NA	--	--	--	NA
			4,4'-DDT	1.7E-06	--	--	1.7E-06	4,4'-DDT	Liver	2.7E-02	--	--	2.7E-02
			ENDRIN	--	--	--	NA	ENDRIN	Liver	5.1E-02	--	--	5.1E-02
			HEPTACHLOR EPOXIDE	1.7E-06	--	--	1.7E-06	HEPTACHLOR EPOXIDE	Liver	3.8E-02	--	--	3.8E-02
			AROCLOR-1254	1.0E-04	--	--	1.0E-04	AROCLOR-1254	Skin	7.0E+00	--	--	7.0E+00
			AROCLOR-1260	5.5E-05	--	--	5.5E-05	AROCLOR-1260	NA	--	--	--	NA
			(Total)	2.0E-04	---	---	2.0E-04		(Total)	8.5E+00	---	---	8.5E+00
						Total Risk Across Fish	**2.0E-04**					**Total Hazard Index Across Fish**	**8.5E+00**
						Total Risk Across All Media and All Exposure Routes	**2E-04**					**Total Hazard Index Across All Media and All Exposure Routes**	**9**

TABLE 9.13
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADOLESCENT RECREATIONAL USER - ALL FISH TISSUE RESULTS

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current Receptor Population: Recreational User Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS All Results	**METALS**					**METALS**					
			ARSENIC	1.0E-05	--	--	1.0E-05	ARSENIC	Skin	1.6E-01	--	--	1.6E-01
			COBALT	--	--	--	NA	COBALT	Thyroid	8.2E-02	--	--	8.2E-02
			MERCURY	--	--	--	NA	MERCURY	Central Nervous System	1.5E+00	--	--	1.5E+00
			PESTICIDES/PCBs					**PESTICIDES/PCBs**					
			ALPHA-BHC	2.8E-06	--	--	2.8E-06	ALPHA-BHC	Liver	3.9E-04	--	--	3.9E-04
			DELTA-BHC	5.5E-07	--	--	5.5E-07	DELTA-BHC	NA	--	--	--	NA
			GAMMA-BHC (LINDANE)	3.4E-07	--	--	3.4E-07	GAMMA-BHC (LINDANE)	Liver and Kidney	7.3E-03	--	--	7.3E-03
			ALDRIN	1.7E-06	--	--	1.7E-06	ALDRIN	Liver	2.3E-02	--	--	2.3E-02
			GAMMA-CHLORDANE	3.5E-07	--	--	3.5E-07	GAMMA-CHLORDANE	Liver	1.4E-02	--	--	1.4E-02
			DIELDRIN	3.9E-06	--	--	3.9E-06	DIELDRIN	Liver	3.4E-02	--	--	3.4E-02
			4,4'-DDE	1.4E-06	--	--	1.4E-06	4,4'-DDE	NA	--	--	--	NA
			4,4'-DDT	8.8E-07	--	--	8.8E-07	4,4'-DDT	Liver	3.6E-02	--	--	3.6E-02
			ENDRIN	--	--	--	NA	ENDRIN	Liver	6.8E-02	--	--	6.8E-02
			HEPTACHLOR EPOXIDE	8.5E-07	--	--	8.5E-07	HEPTACHLOR EPOXIDE	Liver	5.0E-02	--	--	5.0E-02
			AROCLOR-1254	5.3E-05	--	--	5.3E-05	AROCLOR-1254	Skin	9.3E+00	--	--	9.3E+00
			AROCLOR-1260	2.8E-05	--	--	2.8E-05	AROCLOR-1260	NA	--	--	--	NA
			(Total)	1.0E-04	---	---	1.0E-04		(Total)	1.1E+01	---	---	1.1E+01
						Total Risk Across Fish	**1.0E-04**					**Total Hazard Index Across Fish**	**1.1E+01**
						Total Risk Across All Media and All Exposure Routes	**1E-04**					**Total Hazard Index Across All Media and All Exposure Routes**	**11**

TABLE 9.14
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE CHILD RECREATIONAL USER - ALL FISH TISSUE RESULTS

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS	**METALS**					**METALS**					
		All Results	ARSENIC	6.0E-06	--	--	6.0E-06	ARSENIC	Skin	3.1E-01	--	--	3.1E-01
			COBALT	--	--	--	NA	COBALT	Thyroid	1.6E-01	--	--	1.6E-01
			MERCURY	--	--	--	NA	MERCURY	Central Nervous System	3.0E+00	--	--	3.0E+00
			PESTICIDES/PCBs					**PESTICIDES/PCBs**					
			ALPHA-BHC	1.7E-06	--	--	1.7E-06	ALPHA-BHC	Liver	7.7E-04	--	--	7.7E-04
			DELTA-BHC	3.3E-07	--	--	3.3E-07	DELTA-BHC	NA	--	--	--	NA
			GAMMA-BHC (LINDANE)	2.1E-07	--	--	2.1E-07	GAMMA-BHC (LINDANE)	Liver and Kidney	1.5E-02	--	--	1.5E-02
			ALDRIN	1.0E-06	--	--	1.0E-06	ALDRIN	Liver	4.6E-02	--	--	4.6E-02
			GAMMA-CHLORDANE	2.1E-07	--	--	2.1E-07	GAMMA-CHLORDANE	Liver	2.8E-02	--	--	2.8E-02
			DIELDRIN	2.4E-06	--	--	2.4E-06	DIELDRIN	Liver	6.9E-02	--	--	6.9E-02
			4,4'-DDE	8.2E-07	--	--	8.2E-07	4,4'-DDE	NA	--	--	--	NA
			4,4'-DDT	5.3E-07	--	--	5.3E-07	4,4'-DDT	Liver	7.3E-02	--	--	7.3E-02
			ENDRIN	--	--	--	NA	ENDRIN	Liver	1.4E-01	--	--	1.4E-01
			HEPTACHLOR EPOXIDE	5.1E-07	--	--	5.1E-07	HEPTACHLOR EPOXIDE	Liver	1.0E-01	--	--	1.0E-01
			AROCLOR-1254	3.2E-05	--	--	3.2E-05	AROCLOR-1254	Skin	1.9E+01	--	--	1.9E+01
			AROCLOR-1260	1.7E-05	--	--	1.7E-05	AROCLOR-1260	NA	--	--	--	NA
			(Total)	6.2E-05	---	---	6.2E-05		(Total)	2.3E+01	---	---	2.3E+01
						Total Risk Across Fish	**6.2E-05**					**Total Hazard Index Across Fish**	**2.3E+01**
						Total Risk Across All Media and All Exposure Routes	**6E-05**					**Total Hazard Index Across All Media and All Exposure Routes**	**23**

TABLE 9.15
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT SUBSISTENCE FISHER - ALL FISH TISSUE RESULTS

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current
Receptor Population: Subsistence Fisher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS	**METALS**					**METALS**					
		All Results	ARSENIC	8.4E-05	--	--	8.4E-05	ARSENIC	Skin	6.5E-01	--	--	6.5E-01
			COBALT	--	--	--	NA	COBALT	Thyroid	3.5E-01	--	--	3.5E-01
			MERCURY	--	--	--	NA	MERCURY	Central Nervous System	6.3E+00	--	--	6.3E+00
			PESTICIDES/PCBs					**PESTICIDES/PCBs**					
			ALPHA-BHC	2.3E-05	--	--	2.3E-05	ALPHA-BHC	Liver	1.6E-03	--	--	1.6E-03
			DELTA-BHC	4.6E-06	--	--	4.6E-06	DELTA-BHC	NA	--	--	--	NA
			GAMMA-BHC (LINDANE)	2.9E-06	--	--	2.9E-06	GAMMA-BHC (LINDANE)	Liver and Kidney	3.0E-02	--	--	3.0E-02
			ALDRIN	1.4E-05	--	--	1.4E-05	ALDRIN	Liver	9.6E-02	--	--	9.6E-02
			GAMMA-CHLORDANE	2.9E-06	--	--	2.9E-06	GAMMA-CHLORDANE	Liver	5.9E-02	--	--	5.9E-02
			DIELDRIN	3.3E-05	--	--	3.3E-05	DIELDRIN	Liver	1.4E-01	--	--	1.4E-01
			4,4'-DDE	1.1E-05	--	--	1.1E-05	4,4'-DDE	NA	--	--	--	NA
			4,4'-DDT	7.4E-06	--	--	7.4E-06	4,4'-DDT	Liver	1.5E-01	--	--	1.5E-01
			ENDRIN	--	--	--	NA	ENDRIN	Liver	2.8E-01	--	--	2.8E-01
			HEPTACHLOR EPOXIDE	7.1E-06	--	--	7.1E-06	HEPTACHLOR EPOXIDE	Liver	2.1E-01	--	--	2.1E-01
			AROCLOR-1254	4.5E-04	--	--	4.5E-04	AROCLOR-1254	Skin	3.9E+01	--	--	3.9E+01
			AROCLOR-1260	2.3E-04	--	--	2.3E-04	AROCLOR-1260	NA	--	--	--	NA
			(Total)	8.7E-04	---	---	8.7E-04		(Total)	4.7E+01	---	---	4.7E+01
						Total Risk Across Fish	**8.7E-04**					**Total Hazard Index Across Fish**	**4.7E+01**
						Total Risk Across All Media and All Exposure Routes	**9E-04**					**Total Hazard Index Across All Media and All Exposure Routes**	**47**

TABLE 9.16
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT RECREATIONL USER - BUFFALO FISH TISSUE RESULTS

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS Buffalo	**METALS**					**METALS**					
			ARSENIC	1.2E-05	--	--	1.2E-05	ARSENIC	Skin	6.9E-02	--	--	6.9E-02
			MERCURY	--	--	--	NA	MERCURY	Central Nervous System	2.8E-01	--	--	2.8E-01
			PESTICIDES/PCBs					**PESTICIDES/PCBs**					
			GAMMA-CHLORDANE	1.6E-06	--	--	1.6E-06	GAMMA-CHLORDANE	Liver	2.4E-02	--	--	2.4E-02
			DIELDRIN	1.6E-05	--	--	1.6E-05	DIELDRIN	Liver	5.5E-02	--	--	5.5E-02
			4,4'-DDE	4.0E-06	--	--	4.0E-06	4,4'-DDE	NA	--	--	--	NA
			HEPTACHLOR EPOXIDE	3.3E-06	--	--	3.3E-06	HEPTACHLOR EPOXIDE	Liver	7.6E-02	--	--	7.6E-02
			AROCLOR-1254	4.1E-04	--	--	4.1E-04	AROCLOR-1254	Skin	2.8E+01	--	--	2.8E+01
			AROCLOR-1260	8.8E-04	--	--	8.8E-04	AROCLOR-1260	NA	--	--	--	NA
			(Total)	1.3E-03	---	---	1.3E-03		(Total)	2.8E+01	---	---	2.8E+01
						Total Risk Across Fish	**1.3E-03**					**Total Hazard Index Across Fish**	**2.8E+01**
						Total Risk Across All Media and All Exposure Routes	**1E-03**					**Total Hazard Index Across All Media and All Exposure Routes**	**28**

TABLE 9.17
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADOLESCENT RECREATIONAL USER - BUFFALO FISH TISSUE RESULTS

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS Buffalo	**METALS**					**METALS**					
			ARSENIC	5.9E-06	--	--	5.9E-06	ARSENIC	Skin	9.1E-02	--	--	9.1E-02
			MERCURY	--	--	--	NA	MERCURY	Central Nervous System	3.7E-01	--	--	3.7E-01
			PESTICIDES/PCBs					**PESTICIDES/PCBs**					
			GAMMA-CHLORDANE	8.1E-07	--	--	8.1E-07	GAMMA-CHLORDANE	Liver	3.2E-02	--	--	3.2E-02
			DIELDRIN	8.4E-06	--	--	8.4E-06	DIELDRIN	Liver	7.3E-02	--	--	7.3E-02
			4,4'-DDE	2.1E-06	--	--	2.1E-06	4,4'-DDE	NA	--	--	--	NA
			HEPTACHLOR EPOXIDE	1.7E-06	--	--	1.7E-06	HEPTACHLOR EPOXIDE	Liver	1.0E-01	--	--	1.0E-01
			AROCLOR-1254	2.1E-04	--	--	2.1E-04	AROCLOR-1254	Skin	3.7E+01	--	--	3.7E+01
			AROCLOR-1260	4.5E-04	--	--	4.5E-04	AROCLOR-1260	NA	--	--	--	NA
			(Total)	6.8E-04	---	---	6.8E-04	(Total)		3.7E+01	---	---	3.7E+01
						Total Risk Across Fish	**6.8E-04**					**Total Hazard Index Across Fish**	**3.7E+01**
						Total Risk Across All Media and All Exposure Routes	**7E-04**					**Total Hazard Index Across All Media and All Exposure Routes**	**37**

TABLE 9.18
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE CHILD RECREATIONAL USER - BUFFALO FISH TISSUE RESULTS

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS Buffalo	**METALS**					**METALS**					
			ARSENIC	3.5E-06	--	--	3.5E-06	ARSENIC	Skin	1.8E-01	--	--	1.8E-01
			MERCURY	--	--	--	NA	MERCURY	Central Nervous System	7.4E-01	--	--	7.4E-01
			PESTICIDES/PCBs					**PESTICIDES/PCBs**					
			GAMMA-CHLORDANE	4.8E-07	--	--	4.8E-07	GAMMA-CHLORDANE	Liver	6.4E-02	--	--	6.4E-02
			DIELDRIN	5.0E-06	--	--	5.0E-06	DIELDRIN	Liver	1.5E-01	--	--	1.5E-01
			4,4'-DDE	1.2E-06	--	--	1.2E-06	4,4'-DDE	NA	--	--	--	NA
			HEPTACHLOR EPOXIDE	1.0E-06	--	--	1.0E-06	HEPTACHLOR EPOXIDE	Liver	2.0E-01	--	--	2.0E-01
			AROCLOR-1254	1.3E-04	--	--	1.3E-04	AROCLOR-1254	Skin	7.4E+01	--	--	7.4E+01
			AROCLOR-1260	2.7E-04	--	--	2.7E-04	AROCLOR-1260	NA	--	--	--	NA
			(Total)	4.1E-04	---	---	4.1E-04		(Total)	7.5E+01	---	---	7.5E+01
						Total Risk Across Fish	**4.1E-04**					**Total Hazard Index Across Fish**	**7.5E+01**
						Total Risk Across All Media and All Exposure Routes	**4E-04**					**Total Hazard Index Across All Media and All Exposure Routes**	**75**

TABLE 9.19
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT RECREATIONAL USER - CARP FISH TISSUE RESULTS

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS Carp	**METALS**					**METALS**					
			ARSENIC	3.7E-05	--	--	3.7E-05	ARSENIC	Skin	2.2E-01	--	--	2.2E-01
			COBALT	--	--	--	NA	COBALT	Thyroid	7.0E-02	--	--	7.0E-02
			MERCURY	--	--	--	NA	MERCURY	Central Nervous System	5.6E-01	--	--	5.6E-01
			PESTICIDES/PCBs					**PESTICIDES/PCBs**					
			ALDRIN	8.1E-06	--	--	8.1E-06	ALDRIN	Liver	4.3E-02	--	--	4.3E-02
			GAMMA-CHLORDANE	6.9E-07	--	--	6.9E-07	GAMMA-CHLORDANE	Liver	1.1E-02	--	--	1.1E-02
			DIELDRIN	1.6E-05	--	--	1.6E-05	DIELDRIN	Liver	5.5E-02	--	--	5.5E-02
			4,4'-DDE	3.3E-06	--	--	3.3E-06	4,4'-DDE	NA	--	--	--	NA
			4,4'-DDT	5.4E-06	--	--	5.4E-06	4,4'-DDT	Liver	8.5E-02	--	--	8.5E-02
			ENDRIN	--	--	--	NA	ENDRIN	Liver	1.1E-01	--	--	1.1E-01
			HEPTACHLOR EPOXIDE	3.7E-06	--	--	3.7E-06	HEPTACHLOR EPOXIDE	Liver	8.3E-02	--	--	8.3E-02
			AROCLOR-1254	3.6E-05	--	--	3.6E-05	AROCLOR-1254	Skin	2.4E+00	--	--	2.4E+00
			AROCLOR-1260	5.4E-05	--	--	5.4E-05	AROCLOR-1260	NA	--	--	--	NA
			(Total)	1.6E-04	---	---	1.6E-04		(Total)	3.7E+00	---	---	3.7E+00
						Total Risk Across Fish	**1.6E-04**					**Total Hazard Index Across Fish**	**3.7E+00**
						Total Risk Across All Media and All Exposure Routes	**2E-04**					**Total Hazard Index Across All Media and All Exposure Routes**	**4**

TABLE 9.20
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADOLESCENT RECREATIONAL USER - CARP FISH TISSUE RESULTS

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS Carp	**METALS**					**METALS**					
			ARSENIC	1.9E-05	--	--	1.9E-05	ARSENIC	Skin	2.9E-01	--	--	2.9E-01
			COBALT	--	--	--	NA	COBALT	Thyroid	9.3E-02	--	--	9.3E-02
			MERCURY	--	--	--	NA	MERCURY	Central Nervous System	7.4E-01	--	--	7.4E-01
			PESTICIDES/PCBs					**PESTICIDES/PCBs**					
			ALDRIN	4.1E-06	--	--	4.1E-06	ALDRIN	Liver	5.7E-02	--	--	5.7E-02
			GAMMA-CHLORDANE	3.5E-07	--	--	3.5E-07	GAMMA-CHLORDANE	Liver	1.4E-02	--	--	1.4E-02
			DIELDRIN	8.4E-06	--	--	8.4E-06	DIELDRIN	Liver	7.3E-02	--	--	7.3E-02
			4,4'-DDE	1.7E-06	--	--	1.7E-06	4,4'-DDE	NA	--	--	--	NA
			4,4'-DDT	2.8E-06	--	--	2.8E-06	4,4'-DDT	Liver	1.1E-01	--	--	1.1E-01
			ENDRIN	--	--	--	NA	ENDRIN	Liver	1.5E-01	--	--	1.5E-01
			HEPTACHLOR EPOXIDE	1.9E-06	--	--	1.9E-06	HEPTACHLOR EPOXIDE	Liver	1.1E-01	--	--	1.1E-01
			AROCLOR-1254	1.8E-05	--	--	1.8E-05	AROCLOR-1254	Skin	3.2E+00	--	--	3.2E+00
			AROCLOR-1260	2.7E-05	--	--	2.7E-05	AROCLOR-1260	NA	--	--	--	NA
			(Total)	8.3E-05	---	---	8.3E-05		(Total)	4.8E+00	---	---	4.8E+00
						Total Risk Across Fish	**8.3E-05**					**Total Hazard Index Across Fish**	**4.8E+00**
						Total Risk Across All Media and All Exposure Routes	**8E-05**					**Total Hazard Index Across All Media and All Exposure Routes**	**5**

TABLE 9.21
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE CHILD RECREATIONAL USER - CARP FISH TISSUE RESULTS

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS Carp	**METALS**					**METALS**					
			ARSENIC	1.1E-05	--	--	1.1E-05	ARSENIC	Skin	5.8E-01	--	--	5.8E-01
			COBALT	--	--	--	NA	COBALT	Thyroid	1.9E-01	--	--	1.9E-01
			MERCURY	--	--	--	NA	MERCURY	Central Nervous System	1.5E+00	--	--	1.5E+00
			PESTICIDES/PCBs					**PESTICIDES/PCBs**					
			ALDRIN	2.5E-06	--	--	2.5E-06	ALDRIN	Liver	1.1E-01	--	--	1.1E-01
			GAMMA-CHLORDANE	2.1E-07	--	--	2.1E-07	GAMMA-CHLORDANE	Liver	2.8E-02	--	--	2.8E-02
			DIELDRIN	5.0E-06	--	--	5.0E-06	DIELDRIN	Liver	1.5E-01	--	--	1.5E-01
			4,4'-DDE	1.0E-06	--	--	1.0E-06	4,4'-DDE	NA	--	--	--	NA
			4,4'-DDT	1.7E-06	--	--	1.7E-06	4,4'-DDT	Liver	2.3E-01	--	--	2.3E-01
			ENDRIN	--	--	--	NA	ENDRIN	Liver	2.9E-01	--	--	2.9E-01
			HEPTACHLOR EPOXIDE	1.1E-06	--	--	1.1E-06	HEPTACHLOR EPOXIDE	Liver	2.2E-01	--	--	2.2E-01
			AROCLOR-1254	1.1E-05	--	--	1.1E-05	AROCLOR-1254	Skin	6.4E+00	--	--	6.4E+00
			AROCLOR-1260	1.6E-05	--	--	1.6E-05	AROCLOR-1260	NA	--	--	--	NA
			(Total)	5.0E-05	---	---	5.0E-05		(Total)	9.7E+00	---	---	9.7E+00
						Total Risk Across Fish	**5.0E-05**					**Total Hazard Index Across Fish**	**9.7E+00**
						Total Risk Across All Media and All Exposure Routes	**5E-05**					**Total Hazard Index Across All Media and All Exposure Routes**	**10**

TABLE 9.22
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT RECREATIONAL USER - GAR FISH TISSUE RESULTS

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS	**METALS**					**METALS**					
		Gar	COBALT	--	--	--	NA	COBALT	Thyroid	6.0E-02	--	--	6.0E-02
			MERCURY	--	--	--	NA	MERCURY	Central Nervous System	7.2E-01	--	--	7.2E-01
			PESTICIDES/PCBs					**PESTICIDES/PCBs**					
			4,4'-DDE	9.1E-07	--	--	9.1E-07	4,4'-DDE	NA	--	--	--	NA
			AROCLOR-1254	1.1E-04	--	--	1.1E-04	AROCLOR-1254	Skin	7.3E+00	--	--	7.3E+00
			AROCLOR-1260	1.6E-04	--	--	1.6E-04	AROCLOR-1260	NA	--	--	--	NA
			(Total)	2.7E-04	---	---	2.7E-04		(Total)	8.1E+00	---	---	8.1E+00
						Total Risk Across Fish	**2.7E-04**					**Total Hazard Index Across Fish**	**8.1E+00**
						Total Risk Across All Media and All Exposure Routes	**3E-04**					**Total Hazard Index Across All Media and All Exposure Routes**	**8**

TABLE 9.23
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADOLESCENT RECREATIONAL USER - GAR FISH TISSUE RESULTS

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS	**METALS**					**METALS**					
		Gar	COBALT	--	--	--	NA	COBALT	Thyroid	8.0E-02	--	--	8.0E-02
			MERCURY	--	--	--	NA	MERCURY	Central Nervous System	9.6E-01	--	--	9.6E-01
			PESTICIDES/PCBs					**PESTICIDES/PCBs**					
			4,4'-DDE	4.7E-07	--	--	4.7E-07	4,4'-DDE	NA	--	--	--	NA
			AROCLOR-1254	5.5E-05	--	--	5.5E-05	AROCLOR-1254	Skin	9.7E+00	--	--	9.7E+00
			AROCLOR-1260	8.2E-05	--	--	8.2E-05	AROCLOR-1260	NA	--	--	--	NA
			(Total)	1.4E-04	---	---	1.4E-04		(Total)	1.1E+01	---	---	1.1E+01
						Total Risk Across Fish	**1.4E-04**					**Total Hazard Index Across Fish**	**1.1E+01**
						Total Risk Across All Media and All Exposure Routes	**1E-04**					**Total Hazard Index Across All Media and All Exposure Routes**	**11**

TABLE 9.24
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE CHILD RECREATIONAL USER - GAR FISH TISSUE RESULTS

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS	**METALS**					**METALS**					
		Gar	COBALT	--	--	--	NA	COBALT	Thyroid	1.6E-01	--	--	1.6E-01
			MERCURY	--	--	--	NA	MERCURY	Central Nervous System	1.9E+00	--	--	1.9E+00
			PESTICIDES/PCBs					**PESTICIDES/PCBs**					
			4,4'-DDE	2.8E-07	--	--	2.8E-07	4,4'-DDE	NA	--	--	--	NA
			AROCLOR-1254	3.3E-05	--	--	3.3E-05	AROCLOR-1254	Skin	1.9E+01	--	--	1.9E+01
			AROCLOR-1260	4.9E-05	--	--	4.9E-05	AROCLOR-1260	NA	--	--	--	NA
			(Total)	8.2E-05	---	---	8.2E-05		(Total)	2.1E+01	---	---	2.1E+01
						Total Risk Across Fish	**8.2E-05**					**Total Hazard Index Across Fish**	**2.1E+01**
						Total Risk Across All Media and All Exposure Routes	**8E-05**					**Total Hazard Index Across All Media and All Exposure Routes**	**21**

TABLE 9.25
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT RECREATIONAL USER - CATFISH TISSUE RESULTS

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS Catfish	**METALS**					**METALS**					
			MERCURY	--	--	--	NA	MERCURY	Central Nervous System	4.9E-01	--	--	4.9E-01
			PESTICIDES/PCBs					**PESTICIDES/PCBs**					
			ALPHA-BHC	5.5E-06	--	--	5.5E-06	ALPHA-BHC	Liver	2.9E-04	--	--	2.9E-04
			DELTA-BHC	1.1E-06	--	--	1.1E-06	DELTA-BHC	NA	--	--	--	NA
			GAMMA-BHC (LINDANE)	6.7E-07	--	--	6.7E-07	GAMMA-BHC (LINDANE)	Liver and Kidney	5.5E-03	--	--	5.5E-03
			DIELDRIN	1.6E-05	--	--	1.6E-05	DIELDRIN	Liver	5.5E-02	--	--	5.5E-02
			4,4'-DDE	4.0E-06	--	--	4.0E-06	4,4'-DDE	NA	--	--	--	NA
			HEPTACHLOR EPOXIDE	8.2E-07	--	--	8.2E-07	HEPTACHLOR EPOXIDE	Liver	1.9E-02	--	--	1.9E-02
			AROCLOR-1254	8.4E-05	--	--	8.4E-05	AROCLOR-1254	Skin	5.7E+00	--	--	5.7E+00
			AROCLOR-1260	3.7E-05	--	--	3.7E-05	AROCLOR-1260	NA	--	--	--	NA
			(Total)	1.5E-04	---	---	1.5E-04		(Total)	6.2E+00	---	---	6.2E+00
						Total Risk Across Fish	**1.5E-04**					**Total Hazard Index Across Fish**	**6.2E+00**
						Total Risk Across All Media and All Exposure Routes	**1E-04**					**Total Hazard Index Across All Media and All Exposure Routes**	**6**

TABLE 9.26
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADOLESCENT RECREATIONAL USER - CATFISH TISSUE RESULTS

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS Catfish	**METALS**					**METALS**					
			MERCURY	--	--	--	NA	MERCURY	Central Nervous System	6.5E-01	--	--	6.5E-01
			PESTICIDES/PCBs					**PESTICIDES/PCBs**					
			ALPHA-BHC	2.8E-06	--	--	2.8E-06	ALPHA-BHC	Liver	3.9E-04	--	--	3.9E-04
			DELTA-BHC	5.5E-07	--	--	5.5E-07	DELTA-BHC	NA	--	--	--	NA
			GAMMA-BHC (LINDANE)	3.4E-07	--	--	3.4E-07	GAMMA-BHC (LINDANE)	Liver and Kidney	7.3E-03	--	--	7.3E-03
			DIELDRIN	8.4E-06	--	--	8.4E-06	DIELDRIN	Liver	7.3E-02	--	--	7.3E-02
			4,4'-DDE	2.1E-06	--	--	2.1E-06	4,4'-DDE	NA	--	--	--	NA
			HEPTACHLOR EPOXIDE	4.2E-07	--	--	4.2E-07	HEPTACHLOR EPOXIDE	Liver	2.5E-02	--	--	2.5E-02
			AROCLOR-1254	4.3E-05	--	--	4.3E-05	AROCLOR-1254	Skin	7.5E+00	--	--	7.5E+00
			AROCLOR-1260	1.9E-05	--	--	1.9E-05	AROCLOR-1260	NA	--	--	--	NA
			(Total)	7.6E-05	---	---	7.6E-05		(Total)	8.3E+00	---	---	8.3E+00
						Total Risk Across Fish	**7.6E-05**					**Total Hazard Index Across Fish**	**8.3E+00**
						Total Risk Across All Media and All Exposure Routes	**8E-05**					**Total Hazard Index Across All Media and All Exposure Routes**	**8**

TABLE 9.27
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE CHILD RECREATIONAL USER - CATFISH TISSUE RESULTS

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS Catfish	**METALS**					**METALS**					
			MERCURY	--	--	--	NA	MERCURY	Central Nervous System	1.3E+00	--	--	1.3E+00
			PESTICIDES/PCBs					**PESTICIDES/PCBs**					
			ALPHA-BHC	1.7E-06	--	--	1.7E-06	ALPHA-BHC	Liver	7.7E-04	--	--	7.7E-04
			DELTA-BHC	3.3E-07	--	--	3.3E-07	DELTA-BHC	NA	--	--	--	NA
			GAMMA-BHC (LINDANE)	2.1E-07	--	--	2.1E-07	GAMMA-BHC (LINDANE)	Liver and Kidney	1.5E-02	--	--	1.5E-02
			DIELDRIN	5.0E-06	--	--	5.0E-06	DIELDRIN	Liver	1.5E-01	--	--	1.5E-01
			4,4'-DDE	1.2E-06	--	--	1.2E-06	4,4'-DDE	NA	--	--	--	NA
			HEPTACHLOR EPOXIDE	2.5E-07	--	--	2.5E-07	HEPTACHLOR EPOXIDE	Liver	5.0E-02	--	--	5.0E-02
			AROCLOR-1254	2.6E-05	--	--	2.6E-05	AROCLOR-1254	Skin	1.5E+01	--	--	1.5E+01
			AROCLOR-1260	1.1E-05	--	--	1.1E-05	AROCLOR-1260	NA	--	--	--	NA
			(Total)	4.6E-05	---	---	4.6E-05		(Total)	1.7E+01	---	---	1.7E+01
						Total Risk Across Fish	**4.6E-05**					**Total Hazard Index Across Fish**	**1.7E+01**
						Total Risk Across All Media and All Exposure Routes	**5E-05**					**Total Hazard Index Across All Media and All Exposure Routes**	**17**

TABLE 9.28
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT RECREATIONAL USER - LARGE MOUTH BASS FISH TISSUE RESULTS

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS	**METALS**					**METALS**					
		Largemouth Bass	MERCURY	--	--	--	NA	MERCURY	Central Nervous System	2.4E+00	--	--	2.4E+00
			PESTICIDES/PCBs					**PESTICIDES/PCBs**					
			ALDRIN	4.4E-06	--	--	4.4E-06	ALDRIN	Liver	2.3E-02	--	--	2.3E-02
			DIELDRIN	5.7E-06	--	--	5.7E-06	DIELDRIN	Liver	1.9E-02	--	--	1.9E-02
			4,4'-DDE	3.6E-06	--	--	3.6E-06	4,4'-DDE	NA	--	--	--	NA
			HEPTACHLOR EPOXIDE	8.9E-07	--	--	8.9E-07	HEPTACHLOR EPOXIDE	Liver	2.0E-02	--	--	2.0E-02
			AROCLOR-1254	1.3E-05	--	--	1.3E-05	AROCLOR-1254	Skin	8.7E-01	--	--	8.7E-01
			(Total)	2.7E-05	---	---	2.7E-05		(Total)	3.4E+00	---	---	3.4E+00
						Total Risk Across Fish	**2.7E-05**					**Total Hazard Index Across Fish**	**3.4E+00**
						Total Risk Across All Media and All Exposure Routes	**3E-05**					**Total Hazard Index Across All Media and All Exposure Routes**	**3**

TABLE 9.29
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADOLESCENT RECREATIONAL USER - LARGE MOUTH BASS FISH TISSUE RESULTS

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS Largemouth Bass	**METALS**					**METALS**					
			MERCURY	--	--	--	NA	MERCURY	Central Nervous System	3.2E+00	--	--	3.2E+00
			PESTICIDES/PCBs					**PESTICIDES/PCBs**					
			ALDRIN	2.2E-06	--	--	2.2E-06	ALDRIN	Liver	3.0E-02	--	--	3.0E-02
			DIELDRIN	2.9E-06	--	--	2.9E-06	DIELDRIN	Liver	2.5E-02	--	--	2.5E-02
			4,4'-DDE	1.8E-06	--	--	1.8E-06	4,4'-DDE	NA	--	--	--	NA
			HEPTACHLOR EPOXIDE	4.5E-07	--	--	4.5E-07	HEPTACHLOR EPOXIDE	Liver	2.7E-02	--	--	2.7E-02
			AROCLOR-1254	6.6E-06	--	--	6.6E-06	AROCLOR-1254	Skin	1.2E+00	--	--	1.2E+00
			(Total)	1.4E-05	---	---	1.4E-05		(Total)	4.5E+00	---	---	4.5E+00
						Total Risk Across Fish	**1.4E-05**					**Total Hazard Index Across Fish**	**4.5E+00**
						Total Risk Across All Media and All Exposure Routes	**1E-05**					**Total Hazard Index Across All Media and All Exposure Routes**	**4**

TABLE 9.30
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE CHILD RECREATIONAL USER - LARGE MOUTH BASS FISH TISSUE RESULTS

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish	DRCS Largemouth Bass	**METALS**					**METALS**					
			MERCURY	--	--	--	NA	MERCURY	Central Nervous System	6.4E+00	--	--	6.4E+00
			PESTICIDES/PCBs					**PESTICIDES/PCBs**					
			ALDRIN	1.3E-06	--	--	1.3E-06	ALDRIN	Liver	6.1E-02	--	--	6.1E-02
			DIELDRIN	1.7E-06	--	--	1.7E-06	DIELDRIN	Liver	5.1E-02	--	--	5.1E-02
			4,4'-DDE	1.1E-06	--	--	1.1E-06	4,4'-DDE	NA	--	--	--	NA
			HEPTACHLOR EPOXIDE	2.7E-07	--	--	2.7E-07	HEPTACHLOR EPOXIDE	Liver	5.4E-02	--	--	5.4E-02
			AROCLOR-1254	4.0E-06	--	--	4.0E-06	AROCLOR-1254	Skin	2.3E+00	--	--	2.3E+00
			(Total)	8.4E-06	---	---	8.4E-06		(Total)	8.9E+00	---	---	8.9E+00
						Total Risk Across Fish	**8.4E-06**					**Total Hazard Index Across Fish**	**8.9E+00**
						Total Risk Across All Media and All Exposure Routes	**8E-06**					**Total Hazard Index Across All Media and All Exposure Routes**	**9**

TABLE 9.31
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT RECREATIONAL USER - TOTAL PCB CALCULATIONS/FISH TISSUE

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish All Results	DRCS	**PCBs**					**PCBs**					
			TOTAL PCBs	7.2E-03	--	--	7.2E-03	TOTAL PCBs	NA	--	--	--	NA
			(Total)	7.2E-03	---	---	7.2E-03		(Total)	---	---	---	---
			Total Risk Across Fish				**7.2E-03**		**Total Hazard Index Across Fish**				**---**
			Total Risk Across All Media and All Exposure Routes				**7E-03**		**Total Hazard Index Across All Media and All Exposure Routes**				**---**

TABLE 9.32
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADOLESCENT RECREATIONAL USER - TOTAL PCB CALCULATIONS/FISH TISSUE

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current Receptor Population: Recreational User Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish All Results	DRCS	**PCBs**					**PCBs**					
			TOTAL PCBs	3.7E-03	--	--	3.7E-03	TOTAL PCBs	NA	--	--	--	NA
			(Total)	3.7E-03	---	---	3.7E-03		(Total)	---	---	---	---
						Total Risk Across Fish	**3.7E-03**					**Total Hazard Index Across Fish**	**---**
						Total Risk Across All Media and All Exposure Routes	**4E-03**					**Total Hazard Index Across All Media and All Exposure Routes**	**---**

TABLE 9.33
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE CHILD RECREATIONAL USER - TOTAL PCB CALCULATIONS/FISH TISSUE

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current Receptor Population: Recreational User Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish All Results	DRCS	**PCBs**					**PCBs**					
			TOTAL PCBs	2.2E-03	--	--	2.2E-03	TOTAL PCBs	NA	--	--	--	NA
			(Total)	2.2E-03	---	---	2.2E-03	(Total)		---	---	---	---
						Total Risk Across Fish	**2.2E-03**					**Total Hazard Index Across Fish**	**---**
						Total Risk Across All Media and All Exposure Routes	**2E-03**					**Total Hazard Index Across All Media and All Exposure Routes**	**---**

TABLE 9.34
SUMMARY OF RECEPTOR RISKS AND HAZARDS FOR CHEMICALS OF POTENTIAL CONCERN
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT SUBSISTENCE FISHER - TOTAL PCB CALCULATIONS/FISH TISSUE

Location: Donna Reservoir and Canal System
Scenario Timeframe: Current Receptor Population: Subsistence Fisher Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk				Chemical	Non-Carcinogenic Hazard Quotient				
				Ingestion	Dermal	Inhalation	Exposure Routes Total		Primary Target Organ	Ingestion	Dermal	Inhalation	Exposure Routes Total
Surface Water	Fish All Results	DRCS	**PCBs**					**PCBs**					
			TOTAL PCBs	3.1E-02	--	--	3.1E-02	TOTAL PCBs	NA	--	--	--	NA
			(Total)	3.1E-02	---	---	3.1E-02		(Total)	---	---	---	---
						Total Risk Across Fish	**3.1E-02**					**Total Hazard Index Across Fish**	**---**
						Total Risk Across All Media and All Exposure Routes	**3E-02**					**Total Hazard Index Across All Media and All Exposure Routes**	**---**

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TABLE 10.1
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT RECREATIONAL USER - TOTAL PCB CALCULATIONS WITH DIOXINS

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Fish	Fish All Results	Ingestion	**DIOXIN**												
				DIOXIN (TEQ)	1.16E-04	(mg/kg)	1.42E-08	(mg/kg-day)	1.30E+05	per (mg/kg-day)	1.8E-03	3.82E-08	(mg/kg-day)	7.00E-10	(mg/kg-day)	5.5E+01
				PCBs												
				TOTAL PCBs	2.57E+01	(mg/kg)	3.13E-03	(mg/kg-day)	2.00E+00	per (mg/kg-day)	6.3E-03	8.44E-03	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**8.1E-03**					**5.5E+01**
		Exposure Point Total									**8.1E-03**					**5.5E+01**
	Exposure Medium Total										**8.1E-03**					**5.5E+01**
Fish Total											**8.1E-03**					**5.5E+01**
										Total of Receptor Risks Across All Media	**8E-03**				Total of Receptor Hazards Across All Media	**55**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

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TABLE 10.2
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADOLESCENT RECRATIONAL USER - TOTAL PCB CALCULATIONS WITH DIOXINS

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Adolescent

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC Value	EPC Units	Cancer Risk Calculations: Intake Value	Intake Units	CSF Value	CSF Units	Cancer Risk	Non-Cancer Hazard Calculations: Intake Value	Intake Units	RfD Value	RfD Units	Hazard Quotient
Surface Water	DRCS	Fish All Results	Ingestion	**DIOXIN**												
				DIOXIN (TEQ)	1.16E-04	(mg/kg)	7.23E-09	(mg/kg-day)	1.30E+05	per (mg/kg-day)	9.4E-04	5.06E-08	(mg/kg-day)	7.00E-10	(mg/kg-day)	7.2E+01
				PCBs												
				TOTAL PCBs	2.57E+01	(mg/kg)	1.60E-03	(mg/kg-day)	2.00E+00	per (mg/kg-day)	3.2E-03	1.12E-02	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**4.1E-03**					**7.2E+01**
		Exposure Point Total									**4.1E-03**					**7.2E+01**
	Exposure Medium Total										**4.1E-03**					**7.2E+01**
Fish Total											**4.1E-03**					**7.2E+01**
										Total of Receptor Risks Across All Media	**4E-03**				Total of Receptor Hazards Across All Media	**72**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 10.3
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE CHILD RECREATIONAL USER - TOTAL PCB CALCULATIONS WITH DIOXIN

Scenario Timeframe: Current
Receptor Population: Recreational User
Receptor Age: Child

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Fish	Fish All Results	Ingestion	**DIOXIN**												
				DIOXIN (TEQ)	1.16E-04	(mg/kg)	4.34E-09	(mg/kg-day)	1.30E+05	per (mg/kg-day)	5.6E-04	7.59E-08	(mg/kg-day)	7.00E-10	(mg/kg-day)	1.1E+02
				PCBs												
				TOTAL PCBs	2.57E+01	(mg/kg)	9.58E-04	(mg/kg-day)	2.00E+00	per (mg/kg-day)	1.9E-03	1.68E-02	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**2.5E-03**					**1.1E+02**
		Exposure Point Total									**2.5E-03**					**1.1E+02**
	Exposure Medium Total										**2.5E-03**					**1.1E+02**
Surface Water Total											**2.5E-03**					**1.1E+02**
										Total of Receptor Risks Across All Media	**2E-03**				Total of Receptor Hazards Across All Media	**108**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

TABLE 10.4
CALCULATION OF CHEMICAL CANCER RISKS AND NON-CANCER HAZARDS
REASONABLE MAXIMUM EXPOSURE - CURRENT/FUTURE ADULT SUBSISTENCE FISHER - TOTAL PCB CALCULATIONS WITH DIOXIN

Scenario Timeframe: Current
Receptor Population: Subsistence Fisher
Receptor Age: Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Non-Cancer Hazard Calculations				
					Value	Units	Intake		CSF		Cancer Risk	Intake		RfD		Hazard Quotient
							Value	Units	Value	Units		Value	Units	Value	Units	
Surface Water	Fish	Fish All Results	Ingestion	**DIOXIN**												
				DIOXIN (TEQ)	1.16E-04	(mg/kg)	6.06E-08	(mg/kg-day)	1.30E+05	per (mg/kg-day)	7.9E-03	2.12E-07	(mg/kg-day)	7.00E-10	(mg/kg-day)	3.0E+02
				PCBs												
				TOTAL PCBs	2.57E+01	(mg/kg)	1.34E-02	(mg/kg-day)	2.00E+00	per (mg/kg-day)	2.7E-02	4.68E-02	(mg/kg-day)	NA	(mg/kg-day)	--
			Exp. Route Total								**3.5E-02**					**3.0E+02**
		Exposure Point Total									**3.5E-02**					**3.0E+02**
	Exposure Medium Total										**3.5E-02**					**3.0E+02**
Fish Total											**3.5E-02**					**3.0E+02**
										Total of Receptor Risks Across All Media	**3E-02**				Total of Receptor Hazards Across All Media	**303**

Note:

EPC = Exposure Point Concentration
CSF = Cancer Slope Factor
RfD = Reference Dose
RfC = Reference Concentration

ATTACHMENT 1

SAMPLES EVALUATED IN THE HUMAN HEALTH RISK ASSESSMENT

Attachment 1
Samples Used in the Human Health Risk Assessment

Media	Sample Name	Sample Date
Exposure Area 1: Upstream and Adjacent to the Siphon (RGR, MC, ACT1, ACR)		
Sediment	ACR-101-SE-0-6	9/26/2012
Sediment	ACR-102-SE-0-6	9/26/2012
Sediment	ACR-103-SE-0-6	9/26/2012
Sediment	ACR-103-SE-6-12	9/26/2012
Sediment	ACR-104-SE-0-6	9/26/2012
Sediment	ACR-104-SE-6-12	9/26/2012
Sediment	ACR-105-SE-0-6	9/26/2012
Sediment	ACR-106-SE-0-6	9/26/2012
Sediment	ACR-107-SE-0-6	9/26/2012
Sediment	ACR-108-SE-0-6	9/27/2012
Sediment	ACR-109-SE-0-6	12/10/2012
Sediment	ACR-110-SE-0-6	12/10/2012
Sediment	ACR-111-SE-0-6	12/10/2012
Sediment	ACR-112-SE-0-6	12/10/2012
Sediment	ACR-117-SE-0-6	2/21/2013
Sediment	ACR-118-SE-0-6	2/21/2013
Sediment	ACR-119-SE-0-6	2/21/2013
Sediment	ACR-120-SE-0-6	2/21/2013
Sediment	ACT-102-SE-0-6	9/27/2012
Sediment	ACT-103-SE-0-6	9/27/2012
Sediment	ACT-104-SE-0-6	9/27/2012
Sediment	ACT-105-SE-0-6	9/27/2012
Sediment	MC-101-SE-0-6	11/4/2014
Sediment	MC-102-SE-0-6	11/3/2014
Sediment	MC-103-SE-0-6	11/3/2014
Sediment	MC-104-SE-0-6	11/4/2014
Sediment	MC-105-SE-0-6	11/4/2014
Sediment	MC-106-SE-0-6	11/4/2014
Sediment	MC-106-SE-6-12	9/25/2012
Sediment	MC-107-SE-0-6	11/3/2014
Sediment	MC-108-SE-0-6	9/24/2012
Sediment	MC-108-SE-14-24	11/3/2014
Sediment	MC-108-SE-6-14	11/3/2014
Sediment	MC-109-SE-0-6	11/3/2014
Sediment	MC-110-SE-0-6	11/4/2014
Sediment	MC-112-SE-0-2	2/26/2014
Sediment	MC-113-SE-0-1	2/26/2014
Sediment	MC-114-SE-0-5	2/26/2014
Sediment	MC-116-SE-0-1	2/26/2014
Sediment	MC-116-SE-1-5	2/26/2014
Sediment	MC-117-SE-0-5	2/26/2014
Sediment	MC-117-SE-5-7	2/26/2014

Attachment 1
Samples Used in the Human Health Risk Assessment

Media	Sample Name	Sample Date
Sediment	MC-118-SE-0-3	2/26/2014
Sediment	RGR-101-SE-0-6	9/26/2012
Surface Water	DCSW-SG1-01	--
Surface Water	DCSW-SG1-02	--
Surface Water	ACR-101-SW	11/1/2014
Surface Water	ACR-101-SWF	9/24/2012
Surface Water	ACR-102-SW	9/25/2012
Surface Water	ACR-102-SWF	9/25/2012
Surface Water	ACR-125-SW	4/1/2014
Surface Water	ACR-126-SW	4/1/2014
Surface Water	ACT-101-SW	9/25/2012
Surface Water	ACT-101-SWF	9/25/2012
Surface Water	ACT-102-SW	9/26/2012
Surface Water	ACT-102-SWF	9/26/2012
Surface Water	ACT-103-SW	9/26/2012
Surface Water	ACT-103-SWF	9/26/2012
Surface Water	ACT-104-SW	9/26/2012
Surface Water	ACT-104-SWF	9/26/2012
Surface Water	ACT-105-SW	9/26/2012
Surface Water	ACT-105-SWF	9/26/2012
Surface Water	MC-101-SW	11/3/2014
Surface Water	MC-101-SWF	9/17/2012
Surface Water	MC-102-SW	11/1/2014
Surface Water	MC-102-SWF	9/19/2012
Surface Water	MC-103-SW	11/3/2014
Surface Water	MC-103-SWF	9/21/2012
Surface Water	MC-112-SW	2/24/2014
Surface Water	MC-113-SW	2/24/2014
Surface Water	MC-114-SW	2/24/2014
Surface Water	MC-115-SW	2/24/2014
Surface Water	MC-119-SW	4/1/2014
Surface Water	RGR-101-SW	9/26/2012
Surface Water	RGR-101-SWF	9/26/2012
Surface Water	WEIR-101-SW	4/1/2014
Exposure Area 2: The Siphon and Downstream (LWMCU, LWMCL, LEMC)		
Sediment	LEMC-101-SE-0-6	9/22/2012
Sediment	LEMC-102-SE-0-6	10/30/2014
Sediment	LEMC-103-SE-0-6	11/1/2014
Sediment	LEMC-104-SE-0-6	9/22/2012
Sediment	LEMC-105-SE-0-6	10/30/2014
Sediment	LEMC-106-SE-0-6	10/30/2014
Sediment	LEMC-107-SE-0-6	9/22/2012
Sediment	LEMC-108-SE-0-6	9/22/2012

Attachment 1
Samples Used in the Human Health Risk Assessment

Media	Sample Name	Sample Date
Sediment	LWMCU-101-SE-0-6	11/3/2014
Sediment	LWMCU-101-SE-6-12	9/22/2012
Sediment	LWMCU-102-SE-0-6	10/30/2014
Sediment	LWMCU-102-SE-6-12	10/30/2014
Sediment	LWMCU-103-SE-0-6	10/30/2014
Sediment	LWMCU-103-SE-6-12	10/30/2014
Sediment	LWMCU-104-SE-0-6	10/30/2014
Sediment	LWMCU-104-SE-6-12	10/30/2014
Sediment	LWMCU-105-SE-0-6	10/29/2014
Sediment	LWMCU-105-SE-6-12	10/29/2014
Sediment	LWMCU-106-SE-0-6	10/30/2014
Sediment	LWMCU-106-SE-12-20	10/30/2014
Sediment	LWMCU-106-SE-6-12	10/30/2014
Sediment	LWMCU-107-SE-0-6	10/30/2014
Sediment	LWMCU-108-SE-0-6	10/29/2014
Sediment	LWMCU-109-SE-0-6	10/29/2014
Sediment	LWMCU-110-SE-0-6	10/30/2014
Sediment	LWMCU-111-SE-0-6	10/30/2014
Sediment	LWMCU-112-SE-0-6	10/30/2014
Sediment	LWMCU-113-SE-0-6	10/30/2014
Sediment	LWMCU-114-SE-0-6	10/30/2014
Sediment	LWMCU-115-SE-0-6	11/3/2014
Sediment	LWMCU-117-SE-0-6	2/18/2013
Sediment	LWMCU-118-SE-0-6	2/18/2013
Sediment	LWMCU-119-SE-0-6	2/18/2013
Sediment	LWMCU-120-SE-0-6	2/18/2013
Sediment	LWMCU-121-SE-0-6	2/18/2013
Sediment	LWMCU-122-SE-0-6	2/18/2013
Sediment	LWMCU-123-SE-0-6	2/18/2013
Sediment	LWMCU-123-SE-6-12	2/18/2013
Sediment	LWMCU-124-SE-0-6	2/18/2013
Sediment	LWMCU-125-SE-0-6	2/18/2013
Sediment	LWMCU-126-SE-0-6	2/18/2013
Sediment	LWMCU-127-SE-0-6	2/18/2013
Sediment	LWMCU-128-SE-0-6	2/18/2013
Sediment	LWMCU-129-SE-0-6	2/19/2013
Sediment	LWMCU-130-SE-0-6	2/19/2013
Sediment	LWMCU-130-SE-6-12	2/19/2013
Sediment	LWMCU-131-SE-0-6	2/19/2013
Sediment	LWMCU-132-SE-0-6	2/19/2013
Sediment	LWMCU-133-SE-0-6	2/19/2013
Sediment	LWMCU-134-SE-0-6	2/19/2013
Sediment	LWMCU-135-SE-0-6	2/19/2013

Attachment 1
Samples Used in the Human Health Risk Assessment

Media	Sample Name	Sample Date
Sediment	LWMCU-135-SE-6-12	2/19/2013
Sediment	LWMCU-136-SE-0-6	2/19/2013
Sediment	LWMCU-137-SE-0-6	2/19/2013
Sediment	LWMCU-138-SE-0-6	2/19/2013
Sediment	LWMCU-139-SE-0-6	2/19/2013
Sediment	LWMCU-140-SE-0-6	2/19/2013
Sediment	LWMCU-141-SE-0-6	2/19/2013
Sediment	LWMCU-141-SE-6-12	2/19/2013
Sediment	LWMCU-142-SE-0-6	2/19/2013
Sediment	LWMCU-143-SE-0-6	2/20/2013
Sediment	LWMCU-144-SE-0-6	2/19/2013
Sediment	LWMCU-145-SE-0-6	2/20/2013
Sediment	LWMCU-146-SE-0-6	2/20/2013
Sediment	LWMCU-147-SE-0-6	2/20/2013
Sediment	LWMCU-148-SE-0-6	2/20/2013
Sediment	LWMCU-149-SE-0-6	7/15/2013
Sediment	LWMCU-149-SE-12-18	7/15/2013
Sediment	LWMCU-149-SE-6-12	7/15/2013
Sediment	LWMCU-150-SE-0-6	2/20/2013
Sediment	LWMCU-151-SE-0-6	2/18/2013
Sediment	LWMCU-153-SE-0-6	7/15/2013
Sediment	LWMCU-153-SE-12-18	7/15/2013
Sediment	LWMCU-153-SE-18-23	7/15/2013
Sediment	LWMCU-153-SE-6-12	7/15/2013
Sediment	LWMCU-154-SE-0-6	7/15/2013
Sediment	LWMCU-154-SE-12-18	7/15/2013
Sediment	LWMCU-154-SE-18-19	7/15/2013
Sediment	LWMCU-154-SE-6-12	7/15/2013
Sediment	LWMCU-155-SE-0-6	7/15/2013
Sediment	LWMCU-155-SE-12-18	7/15/2013
Sediment	LWMCU-155-SE-6-12	7/15/2013
Sediment	LWMCU-156-SE-0-6	7/15/2013
Sediment	LWMCU-156-SE-6-9	7/15/2013
Sediment	LWMCU-156-SE-9-11	7/15/2013
Sediment	LWMCU-157-SE-0-2	7/15/2013
Sediment	LWMCU-157-SE-2-6	7/15/2013
Sediment	LWMCU-158-SE-0-6	7/16/2013
Sediment	LWMCU-158-SE-12-15	7/16/2013
Sediment	LWMCU-158-SE-6-12	7/16/2013
Sediment	LWMCU-159-SE-0-3	7/16/2013
Sediment	LWMCU-159-SE-3-6	7/16/2013
Sediment	LWMCU-159-SE-6-7	7/16/2013
Sediment	LWMCU-160-SE-0-6	7/16/2013

Attachment 1
Samples Used in the Human Health Risk Assessment

Media	Sample Name	Sample Date
Sediment	LWMCU-160-SE-6-9	7/16/2013
Sediment	LWMCU-160-SE-9-10	7/16/2013
Sediment	LWMCU-167-SE-0-5	2/25/2014
Sediment	LWMCU-168-SE-0-3	2/25/2014
Sediment	LWMCU-170-SE-0-1	2/25/2014
Sediment	LWMCU-170-SE-1-1.5	2/25/2014
Sediment	LWMCU-171-SE-0-6	4/1/2014
Sediment	LWMCU-172-SE-0-6	4/1/2014
Surface Water	DCSW-SG2-01	--
Surface Water	DCSW-SG2-02	--
Surface Water	LEMC-101-SW	11/1/2014
Surface Water	LEMC-101-SWF	9/22/2012
Surface Water	LEMC-102-SW	10/30/2014
Surface Water	LEMC-102-SWF	9/22/2012
Surface Water	LWMCL-101-SW	10/28/2014
Surface Water	LWMCL-101-SWF	9/19/2012
Surface Water	LWMCL-102-SW	10/28/2014
Surface Water	LWMCL-102-SWF	9/19/2012
Surface Water	LWMCU-101-SW	11/1/2014
Surface Water	LWMCU-101-SWF	9/18/2012
Surface Water	LWMCU-102-SW	10/29/2014
Surface Water	LWMCU-102-SWF	9/20/2012
Surface Water	LWMCU-103-SW	10/29/2014
Surface Water	LWMCU-103-SWF	9/21/2012
Surface Water	LWMCU-104-SW	10/29/2014
Surface Water	LWMCU-104-SWF	9/22/2012
Surface Water	LWMCU-105-SW	10/29/2014
Surface Water	LWMCU-105-SWF	9/19/2012
Surface Water	LWMCU-167-SW	2/24/2014
Surface Water	LWMCU-168-SW	2/24/2014
Surface Water	LWMCU-169-SW	2/24/2014
Surface Water	NSIP-102-SW	2/24/2014
Surface Water	NSIP-103-SW	4/1/2014
Surface Water	SIP1150-101-SW	3/27/2014
Surface Water	SIP1350-101-SW	3/27/2014
Surface Water	SIP150-101-SW	3/26/2014
Surface Water	SIP1550-101-SW	3/31/2014
Surface Water	SIP350-101-SW	3/26/2014
Surface Water	SIP550-101-SW	3/26/2014
Surface Water	SIP750-101-SW	3/27/2014
Surface Water	SIP950-101-SW	3/27/2014
Surface Water	SSIP-101-SW	2/24/2014
Surface Water	SSIP-103-SW	3/24/2014

Attachment 1
Samples Used in the Human Health Risk Assessment

Media	Sample Name	Sample Date
	Exposure Area 3: The Reservoirs (RN3E, RN3W)	
Sediment	RN3E-101-SE-0-6	10/28/2014
Sediment	RN3E-102-SE-0-6	9/19/2012
Sediment	RN3E-103-SE-0-6	9/19/2012
Sediment	RN3E-104-SE-0-6	9/19/2012
Sediment	RN3E-105-SE-0-6	9/19/2012
Sediment	RN3W-101-SE-0-6	10/28/2014
Sediment	RN3W-101-SE-6-12	10/28/2014
Sediment	RN3W-102-SE-0-6	10/28/2014
Sediment	RN3W-102-SE-6-12	9/19/2012
Sediment	RN3W-103-SE-0-6	10/29/2014
Sediment	RN3W-103-SE-6-12	10/29/2014
Sediment	RN3W-104-SE-0-6	10/29/2014
Sediment	RN3W-105-SE-0-6	10/29/2014
Sediment	RN3W-106-SE-0-6	9/18/2012
Sediment	RN3W-107-SE-0-6	9/18/2012
Sediment	RN3W-108-SE-0-6	9/18/2012
Surface Water	DCSW-SG3-02	--
Surface Water	DCSW-SG3-04	--
Surface Water	DRSW-RSG1-01	--
Surface Water	DRSW-RSG1-02	--
Surface Water	DRSW-RSG1-03	--
Surface Water	DRSW-RSG2-01	--
Surface Water	RN3W-101-SW	10/28/2014
Surface Water	RN3W-101-SWF	9/17/2012
Surface Water	RN3W-102-SW	10/28/2014
Surface Water	RN3W-102-SWF	9/18/2012
Surface Water	RN3W-103-SW	10/29/2014
Surface Water	RN3W-103-SWF	9/18/2012
Surface Water	RN3W-104-SW	10/29/2014
Surface Water	RN3W-104-SWF	9/17/2012
Surface Water	RN3W-105-SW	10/29/2014
Surface Water	RN3W-105-SWF	9/17/2012
	Exposure Area 4: Downstream of the Reservoirs (COMC)	
Sediment	COMC-101-SE-0-6	10/28/2014
Sediment	COMC-103-SE-0-6	10/28/2014
Sediment	COMC-104-SE-0-6	10/28/2014
Sediment	COMC-105-SE-0-6	10/28/2014
Sediment	COMC-106-SE-0-6	9/17/2012
Sediment	COMC-107-SE-0-6	9/17/2012
Sediment	COMC-108-SE-0-6	9/18/2012
Sediment	COMC-109-SE-0-6	10/28/2014

Attachment 1
Samples Used in the Human Health Risk Assessment

Media	Sample Name	Sample Date
Surface Water	COMC-101-SW	10/28/2014
Surface Water	COMC-101-SWF	9/18/2012
Surface Water	COMC-102-SW	10/28/2014
Surface Water	COMC-102-SWF	9/16/2012
Soil Groupings		
Soil	ACR-101-SO-6-12	10/30/2014
Soil	ACR-102-SO-6-12	10/30/2014
Soil	ACR-103-SO-6-12	9/25/2012
Soil	ACR-104-SO-6-12	9/26/2012
Soil	ACR-105-SO-6-12	9/26/2012
Soil	ACR-106-SO-6-12	9/26/2012
Soil	ACR-107-SO-6-12	9/26/2012
Soil	ACR-108-SO-6-12	9/26/2012
Soil	ACR-109-S0-0-12	12/10/2012
Soil	ACR-110-SO-0-12	12/10/2012
Soil	ACR-111-SO-0-12	12/10/2012
Soil	ACR-114-SO-0-12	12/11/2012
Soil	ACR-115-SO-0-12	12/11/2012
Soil	ACR-116-SO-0-12	12/11/2012
Soil	ACR-117-SO-0-12	12/11/2012
Soil	ACR-118-SO-0-12	12/11/2012
Soil	ACR-119-SO-0-12	12/11/2012
Soil	IR-101-SO-6-12	9/27/2012
Soil	IR-102-SO-6-12	9/27/2012
Soil	IR-103-SO-6-12	9/27/2012
Soil	IR-104-SO-6-12	9/27/2012
Soil	IR-105-SO-6-12	9/27/2012
Soil	IR-106-SO-6-12	9/27/2012
Soil	IR-107-SO-6-12	9/27/2012
Soil	LWMCU-101-SO-6-12	10/29/2014
Soil	LWMCU-102-SO-6-12	10/29/2014
Soil	LWMCU-103-SO-6-12	10/29/2014
Soil	LWMCU-104-SO-6-12	10/29/2014
Soil	LWMCU-105-SO-6-12	10/30/2014
Soil	LWMCU-106-SO-6-12	9/21/2012
Soil	LWMCU-107-SO-6-12	11/1/2014
Soil	LWMCU-108-SO-6-12	11/3/2014
Soil	LWMCU-109-SO-6-12	10/31/2014
Soil	LWMCU-110-SO-6-12	11/3/2014
Soil	LWMCU-111-SO-6-12	11/3/2014
Soil	LWMCU-112-SO-6-12	10/31/2014
Soil	LWMCU-113-SO-6-12	10/31/2014
Soil	LWMCU-114-SO-6-12	11/1/2014

Attachment 1
Samples Used in the Human Health Risk Assessment

Media	Sample Name	Sample Date
Soil	ACR-101-SO-0-6	10/30/2014
Soil	ACR-102-SO-0-6	10/30/2014
Soil	ACR-103-SO-0-6	9/25/2012
Soil	ACR-104-SO-0-6	9/26/2012
Soil	ACR-105-SO-0-6	9/26/2012
Soil	ACR-106-SO-0-6	9/26/2012
Soil	ACR-107-SO-0-6	9/26/2012
Soil	ACR-108-SO-0-6	9/26/2012
Soil	ACR-112-SO-0-6	12/11/2012
Soil	ACR-113-SO-0-6	12/11/2012
Soil	ACR-120-SO-0-6	2/21/2013
Soil	IR-101-SO-0-6	9/27/2012
Soil	IR-102-SO-0-6	9/27/2012
Soil	IR-103-SO-0-6	9/27/2012
Soil	IR-104-SO-0-6	9/27/2012
Soil	IR-105-SO-0-6	9/27/2012
Soil	IR-106-SO-0-6	9/27/2012
Soil	IR-107-SO-0-6	9/27/2012
Soil	LWMCU-101-SO-0-6	10/29/2014
Soil	LWMCU-102-SO-0-6	10/29/2014
Soil	LWMCU-103-SO-0-6	10/29/2014
Soil	LWMCU-104-SO-0-6	10/29/2014
Soil	LWMCU-105-SO-0-6	10/30/2014
Soil	LWMCU-106-SO-0-6	9/21/2012
Soil	LWMCU-107-SO-0-6	11/1/2014
Soil	LWMCU-108-SO-0-6	11/3/2014
Soil	LWMCU-109-SO-0-6	10/31/2014
Soil	LWMCU-110-SO-0-6	11/3/2014
Soil	LWMCU-111-SO-0-6	11/3/2014
Soil	LWMCU-112-SO-0-6	10/31/2014
Soil	LWMCU-113-SO-0-6	10/31/2014
Soil	LWMCU-114-SO-0-6	11/1/2014
	Fish Tissue - Fillet	
Fish Tissue - Fillet	BF-BUF-SG1-F1	--
Fish Tissue - Fillet	BF-BUF-SG1-F2	--
Fish Tissue - Fillet	BF-BUF-SG2-F1	--
Fish Tissue - Fillet	BF-BUF-SG2-F2	--
Fish Tissue - Fillet	BF-BUF-SG3-F1	--
Fish Tissue - Fillet	BF-CARP-RSG1-F1	--
Fish Tissue - Fillet	BF-CARP-RSG1-F2	--
Fish Tissue - Fillet	BF-CARP-RSG2-F1	--
Fish Tissue - Fillet	BF-CARP-RSG2-F2	--
Fish Tissue - Fillet	BF-CARP-RSG4-F1	--

Attachment 1
Samples Used in the Human Health Risk Assessment

Media	Sample Name	Sample Date
Fish Tissue - Fillet	BF-CARP-RSG5-F1	--
Fish Tissue - Fillet	BF-CARP-SG1-F1	--
Fish Tissue - Fillet	BF-CARP-SG1-F2	--
Fish Tissue - Fillet	BF-CARP-SG1-F3	--
Fish Tissue - Fillet	BF-CARP-SG1-F4	--
Fish Tissue - Fillet	BF-CARP-SG2-F1	--
Fish Tissue - Fillet	BF-CARP-SG2-F2	--
Fish Tissue - Fillet	BF-CARP-SG2-F3	--
Fish Tissue - Fillet	BF-CARP-SG2-F4	--
Fish Tissue - Fillet	BF-CARP-SG3-F1	--
Fish Tissue - Fillet	BF-CARP-SG3-F2	--
Fish Tissue - Fillet	BF-CARP-SG3-F3	--
Fish Tissue - Fillet	BF-CARP-SG3-F4	--
Fish Tissue - Fillet	P-DRUM-RSG4-F1	--
Fish Tissue - Fillet	P-LMB-RSG1-F1	--
Fish Tissue - Fillet	P-LMB-RSG1-F2	--
Fish Tissue - Fillet	P-LMB-RSG2-F1	--
Fish Tissue - Fillet	P-LMB-RSG2-F2	--
Fish Tissue - Fillet	P-LMB-SG1-F2	--
Fish Tissue - Fillet	P-LMB-SG2-F2	--
Fish Tissue - Fillet	SC-CAT-RSG1-F1	--
Fish Tissue - Fillet	SC-CAT-RSG1-F2	--
Fish Tissue - Fillet	SC-CAT-RSG2-F1	--
Fish Tissue - Fillet	SC-CAT-RSG2-F2	--
Fish Tissue - Fillet	SC-CAT-RSG4-F1	--
Fish Tissue - Fillet	SC-CAT-RSG5-F1	--
Fish Tissue - Fillet	SC-CAT-SG1-F3	--
Fish Tissue - Fillet	SC-CAT-SG2-F1	--
Fish Tissue - Fillet	SC-CAT-SG3-F3	--
Fish Tissue - Fillet	SC-CAT-SG3-F4	--
Fish Tissue - Fillet	BUF-105-F	10/16/2012
Fish Tissue - Fillet	BUF-115-F	4/7/2015
Fish Tissue - Fillet	BUF-120-F	4/7/2015
Fish Tissue - Fillet	BUF-126-F	4/7/2015
Fish Tissue - Fillet	BUF-133-F	4/7/2015
Fish Tissue - Fillet	BUF-138-F	4/9/2015
Fish Tissue - Fillet	BUF-153-F	4/8/2015
Fish Tissue - Fillet	BUF-158-F	4/8/2015
Fish Tissue - Fillet	BUF-166-F	4/8/2015
Fish Tissue - Fillet	BUF-170-F	4/8/2015
Fish Tissue - Fillet	CAR-106-F	10/16/2012
Fish Tissue - Fillet	CAR-111-F	10/17/2012
Fish Tissue - Fillet	CAR-115-F	2/21/2013

Attachment 1
Samples Used in the Human Health Risk Assessment

Media	Sample Name	Sample Date
Fish Tissue - Fillet	CAR-116-F	4/7/2015
Fish Tissue - Fillet	CAR-119-F	4/7/2015
Fish Tissue - Fillet	CAR-127-F	4/7/2015
Fish Tissue - Fillet	CAR-129-F	4/7/2015
Fish Tissue - Fillet	CAR-130-F	4/7/2015
Fish Tissue - Fillet	CAR-131-F	4/7/2015
Fish Tissue - Fillet	CAR-134-F	4/7/2015
Fish Tissue - Fillet	CAR-139-F	4/9/2015
Fish Tissue - Fillet	CAR-150-F	4/8/2015
Fish Tissue - Fillet	CAR-152-F	4/8/2015
Fish Tissue - Fillet	CAR-154-F	4/8/2015
Fish Tissue - Fillet	CAR-168-F	4/8/2015
Fish Tissue - Fillet	CAR-169-F	4/8/2015
Fish Tissue - Fillet	CAR-178-F	4/8/2015
Fish Tissue - Fillet	CAR-179-F	4/8/2015
Fish Tissue - Fillet	CAR-180-F	4/8/2015
Fish Tissue - Fillet	CAR-185-F	4/8/2015
Fish Tissue - Fillet	CAT-113-F	10/17/2012
Fish Tissue - Fillet	CAT-116-F	2/21/2013
Fish Tissue - Fillet	CAT-117-F	4/7/2015
Fish Tissue - Fillet	CAT-118-F	4/7/2015
Fish Tissue - Fillet	CAT-136-F	4/9/2015
Fish Tissue - Fillet	CAT-140-F	4/7/2015
Fish Tissue - Fillet	CAT-143-F	4/9/2015
Fish Tissue - Fillet	CAT-147-F	4/8/2015
Fish Tissue - Fillet	CAT-156-F	4/8/2015
Fish Tissue - Fillet	CAT-159-F	4/8/2015
Fish Tissue - Fillet	CAT-160-F	4/8/2015
Fish Tissue - Fillet	DRM-167-F	4/8/2015
Fish Tissue - Fillet	DRM-173-F	4/8/2015
Fish Tissue - Fillet	DRM-174-F	4/8/2015
Fish Tissue - Fillet	DRM-175-F	4/8/2015
Fish Tissue - Fillet	DRM-184-F	4/8/2015
Fish Tissue - Fillet	GAR-104-F	10/15/2012
Fish Tissue - Fillet	GAR-146-F	4/8/2015
Fish Tissue - Fillet	GAR-149-F	4/8/2015
Fish Tissue - Fillet	GAR-151-F	4/8/2015
Fish Tissue - Fillet	GAR-161-F	4/8/2015
Fish Tissue - Fillet	GAR-162-F	4/8/2015
Fish Tissue - Fillet	GAR-165-F	4/8/2015
Fish Tissue - Fillet	GAR-181-F	4/8/2015
Fish Tissue - Fillet	GAR-182-F	4/8/2015
Fish Tissue - Fillet	GAR-183-F	4/8/2015

Attachment 1
Samples Used in the Human Health Risk Assessment

Media	Sample Name	Sample Date
Fish Tissue - Fillet	GAR-186-F	4/8/2015
Fish Tissue - Fillet	LMB-101-F	10/15/2012
Fish Tissue - Fillet	LMB-112-F	10/17/2012
Fish Tissue - Fillet	LMB-121-F	4/7/2015
Fish Tissue - Fillet	LMB-122-F	4/7/2015
Fish Tissue - Fillet	LMB-123-F	4/7/2015
Fish Tissue - Fillet	LMB-124-F	4/7/2015
Fish Tissue - Fillet	LMB-125-F	4/7/2015
Fish Tissue - Fillet	LMB-128-F	4/7/2015
Fish Tissue - Fillet	LMB-132-F	4/7/2015
Fish Tissue - Fillet	LMB-137-F	4/9/2015
Fish Tissue - Fillet	LMB-141-F	4/7/2015
Fish Tissue - Fillet	LMB-142-F	4/7/2015
Fish Tissue - Fillet	LMB-144-F	4/8/2015
Fish Tissue - Fillet	LMB-145-F	4/8/2015
Fish Tissue - Fillet	LMB-155-F	4/8/2015
Fish Tissue - Fillet	LMB-163-F	4/8/2015
Fish Tissue - Fillet	LMB-171-F	4/8/2015
Fish Tissue - Fillet	LMB-172-F	4/8/2015
Fish Tissue - Fillet	LMB-176-F	4/8/2015
Fish Tissue - Fillet	SHD-135-F	4/7/2015
Fish Tissue - Fillet	TIL-114-F	10/17/2012
Fish Tissue - Fillet	WHB-148-F	4/8/2015
Fish Tissue - Fillet	WHB-157-F	4/8/2015
Fish Tissue - Fillet	WHB-164-F	4/8/2015
Fish Tissue - Fillet	WHB-177-F	4/8/2015
Ground Water		
Ground Water	MW-101	1/27/2014
Ground Water	MW-101F	1/27/2014
Ground Water	MW-102	1/27/2014
Ground Water	MW-102F	1/27/2014

Attachment 1
Samples Used in the Human Health Risk Assessment

Media	Sample Name	Sample Date

Note:
Samples without dates were not collected as part of the Remedial Investigation field activities.
ACR: Arroyo Colorado River
ACT: Arroyo Colorado Tributary
COMC: Cross Over Main Canal
IR: Irrigation Riser
LEMC: Lower East Main Canal
LWMCL: Lower West Main Canal Lined
LWMCU: Lower West Main Canal Unlined
MC: Main Canal
NSIP: Siphon
RGR: Rio Grand River
RN3E: Reservoir No. 3 East
RN3W: Reservoir No. 3 West
SG1: Segment one
SG2: Segment two
SG3: Segment three
SIP: Inverted Siphon
CAR = Carp
CAT = Catfish
BUF = Buffalo
DRM = Drum
GAR = Gar
LMB = Large Mouth Bass
SHD = Shad
TIL = Tilapia
WHB = White Bass

ATTACHMENT 2

INDIVIDUAL SEDIMENT EXPOSURE AREA RISK-BASED SCREENING

TABLE 1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
RIO GRANDE RIVER - SEDIMENT

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Rio Grande River

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
INORGANICS																
7429-90-5	Aluminum	1.41E+04		1.41E+04		mg/kg	RGR-101-SE-0-6	1/1	6.87E+01 - 6.87E+01	1.41E+04	NA	1.50E+04 N	NA	NA	No	BSL
7440-38-2	Arsenic	3.90E+00		3.90E+00		mg/kg	RGR-101-SE-0-6	1/1	6.40E-01 - 6.40E-01	3.90E+00	NA	1.10E+01 N	NA	NA	No	BSL
7440-39-3	Barium	1.36E+02		1.36E+02		mg/kg	RGR-101-SE-0-6	1/1	6.40E+00 - 6.40E+00	1.36E+02	NA	2.30E+03 N	NA	NA	No	BSL
7440-41-7	Beryllium	7.10E-01		7.10E-01		mg/kg	RGR-101-SE-0-6	1/1	6.40E-01 - 6.40E-01	7.10E-01	NA	2.70E+00 N	NA	NA	No	BSL
7440-43-9	Cadmium	3.30E-01	J	3.30E-01	J	mg/kg	RGR-101-SE-0-6	1/1	6.40E-01 - 6.40E-01	3.30E-01	NA	1.10E+02 N	NA	NA	No	BSL
7440-70-2	Calcium	8.07E+04		8.07E+04		mg/kg	RGR-101-SE-0-6	1/1	1.72E+03 - 1.72E+03	8.07E+04	NA	NA	NA	NA	No	NUT
7440-47-3	Chromium	9.90E+00		9.90E+00		mg/kg	RGR-101-SE-0-6	1/1	1.30E+00 - 1.30E+00	9.90E+00	NA	3.60E+03 N	NA	NA	No	BSL
7440-48-4	Cobalt	5.30E+00		5.30E+00		mg/kg	RGR-101-SE-0-6	1/1	6.40E-01 - 6.40E-01	5.30E+00	NA	3.20E+03 N	NA	NA	No	BSL
7440-50-8	Copper	8.80E+00		8.80E+00		mg/kg	RGR-101-SE-0-6	1/1	1.30E+00 - 1.30E+00	8.80E+00	NA	2.10E+03 N	NA	NA	No	BSL
7439-89-6	Iron	1.67E+04		1.67E+04		mg/kg	RGR-101-SE-0-6	1/1	1.15E+01 - 1.15E+01	1.67E+04	NA	NA	NA	NA	No	BSL
7439-92-1	Lead	9.00E+00		9.00E+00		mg/kg	RGR-101-SE-0-6	1/1	6.40E-01 - 6.40E-01	9.00E+00	NA	5.00E+02	NA	NA	No	BSL
7439-95-4	Magnesium	6.26E+03		6.26E+03		mg/kg	RGR-101-SE-0-6	1/1	5.73E+02 - 5.73E+02	6.26E+03	NA	NA	NA	NA	No	NUT
7439-96-5	Manganese	2.97E+02		2.97E+02		mg/kg	RGR-101-SE-0-6	1/1	6.40E-01 - 6.40E-01	2.97E+02	NA	1.40E+03 N	NA	NA	No	BSL
7439-97-6	Mercury	1.50E-01		1.50E-01		mg/kg	RGR-101-SE-0-6	1/1	1.30E-01 - 1.30E-01	1.50E-01	NA	3.40E+00 N	NA	NA	No	BSL
7440-02-2	Nickel	1.08E+01		1.08E+01		mg/kg	RGR-101-SE-0-6	1/1	6.40E-01 - 6.40E-01	1.08E+01	NA	1.40E+02 N	NA	NA	No	BSL
7440-09-7	Potassium	2.98E+03		2.98E+03		mg/kg	RGR-101-SE-0-6	1/1	5.73E+02 - 5.73E+02	2.98E+03	NA	NA	NA	NA	No	NUT
7440-23-5	Sodium	7.72E+02		7.72E+02		mg/kg	RGR-101-SE-0-6	1/1	5.73E+02 - 5.73E+02	7.72E+02	NA	NA	NA	NA	No	NUT
7440-62-2	Vanadium	1.98E+01		1.98E+01		mg/kg	RGR-101-SE-0-6	1/1	3.20E+00 - 3.20E+00	1.98E+01	NA	3.30E+01 N	NA	NA	No	BSL
7440-66-6	Zinc	3.51E+01	J	3.51E+01	J	mg/kg	RGR-101-SE-0-6	1/1	1.30E+00 - 1.30E+00	3.51E+01	NA	7.60E+03 N	NA	NA	No	BSL
PCBS																
Total PCBs	Total PCB Congeners	2.10E-05	J	2.10E-05	J	mg/kg	RGR-101-SE-0-6	1/1	6.40E-03 - 6.40E-03	2.10E-05	NA	2.30E-01 N	NA	NA	No	BSL
SVOCS																
117-81-7	Bis(2-ethylhexyl)phthalate	2.20E-01	J	2.20E-01	J	mg/kg	RGR-101-SE-0-6	1/1	2.30E-01 - 2.30E-01	2.20E-01	NA	2.44E+02 C	NA	NA	No	BSL
VOCS																
67-64-1	Acetone	5.20E-02		5.20E-02		mg/kg	RGR-101-SE-0-6	1/1	1.30E-02 - 1.30E-02	5.20E-02	NA	6.61E+04 N	NA	NA	No	BSL
75-09-2	Methylene chloride	4.40E-03	J	4.40E-03	J	mg/kg	RGR-101-SE-0-6	1/1	6.40E-03 - 6.40E-03	4.40E-03	NA	7.27E+03 C	NA	NA	No	BSL

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.
(4) TCEQ Protective Concentration Levels (PCLs), March 2006, Tier 1 Sediment, TotSedComb. For non-carcinogens 1/10th the PCL is used.
(5) Rationale Codes
Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Definitions:
C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
mg/kg = milligrams per kilogram

Data Qualifiers: J = Indicates an estimated value

TABLE 2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
MAIN CANAL - SEDIMENT

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Main Canal

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
INORGANICS																
7429-90-5	Aluminum	1.48E+03		1.19E+04		mg/kg	MC-102-SE-0-6	10/10	1.96E+01 - 6.92E+01	1.19E+04	NA	1.53E+04 N	NA	NA	No	BSL
7440-38-2	Arsenic	2.20E+00		5.30E+00		mg/kg	MC-105-SE-0-6	10/10	5.10E-01 - 7.20E-01	5.30E+00	NA	1.15E+01 N	NA	NA	No	BSL
7440-39-3	Barium	3.17E+01		1.66E+02		mg/kg	MC-102-SE-0-6	10/10	5.10E+00 - 7.20E+00	1.66E+02	NA	2.29E+03 N	NA	NA	No	BSL
7440-43-9	Cadmium	2.40E-01	J	2.40E-01	J	mg/kg	MC-104-SE-0-6	1/10	5.10E-01 - 7.20E-01	2.40E-01	NA	1.09E+02 N	NA	NA	No	BSL
7440-70-2	Calcium	2.53E+04		7.03E+04		mg/kg	MC-102-SE-0-6	10/10	5.91E+02 - 2.04E+03	7.03E+04	NA	NA	NA	NA	No	NUT
7440-47-3	Chromium	1.50E+00		8.80E+00		mg/kg	MC-109-SE-0-6	10/10	1.00E+00 - 1.40E+00	8.80E+00	NA	3.65E+03 N	NA	NA	No	BSL
7440-48-4	Cobalt	1.70E+00		6.00E+00		mg/kg	MC-108-SE-0-6	10/10	5.10E-01 - 7.20E-01	6.00E+00	NA	3.20E+03 N	NA	NA	No	BSL
7440-50-8	Copper	3.70E+00		8.10E+00		mg/kg	MC-102-SE-0-6	8/10	1.00E+00 - 1.40E+00	8.10E+00	NA	2.13E+03 N	NA	NA	No	BSL
7439-89-6	Iron	5.11E+03		1.49E+04		mg/kg	MC-102-SE-0-6	10/10	9.80E+00 - 1.41E+01	1.49E+04	NA	NA	NA	NA	No	BSL
7439-92-1	Lead	3.30E+00		8.90E+00		mg/kg	MC-102-SE-0-6	10/10	5.10E-01 - 7.20E-01	8.90E+00	NA	5.00E+02	NA	NA	No	BSL
7439-95-4	Magnesium	6.84E+02		4.68E+03		mg/kg	MC-102-SE-0-6	10/10	4.89E+02 - 7.03E+02	4.68E+03	NA	NA	NA	NA	No	NUT
7439-96-5	Manganese	8.50E+01		3.54E+02		mg/kg	MC-102-SE-0-6	10/10	5.10E-01 - 7.20E-01	3.54E+02	NA	1.40E+03 N	NA	NA	No	BSL
7439-97-6	Mercury	1.20E-02	J	4.50E-02	J	mg/kg	MC-107-SE-0-6	10/10	1.20E-01 - 1.70E-01	4.50E-02	NA	3.43E+00 N	NA	NA	No	BSL
7440-02-2	Nickel	1.80E+00		9.10E+00		mg/kg	MC-102-SE-0-6	10/10	5.10E-01 - 7.20E-01	9.10E+00	NA	1.40E+02 N	NA	NA	No	BSL
7440-09-7	Potassium	1.16E+03		2.66E+03		mg/kg	MC-109-SE-0-6	8/10	4.89E+02 - 7.03E+02	2.66E+03	NA	NA	NA	NA	No	NUT
7440-62-2	Vanadium	5.70E+00		1.87E+01		mg/kg	MC-102-SE-0-6	10/10	2.60E+00 - 3.60E+00	1.87E+01	NA	3.29E+01 N	NA	NA	No	BSL
7440-66-6	Zinc	9.40E+00	J	3.90E+01	J	mg/kg	MC-102-SE-0-6	10/10	1.00E+00 - 1.40E+00	3.90E+01	NA	7.60E+03 N	NA	NA	No	BSL
PAHS																
50-32-8	Benzo(a)pyrene	1.90E-01	J	1.90E-01	J	mg/kg	MC-108-SE-14-24	1/12	2.10E-01 - 4.50E-01	1.90E-01	NA	1.59E+00 C	NA	NA	No	BSL
205-99-2	Benzo(b)fluoranthene	7.90E-02	J	7.90E-02	J	mg/kg	MC-108-SE-14-24	1/12	2.10E-01 - 4.50E-01	7.90E-02	NA	1.59E+01 C	NA	NA	No	BSL
218-01-9	Chrysene	1.30E-01	J	1.30E-01	J	mg/kg	MC-108-SE-14-24	1/12	2.10E-01 - 4.50E-01	1.30E-01	NA	1.59E+03 C	NA	NA	No	BSL
206-44-0	Fluoranthene	3.20E-01		3.20E-01		mg/kg	MC-108-SE-14-24	1/12	2.10E-01 - 4.50E-01	3.20E-01	NA	4.95E+02 N	NA	NA	No	BSL
PCBS																
11096-82-5	Aroclor-1260	7.40E-04	J	7.40E-04	J	mg/kg	MC-116-SE-0-1	1/21	1.00E-03 - 7.00E-03	7.40E-04	NA	2.30E-01 N	NA	NA	No	BSL
Total PCBs	Total PCB Congeners	5.70E-05	J	7.70E-03	J/	mg/kg	MC-105-SE-0-6	9/9	4.90E-06 - 7.80E-03	7.70E-03	NA	2.30E-01 N	NA	NA	No	BSL
PESTICIDES																
72-54-8	4,4′-DDD	1.40E-02		1.40E-02		mg/kg	MC-108-SE-14-24	1/12	4.10E-03 - 8.80E-03	1.40E-02	NA	1.23E+02 C	NA	NA	No	BSL
72-55-9	4,4′-DDE	1.20E-03	J	1.30E-02		mg/kg	MC-108-SE-14-24	9/12	4.10E-03 - 8.80E-03	1.30E-02	NA	8.66E+01 C	NA	NA	No	BSL
50-29-3	4,4′-DDT	2.70E-02		2.70E-02		mg/kg	MC-108-SE-14-24	1/12	4.10E-03 - 8.80E-03	2.70E-02	NA	8.66E+01 C	NA	NA	No	BSL
319-86-8	delta-BHC	9.10E-04	J	9.10E-04	J	mg/kg	MC-102-SE-0-6	1/12	2.10E-03 - 4.50E-03	9.10E-04	NA	1.42E+01 C	NA	NA	No	BSL
SVOCS																
117-81-7	Bis(2-ethylhexyl)phthalate	1.90E-01	J	6.10E-01		mg/kg	MC-107-SE-0-6	5/12	2.10E-01 - 4.50E-01	6.10E-01	NA	2.44E+02 C	NA	NA	No	BSL
108-95-2	Phenol	4.40E-02	J	6.70E-02	J	mg/kg	MC-108-SE-0-6	4/12	2.10E-01 - 4.50E-01	6.70E-02	NA	4.59E+03 N	NA	NA	No	BSL
VOCS																
98-86-2	Acetophenone	5.50E-02	J	8.30E-02	J	mg/kg	MC-109-SE-0-6	6/12	2.10E-01 - 4.50E-01	8.30E-02	NA	1.53E+03 N	NA	NA	No	BSL
108-88-3	Toluene	2.70E-03	J	2.70E-03	J	mg/kg	MC-102-SE-0-6	1/3	6.10E-03 - 2.39E-01	2.70E-03	NA	5.88E+03 N	NA	NA	No	BSL

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.
(4) TCEQ Protective Concentration Levels (PCLs), March 2006, Tier 1 Sediment, TotSedComb. For non-carcinogens 1/10th the PCL is used.
(5) Rationale Codes
Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Definitions:
C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
mg/kg = milligrams per kilogram

Data Qualifiers: J = Indicates an estimated value

TABLE 3
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
ARROYO COLORADO TRIBUTARY - SEDIMENT

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Arroyo Colorado Tributary

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
							INORGANICS										
7429-90-5	**Aluminum**	**1.16E+04**		**1.90E+04**		**mg/kg**	**ACT-104-SE-0-6**	**4/4**	**2.49E+01 - 6.69E+01**	**1.90E+04**	**NA**	**1.50E+04**	**N**	**NA**	**NA**	**Yes**	**ASL**
7440-38-2	Arsenic	6.20E+00		6.60E+00		mg/kg	ACT-105-SE-0-6	4/4	6.90E-01 - 9.40E-01	6.60E+00	NA	1.10E+01	N	NA	NA	No	BSL
7440-39-3	Barium	1.24E+02		1.86E+02		mg/kg	ACT-104-SE-0-6	4/4	5.90E+00 - 7.60E+00	1.86E+02	NA	2.30E+03	N	NA	NA	No	BSL
7440-41-7	Beryllium	6.90E-01		8.60E-01		mg/kg	ACT-104-SE-0-6	2/4	6.90E-01 - 9.40E-01	8.60E-01	NA	2.70E+00	N	NA	NA	No	BSL
7440-43-9	Cadmium	3.30E-01	J	4.40E-01	J	mg/kg	ACT-105-SE-0-6	4/4	6.90E-01 - 9.40E-01	4.40E-01	NA	1.10E+02	N	NA	NA	No	BSL
7440-70-2	Calcium	7.05E+04		8.97E+04		mg/kg	ACT-105-SE-0-6	4/4	1.56E+03 - 1.88E+03	8.97E+04	NA	NA		NA	NA	No	NUT
7440-47-3	Chromium	8.30E+00		1.27E+01		mg/kg	ACT-104-SE-0-6	4/4	1.40E+00 - 1.90E+00	1.27E+01	NA	3.60E+03	N	NA	NA	No	BSL
7440-48-4	Cobalt	4.80E+00		6.10E+00		mg/kg	ACT-104-SE-0-6	4/4	6.90E-01 - 9.40E-01	6.10E+00	NA	3.20E+03	N	NA	NA	No	BSL
7440-50-8	Copper	8.70E+00		1.30E+01		mg/kg	ACT-105-SE-0-6	4/4	1.40E+00 - 1.90E+00	1.30E+01	NA	2.10E+03	N	NA	NA	No	BSL
7439-89-6	Iron	1.33E+04		1.78E+04		mg/kg	ACT-104-SE-0-6	4/4	1.12E+01 - 1.88E+01	1.78E+04	NA	NA		NA	NA	No	BSL
7439-92-1	Lead	7.50E+00		1.20E+01		mg/kg	ACT-104-SE-0-6	4/4	6.90E-01 - 9.40E-01	1.20E+01	NA	5.00E+02		NA	NA	No	BSL
7439-95-4	Magnesium	4.63E+03		6.82E+03		mg/kg	ACT-105-SE-0-6	4/4	5.58E+02 - 9.38E+02	6.82E+03	NA	NA		NA	NA	No	NUT
7439-96-5	Manganese	3.82E+02		5.86E+02		mg/kg	ACT-102-SE-0-6	4/4	6.90E-01 - 9.40E-01	5.86E+02	NA	1.40E+03	N	NA	NA	No	BSL
7439-97-6	Mercury	1.80E-02	J	5.30E-02	J	mg/kg	ACT-105-SE-0-6	3/4	1.60E-01 - 1.90E-01	5.30E-02	NA	3.40E+00	N	NA	NA	No	BSL
7440-02-2	Nickel	8.90E+00		1.23E+01		mg/kg	ACT-104-SE-0-6	4/4	6.90E-01 - 9.40E-01	1.23E+01	NA	1.40E+02	N	NA	NA	No	BSL
7440-09-7	Potassium	2.72E+03		4.53E+03		mg/kg	ACT-104-SE-0-6	4/4	5.58E+02 - 9.38E+02	4.53E+03	NA	NA		NA	NA	No	NUT
7440-23-5	Sodium	6.47E+02		2.12E+03		mg/kg	ACT-105-SE-0-6	4/4	5.58E+02 - 7.79E+02	2.12E+03	NA	NA		NA	NA	No	NUT
7440-62-2	Vanadium	2.18E+01		2.85E+01		mg/kg	ACT-104-SE-0-6	4/4	3.50E+00 - 4.70E+00	2.85E+01	NA	3.30E+01	N	NA	NA	No	BSL
7440-66-6	Zinc	3.28E+01	J	5.07E+01	J	mg/kg	ACT-105-SE-0-6	4/4	1.40E+00 - 1.90E+00	5.07E+01	NA	7.60E+03	N	NA	NA	No	BSL
							PCBS										
Total PCBs	Total PCB Congeners	1.20E-02		1.20E-02		mg/kg	ACT-105-SE-0-6	1/1	8.00E-03 - 8.00E-03	1.20E-02	NA	2.30E-01	N	NA	NA	No	BSL
							PESTICIDES										
72-55-9	4,4´-DDE	4.50E-03	J	1.30E-02		mg/kg	ACT-102-SE-0-6	3/4	5.40E-03 - 7.70E-03	1.30E-02	NA	8.66E+01	C	NA	NA	No	BSL
							VOCS										
67-64-1	Acetone	4.80E-02		4.80E-02		mg/kg	ACT-105-SE-0-6	1/1	1.90E-02 - 1.90E-02	4.80E-02	NA	6.61E+04	N	NA	NA	No	BSL

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.
(4) TCEQ Protective Concentration Levels (PCLs), March 2006, Tier 1 Sediment, TotSedComb. For non-carcinogens 1/10th the PCL is used.
(5) Rationale Codes
Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Definitions:
C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
mg/kg = milligrams per kilogram

Data Qualifiers: J = Indicates an estimated value

TABLE 4
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
ARROYO COLORADO RIVER - SEDIMENT

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Arroyo Colorado River

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
								INORGANICS								
7429-90-5	**Aluminum**	**1.30E+04**		**2.40E+04**		**mg/kg**	**ACR-108-SE-0-6**	**10/10**	**6.45E+01 - 8.79E+01**	**2.40E+04**	**NA**	**1.50E+04 N**	**NA**	**NA**	**Yes**	**ASL**
7440-38-2	Arsenic	3.20E+00		4.70E+00		mg/kg	ACR-101-SE-0-6	10/10	5.30E-01 - 1.20E+00	4.70E+00	NA	1.10E+01 N	NA	NA	No	BSL
7440-39-3	Barium	1.66E+02		2.55E+02		mg/kg	ACR-101-SE-0-6	10/10	5.30E+00 - 1.16E+01	2.55E+02	NA	2.30E+03 N	NA	NA	No	BSL
7440-41-7	Beryllium	6.40E-01		9.80E-01		mg/kg	ACR-101-SE-0-6	6/10	5.30E-01 - 1.20E+00	9.80E-01	NA	2.70E+00 N	NA	NA	No	BSL
7440-43-9	Cadmium	3.20E-01	J	4.90E-01	J	mg/kg	ACR-102-SE-0-6	10/10	5.30E-01 - 1.20E+00	4.90E-01	NA	1.10E+02 N	NA	NA	No	BSL
7440-70-2	Calcium	7.12E+04		1.00E+05		mg/kg	ACR-108-SE-0-6	10/10	1.61E+03 - 2.20E+03	1.00E+05	NA	NA	NA	NA	No	NUT
7440-47-3	Chromium	9.10E+00		1.67E+01		mg/kg	ACR-106-SE-0-6	10/10	1.10E+00 - 2.30E+00	1.67E+01	NA	3.60E+03 N	NA	NA	No	BSL
7440-48-4	Cobalt	4.40E+00		7.20E+00		mg/kg	ACR-108-SE-0-6	10/10	5.30E-01 - 1.20E+00	7.20E+00	NA	3.20E+03 N	NA	NA	No	BSL
7440-50-8	Copper	8.30E+00		1.69E+01		mg/kg	ACR-108-SE-0-6	10/10	1.10E+00 - 2.30E+00	1.69E+01	NA	2.10E+03 N	NA	NA	No	BSL
7439-89-6	Iron	1.43E+04		2.19E+04		mg/kg	ACR-108-SE-0-6	10/10	1.10E+01 - 2.20E+01	2.19E+04	NA	NA	NA	NA	No	BSL
7439-92-1	Lead	8.10E+00		1.37E+01		mg/kg	ACR-108-SE-0-6	10/10	5.30E-01 - 1.20E+00	1.37E+01	NA	5.00E+02	NA	NA	No	BSL
7439-95-4	Magnesium	4.79E+03		8.35E+03		mg/kg	ACR-108-SE-0-6	10/10	5.48E+02 - 1.10E+03	8.35E+03	NA	NA	NA	NA	No	NUT
7439-96-5	Manganese	2.54E+02		1.18E+03		mg/kg	ACR-108-SE-0-6	10/10	5.30E-01 - 1.20E+00	1.18E+03	NA	1.40E+03 N	NA	NA	No	BSL
7439-97-6	Mercury	1.80E-02	J	2.20E-01	J	mg/kg	ACR-108-SE-0-6	10/10	1.20E-01 - 2.40E-01	2.20E-01	NA	3.40E+00 N	NA	NA	No	BSL
7440-02-2	Nickel	9.10E+00		1.49E+01		mg/kg	ACR-108-SE-0-6	10/10	5.30E-01 - 1.20E+00	1.49E+01	NA	1.40E+02 N	NA	NA	No	BSL
7440-09-7	Potassium	3.10E+03		5.62E+03		mg/kg	ACR-108-SE-0-6	10/10	5.48E+02 - 1.10E+03	5.62E+03	NA	NA	NA	NA	No	NUT
7440-23-5	Sodium	9.68E+02		1.86E+03		mg/kg	ACR-103-SE-6-12	10/10	5.48E+02 - 1.10E+03	1.86E+03	NA	NA	NA	NA	No	NUT
7440-62-2	Vanadium	1.85E+01		2.69E+01		mg/kg	ACR-108-SE-0-6	10/10	2.60E+00 - 5.80E+00	2.69E+01	NA	3.30E+01 N	NA	NA	No	BSL
7440-66-6	Zinc	3.65E+01	J	7.45E+01	J	mg/kg	ACR-108-SE-0-6	10/10	1.10E+00 - 2.30E+00	7.45E+01	NA	7.60E+03 N	NA	NA	No	BSL
								PCBS								
11096-82-5	Aroclor-1260	6.90E-04	J	5.60E-03		mg/kg	ACR-111-SE-0-6	5/18	4.10E-04 - 7.10E-02	5.60E-03	NA	2.30E-01 N	NA	NA	No	BSL
Total PCBs	Total PCB Congeners	1.60E-04		1.60E-03		mg/kg	ACR-101-SE-0-6	3/3	6.80E-03 - 6.80E-03	1.60E-03	NA	2.30E-01 N	NA	NA	No	BSL
								SVOCS								
117-81-7	Bis(2-ethylhexyl)phthalate	1.10E-01	J/J	1.20E-01	J	mg/kg	ACR-106-SE-0-6	3/10	2.50E-01 - 3.70E-01	1.20E-01	NA	2.44E+02 C	NA	NA	No	BSL

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.
(4) TCEQ Protective Concentration Levels (PCLs), March 2006, Tier 1 Sediment, TotSedComb. For non-carcinogens 1/10th the PCL is used.
(5) Rationale Codes
Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Definitions:
C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
mg/kg = milligrams per kilogram

Data Qualifiers: J = Indicates an estimated value

TABLE 5
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
LOWER EAST MAIN CANAL - SEDIMENT

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Lower East Main Canal

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
								INORGANICS									
7429-90-5	**Aluminum**	**7.77E+03**		**1.96E+04**		**mg/kg**	**LEMC-105-SE-0-6**	**3/3**	**3.44E+01 - 5.99E+01**	**1.96E+04**	**NA**	**1.53E+04**	**N**	**NA**	**NA**	**Yes**	**ASL**
7440-38-2	Arsenic	2.70E+00	J	4.30E+00	J	mg/kg	LEMC-105-SE-0-6	3/3	7.30E-01 - 9.80E-01	4.30E+00	NA	1.15E+01	N	NA	NA	No	BSL
7440-39-3	Barium	1.43E+02		2.10E+02		mg/kg	LEMC-105-SE-0-6	3/3	7.30E+00 - 9.80E+00	2.10E+02	NA	2.29E+03	N	NA	NA	No	BSL
7440-43-9	Cadmium	2.10E-01	J	4.30E-01	J	mg/kg	LEMC-102-SE-0-6	3/3	7.30E-01 - 9.80E-01	4.30E-01	NA	1.09E+02	N	NA	NA	No	BSL
7440-70-2	Calcium	7.18E+04		1.44E+05		mg/kg	LEMC-103-SE-0-6	3/3	1.50E+03 - 4.30E+03	1.44E+05	NA	NA		NA	NA	No	NUT
7440-47-3	Chromium	7.40E+00		1.45E+01		mg/kg	LEMC-105-SE-0-6	3/3	1.50E+00 - 2.00E+00	1.45E+01	NA	3.65E+03	N	NA	NA	No	BSL
7440-48-4	Cobalt	3.40E+00		5.90E+00		mg/kg	LEMC-105-SE-0-6	3/3	7.30E-01 - 9.80E-01	5.90E+00	NA	3.20E+03	N	NA	NA	No	BSL
7440-50-8	Copper	6.80E+00		1.13E+01		mg/kg	LEMC-105-SE-0-6	3/3	1.50E+00 - 2.00E+00	1.13E+01	NA	2.13E+03	N	NA	NA	No	BSL
7439-89-6	Iron	8.37E+03		1.91E+04		mg/kg	LEMC-105-SE-0-6	3/3	1.50E+01 - 2.38E+01	1.91E+04	NA	NA		NA	NA	No	BSL
7439-92-1	Lead	5.70E+00		4.09E+01		mg/kg	LEMC-102-SE-0-6	3/3	7.30E-01 - 9.80E-01	4.09E+01	NA	5.00E+02		NA	NA	No	BSL
7439-95-4	Magnesium	3.19E+03		6.88E+03		mg/kg	LEMC-105-SE-0-6	3/3	7.49E+02 - 1.19E+03	6.88E+03	NA	NA		NA	NA	No	NUT
7439-96-5	Manganese	3.33E+02		4.94E+02		mg/kg	LEMC-105-SE-0-6	3/3	7.30E-01 - 9.80E-01	4.94E+02	NA	1.40E+03	N	NA	NA	No	BSL
7439-97-6	Mercury	3.70E-02	J	4.40E-02	J	mg/kg	LEMC-102-SE-0-6	3/3	1.50E-01 - 2.30E-01	4.40E-02	NA	3.43E+00	N	NA	NA	No	BSL
7440-02-2	Nickel	6.00E+00		1.15E+01		mg/kg	LEMC-105-SE-0-6	3/3	7.30E-01 - 9.80E-01	1.15E+01	NA	1.40E+02	N	NA	NA	No	BSL
7440-09-7	Potassium	2.11E+03		4.73E+03		mg/kg	LEMC-105-SE-0-6	3/3	7.49E+02 - 1.19E+03	4.73E+03	NA	NA		NA	NA	No	NUT
7440-23-5	Sodium	1.11E+03		1.11E+03		mg/kg	LEMC-103-SE-0-6	1/3	7.49E+02 - 1.19E+03	1.11E+03	NA	NA		NA	NA	No	NUT
7440-62-2	Vanadium	1.46E+01		2.66E+01		mg/kg	LEMC-105-SE-0-6	3/3	3.60E+00 - 4.90E+00	2.66E+01	NA	3.29E+01	N	NA	NA	No	BSL
7440-66-6	Zinc	2.98E+01	J	5.62E+01	J	mg/kg	LEMC-105-SE-0-6	3/3	1.50E+00 - 2.00E+00	5.62E+01	NA	7.60E+03	N	NA	NA	No	BSL
								PCBS									
11097-69-1	Aroclor-1254	1.20E-03	J	2.30E-02	J	mg/kg	LEMC-102-SE-0-6	7/8	1.30E-03 - 9.30E-03	2.30E-02	NA	2.30E-01	N	NA	NA	No	BSL
Total PCBs	Total PCB Congeners	9.60E-03		2.10E-02		mg/kg	LEMC-105-SE-0-6	2/2	1.20E-02 - 1.20E-02	2.10E-02	NA	2.30E-01	N	NA	NA	No	BSL
								PESTICIDES									
72-55-9	4,4′-DDE	1.50E-03	J	2.00E-03	J	mg/kg	LEMC-106-SE-0-6	3/4	5.20E-03 - 7.40E-03	2.00E-03	NA	8.66E+01	C	NA	NA	No	BSL
50-29-3	4,4′-DDT	4.30E-03	J	1.40E-02		mg/kg	LEMC-106-SE-0-6	3/4	5.20E-03 - 7.40E-03	1.40E-02	NA	8.66E+01	C	NA	NA	No	BSL
5103-74-2	gamma-Chlordane	1.00E-03	J	1.00E-03	J	mg/kg	LEMC-105-SE-0-6	1/4	2.70E-03 - 3.80E-03	1.00E-03	NA	4.06E+01	C	NA	NA	No	BSL
1024-57-3	Heptachlor epoxide	9.10E-04	J	1.20E-03	J	mg/kg	LEMC-102-SE-0-6	2/4	2.70E-03 - 3.80E-03	1.20E-03	NA	1.56E+00	C	NA	NA	No	BSL
								SVOCS									
117-81-7	Bis(2-ethylhexyl)phthalate	1.40E-01	J	8.10E+00		mg/kg	LEMC-106-SE-0-6	3/4	2.70E-01 - 1.10E+00	8.10E+00	NA	2.44E+02	C	NA	NA	No	BSL
								VOCS									
108-88-3	Toluene	4.70E-03	J	4.70E-03	J	mg/kg	LEMC-102-SE-0-6	1/2	2.25E-01 - 2.44E-01	4.70E-03	NA	5.88E+04	N	NA	NA	No	BSL

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.
(4) TCEQ Protective Concentration Levels (PCLs), March 2006, Tier 1 Sediment, TotSedComb. For non-carcinogens 1/10th the PCL is used.
(5) Rationale Codes
Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Definitions:
C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
mg/kg = milligrams per kilogram

Data Qualifiers: J = Indicates an estimated value

TABLE 6
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
LOWER WEST MAIN CANAL UNLINED - SEDIMENT

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Lower West Main Canal Unlined

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
							INORGANICS										
7429-90-5	**Aluminum**	**7.23E+03**		**2.19E+04**		**mg/kg**	**LWMCU-104-SE-6-12**	**19/19**	**1.90E+01 - 6.85E+01**	**2.19E+04**	**NA**	**1.53E+04**	**N**	**7.70E+03**	**RSL**	**Yes**	**ASL**
7440-38-2	Arsenic	2.40E+00	J	4.90E+00		mg/kg	LWMCU-104-SE-6-12	19/19	5.10E-01 - 1.10E+00	4.90E+00	NA	1.15E+01	N	6.70E-01	RSL	No	BSL
7440-39-3	Barium	1.20E+02		2.72E+02		mg/kg	LWMCU-101-SE-0-6	19/19	5.10E+00 - 1.07E+01	2.72E+02	NA	2.29E+03	N	1.50E+03	RSL	No	BSL
7440-41-7	Beryllium	6.00E-01		6.00E-01		mg/kg	LWMCU-101-SE-0-6	1/19	5.10E-01 - 1.10E+00	6.00E-01	NA	2.66E+00	N	1.60E+01	RSL	No	BSL
7440-43-9	Cadmium	1.80E-01	J	4.90E-01	J	mg/kg	LWMCU-109-SE-0-6	19/19	5.10E-01 - 1.10E+00	4.90E-01	NA	1.09E+02	N	7.00E+00	RSL	No	BSL
7440-70-2	Calcium	5.82E+04		1.68E+05		mg/kg	LWMCU-115-SE-0-6	19/19	1.53E+03 - 6.54E+03	1.68E+05	NA	NA		NA	NA	No	NUT
7440-47-3	Chromium	5.70E+00		1.51E+01		mg/kg	LWMCU-109-SE-0-6	19/19	1.00E+00 - 2.10E+00	1.51E+01	NA	3.65E+03	N	1.20E+04	RSL	No	BSL
7440-48-4	Cobalt	3.10E+00		7.70E+00		mg/kg	LWMCU-114-SE-0-6	19/19	5.10E-01 - 1.10E+00	7.70E+00	NA	3.20E+03	N	2.30E+00	RSL	No	BSL
7440-50-8	Copper	5.60E+00		2.15E+01		mg/kg	LWMCU-115-SE-0-6	19/19	1.00E+00 - 2.10E+00	2.15E+01	NA	2.13E+03	N	3.10E+02	RSL	No	BSL
7439-89-6	Iron	1.02E+04		2.21E+04		mg/kg	LWMCU-104-SE-6-12	19/19	9.50E+00 - 1.71E+01	2.21E+04	NA	NA		5.50E+03	RSL	No	BSL
7439-92-1	Lead	5.50E+00	J	1.56E+01	J	mg/kg	LWMCU-109-SE-0-6	19/19	5.10E-01 - 1.10E+00	1.56E+01	NA	5.00E+01		4.00E+02	RSL	No	BSL
7439-95-4	Magnesium	2.96E+03		7.19E+03		mg/kg	LWMCU-104-SE-6-12	19/19	4.75E+02 - 8.56E+02	7.19E+03	NA	NA		NA	NA	No	NUT
7439-96-5	Manganese	2.72E+02		6.95E+02		mg/kg	LWMCU-101-SE-0-6	19/19	5.10E-01 - 1.10E+00	6.95E+02	NA	1.40E+03	N	1.80E+02	RSL	No	BSL
7439-97-6	Mercury	3.00E-02	J	1.00E-01	J	mg/kg	LWMCU-105-SE-6-12	19/19	1.20E-01 - 2.50E-01	1.00E-01	NA	3.43E+00	N	2.30E+00	RSL	No	BSL
7440-02-2	Nickel	5.20E+00		1.35E+01		mg/kg	LWMCU-109-SE-0-6	19/19	5.10E-01 - 1.10E+00	1.35E+01	NA	1.40E+02	N	NA	NA	No	BSL
7440-09-7	Potassium	1.67E+03		4.90E+03		mg/kg	LWMCU-109-SE-0-6	19/19	4.75E+02 - 8.56E+02	4.90E+03	NA	NA		NA	NA	No	NUT
7782-49-2	Selenium	2.30E-02	J	2.10E-01	J	mg/kg	LWMCU-102-SE-0-6	4/19	2.50E+00 - 5.40E+00	2.10E-01	NA	2.66E+02	N	3.90E+01	RSL	No	BSL
7440-23-5	Sodium	4.24E+02	J	1.17E+03		mg/kg	LWMCU-115-SE-0-6	10/19	4.75E+02 - 8.56E+02	1.17E+03	NA	NA		NA	NA	No	NUT
7440-62-2	Vanadium	1.25E+01		2.57E+01		mg/kg	LWMCU-109-SE-0-6	19/19	2.50E+00 - 5.40E+00	2.57E+01	NA	3.29E+01	N	3.90E+01	RSL	No	BSL
7440-66-6	Zinc	3.17E+01	J	6.20E+01	J	mg/kg	LWMCU-109-SE-0-6	19/19	1.00E+00 - 2.10E+00	6.20E+01	NA	7.60E+03	N	2.30E+03	RSL	No	BSL
							PAHS										
91-57-6	2-Methylnaphthalene	5.60E-02	J	5.60E-02	J	mg/kg	LWMCU-101-SE-0-6	1/21	2.30E-01 - 3.50E-01	5.60E-02	NA	4.95E+01	N	2.30E+01	RSL	No	BSL
83-32-9	Acenaphthene	6.30E-02	J	6.30E-02	J	mg/kg	LWMCU-101-SE-0-6	1/21	2.30E-01 - 3.50E-01	6.30E-02	NA	7.42E+02	N	3.50E+02	RSL	No	BSL
120-12-7	Anthracene	1.30E-01	J	1.30E-01	J	mg/kg	LWMCU-101-SE-0-6	1/21	2.30E-01 - 3.50E-01	1.30E-01	NA	3.71E+03	N	1.70E+03	RSL	No	BSL
56-55-3	Benzo(a)anthracene	2.80E-01		2.80E-01		mg/kg	LWMCU-101-SE-0-6	1/21	2.30E-01 - 3.50E-01	2.80E-01	NA	1.59E+00	C	1.50E-01	RSL	No	BSL
50-32-8	**Benzo(a)pyrene**	**2.30E-01**	**J**	**2.30E-01**	**J**	**mg/kg**	**LWMCU-101-SE-0-6**	**1/21**	**2.30E-01 - 3.50E-01**	**2.30E-01**	**NA**	**1.59E-01**	**C**	**1.50E-02**	**RSL**	**Yes**	**ASL**
205-99-2	Benzo(b)fluoranthene	9.20E-02	J	3.50E-01		mg/kg	LWMCU-101-SE-0-6	2/21	2.30E-01 - 3.50E-01	3.50E-01	NA	1.59E+00	C	1.50E-01	RSL	No	BSL
191-24-2	Benzo(g,h,i)perylene	1.40E-01	J	1.40E-01	J	mg/kg	LWMCU-101-SE-0-6	1/21	2.30E-01 - 3.50E-01	1.40E-01	NA	3.71E+02	N	1.70E+02	RSL	No	BSL
207-08-9	Benzo(k)fluoranthene	1.20E-01	J	1.20E-01	J	mg/kg	LWMCU-101-SE-0-6	1/21	2.30E-01 - 3.50E-01	1.20E-01	NA	1.59E+01	C	1.50E+00	RSL	No	BSL
218-01-9	Chrysene	4.40E-02	J	3.20E-01		mg/kg	LWMCU-101-SE-0-6	2/21	2.30E-01 - 3.50E-01	3.20E-01	NA	1.59E+02	C	1.50E+01	RSL	No	BSL
53-70-3	Dibenzo(a,h)anthracene	6.60E-02	J	6.60E-02	J	mg/kg	LWMCU-101-SE-0-6	1/21	2.30E-01 - 3.50E-01	6.60E-02	NA	1.59E-01	C	1.50E-02	RSL	No	BSL
206-44-0	Fluoranthene	4.40E-02	J	6.80E-01		mg/kg	LWMCU-101-SE-0-6	2/21	2.30E-01 - 3.50E-01	6.80E-01	NA	4.95E+02	N	2.30E+02	RSL	No	BSL
86-73-7	Fluorene	9.10E-02	J	9.10E-02	J	mg/kg	LWMCU-101-SE-0-6	1/21	2.30E-01 - 3.50E-01	9.10E-02	NA	4.95E+02	N	2.30E+02	RSL	No	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	1.60E-01	J	1.60E-01	J	mg/kg	LWMCU-101-SE-0-6	1/21	2.30E-01 - 3.50E-01	1.60E-01	NA	1.59E+00	C	1.50E-01	RSL	No	BSL
91-20-3	Naphthalene	8.60E-02	J	8.60E-02	J	mg/kg	LWMCU-101-SE-0-6	1/21	2.30E-01 - 3.50E-01	8.60E-02	NA	2.47E+02	N	3.80E+00	RSL	No	BSL
85-01-8	Phenanthrene	5.10E-01		5.10E-01		mg/kg	LWMCU-101-SE-0-6	1/21	2.30E-01 - 3.50E-01	5.10E-01	NA	3.71E+02	N	1.70E+02	RSL	No	BSL
129-00-0	Pyrene	4.60E-01		4.60E-01		mg/kg	LWMCU-101-SE-0-6	1/21	2.30E-01 - 3.50E-01	4.60E-01	NA	3.71E+02	N	1.70E+02	RSL	No	BSL
							PCBS										
11104-28-2	Aroclor-1221	2.10E-03		2.10E-03		mg/kg	LWMCU-130-SE-6-12	1/94	1.10E-03 - 2.50E-01	2.10E-03	NA	2.30E-01	N	1.50E-01	RSL	No	BSL
53469-21-9	Aroclor-1242	1.70E-01		1.70E-01		mg/kg	LWMCU-138-SE-0-6	1/94	1.10E-03 - 2.50E-01	1.70E-01	NA	2.30E-01	N	2.40E-01	RSL	No	BSL
12672-29-6	Aroclor-1248	1.00E-03	J	1.00E-03	J	mg/kg	LWMCU-137-SE-0-6	1/94	1.10E-03 - 2.50E-01	1.00E-03	NA	2.30E-01	N	2.40E-01	RSL	No	BSL
11097-69-1	**Aroclor-1254**	**1.20E-03**	**J**	**1.10E+01**		**mg/kg**	**LWMCU-160-SE-0-6**	**77/94**	**1.20E-03 - 2.50E-01**	**1.10E+01**	**NA**	**2.30E-01**	**N**	**1.10E-01**	**RSL**	**No**	**BSL**
11096-82-5	Aroclor-1260	2.60E-03		1.80E-01		mg/kg	LWMCU-138-SE-0-6	10/94	1.10E-03 - 2.50E-01	1.80E-01	NA	2.30E-01	N	2.40E-01	RSL	No	BSL
Total PCBs	**Total PCB Congeners**	**3.30E-04**		**6.10E+00**		**mg/kg**	**LWMCU-160-SE-0-6**	**19/19**	**2.00E-06 - 2.21E-01**	**6.10E+00**	**NA**	**2.30E-01**	**N**	**NA**	**NA**	**No**	**BSL**

TABLE 6
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
LOWER WEST MAIN CANAL UNLINED - SEDIMENT

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Lower West Main Canal Unlined

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
PESTICIDES																	
72-55-9	4,4´-DDE	2.10E-03	J	1.70E-02		mg/kg	LWMCU-115-SE-0-6	21/21	4.40E-03 - 6.70E-03	1.70E-02	NA	8.66E+00	C	1.60E+00	RSL	No	BSL
50-29-3	4,4´-DDT	2.00E-03	J	6.10E-02	J	mg/kg	LWMCU-115-SE-0-6	17/21	4.40E-03 - 6.70E-03	6.10E-02	NA	8.66E+00	C	1.90E+00	RSL	No	BSL
5103-71-9	alpha-Chlordane	1.50E-03	J	2.40E-03	J	mg/kg	LWMCU-101-SE-0-6	3/21	2.30E-03 - 3.50E-03	2.40E-03	NA	4.06E+00	C	1.80E+00	RSL	No	BSL
319-85-7	beta-BHC	2.10E-03	J	2.10E-03	J	mg/kg	LWMCU-103-SE-0-6	1/21	2.30E-03 - 3.50E-03	2.10E-03	NA	1.42E+00	C	3.00E-01	RSL	No	BSL
319-86-8	delta-BHC	9.80E-04	J	9.90E-04	J	mg/kg	LWMCU-103-SE-0-6	2/21	2.30E-03 - 3.50E-03	9.90E-04	NA	1.42E+00	C	8.50E-02	RSL	No	BSL
60-57-1	Dieldrin	1.90E-03	J	1.90E-02	J	mg/kg	LWMCU-101-SE-0-6	6/21	4.40E-03 - 6.70E-03	1.90E-02	NA	8.88E-02	C	3.30E-02	RSL	No	BSL
959-98-8	Endosulfan I	8.30E-04	J	2.10E-03	J	mg/kg	LWMCU-115-SE-0-6	3/21	2.30E-03 - 3.50E-03	2.10E-03	NA	3.06E+01	N	3.70E+01	RSL	No	BSL
33213-65-9	Endosulfan II	1.60E-03	J	6.10E-03	J	mg/kg	LWMCU-101-SE-0-6	6/21	4.40E-03 - 6.70E-03	6.10E-03	NA	9.19E+01	N	3.70E+01	RSL	No	BSL
72-20-8	Endrin	1.50E-03	J/J/J	8.60E-03	J	mg/kg	LWMCU-101-SE-0-6	7/21	4.40E-03 - 6.70E-03	8.60E-03	NA	4.59E+00	N	1.80E+00	RSL	No	BSL
7421-93-4	Endrin aldehyde	2.10E-03	J	6.50E-03		mg/kg	LWMCU-101-SE-0-6	5/21	4.40E-03 - 6.70E-03	6.50E-03	NA	4.59E+00	N	1.80E+00	RSL	No	BSL
58-89-9	gamma-BHC (Lindane)	5.80E-04	J	5.80E-04	J	mg/kg	LWMCU-114-SE-0-6	1/21	2.30E-03 - 3.50E-03	5.80E-04	NA	1.96E+00	C	5.60E-01	RSL	No	BSL
5103-74-2	gamma-Chlordane	8.20E-04	J	1.80E-02	J	mg/kg	LWMCU-115-SE-0-6	20/21	2.30E-03 - 3.50E-03	1.80E-02	NA	4.06E+00	C	1.80E+00	RSL	No	BSL
1024-57-3	Heptachlor epoxide	7.40E-04	J	8.60E-03	J	mg/kg	LWMCU-115-SE-0-6	14/21	2.30E-03 - 3.50E-03	8.60E-03	NA	1.56E-01	C	5.90E-02	RSL	No	BSL
SVOCS																	
117-81-7	Bis(2-ethylhexyl)phthalate	2.00E-01	J	6.70E-01	J	mg/kg	LWMCU-103-SE-6-12	2/21	2.30E-01 - 3.50E-01	6.70E-01	NA	2.44E+01	C	3.80E+01	RSL	No	BSL
86-74-8	Carbazole	8.60E-02	J	8.60E-02	J	mg/kg	LWMCU-101-SE-0-6	1/21	2.30E-01 - 3.50E-01	8.60E-02	NA	7.10E+01	C	NA	NA	No	BSL
84-74-2	Di-n-butyl phthalate	2.00E-01	J	2.00E-01	J	mg/kg	LWMCU-110-SE-0-6	1/21	2.30E-01 - 3.50E-01	2.00E-01	NA	1.53E+03	N	6.20E+02	RSL	No	BSL
108-95-2	Phenol	4.30E-02	J	8.30E-02	J	mg/kg	LWMCU-110-SE-0-6	3/21	2.30E-01 - 3.50E-01	8.30E-02	NA	4.59E+03	N	1.80E+03	RSL	No	BSL
VOCS																	
98-86-2	Acetophenone	5.60E-02	J	1.20E-01	J	mg/kg	LWMCU-110-SE-0-6	3/21	2.30E-01 - 3.50E-01	1.20E-01	NA	1.53E+03	N	7.80E+02	RSL	No	BSL

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.
(4) TCEQ Protective Concentration Levels (PCLs), March 2006, Tier 1 Sediment, TotSedComb. For non-carcinogens 1/10th the PCL is used.
(5) Rationale Codes
Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Definitions:
C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
NA = Not Applicable

Data Qualifiers: J = Indicates an estimated value

TABLE 7
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
RESERVOIR NO. 3 EAST - SEDIMENT

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Reservoir No. 3 East

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
							INORGANICS									
7429-90-5	**Aluminum**	**1.81E+04**		**1.81E+04**		**mg/kg**	**RN3E-101-SE-0-6**	**1/1**	**7.28E+01 - 7.28E+01**	**1.81E+04**	**NA**	**1.53E+04 N**	**NA**	**NA**	**Yes**	**ASL**
7440-38-2	Arsenic	4.00E+00		4.00E+00		mg/kg	RN3E-101-SE-0-6	1/1	1.30E+00 - 1.30E+00	4.00E+00	NA	1.15E+01 N	NA	NA	No	BSL
7440-39-3	Barium	1.70E+02		1.70E+02		mg/kg	RN3E-101-SE-0-6	1/1	1.32E+01 - 1.32E+01	1.70E+02	NA	2.29E+03 N	NA	NA	No	BSL
7440-43-9	Cadmium	3.20E-01	J	3.20E-01	J	mg/kg	RN3E-101-SE-0-6	1/1	1.30E+00 - 1.30E+00	3.20E-01	NA	1.09E+02 N	NA	NA	No	BSL
7440-70-2	Calcium	1.14E+05		1.14E+05		mg/kg	RN3E-101-SE-0-6	1/1	4.55E+03 - 4.55E+03	1.14E+05	NA	NA	NA	NA	No	NUT
7440-47-3	Chromium	9.90E+00		9.90E+00		mg/kg	RN3E-101-SE-0-6	1/1	2.60E+00 - 2.60E+00	9.90E+00	NA	3.65E+03 N	NA	NA	No	BSL
7440-48-4	Cobalt	6.10E+00		6.10E+00		mg/kg	RN3E-101-SE-0-6	1/1	1.30E+00 - 1.30E+00	6.10E+00	NA	3.20E+03 N	NA	NA	No	BSL
7440-50-8	Copper	1.01E+01		1.01E+01		mg/kg	RN3E-101-SE-0-6	1/1	2.60E+00 - 2.60E+00	1.01E+01	NA	2.13E+03 N	NA	NA	No	BSL
7439-89-6	Iron	1.66E+04		1.66E+04		mg/kg	RN3E-101-SE-0-6	1/1	1.82E+01 - 1.82E+01	1.66E+04	NA	NA	NA	NA	No	BSL
7439-92-1	Lead	1.01E+01	J	1.01E+01	J	mg/kg	RN3E-101-SE-0-6	1/1	1.30E+00 - 1.30E+00	1.01E+01	NA	5.00E+02	NA	NA	No	BSL
7439-95-4	Magnesium	6.70E+03		6.70E+03		mg/kg	RN3E-101-SE-0-6	1/1	9.10E+02 - 9.10E+02	6.70E+03	NA	NA	NA	NA	No	NUT
7439-96-5	Manganese	2.69E+02	J	2.69E+02	J	mg/kg	RN3E-101-SE-0-6	1/1	1.30E+00 - 1.30E+00	2.69E+02	NA	1.40E+03 N	NA	NA	No	BSL
7440-02-2	Nickel	1.12E+01		1.12E+01		mg/kg	RN3E-101-SE-0-6	1/1	1.30E+00 - 1.30E+00	1.12E+01	NA	1.40E+02 N	NA	NA	No	BSL
7440-09-7	Potassium	4.15E+03		4.15E+03		mg/kg	RN3E-101-SE-0-6	1/1	9.10E+02 - 9.10E+02	4.15E+03	NA	NA	NA	NA	No	NUT
7440-23-5	Sodium	5.66E+02	J	5.66E+02	J	mg/kg	RN3E-101-SE-0-6	1/1	9.10E+02 - 9.10E+02	5.66E+02	NA	NA	NA	NA	No	NUT
7440-62-2	Vanadium	2.04E+01		2.04E+01		mg/kg	RN3E-101-SE-0-6	1/1	6.60E+00 - 6.60E+00	2.04E+01	NA	3.29E+01 N	NA	NA	No	BSL
7440-66-6	Zinc	4.08E+01	J	4.08E+01	J	mg/kg	RN3E-101-SE-0-6	1/1	2.60E+00 - 2.60E+00	4.08E+01	NA	7.60E+03 N	NA	NA	No	BSL
							PCBS									
11096-82-5	Aroclor-1260	1.70E-03	J	2.80E-03	J	mg/kg	RN3E-104-SE-0-6	2/5	9.30E-03 - 1.40E-02	2.80E-03	NA	2.30E-01 N	NA	NA	No	BSL
Total PCBs	Total PCB Congeners	3.70E-03		3.70E-03		mg/kg	RN3E-101-SE-0-6	1/1	1.38E-01 - 1.38E-01	3.70E-03	NA	2.30E-01 N	NA	NA	No	BSL
							PESTICIDES									
72-54-8	4,4′-DDD	3.70E-03	J	3.70E-03	J	mg/kg	RN3E-101-SE-0-6	1/1	4.60E-03 - 4.60E-03	3.70E-03	NA	1.23E+02 C	NA	NA	No	BSL
72-55-9	4,4′-DDE	6.40E-02		6.40E-02		mg/kg	RN3E-101-SE-0-6	1/1	4.60E-03 - 4.60E-03	6.40E-02	NA	8.66E+01 C	NA	NA	No	BSL
50-29-3	4,4′-DDT	3.50E-03	J	3.50E-03	J	mg/kg	RN3E-101-SE-0-6	1/1	4.60E-03 - 4.60E-03	3.50E-03	NA	8.66E+01 C	NA	NA	No	BSL
319-84-6	alpha-BHC	6.50E-04	J	6.50E-04	J	mg/kg	RN3E-101-SE-0-6	1/1	2.40E-03 - 2.40E-03	6.50E-04	NA	4.05E+00 C	NA	NA	No	BSL
5103-71-9	alpha-Chlordane	1.10E-03	J	1.10E-03	J	mg/kg	RN3E-101-SE-0-6	1/1	2.40E-03 - 2.40E-03	1.10E-03	NA	4.06E+01 C	NA	NA	No	BSL
60-57-1	Dieldrin	7.50E-03	J	7.50E-03	J	mg/kg	RN3E-101-SE-0-6	1/1	4.60E-03 - 4.60E-03	7.50E-03	NA	8.88E-01 C	NA	NA	No	BSL
7421-93-4	Endrin aldehyde	3.20E-03	J	3.20E-03	J	mg/kg	RN3E-101-SE-0-6	1/1	4.60E-03 - 4.60E-03	3.20E-03	NA	4.59E+01 N	NA	NA	No	BSL
5103-74-2	gamma-Chlordane	2.90E-03		2.90E-03		mg/kg	RN3E-101-SE-0-6	1/1	2.40E-03 - 2.40E-03	2.90E-03	NA	4.06E+01 C	NA	NA	No	BSL
1024-57-3	Heptachlor epoxide	7.80E-04	J	7.80E-04	J	mg/kg	RN3E-101-SE-0-6	1/1	2.40E-03 - 2.40E-03	7.80E-04	NA	1.56E+00 C	NA	NA	No	BSL
							SVOCS									
117-81-7	Bis(2-ethylhexyl)phthalate	1.10E-01	J	1.10E-01	J	mg/kg	RN3E-101-SE-0-6	1/1	2.40E-01 - 2.40E-01	1.10E-01	NA	2.44E+02 C	NA	NA	No	BSL
85-68-7	Butylbenzylphthalate	9.90E-01	J	9.90E-01	J	mg/kg	RN3E-101-SE-0-6	1/1	2.40E-01 - 2.40E-01	9.90E-01	NA	3.06E+03 N	NA	NA	No	BSL

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.
(4) TCEQ Protective Concentration Levels (PCLs), March 2006, Tier 1 Sediment, TotSedComb. For non-carcinogens 1/10th the PCL is used.
(5) Rationale Codes
Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Definitions:
C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
mg/kg = milligrams per kilogram

Data Qualifiers: J = Indicates an estimated value

TABLE 8
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
RESERVOIR NO. 3 WEST - SEDIMENT

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Reservoir No. 3 West

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value		Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
							INORGANICS										
7429-90-5	**Aluminum**	**1.31E+04**		**2.32E+04**		**mg/kg**	**RN3W-101-SE-6-12**	**8/8**	**2.65E+01 - 8.43E+01**	**2.32E+04**	**NA**	**1.53E+04**	**N**	**NA**	**NA**	**Yes**	**ASL**
7440-38-2	Arsenic	4.00E+00		5.40E+00		mg/kg	RN3W-101-SE-6-12	8/8	5.90E-01 - 1.10E+00	5.40E+00	NA	1.15E+01	N	NA	NA	No	BSL
7440-39-3	Barium	1.43E+02		1.81E+02		mg/kg	RN3W-103-SE-0-6	8/8	5.90E+00 - 1.11E+01	1.81E+02	NA	2.29E+03	N	NA	NA	No	BSL
7440-43-9	Cadmium	3.20E-01	J	4.70E-01	J	mg/kg	RN3W-101-SE-6-12	8/8	5.90E-01 - 1.10E+00	4.70E-01	NA	1.09E+02	N	NA	NA	No	BSL
7440-70-2	Calcium	8.40E+04		2.11E+05		mg/kg	RN3W-103-SE-0-6	8/8	1.99E+03 - 6.03E+03	2.11E+05	NA	NA		NA	NA	No	NUT
7440-47-3	Chromium	8.50E+00		1.20E+01		mg/kg	RN3W-101-SE-6-12	8/8	1.20E+00 - 2.20E+00	1.20E+01	NA	3.65E+03	N	NA	NA	No	BSL
7440-48-4	Cobalt	4.70E+00		6.20E+00		mg/kg	RN3W-101-SE-6-12	8/8	5.90E-01 - 1.10E+00	6.20E+00	NA	3.20E+03	N	NA	NA	No	BSL
7440-50-8	Copper	8.50E+00		1.30E+01		mg/kg	RN3W-101-SE-6-12	8/8	1.20E+00 - 2.20E+00	1.30E+01	NA	2.13E+03	N	NA	NA	No	BSL
7439-89-6	Iron	1.40E+04		2.12E+04		mg/kg	RN3W-101-SE-6-12	8/8	1.33E+01 - 2.41E+01	2.12E+04	NA	NA		NA	NA	No	BSL
7439-92-1	Lead	8.80E+00	J	1.30E+01	J	mg/kg	RN3W-101-SE-6-12, RN3W-102-SE-6-12	8/8	5.90E-01 - 1.60E+00	1.30E+01	NA	5.00E+02		NA	NA	No	BSL
7439-95-4	Magnesium	4.80E+03		7.62E+03		mg/kg	RN3W-101-SE-6-12	8/8	6.63E+02 - 1.21E+03	7.62E+03	NA	NA		NA	NA	No	NUT
7439-96-5	Manganese	3.62E+02	J	4.51E+02	J	mg/kg	RN3W-105-SE-0-6	8/8	5.90E-01 - 1.10E+00	4.51E+02	NA	1.40E+03	N	NA	NA	No	BSL
7439-97-6	Mercury	2.70E-02	J	6.00E-02	J	mg/kg	RN3W-102-SE-6-12	8/8	1.70E-01 - 2.50E-01	6.00E-02	NA	3.40E+00	N	NA	NA	No	BSL
7440-02-2	Nickel	8.60E+00		1.23E+01		mg/kg	RN3W-101-SE-6-12	8/8	5.90E-01 - 1.10E+00	1.23E+01	NA	1.40E+02	N	NA	NA	No	BSL
7440-09-7	Potassium	3.10E+03		5.23E+03		mg/kg	RN3W-101-SE-6-12	8/8	6.63E+02 - 1.21E+03	5.23E+03	NA	NA		NA	NA	No	NUT
7782-49-2	Selenium	2.00E-01	J	3.10E-01	J	mg/kg	RN3W-101-SE-6-12	7/8	3.00E+00 - 5.60E+00	3.10E-01	NA	2.66E+02	N	NA	NA	No	BSL
7440-23-5	Sodium	3.65E+02	J	1.18E+03	J	mg/kg	RN3W-103-SE-0-6	8/8	6.63E+02 - 1.21E+03	1.18E+03	NA	NA		NA	NA	No	NUT
7440-62-2	Vanadium	1.66E+01		2.40E+01		mg/kg	RN3W-101-SE-6-12	8/8	3.00E+00 - 5.60E+00	2.40E+01	NA	3.30E+01	N	NA	NA	No	BSL
7440-66-6	Zinc	3.85E+01	J	5.38E+01	J	mg/kg	RN3W-101-SE-6-12	8/8	1.20E+00 - 2.20E+00	5.38E+01	NA	7.60E+03	N	NA	NA	No	BSL
							PCBS										
11097-69-1	Aroclor-1254	2.00E-03	J	3.30E-03	J	mg/kg	RN3W-103-SE-0-6	5/11	1.50E-03 - 8.50E-03	3.30E-03	NA	2.30E-01	N	NA	NA	No	BSL
Total PCBs	Total PCB Congeners	2.80E-04	J	1.00E-02		mg/kg	RN3W-102-SE	5/5	2.90E-06 - 2.05E-01	1.00E-02	NA	2.30E-01	N	NA	NA	No	BSL
							PESTICIDES										
72-55-9	4,4'-DDE	1.80E-03	J	1.20E-02		mg/kg	RN3W-103-SE-0-6	6/8	5.40E-03 - 7.80E-03	1.20E-02	NA	8.66E+01	C	NA	NA	No	BSL
5103-74-2	gamma-Chlordane	9.20E-04	J	9.20E-04	J	mg/kg	RN3W-101-SE-6-12	1/8	2.80E-03 - 4.00E-03	9.20E-04	NA	4.06E+01	C	NA	NA	No	BSL

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.
(4) TCEQ Protective Concentration Levels (PCLs), March 2006, Tier 1 Sediment, TotSedComb. For non-carcinogens 1/10th the PCL is used.
(5) Rationale Codes
Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Definitions:
C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
mg/kg = milligrams per kilogram

Data Qualifiers: J = Indicates an estimated value

Surrogates used: .

TABLE 9
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
CROSS OVER MAIN CANAL - SEDIMENT

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Cross Over Main Canal

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
							INORGANICS									
7429-90-5	**Aluminum**	**1.89E+04**	**J**	**2.62E+04**	**J**	**mg/kg**	**COMC-104-SE-0-6**	**5/5**	**5.89E+01 - 9.84E+01**	**2.62E+04**	**NA**	**1.50E+04 N**	**NA**	**NA**	**Yes**	**ASL**
7440-38-2	Arsenic	3.60E+00	J	4.30E+00	J	mg/kg	COMC-105-SE-0-6	5/5	4.70E-01 - 8.60E-01	4.30E+00	NA	1.10E+01 N	NA	NA	No	BSL
7440-39-3	Barium	1.67E+02	J	2.14E+02	J	mg/kg	COMC-105-SE-0-6	5/5	4.60E+00 - 4.90E+00	2.14E+02	NA	2.30E+03 N	NA	NA	No	BSL
7440-41-7	Beryllium	7.40E-01	J	1.00E+00	J	mg/kg	COMC-105-SE-0-6	5/5	4.60E-01 - 4.90E-01	1.00E+00	NA	2.70E+00 N	NA	NA	No	BSL
7440-43-9	Cadmium	3.90E-01	J	5.10E-01	J	mg/kg	COMC-105-SE-0-6	5/5	4.70E-01 - 8.60E-01	5.10E-01	NA	1.10E+02 N	NA	NA	No	BSL
7440-70-2	Calcium	8.02E+04	J	1.25E+05	J	mg/kg	COMC-105-SE-0-6	5/5	2.91E+03 - 5.00E+03	1.25E+05	NA	NA	NA	NA	No	NUT
7440-47-3	Chromium	1.18E+01	J	1.52E+01	J	mg/kg	COMC-105-SE-0-6	5/5	9.10E-01 - 9.80E-01	1.52E+01	NA	3.60E+03 N	NA	NA	No	BSL
7440-48-4	Cobalt	5.70E+00	J	6.60E+00	J	mg/kg	COMC-101-SE-0-6	5/5	4.70E-01 - 8.60E-01	6.60E+00	NA	3.20E+03 N	NA	NA	No	BSL
7440-50-8	Copper	1.05E+01	J	1.30E+01	J	mg/kg	COMC-101-SE-0-6	5/5	9.10E-01 - 9.80E-01	1.30E+01	NA	2.10E+03 N	NA	NA	No	BSL
7439-89-6	Iron	1.68E+04	J	2.34E+04	J	mg/kg	COMC-104-SE-0-6	5/5	9.80E+00 - 3.00E+01	2.34E+04	NA	NA	NA	NA	No	BSL
7439-92-1	Lead	1.59E+01	J	2.48E+01	J	mg/kg	COMC-103-SE-0-6	5/5	4.70E-01 - 8.60E-01	2.48E+01	NA	5.00E+02	NA	NA	No	BSL
7439-95-4	Magnesium	6.46E+03	J	9.00E+03	J	mg/kg	COMC-104-SE-0-6	5/5	4.76E+02 - 9.71E+02	9.00E+03	NA	NA	NA	NA	No	NUT
7439-96-5	Manganese	3.63E+02	J	5.09E+02	J	mg/kg	COMC-105-SE-0-6	5/5	4.60E-01 - 4.90E-01	5.09E+02	NA	1.40E+03 N	NA	NA	No	BSL
7439-97-6	Mercury	3.10E-02	J	4.60E-02	J	mg/kg	COMC-105-SE-0-6	5/5	9.90E-02 - 1.00E-01	4.60E-02	NA	3.40E+00 N	NA	NA	No	BSL
7440-02-2	Nickel	1.19E+01	J	1.45E+01	J	mg/kg	COMC-105-SE-0-6	5/5	4.60E-01 - 4.90E-01	1.45E+01	NA	1.40E+02 N	NA	NA	No	BSL
7440-09-7	Potassium	4.78E+03	J	6.03E+03	J	mg/kg	COMC-104-SE-0-6	5/5	4.76E+02 - 9.71E+02	6.03E+03	NA	NA	NA	NA	No	NUT
7782-49-2	Selenium	2.10E-01	J	4.80E-01	J	mg/kg	COMC-103-SE-0-6	5/5	2.30E+00 - 2.50E+00	4.80E-01	NA	2.66E+02 N	NA	NA	No	BSL
7440-23-5	Sodium	8.53E+02	J	1.03E+03	J	mg/kg	COMC-105-SE-0-6	5/5	4.76E+02 - 9.71E+02	1.03E+03	NA	NA	NA	NA	No	NUT
7440-62-2	Vanadium	2.13E+01	J	2.84E+01	J	mg/kg	COMC-105-SE-0-6	5/5	2.30E+00 - 4.30E+00	2.84E+01	NA	3.30E+01 N	NA	NA	No	BSL
7440-66-6	Zinc	5.04E+01	J	5.93E+01	J	mg/kg	COMC-105-SE-0-6	5/5	9.10E-01 - 9.80E-01	5.93E+01	NA	7.60E+03 N	NA	NA	No	BSL
							PAHS									
91-57-6	2-Methylnaphthalene	6.20E-02	J	6.20E-02	J	mg/kg	COMC-101-SE-0-6	1/5	2.20E-01 - 3.40E-01	6.20E-02	NA	4.95E+01 N	NA	NA	No	BSL
83-32-9	Acenaphthene	8.20E-01		8.20E-01		mg/kg	COMC-101-SE-0-6	1/5	2.20E-01 - 3.40E-01	8.20E-01	NA	7.42E+02 N	NA	NA	No	BSL
120-12-7	Anthracene	3.30E+00	J	3.30E+00	J	mg/kg	COMC-101-SE-0-6	1/5	2.20E-01 - 3.40E-01	3.30E+00	NA	3.71E+03 N	NA	NA	No	BSL
56-55-3	**Benzo(a)anthracene**	**7.10E-02**	**J**	**3.40E+01**		**mg/kg**	**COMC-101-SE-0-6**	**3/5**	**2.60E-01 - 2.20E+01**	**3.40E+01**	**NA**	**1.59E+01 C**	**NA**	**NA**	**Yes**	**ASL**
50-32-8	**Benzo(a)pyrene**	**5.50E-02**	**J**	**1.80E+01**	**J**	**mg/kg**	**COMC-101-SE-0-6**	**2/5**	**2.60E-01 - 2.20E+01**	**1.80E+01**	**NA**	**1.59E+00 C**	**NA**	**NA**	**Yes**	**ASL**
205-99-2	**Benzo(b)fluoranthene**	**8.80E-02**	**J**	**3.10E+01**		**mg/kg**	**COMC-101-SE-0-6**	**3/5**	**2.60E-01 - 2.20E+01**	**3.10E+01**	**NA**	**1.59E+01 C**	**NA**	**NA**	**Yes**	**ASL**
191-24-2	Benzo(g,h,i)perylene	5.00E+00	J	5.00E+00	J	mg/kg	COMC-101-SE-0-6	1/5	2.20E-01 - 3.40E-01	5.00E+00	NA	3.71E+02 N	NA	NA	No	BSL
207-08-9	Benzo(k)fluoranthene	2.00E+01	J	2.00E+01	J	mg/kg	COMC-101-SE-0-6	1/5	2.20E-01 - 3.40E-01	2.00E+01	NA	1.59E+02 C	NA	NA	No	BSL
218-01-9	Chrysene	6.40E-02	J	3.40E+01		mg/kg	COMC-101-SE-0-6	3/5	2.60E-01 - 2.20E+01	3.40E+01	NA	1.59E+03 C	NA	NA	No	BSL
53-70-3	**Dibenzo(a,h)anthracene**	**2.40E+00**	**J**	**2.40E+00**	**J**	**mg/kg**	**COMC-101-SE-0-6**	**1/5**	**2.20E-01 - 3.40E-01**	**2.40E+00**	**NA**	**1.59E+00 C**	**NA**	**NA**	**Yes**	**ASL**
206-44-0	Fluoranthene	6.60E-02	J	5.10E+01		mg/kg	COMC-101-SE-0-6	3/5	2.60E-01 - 2.20E+01	5.10E+01	NA	4.95E+02 N	NA	NA	No	BSL
86-73-7	Fluorene	5.10E-01		5.10E-01		mg/kg	COMC-101-SE-0-6	1/5	2.20E-01 - 3.40E-01	5.10E-01	NA	4.95E+02 N	NA	NA	No	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	8.70E+00	J	8.70E+00	J	mg/kg	COMC-101-SE-0-6	1/5	2.60E-01 - 2.20E+01	8.70E+00	NA	1.59E+01 C	NA	NA	No	BSL
91-20-3	Naphthalene	4.00E-02	J	4.00E-02	J	mg/kg	COMC-101-SE-0-6	1/5	2.20E-01 - 3.40E-01	4.00E-02	NA	2.47E+02 N	NA	NA	No	BSL
85-01-8	Phenanthrene	7.10E-02	J	2.30E+01		mg/kg	COMC-101-SE-0-6	2/5	2.60E-01 - 2.20E+01	2.30E+01	NA	3.71E+02 N	NA	NA	No	BSL
129-00-0	Pyrene	3.60E+01		3.60E+01		mg/kg	COMC-101-SE-0-6	1/5	2.60E-01 - 2.20E+01	3.60E+01	NA	3.71E+02 N	NA	NA	No	BSL
							PCBS									
11097-69-1	Aroclor-1254	2.10E-03	J	8.20E-03	J	mg/kg	COMC-103-SE-0-6	3/8	1.20E-03 - 7.70E-03	8.20E-03	NA	2.30E-01 N	NA	NA	No	BSL
11096-82-5	Aroclor-1260	1.00E-03	J	1.00E-03	J	mg/kg	COMC-101-SE-0-6	1/8	1.20E-03 - 7.70E-03	1.00E-03	NA	2.30E-01 N	NA	NA	No	BSL
Total PCBs	Total PCB Congeners	1.60E-02		1.60E-02		mg/kg	COMC-101-SE-0-6	1/1	1.30E-05 - 1.30E-05	1.60E-02	NA	2.30E-01 N	NA	NA	No	BSL

TABLE 9

OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

CROSS OVER MAIN CANAL - SEDIMENT

Scenario Timeframe: Current
Medium: Sediment
Exposure Medium: Sediment
Exposure Point: Cross Over Main Canal

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration (2) Used for Screening	Background (3) Value	Screening (4) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (5) Contaminant Deletion or Selection
PESTICIDES																
72-54-8	4,4´-DDD	3.00E-03	J	3.00E-03	J	mg/kg	COMC-101-SE-0-6	1/5	4.20E-03 - 6.60E-03	3.00E-03	NA	1.23E+02 C	NA	NA	No	BSL
72-55-9	4,4´-DDE	1.40E-03	J	9.10E-02		mg/kg	COMC-103-SE-0-6	5/5	4.20E-03 - 9.90E-03	9.10E-02	NA	8.66E+01 C	NA	NA	No	BSL
50-29-3	4,4´-DDT	1.60E-03	J	5.70E-03		mg/kg	COMC-103-SE-0-6	2/5	4.20E-03 - 6.60E-03	5.70E-03	NA	8.66E+01 C	NA	NA	No	BSL
309-00-2	Aldrin	6.50E-04	J	6.50E-04	J	mg/kg	COMC-101-SE-0-6	1/5	2.10E-03 - 3.40E-03	6.50E-04	NA	8.36E-01 C	NA	NA	No	BSL
319-84-6	alpha-BHC	6.70E-04	J	6.70E-04	J	mg/kg	COMC-101-SE-0-6	1/5	2.10E-03 - 3.40E-03	6.70E-04	NA	4.05E+00 C	NA	NA	No	BSL
5103-71-9	alpha-Chlordane	8.20E-04	J	1.30E-03	J	mg/kg	COMC-101-SE-0-6	2/5	2.10E-03 - 3.40E-03	1.30E-03	NA	4.06E+01 C	NA	NA	No	BSL
319-86-8	delta-BHC	9.30E-04	J	3.00E-03		mg/kg	COMC-101-SE-0-6	2/5	2.10E-03 - 3.40E-03	3.00E-03	NA	1.42E+01 C	NA	NA	No	BSL
33213-65-9	Endosulfan II	2.30E-03	J	6.00E-03	J	mg/kg	COMC-101-SE-0-6	2/5	4.20E-03 - 6.60E-03	6.00E-03	NA	9.19E+01 N	NA	NA	No	BSL
1031-07-8	Endosulfan sulfate	1.70E-03	J	1.70E-03	J	mg/kg	COMC-101-SE-0-6	1/5	4.10E-03 - 6.60E-03	1.70E-03	NA	9.19E+01 N	NA	NA	No	BSL
72-20-8	Endrin	1.30E-03	J	1.30E-03	J	mg/kg	COMC-101-SE-0-6	1/5	4.20E-03 - 6.60E-03	1.30E-03	NA	4.59E+00 N	NA	NA	No	BSL
7421-93-4	Endrin aldehyde	3.80E-03	J	5.60E-03		mg/kg	COMC-103-SE-0-6	2/5	4.20E-03 - 6.60E-03	5.60E-03	NA	4.59E+00 N	NA	NA	No	BSL
53494-70-5	Endrin ketone	2.10E-02	J	2.10E-02	J	mg/kg	COMC-101-SE-0-6	1/5	4.20E-03 - 6.60E-03	2.10E-02	NA	4.59E+00 N	NA	NA	No	BSL
58-89-9	gamma-BHC (Lindane)	9.40E-04	J	9.40E-04	J	mg/kg	COMC-101-SE-0-6	1/5	2.10E-03 - 3.40E-03	9.40E-04	NA	1.96E+01 C	NA	NA	No	BSL
5103-74-2	gamma-Chlordane	1.20E-03	J	2.40E-03	J	mg/kg	COMC-101-SE-0-6	4/5	2.20E-03 - 3.40E-03	2.40E-03	NA	4.06E+01 C	NA	NA	No	BSL
76-44-8	Heptachlor	3.90E-03		3.90E-03		mg/kg	COMC-101-SE-0-6	1/5	2.20E-03 - 3.40E-03	3.90E-03	NA	3.16E+00 C	NA	NA	No	BSL
1024-57-3	Heptachlor epoxide	9.70E-04	J	1.80E-03	J	mg/kg	COMC-101-SE-0-6	3/5	2.10E-03 - 3.40E-03	1.80E-03	NA	1.56E+00 C	NA	NA	No	BSL
72-43-5	Methoxychlor	3.00E-02	J	3.00E-02	J	mg/kg	COMC-101-SE-0-6	1/5	2.20E-02 - 3.40E-02	3.00E-02	NA	7.65E+01 N	NA	NA	No	BSL
SVOCS																
86-74-8	Carbazole	2.40E+00	J	2.40E+00	J	mg/kg	COMC-101-SE-0-6	1/5	2.20E-01 - 3.40E-01	2.40E+00	NA	7.10E+02 C	NA	NA	No	BSL
132-64-9	Dibenzofuran	3.50E-01		3.50E-01		mg/kg	COMC-101-SE-0-6	1/5	2.20E-01 - 3.40E-01	3.50E-01	NA	6.12E+01 N	NA	NA	No	BSL

(1) Minimum/maximum detected concentration.
(2) Maximum concentration used as screening value.
(3) Background values are not included as part of the COPC selection process.
(4) TCEQ Protective Concentration Levels (PCLs), March 2006, Tier 1 Sediment, TotSedComb. For non-carcinogens 1/10th the PCL is used.
(5) Rationale Codes
Selection Reason: ASL = Above Screening Toxicity Level
Deletion Reason: BSL = Below Screening Toxicity Level
NSL = No Screening Toxicity Level
NUT = Essential Nutrient

Definitions:
C = Carcinogenic
COPC = Chemical of Potential Concern
N = Non-Carcinogenic
mg/kg = milligrams per kilogram

Data Qualifiers: J = Indicates an estimated value

Surrogates used: Methylmercury for mercury, chlordane for alpha- and gamma-chlordane, endosulfan for endosulfan II and endosulfan sulfate, endrin for endrin aldehyde and endrin ketone.

ATTACHMENT 3

ProUCL OUTPUTS

FISH TISSUE – ALL RESULTS

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	9/6/2015 5:13:02 PM
From File	All fish inputs.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	10000

gamma-Chlordane-fish

General Statistics

Total Number of Observations	10	Number of Distinct Observations	9
Number of Detects	9	Number of Non-Detects	1
Number of Distinct Detects	9	Number of Distinct Non-Detects	1
Minimum Detect	8.9000E-5	Minimum Non-Detect	1.7000E-4
Maximum Detect	0.037	Maximum Non-Detect	1.7000E-4
Variance Detects	1.3689E-4	Percent Non-Detects	10%
Mean Detects	0.0105	SD Detects	0.0117
Median Detects	0.0091	CV Detects	1.119
Skewness Detects	1.573	Kurtosis Detects	3.037
Mean of Logged Detects	-5.843	SD of Logged Detects	2.332

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.834	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.829	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.188	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.295	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.00942	Standard Error of Mean	0.00366
SD	0.0109	95% KM (BCA) UCL	0.0157
95% KM (t) UCL	0.0161	95% KM (Percentile Bootstrap) UCL	0.0154
95% KM (z) UCL	0.0154	95% KM Bootstrap t UCL	0.0201
90% KM Chebyshev UCL	0.0204	95% KM Chebyshev UCL	0.0254
97.5% KM Chebyshev UCL	0.0323	99% KM Chebyshev UCL	0.0459

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.62	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.771	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.244	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.294	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.496	k star (bias corrected MLE)	0.405
Theta hat (MLE)	0.0211	Theta star (bias corrected MLE)	0.0259
nu hat (MLE)	8.923	nu star (bias corrected)	7.282
MLE Mean (bias corrected)	0.0105	MLE Sd (bias corrected)	0.0164

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.745	nu hat (KM)	14.9
Approximate Chi Square Value (14.90, α)	7.191	Adjusted Chi Square Value (14.90, β)	6.283
95% Gamma Approximate KM-UCL (use when n>=50)	0.0195	95% Gamma Adjusted KM-UCL (use when n<50)	0.0223

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	8.9000E-5	Mean	0.0104
Maximum	0.037	Median	0.0095
SD	0.011	CV	1.059
k hat (MLE)	0.543	k star (bias corrected MLE)	0.447
Theta hat (MLE)	0.0192	Theta star (bias corrected MLE)	0.0233
nu hat (MLE)	10.86	nu star (bias corrected)	8.936
MLE Mean (bias corrected)	0.0104	MLE Sd (bias corrected)	0.0156
		Adjusted Level of Significance (β)	0.0267
Approximate Chi Square Value (8.94, α)	3.289	Adjusted Chi Square Value (8.94, β)	2.721
95% Gamma Approximate UCL (use when n>=50)	0.0283	95% Gamma Adjusted UCL (use when n<50)	0.0342

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.811	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.829	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.307	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.295	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.00942	Mean in Log Scale	-6.216
SD in Original Scale	0.0115	SD in Log Scale	2.494
95% t UCL (assumes normality of ROS data)	0.0161	95% Percentile Bootstrap UCL	0.0155
95% BCA Bootstrap UCL	0.0173	95% Bootstrap t UCL	0.02
95% H-UCL (Log ROS)	10.89		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.00942	Mean in Log Scale	-6.196
SD in Original Scale	0.0115	SD in Log Scale	2.466
95% t UCL (Assumes normality)	0.0161	95% H-Stat UCL	9.18

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.0161	95% KM (Percentile Bootstrap) UCL	0.0154

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Total PCBs-fish

General Statistics

Total Number of Observations	20	Number of Distinct Observations	18
		Number of Missing Observations	0
Minimum	0.005	Mean	9.444
Maximum	150	Median	0.225
SD	33.33	Std. Error of Mean	7.452
Coefficient of Variation	3.529	Skewness	4.369

Normal GOF Test

Shapiro Wilk Test Statistic	0.307	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.905	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.427	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.198	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	22.33	95% Adjusted-CLT UCL (Chen-1995)	29.48
		95% Modified-t UCL (Johnson-1978)	23.54

Gamma GOF Test

A-D Test Statistic	1.61	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.89	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.187	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.205	k star (bias corrected MLE)	0.208
Theta hat (MLE)	45.98	Theta star (bias corrected MLE)	45.42
nu hat (MLE)	8.217	nu star (bias corrected)	8.318
MLE Mean (bias corrected)	9.444	MLE Sd (bias corrected)	20.71
		Approximate Chi Square Value (0.05)	2.92
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	2.673

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	26.9	95% Adjusted Gamma UCL (use when n<50)	29.39

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.931	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.905	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.17	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.198	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-5.298	Mean of logged Data	-1.322
Maximum of Logged Data	5.011	SD of logged Data	2.953

Assuming Lognormal Distribution

95% H-UCL	1277	90% Chebyshev (MVUE) UCL	31.75
95% Chebyshev (MVUE) UCL	41.84	97.5% Chebyshev (MVUE) UCL	55.84
99% Chebyshev (MVUE) UCL	83.35		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	21.7	95% Jackknife UCL	22.33
95% Standard Bootstrap UCL	21.47	95% Bootstrap-t UCL	160
95% Hall's Bootstrap UCL	85.79	95% Percentile Bootstrap UCL	24.02
95% BCA Bootstrap UCL	32.42		
90% Chebyshev(Mean, Sd) UCL	31.8	95% Chebyshev(Mean, Sd) UCL	41.93
97.5% Chebyshev(Mean, Sd) UCL	55.98	99% Chebyshev(Mean, Sd) UCL	83.59

Suggested UCL to Use

95% Adjusted Gamma UCL	29.39

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	10000

TF_4,4´-DDE

General Statistics

Number of Valid Observations	10	Number of Distinct Observations	9
Raw Statistics		**Log-transformed Statistics**	
Minimum	0.014	Minimum of Log Data	-4.269
Maximum	0.097	Maximum of Log Data	-2.333
Mean	0.0466	Mean of log Data	-3.284
Geometric Mean	0.0375	SD of log Data	0.709
Median	0.036		
SD	0.0312		
Std. Error of Mean	0.00985		
Coefficient of Variation	0.669		
Skewness	0.613		

Relevant UCL Statistics

Normal Distribution Test		**Lognormal Distribution Test**	
Shapiro Wilk Test Statistic	0.869	Shapiro Wilk Test Statistic	0.914
Shapiro Wilk Critical Value	0.842	Shapiro Wilk Critical Value	0.842
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
95% Student's-t UCL	0.0647	95% H-UCL	0.088
95% UCLs (Adjusted for Skewness)		95% Chebyshev (MVUE) UCL	0.094
95% Adjusted-CLT UCL (Chen-1995)	0.0648	97.5% Chebyshev (MVUE) UCL	0.114
95% Modified-t UCL (Johnson-1978)	0.065	99% Chebyshev (MVUE) UCL	0.155
Gamma Distribution Test		**Data Distribution**	
k star (bias corrected)	1.782	**Data appear Normal at 5% Significance Level**	
Theta Star	0.0261		
MLE of Mean	0.0466		
MLE of Standard Deviation	0.0349		
nu star	35.65		
Approximate Chi Square Value (.05)	22.98	**Nonparametric Statistics**	
Adjusted Level of Significance	0.0267	95% CLT UCL	0.0628
Adjusted Chi Square Value	21.23	95% Jackknife UCL	0.0647
		95% Standard Bootstrap UCL	0.0619
Anderson-Darling Test Statistic	0.459	95% Bootstrap-t UCL	0.0675
Anderson-Darling 5% Critical Value	0.734	95% Hall's Bootstrap UCL	0.0608
Kolmogorov-Smirnov Test Statistic	0.194	95% Percentile Bootstrap UCL	0.0625
Kolmogorov-Smirnov 5% Critical Value	0.269	95% BCA Bootstrap UCL	0.0639
Data appear Gamma Distributed at 5% Significance Level		95% Chebyshev(Mean, Sd) UCL	0.0895
		97.5% Chebyshev(Mean, Sd) UCL	0.108
Assuming Gamma Distribution		99% Chebyshev(Mean, Sd) UCL	0.145
95% Approximate Gamma UCL (Use when n >= 40)	0.0723		
95% Adjusted Gamma UCL (Use when n < 40)	0.0782		
Potential UCL to Use		Use 95% Student's-t UCL	0.0647

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL. These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002) and Singh and Singh (2003). For additional insight, the user may want to consult a statistician.

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	10000

TF_4,4´-DDT

General Statistics

Number of Valid Data	10	Number of Detected Data	7
Number of Distinct Detected Data	7	Number of Non-Detect Data	3
		Percent Non-Detects	30.00%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.00018	Minimum Detected	-8.623
Maximum Detected	0.13	Maximum Detected	-2.04
Mean of Detected	0.0228	Mean of Detected	-5.749
SD of Detected	0.0475	SD of Detected	2.38
Minimum Non-Detect	0.00042	Minimum Non-Detect	-7.775
Maximum Non-Detect	0.0017	Maximum Non-Detect	-6.377

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	6
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	4
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	60.00%

Warning: There are only 7 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.538	Shapiro Wilk Test Statistic	0.911
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0161	Mean	-6.285
SD	0.0402	SD	2.16
95% DL/2 (t) UCL	0.0395	95% H-Stat (DL/2) UCL	1.24
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-6.473
		SD in Log Scale	2.301
		Mean in Original Scale	0.0161
		SD in Original Scale	0.0403
		95% t UCL	0.0394
		95% Percentile Bootstrap UCL	0.0409
		95% BCA Bootstrap UCL	0.0539
		95% H-UCL	2.399

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.291	**Data appear Gamma Distributed at 5% Significance Level**	
Theta Star	0.0782		
nu star	4.078		
A-D Test Statistic	0.556	**Nonparametric Statistics**	
5% A-D Critical Value	0.777	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.777	Mean	0.016
5% K-S Critical Value	0.333	SD	0.0382
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0131
		95% KM (t) UCL	0.04
Assuming Gamma Distribution		95% KM (z) UCL	0.0375
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0394
Minimum	0.000001	95% KM (bootstrap t) UCL	0.176
Maximum	0.13	95% KM (BCA) UCL	0.0417
Mean	0.0159	95% KM (Percentile Bootstrap) UCL	0.0409
Median	0.000425	95% KM (Chebyshev) UCL	0.0729
SD	0.0403	97.5% KM (Chebyshev) UCL	0.0975
k star	0.196	99% KM (Chebyshev) UCL	0.146
Theta star	0.0813		
Nu star	3.921	**Potential UCLs to Use**	
AppChi2	0.691	95% KM (BCA) UCL	0.0417
95% Gamma Approximate UCL (Use when n >= 40)	0.0905		
95% Adjusted Gamma UCL (Use when n < 40)	0.126		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

For additional insight, the user may want to consult a statistician.

098305

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	10000

TF_Aldrin

General Statistics

Number of Valid Data	10	Number of Detected Data	5
Number of Distinct Detected Data	5	Number of Non-Detect Data	5
		Percent Non-Detects	50.00%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.000046	Minimum Detected	-9.987
Maximum Detected	0.0039	Maximum Detected	-5.547
Mean of Detected	0.00128	Mean of Detected	-7.934
SD of Detected	0.0017	SD of Detected	2.062
Minimum Non-Detect	0.00042	Minimum Non-Detect	-7.775
Maximum Non-Detect	0.0017	Maximum Non-Detect	-6.377

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	8
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	2
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	80.00%

Warning: There are only 5 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.812	Shapiro Wilk Test Statistic	0.875
5% Shapiro Wilk Critical Value	0.762	5% Shapiro Wilk Critical Value	0.762
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0009385	Mean	-7.782
SD	0.00121	SD	1.475
95% DL/2 (t) UCL	0.00164	95% H-Stat (DL/2) UCL	0.00953
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-8.595
		SD in Log Scale	1.67
		Mean in Original Scale	0.0007084
		SD in Original Scale	0.00128
		95% t UCL	0.00145
		95% Percentile Bootstrap UCL	0.00143
		95% BCA Bootstrap UCL	0.00167
		95% H-UCL	0.00971
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.333	**Data appear Normal at 5% Significance Level**	
Theta Star	0.00386		
nu star	3.326		
A-D Test Statistic	0.399	**Nonparametric Statistics**	
5% A-D Critical Value	0.711	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.711	Mean	0.0007107
5% K-S Critical Value	0.372	SD	0.00122
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0004341
		95% KM (t) UCL	0.00151
Assuming Gamma Distribution		95% KM (z) UCL	0.00142
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.00147
Minimum	0.000001	95% KM (bootstrap t) UCL	0.0043
Maximum	0.0039	95% KM (BCA) UCL	0.00161
Mean	0.0007473	95% KM (Percentile Bootstrap) UCL	0.00157
Median	0.0001845	95% KM (Chebyshev) UCL	0.0026
SD	0.00128	97.5% KM (Chebyshev) UCL	0.00342
k star	0.267	99% KM (Chebyshev) UCL	0.00503
Theta star	0.0028		
Nu star	5.337	**Potential UCLs to Use**	
AppChi2	1.311	95% KM (t) UCL	0.00151
95% Gamma Approximate UCL (Use when n >= 40)	0.00304	95% KM (Percentile Bootstrap) UCL	0.00157
95% Adjusted Gamma UCL (Use when n < 40)	0.00399		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	10000

TF_Aroclor-1254

General Statistics

Number of Valid Data	105	Number of Detected Data	35
Number of Distinct Detected Data	33	Number of Non-Detect Data	70
		Percent Non-Detects	66.67%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0042	Minimum Detected	-5.473
Maximum Detected	4.5	Maximum Detected	1.504
Mean of Detected	0.513	Mean of Detected	-1.776
SD of Detected	0.923	SD of Detected	1.518
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	0.163	Maximum Non-Detect	-1.814

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	90
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	15
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	85.71%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.573	Shapiro Wilk Test Statistic	0.962
5% Shapiro Wilk Critical Value	0.934	5% Shapiro Wilk Critical Value	0.934
Data not Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.182	Mean	-3.394
SD	0.578	SD	1.502
95% DL/2 (t) UCL	0.276	95% H-Stat (DL/2) UCL	0.155
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-4.608
		SD in Log Scale	2.586
		Mean in Original Scale	0.175
		SD in Original Scale	0.58
		95% t UCL	0.269
		95% Percentile Bootstrap UCL	0.277
		95% BCA Bootstrap UCL	0.309
		95% H-UCL	0.788

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.533	**Data appear Lognormal at 5% Significance Level**	
Theta Star	0.962		
nu star	37.34		
A-D Test Statistic	1.784	**Nonparametric Statistics**	
5% A-D Critical Value	0.806	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.806	Mean	0.178
5% K-S Critical Value	0.156	SD	0.576
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.0571
		95% KM (t) UCL	0.273
Assuming Gamma Distribution		95% KM (z) UCL	0.272
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.265
Minimum	0.000001	95% KM (bootstrap t) UCL	0.35
Maximum	4.5	95% KM (BCA) UCL	0.295
Mean	0.171	95% KM (Percentile Bootstrap) UCL	0.284
Median	0.000001	95% KM (Chebyshev) UCL	0.427
SD	0.581	97.5% KM (Chebyshev) UCL	0.534
k star	0.104	99% KM (Chebyshev) UCL	0.746
Theta star	1.638		
Nu star	21.92	**Potential UCLs to Use**	
AppChi2	12.28	95% KM (Chebyshev) UCL	0.427
95% Gamma Approximate UCL (Use when n >= 40)	0.305		
95% Adjusted Gamma UCL (Use when n < 40)	0.308		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	10000

TF_Aroclor-1260

General Statistics

Number of Valid Data	104	Number of Detected Data	18
Number of Distinct Detected Data	14	Number of Non-Detect Data	86
		Percent Non-Detects	82.69%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.037	Minimum Detected	-3.297
Maximum Detected	3.6	Maximum Detected	1.281
Mean of Detected	0.431	Mean of Detected	-1.628
SD of Detected	0.829	SD of Detected	1.108
Minimum Non-Detect	0.0041	Minimum Non-Detect	-5.497
Maximum Non-Detect	0.163	Maximum Non-Detect	-1.814

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	97
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	7
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	93.27%

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.464	Shapiro Wilk Test Statistic	0.886
5% Shapiro Wilk Critical Value	0.897	5% Shapiro Wilk Critical Value	0.897
Data not Normal at 5% Significance Level		**Data not Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0882	Mean	-3.789
SD	0.372	SD	1.224
95% DL/2 (t) UCL	0.149	95% H-Stat (DL/2) UCL	0.0642
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE yields a negative mean		Mean in Log Scale	-5.367
		SD in Log Scale	2.393
		Mean in Original Scale	0.08
		SD in Original Scale	0.374
		95% t UCL	0.141
		95% Percentile Bootstrap UCL	0.148
		95% BCA Bootstrap UCL	0.196
		95% H-UCL	0.2

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.67	**Data do not follow a Discernable Distribution (0.05)**	
Theta Star	0.643		
nu star	24.13		
A-D Test Statistic	1.853	**Nonparametric Statistics**	
5% A-D Critical Value	0.778	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.778	Mean	0.105
5% K-S Critical Value	0.211	SD	0.367
Data not Gamma Distributed at 5% Significance Level		SE of Mean	0.037
		95% KM (t) UCL	0.167
Assuming Gamma Distribution		95% KM (z) UCL	0.166
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.156
Minimum	0.000001	95% KM (bootstrap t) UCL	0.281
Maximum	3.6	95% KM (BCA) UCL	0.225
Mean	0.0746	95% KM (Percentile Bootstrap) UCL	0.188
Median	0.000001	95% KM (Chebyshev) UCL	0.267
SD	0.375	97.5% KM (Chebyshev) UCL	0.336
k star	0.0941	99% KM (Chebyshev) UCL	0.474
Theta star	0.793		
Nu star	19.57	**Potential UCLs to Use**	
AppChi2	10.53	95% KM (BCA) UCL	0.225
95% Gamma Approximate UCL (Use when n >= 40)	0.139		
95% Adjusted Gamma UCL (Use when n < 40)	0.14		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	10000

TF_Arsenic

General Statistics

Number of Valid Data	10	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	6
		Percent Non-Detects	60.00%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.036	Minimum Detected	-3.324
Maximum Detected	0.2	Maximum Detected	-1.609
Mean of Detected	0.0923	Mean of Detected	-2.589
SD of Detected	0.0733	SD of Detected	0.716
Minimum Non-Detect	0.093	Minimum Non-Detect	-2.375
Maximum Non-Detect	0.099	Maximum Non-Detect	-2.313

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	9
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	1
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	90.00%

Warning: There are only 4 Distinct Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.804	Shapiro Wilk Test Statistic	0.931
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0658	Mean	-2.857
SD	0.0481	SD	0.473
95% DL/2 (t) UCL	0.0936	95% H-Stat (DL/2) UCL	0.0907
Maximum Likelihood Estimate(MLE) Method	N/A	Log ROS Method	
MLE method failed to converge properly		Mean in Log Scale	-2.767
		SD in Log Scale	0.441
		Mean in Original Scale	0.0704
		SD in Original Scale	0.0463
		95% t UCL	0.0972
		95% Percentile Bootstrap UCL	0.0985
		95% BCA Bootstrap UCL	0.112
		95% H-UCL	0.0948
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.812	**Data appear Normal at 5% Significance Level**	
Theta Star	0.114		
nu star	6.493		
A-D Test Statistic	0.409	**Nonparametric Statistics**	
5% A-D Critical Value	0.66	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.66	Mean	0.0707
5% K-S Critical Value	0.397	SD	0.0453
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.018
		95% KM (t) UCL	0.104
Assuming Gamma Distribution		95% KM (z) UCL	0.1
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.104
Minimum	0.036	95% KM (bootstrap t) UCL	0.124
Maximum	0.2	95% KM (BCA) UCL	0.0994
Mean	0.0742	95% KM (Percentile Bootstrap) UCL	0.107
Median	0.0621	95% KM (Chebyshev) UCL	0.149
SD	0.0451	97.5% KM (Chebyshev) UCL	0.183
k star	3.622	99% KM (Chebyshev) UCL	0.25
Theta star	0.0205		
Nu star	72.45	**Potential UCLs to Use**	
AppChi2	53.85	95% KM (t) UCL	0.104
95% Gamma Approximate UCL (Use when n >= 40)	0.0998	95% KM (Percentile Bootstrap) UCL	0.107
95% Adjusted Gamma UCL (Use when n < 40)	N/A		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

For additional insight, the user may want to consult a statistician.

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	10000

TF_Cobalt

General Statistics

Number of Valid Data	10	Number of Detected Data	4
Number of Distinct Detected Data	4	Number of Non-Detect Data	6
		Percent Non-Detects	60.00%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.0051	Minimum Detected	-5.279
Maximum Detected	0.064	Maximum Detected	-2.749
Mean of Detected	0.0408	Mean of Detected	-3.543
SD of Detected	0.0259	SD of Detected	1.175
Minimum Non-Detect	0.0042	Minimum Non-Detect	-5.473
Maximum Non-Detect	0.024	Maximum Non-Detect	-3.73

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	7
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	3
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	70.00%

Warning: There are only 4 Distinct Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.923	Shapiro Wilk Test Statistic	0.778
5% Shapiro Wilk Critical Value	0.748	5% Shapiro Wilk Critical Value	0.748
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0206	Mean	-4.506
SD	0.0232	SD	1.209
95% DL/2 (t) UCL	0.034	95% H-Stat (DL/2) UCL	0.0958
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.0528	Mean in Log Scale	-5.255
SD	0.0103	SD in Log Scale	1.674
95% MLE (t) UCL	0.0588	Mean in Original Scale	0.0175
95% MLE (Tiku) UCL	0.0638	SD in Original Scale	0.0251
		95% t UCL	0.032
		95% Percentile Bootstrap UCL	0.0303
		95% BCA Bootstrap UCL	0.0329
		95% H UCL	0.279

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.567	**Data appear Normal at 5% Significance Level**	
Theta Star	0.0719		
nu star	4.539		
A-D Test Statistic	0.525	**Nonparametric Statistics**	
5% A-D Critical Value	0.662	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.662	Mean	0.0194
5% K-S Critical Value	0.399	SD	0.0225
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.00822
		95% KM (t) UCL	0.0344
Assuming Gamma Distribution		95% KM (z) UCL	0.0329
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0414
Minimum	0.000001	95% KM (bootstrap t) UCL	0.0271
Maximum	0.064	95% KM (BCA) UCL	0.0577
Mean	0.0163	95% KM (Percentile Bootstrap) UCL	0.0568
Median	0.000001	95% KM (Chebyshev) UCL	0.0552
SD	0.0258	97.5% KM (Chebyshev) UCL	0.0707
k star	0.164	99% KM (Chebyshev) UCL	0.101
Theta star	0.0995		
Nu star	3.279	**Potential UCLs to Use**	
AppChi2	0.46	95% KM (t) UCL	0.0344
95% Gamma Approximate UCL (Use when n >= 40)	0.116	95% KM (Percentile Bootstrap) UCL	0.0568
95% Adjusted Gamma UCL (Use when n < 40)	N/A		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

For additional insight, the user may want to consult a statistician.

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	10000

TF_Dieldrin

General Statistics

Number of Valid Data	10	Number of Detected Data	7
Number of Distinct Detected Data	7	Number of Non-Detect Data	3
		Percent Non-Detects	30.00%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.00017	Minimum Detected	-8.68
Maximum Detected	0.0084	Maximum Detected	-4.78
Mean of Detected	0.00312	Mean of Detected	-6.425
SD of Detected	0.00295	SD of Detected	1.486
Minimum Non-Detect	0.00017	Minimum Non-Detect	-8.68
Maximum Non-Detect	0.0017	Maximum Non-Detect	-6.377

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	6
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	4
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	60.00%

Warning: There are only 7 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set

the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.914	Shapiro Wilk Test Statistic	0.895
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.00229	Mean	-7.079
SD	0.00276	SD	1.725
95% DL/2 (t) UCL	0.00389	95% H-Stat (DL/2) UCL	0.0567
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.00523	Mean in Log Scale	-7.308
SD	0.00218	SD in Log Scale	1.92
95% MLE (t) UCL	0.00649	Mean in Original Scale	0.00222
95% MLE (Tiku) UCL	0.00718	SD in Original Scale	0.00281
		95% t UCL	0.00385
		95% Percentile Bootstrap UCL	0.00369
		95% BCA Bootstrap UCL	0.00404
		95% H UCL	0.118
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.606	**Data appear Normal at 5% Significance Level**	
Theta Star	0.00515		
nu star	8.479		
A-D Test Statistic	0.278	**Nonparametric Statistics**	
5% A-D Critical Value	0.731	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.731	Mean	0.00226
5% K-S Critical Value	0.321	SD	0.00264
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0009033
		95% KM (t) UCL	0.00392
Assuming Gamma Distribution		95% KM (z) UCL	0.00375
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.00387
Minimum	0.000001	95% KM (bootstrap t) UCL	0.00477
Maximum	0.0084	95% KM (BCA) UCL	0.00421
Mean	0.00218	95% KM (Percentile Bootstrap) UCL	0.00395
Median	0.000885	95% KM (Chebyshev) UCL	0.0062
SD	0.00284	97.5% KM (Chebyshev) UCL	0.0079
k star	0.261	99% KM (Chebyshev) UCL	0.0113
Theta star	0.00837		
Nu star	5.22	**Potential UCLs to Use**	
AppChi2	1.255	95% KM (t) UCL	0.00392
95% Gamma Approximate UCL (Use when n >= 40)	0.00908	95% KM (Percentile Bootstrap) UCL	0.00395
95% Adjusted Gamma UCL (Use when n < 40)	0.012		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.

These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).

For additional insight, the user may want to consult a statistician.

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	10000

TF_Endrin

General Statistics

Number of Valid Data	10	Number of Detected Data	8
Number of Distinct Detected Data	8	Number of Non-Detect Data	2
		Percent Non-Detects	20.00%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.00018	Minimum Detected	-8.623
Maximum Detected	0.1	Maximum Detected	-2.303
Mean of Detected	0.0343	Mean of Detected	-4.396
SD of Detected	0.0329	SD of Detected	2.195
Minimum Non-Detect	0.00042	Minimum Non-Detect	-7.775
Maximum Non-Detect	0.00042	Maximum Non-Detect	-7.775

Warning: There are only 8 Detected Values in this data

Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.902	Shapiro Wilk Test Statistic	0.832
5% Shapiro Wilk Critical Value	0.818	5% Shapiro Wilk Critical Value	0.818
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0275	Mean	-5.21
SD	0.0324	SD	2.588
95% DL/2 (t) UCL	0.0463	95% H-Stat (DL/2) UCL	56.54
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.0196	Mean in Log Scale	-5.115
SD	0.0406	SD in Log Scale	2.474
95% MLE (t) UCL	0.0432	Mean in Original Scale	0.0275
95% MLE (Tiku) UCL	0.0446	SD in Original Scale	0.0324
		95% t UCL	0.0463
		95% Percentile Bootstrap UCL	0.0444
		95% BCA Bootstrap UCL	0.0481
		95% H UCL	28.66
Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.461	**Data appear Normal at 5% Significance Level**	
Theta Star	0.0744		
nu star	7.37		
A-D Test Statistic	0.439	**Nonparametric Statistics**	
5% A-D Critical Value	0.755	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.755	Mean	0.0275
5% K-S Critical Value	0.307	SD	0.0308
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0104
		95% KM (t) UCL	0.0465
Assuming Gamma Distribution		95% KM (z) UCL	0.0446
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.0462
Minimum	0.000001	95% KM (bootstrap t) UCL	0.0546
Maximum	0.1	95% KM (BCA) UCL	0.0471
Mean	0.0274	95% KM (Percentile Bootstrap) UCL	0.046
Median	0.0215	95% KM (Chebyshev) UCL	0.0728
SD	0.0325	97.5% KM (Chebyshev) UCL	0.0924
k star	0.25	99% KM (Chebyshev) UCL	0.131
Theta star	0.11		
Nu star	5.01	**Potential UCLs to Use**	
AppChi2	1.157	95% KM (t) UCL	0.0465
95% Gamma Approximate UCL (Use when n >= 40)	0.119	95% KM (Percentile Bootstrap) UCL	0.046
95% Adjusted Gamma UCL (Use when n < 40)	0.158		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

General UCL Statistics for Data Sets with Non-Detects

User Selected Options

From File	Sheet1.wst
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	10000

TF_Heptachlor epoxide

General Statistics

Number of Valid Data	10	Number of Detected Data	7
Number of Distinct Detected Data	7	Number of Non-Detect Data	3
		Percent Non-Detects	30.00%

Raw Statistics		**Log-transformed Statistics**	
Minimum Detected	0.000052	Minimum Detected	-9.864
Maximum Detected	0.0033	Maximum Detected	-5.714
Mean of Detected	0.00119	Mean of Detected	-7.229
SD of Detected	0.00107	SD of Detected	1.323
Minimum Non-Detect	0.00017	Minimum Non-Detect	-8.68
Maximum Non-Detect	0.00042	Maximum Non-Detect	-7.775

Note: Data have multiple DLs - Use of KM Method is recommended	Number treated as Non-Detect	4
For all methods (except KM, DL/2, and ROS Methods),	Number treated as Detected	6
Observations < Largest ND are treated as NDs	Single DL Non-Detect Percentage	40.00%

Warning: There are only 7 Detected Values in this data
Note: It should be noted that even though bootstrap may be performed on this data set
the resulting calculations may not be reliable enough to draw conclusions

It is recommended to have 10-15 or more distinct observations for accurate and meaningful results.

UCL Statistics

Normal Distribution Test with Detected Values Only		**Lognormal Distribution Test with Detected Values Only**	
Shapiro Wilk Test Statistic	0.889	Shapiro Wilk Test Statistic	0.889
5% Shapiro Wilk Critical Value	0.803	5% Shapiro Wilk Critical Value	0.803
Data appear Normal at 5% Significance Level		**Data appear Lognormal at 5% Significance Level**	
Assuming Normal Distribution		**Assuming Lognormal Distribution**	
DL/2 Substitution Method		DL/2 Substitution Method	
Mean	0.0008867	Mean	-7.691
SD	0.00101	SD	1.335
95% DL/2 (t) UCL	0.00147	95% H-Stat (DL/2) UCL	0.00611
Maximum Likelihood Estimate(MLE) Method		Log ROS Method	
Mean	0.0006185	Mean in Log Scale	-7.899
SD	0.00128	SD in Log Scale	1.54
95% MLE (t) UCL	0.00136	Mean in Original Scale	0.0008611
95% MLE (Tiku) UCL	0.00145	SD in Original Scale	0.00103
		95% t UCL	0.00146
		95% Percentile Bootstrap UCL	0.0014
		95% BCA Bootstrap UCL	0.00156
		95% H UCL	0.0111

Gamma Distribution Test with Detected Values Only		**Data Distribution Test with Detected Values Only**	
k star (bias corrected)	0.746	**Data appear Normal at 5% Significance Level**	
Theta Star	0.0016		
nu star	10.45		
A-D Test Statistic	0.222	**Nonparametric Statistics**	
5% A-D Critical Value	0.726	Kaplan-Meier (KM) Method	
K-S Test Statistic	0.726	Mean	0.0008518
5% K-S Critical Value	0.319	SD	0.0009815
Data appear Gamma Distributed at 5% Significance Level		SE of Mean	0.0003353
		95% KM (t) UCL	0.00147
Assuming Gamma Distribution		95% KM (z) UCL	0.0014
Gamma ROS Statistics using Extrapolated Data		95% KM (jackknife) UCL	0.00142
Minimum	0.000001	95% KM (bootstrap t) UCL	0.0018
Maximum	0.0033	95% KM (BCA) UCL	0.00166
Mean	0.0008365	95% KM (Percentile Bootstrap) UCL	0.0015
Median	0.000605	95% KM (Chebyshev) UCL	0.00231
SD	0.00105	97.5% KM (Chebyshev) UCL	0.00295
k star	0.292	99% KM (Chebyshev) UCL	0.00419
Theta star	0.00287		
Nu star	5.838	**Potential UCLs to Use**	
AppChi2	1.558	95% KM (t) UCL	0.00147
95% Gamma Approximate UCL (Use when n >= 40)	0.00314	95% KM (Percentile Bootstrap) UCL	0.0015
95% Adjusted Gamma UCL (Use when n < 40)	0.00405		

Note: DL/2 is not a recommended method.

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
For additional insight, the user may want to consult a statistician.

FISH SPECIES

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	9/7/2015 5:13:39 PM
From File	Fish Species ProUCL inputs.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	10000

BUF Aroclor 1254

General Statistics

Total Number of Observations	12	Number of Distinct Observations	8
Number of Detects	8	Number of Non-Detects	4
Number of Distinct Detects	7	Number of Distinct Non-Detects	1
Minimum Detect	0.065	Minimum Non-Detect	0.033
Maximum Detect	4.5	Maximum Non-Detect	0.033
Variance Detects	2.55	Percent Non-Detects	33.33%
Mean Detects	1.369	SD Detects	1.597
Median Detects	0.825	CV Detects	1.166
Skewness Detects	1.342	Kurtosis Detects	0.93
Mean of Logged Detects	-0.462	SD of Logged Detects	1.469

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.812	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.267	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.924	Standard Error of Mean	0.424
SD	1.373	95% KM (BCA) UCL	1.639
95% KM (t) UCL	1.685	95% KM (Percentile Bootstrap) UCL	1.639
95% KM (z) UCL	1.621	95% KM Bootstrap t UCL	2.718
90% KM Chebyshev UCL	2.195	95% KM Chebyshev UCL	2.771
97.5% KM Chebyshev UCL	3.57	99% KM Chebyshev UCL	5.139

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.318	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.744	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.215	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.304	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.769	k star (bias corrected MLE)	0.564
Theta hat (MLE)	1.781	Theta star (bias corrected MLE)	2.428
nu hat (MLE)	12.3	nu star (bias corrected)	9.023
MLE Mean (bias corrected)	1.369	MLE Sd (bias corrected)	1.824

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.453	nu hat (KM)	10.87
Approximate Chi Square Value (10.87, α)	4.493	Adjusted Chi Square Value (10.87, β)	3.887
95% Gamma Approximate KM-UCL (use when n>=50)	2.235	95% Gamma Adjusted KM-UCL (use when n<50)	2.584

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.916
Maximum	4.5	Median	0.22
SD	1.439	CV	1.571
k hat (MLE)	0.378	k star (bias corrected MLE)	0.339
Theta hat (MLE)	2.422	Theta star (bias corrected MLE)	2.701
nu hat (MLE)	9.079	nu star (bias corrected)	8.142
MLE Mean (bias corrected)	0.916	MLE Sd (bias corrected)	1.573
		Adjusted Level of Significance (β)	0.029
Approximate Chi Square Value (8.14, α)	2.818	Adjusted Chi Square Value (8.14, β)	2.362
95% Gamma Approximate UCL (use when n>=50)	2.648	95% Gamma Adjusted UCL (use when n<50)	3.158

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.951	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.189	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.313	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.919	Mean in Log Scale	-1.73
SD in Original Scale	1.437	SD in Log Scale	2.265
95% t UCL (assumes normality of ROS data)	1.664	95% Percentile Bootstrap UCL	1.63
95% BCA Bootstrap UCL	1.842	95% Bootstrap t UCL	2.725
95% H-UCL (Log ROS)	101.6		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-1.445	95% H-UCL (KM -Log)	13.14
KM SD (logged)	1.787	95% Critical H Value (KM-Log)	4.5
KM Standard Error of Mean (logged)	0.551		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.918	Mean in Log Scale	-1.676
SD in Original Scale	1.438	SD in Log Scale	2.142
95% t UCL (Assumes normality)	1.664	95% H-Stat UCL	56.02

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	1.685	95% KM (Percentile Bootstrap) UCL	1.639

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

BUF Aroclor 1260

General Statistics

Total Number of Observations	12	Number of Distinct Observations	4
Number of Detects	2	Number of Non-Detects	10
Number of Distinct Detects	2	Number of Distinct Non-Detects	2
Minimum Detect	0.14	Minimum Non-Detect	0.033
Maximum Detect	3.6	Maximum Non-Detect	0.083
Variance Detects	5.986	Percent Non-Detects	83.33%
Mean Detects	1.87	SD Detects	2.447
Median Detects	1.87	CV Detects	1.308
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-0.343	SD of Logged Detects	2.296

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.339	Standard Error of Mean	0.402
SD	0.984	95% KM (BCA) UCL	N/A
95% KM (t) UCL	1.06	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	1	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	1.544	95% KM Chebyshev UCL	2.09
97.5% KM Chebyshev UCL	2.847	99% KM Chebyshev UCL	4.335

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	0.633	k star (bias corrected MLE)	N/A
Theta hat (MLE)	2.954	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	2.532	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.119	nu hat (KM)	2.854
		Adjusted Level of Significance (β)	0.029
Approximate Chi Square Value (2.85, α)	0.33	Adjusted Chi Square Value (2.85, β)	0.237
95% Gamma Approximate KM-UCL (use when n>=50)	2.929	95% Gamma Adjusted KM-UCL (use when n<50)	4.089

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.312	Mean in Log Scale	-12.42
SD in Original Scale	1.036	SD in Log Scale	7.564
95% t UCL (assumes normality of ROS data)	0.849	95% Percentile Bootstrap UCL	0.9
95% BCA Bootstrap UCL	1.212	95% Bootstrap t UCL	940.2
95% H-UCL (Log ROS)	3.591E+24		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.328	Mean in Log Scale	-3.401
SD in Original Scale	1.031	SD in Log Scale	1.609
95% t UCL (Assumes normality)	0.862	95% H-Stat UCL	0.9

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

99% KM (Chebyshev) UCL 4.335

Warning: Recommended UCL exceeds the maximum observation

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

BUF Total PCBs

General Statistics

Total Number of Observations	3	Number of Distinct Observations	3
		Number of Missing Observations	0
Minimum	0.016	Mean	55.67
Maximum	150	Median	17
SD	82.13	Std. Error of Mean	47.42
Coefficient of Variation	1.475	Skewness	1.649

**Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0**

Normal GOF Test

Shapiro Wilk Test Statistic	0.834	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.348	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.512	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	194.1	95% Adjusted-CLT UCL (Chen-1995)	181.9
		95% Modified-t UCL (Johnson-1978)	201.7

Gamma GOF Test

Not Enough Data to Perform GOF Test

Gamma Statistics

k hat (MLE)	0.254	k star (bias corrected MLE)	N/A
Theta hat (MLE)	218.8	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	1.527	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A
		Approximate Chi Square Value (0.05)	N/A
Adjusted Level of Significance	N/A	Adjusted Chi Square Value	N/A

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	N/A	95% Adjusted Gamma UCL (use when n<50)	N/A

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.916	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.767	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.298	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.512	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-4.135	Mean of logged Data	1.236
Maximum of Logged Data	5.011	SD of logged Data	4.777

Assuming Lognormal Distribution

95% H-UCL	1.439E+97	90% Chebyshev (MVUE) UCL	591.6
95% Chebyshev (MVUE) UCL	792	97.5% Chebyshev (MVUE) UCL	1070
99% Chebyshev (MVUE) UCL	1616		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	133.7	95% Jackknife UCL	194.1
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A		
90% Chebyshev(Mean, Sd) UCL	197.9	95% Chebyshev(Mean, Sd) UCL	262.4
97.5% Chebyshev(Mean, Sd) UCL	351.8	99% Chebyshev(Mean, Sd) UCL	527.5

Suggested UCL to Use

95% Student's-t UCL	194.1

Recommended UCL exceeds the maximum observation

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

CAT Aroclor 1254

General Statistics

Total Number of Observations	18	Number of Distinct Observations	12
Number of Detects	8	Number of Non-Detects	10
Number of Distinct Detects	8	Number of Distinct Non-Detects	4
Minimum Detect	0.043	Minimum Non-Detect	0.0042
Maximum Detect	0.96	Maximum Non-Detect	0.033
Variance Detects	0.0962	Percent Non-Detects	55.56%
Mean Detects	0.254	SD Detects	0.31
Median Detects	0.098	CV Detects	1.223
Skewness Detects	2.107	Kurtosis Detects	4.53
Mean of Logged Detects	-1.88	SD of Logged Detects	1.02

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.701	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.315	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.115	Standard Error of Mean	0.0579

SD	0.23	95% KM (BCA) UCL	0.24
95% KM (t) UCL	0.216	95% KM (Percentile Bootstrap) UCL	0.22
95% KM (z) UCL	0.21	95% KM Bootstrap t UCL	0.381
90% KM Chebyshev UCL	0.289	95% KM Chebyshev UCL	0.367
97.5% KM Chebyshev UCL	0.476	99% KM Chebyshev UCL	0.691

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.653	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.734	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.323	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.301	Detected Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.121	k star (bias corrected MLE)	0.784
Theta hat (MLE)	0.226	Theta star (bias corrected MLE)	0.324
nu hat (MLE)	17.93	nu star (bias corrected)	12.54
MLE Mean (bias corrected)	0.254	MLE Sd (bias corrected)	0.286

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.251	nu hat (KM)	9.033
Approximate Chi Square Value (9.03, α)	3.347	Adjusted Chi Square Value (9.03, β)	3.022
95% Gamma Approximate KM-UCL (use when n>=50)	0.311	95% Gamma Adjusted KM-UCL (use when n<50)	0.344

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.118
Maximum	0.96	Median	0.01
SD	0.235	CV	1.985
k hat (MLE)	0.504	k star (bias corrected MLE)	0.457
Theta hat (MLE)	0.235	Theta star (bias corrected MLE)	0.259
nu hat (MLE)	18.14	nu star (bias corrected)	16.45
MLE Mean (bias corrected)	0.118	MLE Sd (bias corrected)	0.175
		Adjusted Level of Significance (β)	0.0357
Approximate Chi Square Value (16.45, α)	8.278	Adjusted Chi Square Value (16.45, β)	7.726
95% Gamma Approximate UCL (use when n>=50)	0.235	95% Gamma Adjusted UCL (use when n<50)	0.252

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.907	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.286	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.313	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.118	Mean in Log Scale	-3.61
SD in Original Scale	0.235	SD in Log Scale	1.818
95% t UCL (assumes normality of ROS data)	0.214	95% Percentile Bootstrap UCL	0.219
95% BCA Bootstrap UCL	0.263	95% Bootstrap t UCL	0.42
95% H-UCL (Log ROS)	0.819		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-3.876	95% H-UCL (KM -Log)	0.832
KM SD (logged)	1.895	95% Critical H Value (KM-Log)	4.125
KM Standard Error of Mean (logged)	0.478		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.121	Mean in Log Scale	-3.232
SD in Original Scale	0.233	SD in Log Scale	1.483
95% t UCL (Assumes normality)	0.217	95% H-Stat UCL	0.404

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.216	95% GROS Adjusted Gamma UCL	0.252

95% Adjusted Gamma KM-UCL	0.344

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

CAT Aroclor 1260

General Statistics

Total Number of Observations	18	Number of Distinct Observations	9
Number of Detects	5	Number of Non-Detects	13
Number of Distinct Detects	5	Number of Distinct Non-Detects	4
Minimum Detect	0.055	Minimum Non-Detect	0.0042
Maximum Detect	0.72	Maximum Non-Detect	0.033
Variance Detects	0.0739	Percent Non-Detects	72.22%
Mean Detects	0.247	SD Detects	0.272
Median Detects	0.12	CV Detects	1.101
Skewness Detects	1.95	Kurtosis Detects	3.894
Mean of Logged Detects	-1.805	SD of Logged Detects	0.969

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.75	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.325	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.396	Detected Data appear Normal at 5% Significance Level

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.0716	Standard Error of Mean	0.0443
SD	0.168	95% KM (BCA) UCL	0.161
95% KM (t) UCL	0.149	95% KM (Percentile Bootstrap) UCL	0.151
95% KM (z) UCL	0.145	95% KM Bootstrap t UCL	0.212
90% KM Chebyshev UCL	0.205	95% KM Chebyshev UCL	0.265
97.5% KM Chebyshev UCL	0.348	99% KM Chebyshev UCL	0.512

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.408	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.688	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.275	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.362	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.372	k star (bias corrected MLE)	0.682
Theta hat (MLE)	0.18	Theta star (bias corrected MLE)	0.362
nu hat (MLE)	13.72	nu star (bias corrected)	6.82
MLE Mean (bias corrected)	0.247	MLE Sd (bias corrected)	0.299

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.182	nu hat (KM)	6.539
Approximate Chi Square Value (6.54, α)	1.921	Adjusted Chi Square Value (6.54, β)	1.691
95% Gamma Approximate KM-UCL (use when n>=50)	0.244	95% Gamma Adjusted KM-UCL (use when n<50)	0.277

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.0758
Maximum	0.72	Median	0.01
SD	0.171	CV	2.258
k hat (MLE)	0.508	k star (bias corrected MLE)	0.46
Theta hat (MLE)	0.149	Theta star (bias corrected MLE)	0.165
nu hat (MLE)	18.28	nu star (bias corrected)	16.56
MLE Mean (bias corrected)	0.0758	MLE Sd (bias corrected)	0.112
		Adjusted Level of Significance (β)	0.0357
Approximate Chi Square Value (16.56, α)	8.361	Adjusted Chi Square Value (16.56, β)	7.806
95% Gamma Approximate UCL (use when n>=50)	0.15	95% Gamma Adjusted UCL (use when n<50)	0.161

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.949	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.227	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.396	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0727	Mean in Log Scale	-4.656
SD in Original Scale	0.173	SD in Log Scale	2.142
95% t UCL (assumes normality of ROS data)	0.143	95% Percentile Bootstrap UCL	0.145
95% BCA Bootstrap UCL	0.191	95% Bootstrap t UCL	0.334
95% H-UCL (Log ROS)	1.013		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-4.454	95% H-UCL (KM -Log)	0.238
KM SD (logged)	1.705	95% Critical H Value (KM-Log)	3.788
KM Standard Error of Mean (logged)	0.449		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0789	Mean in Log Scale	-3.696
SD in Original Scale	0.17	SD in Log Scale	1.449
95% t UCL (Assumes normality)	0.149	95% H-Stat UCL	0.23

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.149	95% KM (Percentile Bootstrap) UCL	0.151

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

CAT Total PCBs

General Statistics

Total Number of Observations	4	Number of Distinct Observations	4
		Number of Missing Observations	0
Minimum	0.0097	Mean	1.556
Maximum	4	Median	1.108
SD	1.928	Std. Error of Mean	0.964
Coefficient of Variation	1.239	Skewness	0.698

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest. For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012). Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.866	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.748	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.288	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.443	Data appear Normal at 5% Significance Level	

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	3.825	95% Adjusted-CLT UCL (Chen-1995)	3.501
		95% Modified-t UCL (Johnson-1978)	3.881

Gamma GOF Test

A-D Test Statistic	0.517	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.701	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.327	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.417	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.323	k star (bias corrected MLE)	0.247
Theta hat (MLE)	4.814	Theta star (bias corrected MLE)	6.288
nu hat (MLE)	2.586	nu star (bias corrected)	1.98
MLE Mean (bias corrected)	1.556	MLE Sd (bias corrected)	3.128
		Approximate Chi Square Value (0.05)	0.148
Adjusted Level of Significance	N/A	Adjusted Chi Square Value	N/A

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	20.8	95% Adjusted Gamma UCL (use when n<50)	N/A

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.809	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.748	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.286	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.443	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-4.636	Mean of logged Data	-1.665
Maximum of Logged Data	1.386	SD of logged Data	3.193

Assuming Lognormal Distribution

95% H-UCL	1.524E+18	90% Chebyshev (MVUE) UCL	8.958
95% Chebyshev (MVUE) UCL	11.94	97.5% Chebyshev (MVUE) UCL	16.08
99% Chebyshev (MVUE) UCL	24.21		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	3.142	95% Jackknife UCL	3.825
95% Standard Bootstrap UCL	N/A	95% Bootstrap-t UCL	N/A
95% Hall's Bootstrap UCL	N/A	95% Percentile Bootstrap UCL	N/A
95% BCA Bootstrap UCL	N/A		
90% Chebyshev(Mean, Sd) UCL	4.448	95% Chebyshev(Mean, Sd) UCL	5.759
97.5% Chebyshev(Mean, Sd) UCL	7.577	99% Chebyshev(Mean, Sd) UCL	11.15

Suggested UCL to Use

95% Student's-t UCL	3.825

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

GAR Aroclor 1254

General Statistics

Total Number of Observations	10	Number of Distinct Observations	5
Number of Detects	3	Number of Non-Detects	7
Number of Distinct Detects	3	Number of Distinct Non-Detects	2
Minimum Detect	0.15	Minimum Non-Detect	0.0042
Maximum Detect	0.95	Maximum Non-Detect	0.033
Variance Detects	0.186	Percent Non-Detects	70%
Mean Detects	0.643	SD Detects	0.431
Median Detects	0.83	CV Detects	0.671
Skewness Detects	-1.583	Kurtosis Detects	N/A
Mean of Logged Detects	-0.712	SD of Logged Detects	1.029

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.86	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.334	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.196	Standard Error of Mean	0.136
SD	0.351	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.445	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.419	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.603	95% KM Chebyshev UCL	0.788
97.5% KM Chebyshev UCL	1.044	99% KM Chebyshev UCL	1.547

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	1.999	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.322	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	11.99	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.312	nu hat (KM)	6.242
		Adjusted Level of Significance (β)	0.0267
Approximate Chi Square Value (6.24, α)	1.765	Adjusted Chi Square Value (6.24, β)	1.384
95% Gamma Approximate KM-UCL (use when n>=50)	0.693	95% Gamma Adjusted KM-UCL (use when n<50)	0.884

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.805	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.362	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.207	Mean in Log Scale	-3.391
SD in Original Scale	0.364	SD in Log Scale	2.188
95% t UCL (assumes normality of ROS data)	0.418	95% Percentile Bootstrap UCL	0.391
95% BCA Bootstrap UCL	0.463	95% Bootstrap t UCL	1.603
95% H-UCL (Log ROS)	26.35		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-4.044	95% H-UCL (KM -Log)	17.6
KM SD (logged)	2.23	95% Critical H Value (KM-Log)	5.955
KM Standard Error of Mean (logged)	0.864		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.203	Mean in Log Scale	-3.293
SD in Original Scale	0.366	SD in Log Scale	1.953
95% t UCL (Assumes normality)	0.415	95% H-Stat UCL	7.772

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.445	95% KM (Percentile Bootstrap) UCL	N/A

Warning: One or more Recommended UCL(s) not available!

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

GAR Aroclor 1260

General Statistics

Total Number of Observations	10	Number of Distinct Observations	9
Number of Detects	9	Number of Non-Detects	1
Number of Distinct Detects	8	Number of Distinct Non-Detects	1
Minimum Detect	0.085	Minimum Non-Detect	0.0042
Maximum Detect	0.83	Maximum Non-Detect	0.0042
Variance Detects	0.0865	Percent Non-Detects	10%
Mean Detects	0.281	SD Detects	0.294

Median Detects	0.14	CV Detects	1.048
Skewness Detects	1.58	Kurtosis Detects	0.736
Mean of Logged Detects	-1.643	SD of Logged Detects	0.836

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.645	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.829	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.373	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.295	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.253	Standard Error of Mean	0.0925
SD	0.276	95% KM (BCA) UCL	0.408
95% KM (t) UCL	0.423	95% KM (Percentile Bootstrap) UCL	0.401
95% KM (z) UCL	0.405	95% KM Bootstrap t UCL	1.017
90% KM Chebyshev UCL	0.53	95% KM Chebyshev UCL	0.656
97.5% KM Chebyshev UCL	0.831	99% KM Chebyshev UCL	1.173

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.272	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.735	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.348	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.284	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	1.489	k star (bias corrected MLE)	1.067
Theta hat (MLE)	0.188	Theta star (bias corrected MLE)	0.263
nu hat (MLE)	26.8	nu star (bias corrected)	19.2
MLE Mean (bias corrected)	0.281	MLE Sd (bias corrected)	0.272

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.841	nu hat (KM)	16.82
Approximate Chi Square Value (16.82, α)	8.542	Adjusted Chi Square Value (16.82, β)	7.538
95% Gamma Approximate KM-UCL (use when n>=50)	0.498	95% Gamma Adjusted KM-UCL (use when n<50)	0.564

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.254
Maximum	0.83	Median	0.135
SD	0.29	CV	1.145
k hat (MLE)	1.016	k star (bias corrected MLE)	0.778
Theta hat (MLE)	0.249	Theta star (bias corrected MLE)	0.326
nu hat (MLE)	20.33	nu star (bias corrected)	15.56
MLE Mean (bias corrected)	0.254	MLE Sd (bias corrected)	0.287
		Adjusted Level of Significance (β)	0.0267
Approximate Chi Square Value (15.56, α)	7.656	Adjusted Chi Square Value (15.56, β)	6.714
95% Gamma Approximate UCL (use when n>=50)	0.515	95% Gamma Adjusted UCL (use when n<50)	0.588

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.779	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.829	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.317	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.295	Detected Data Not Lognormal at 5% Significance Level

Detected Data Not Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.255	Mean in Log Scale	-1.832
SD in Original Scale	0.288	SD in Log Scale	0.99
95% t UCL (assumes normality of ROS data)	0.423	95% Percentile Bootstrap UCL	0.403
95% BCA Bootstrap UCL	0.458	95% Bootstrap t UCL	1.095
95% H-UCL (Log ROS)	0.722		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.253	Mean in Log Scale	-2.095
SD in Original Scale	0.291	SD in Log Scale	1.633

95% t UCL (Assumes normality)	0.421	95% H-Stat UCL	5.458

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL 0.656

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

LMB Aroclor 1254

General Statistics

Total Number of Observations	19	Number of Distinct Observations	8
Number of Detects	4	Number of Non-Detects	15
Number of Distinct Detects	4	Number of Distinct Non-Detects	4
Minimum Detect	0.031	Minimum Non-Detect	0.0041
Maximum Detect	0.14	Maximum Non-Detect	0.163
Variance Detects	0.00219	Percent Non-Detects	78.95%
Mean Detects	0.081	SD Detects	0.0468
Median Detects	0.0765	CV Detects	0.578
Skewness Detects	0.474	Kurtosis Detects	-0.569
Mean of Logged Detects	-2.657	SD of Logged Detects	0.645

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.985	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.173	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.443	Detected Data appear Normal at 5% Significance Level

Detected Data appear Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.0309	Standard Error of Mean	0.0128
SD	0.035	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.053	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0519	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.0692	95% KM Chebyshev UCL	0.0866
97.5% KM Chebyshev UCL	0.111	99% KM Chebyshev UCL	0.158

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.196	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.659	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.171	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.396	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	3.635	k star (bias corrected MLE)	1.075
Theta hat (MLE)	0.0223	Theta star (bias corrected MLE)	0.0753
nu hat (MLE)	29.08	nu star (bias corrected)	8.604
MLE Mean (bias corrected)	0.081	MLE Sd (bias corrected)	0.0781

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.782	nu hat (KM)	29.7
Approximate Chi Square Value (29.70, α)	18.26	Adjusted Chi Square Value (29.70, β)	17.47
95% Gamma Approximate KM-UCL (use when n>=50)	0.0503	95% Gamma Adjusted KM-UCL (use when n<50)	0.0525

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs
GROS may not be used when kstar of detected data is small such as < 0.1
For such situations, GROS method tends to yield inflated values of UCLs and BTVs
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.029
Maximum	0.14	Median	0.01
SD	0.0348	CV	1.202
k hat (MLE)	1.272	k star (bias corrected MLE)	1.107
Theta hat (MLE)	0.0228	Theta star (bias corrected MLE)	0.0262

nu hat (MLE)	48.35	nu star (bias corrected)	42.05
MLE Mean (bias corrected)	0.029	MLE Sd (bias corrected)	0.0275
		Adjusted Level of Significance (β)	0.0369
Approximate Chi Square Value (42.05, α)	28.18	Adjusted Chi Square Value (42.05, β)	27.19
95% Gamma Approximate UCL (use when n>=50)	0.0432	95% Gamma Adjusted UCL (use when n<50)	N/A

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.986	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.748	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.169	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.443	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0318	Mean in Log Scale	-3.845
SD in Original Scale	0.0338	SD in Log Scale	0.887
95% t UCL (assumes normality of ROS data)	0.0452	95% Percentile Bootstrap UCL	0.0453
95% BCA Bootstrap UCL	0.0496	95% Bootstrap t UCL	0.0596
95% H-UCL (Log ROS)	0.053		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-4.135	95% H-UCL (KM -Log)	0.0781
KM SD (logged)	1.219	95% Critical H Value (KM-Log)	2.935
KM Standard Error of Mean (logged)	0.721		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0327	Mean in Log Scale	-3.826
SD in Original Scale	0.0355	SD in Log Scale	0.915
95% t UCL (Assumes normality)	0.0468	95% H-Stat UCL	0.0567

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.053	95% KM (Percentile Bootstrap) UCL	N/A

Warning: One or more Recommended UCL(s) not available!

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

LMB Total PCBs

General Statistics

Total Number of Observations	7	Number of Distinct Observations	6
		Number of Missing Observations	0
Minimum	0.015	Mean	0.463
Maximum	2.1	Median	0.059
SD	0.778	Std. Error of Mean	0.294
Coefficient of Variation	1.679	Skewness	2.025

Note: Sample size is small (e.g., <10), if data are collected using ISM approach, you should use
guidance provided in ITRC Tech Reg Guide on ISM (ITRC, 2012) to compute statistics of interest.
For example, you may want to use Chebyshev UCL to estimate EPC (ITRC, 2012).
Chebyshev UCL can be computed using the Nonparametric and All UCL Options of ProUCL 5.0

Normal GOF Test

Shapiro Wilk Test Statistic	0.672	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.356	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.335	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	1.035	95% Adjusted-CLT UCL (Chen-1995)	1.188
		95% Modified-t UCL (Johnson-1978)	1.072

Fish Species ProUCL outputs

Gamma GOF Test

A-D Test Statistic	0.578	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.758	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.27	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.329	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.459	k star (bias corrected MLE)	0.357
Theta hat (MLE)	1.01	Theta star (bias corrected MLE)	1.296
nu hat (MLE)	6.425	nu star (bias corrected)	5.005
MLE Mean (bias corrected)	0.463	MLE Sd (bias corrected)	0.775
		Approximate Chi Square Value (0.05)	1.154
Adjusted Level of Significance	0.0158	Adjusted Chi Square Value	0.693

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	2.009	95% Adjusted Gamma UCL (use when n<50)	3.349

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.907	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.803	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.21	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.335	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-4.2	Mean of logged Data	-2.172
Maximum of Logged Data	0.742	SD of logged Data	1.86

Assuming Lognormal Distribution

95% H-UCL	76.96	90% Chebyshev (MVUE) UCL	1.223
95% Chebyshev (MVUE) UCL	1.591	97.5% Chebyshev (MVUE) UCL	2.102
99% Chebyshev (MVUE) UCL	3.105		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	0.947	95% Jackknife UCL	1.035
95% Standard Bootstrap UCL	0.914	95% Bootstrap-t UCL	5.89
95% Hall's Bootstrap UCL	5.649	95% Percentile Bootstrap UCL	0.96
95% BCA Bootstrap UCL	1.167		
90% Chebyshev(Mean, Sd) UCL	1.346	95% Chebyshev(Mean, Sd) UCL	1.745
97.5% Chebyshev(Mean, Sd) UCL	2.3	99% Chebyshev(Mean, Sd) UCL	3.39

Suggested UCL to Use

95% Adjusted Gamma UCL	3.349

Recommended UCL exceeds the maximum observation

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

SOIL

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	9/28/2015 8:10:13 PM
From File	Soil inputs.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	10000

Aluminum

General Statistics

Total Number of Observations	58	Number of Distinct Observations	45
		Number of Missing Observations	0
Minimum	10400	Mean	20029
Maximum	27700	Median	20150
SD	3722	Std. Error of Mean	488.8
Coefficient of Variation	0.186	Skewness	-0.375

Normal GOF Test

Shapiro Wilk Test Statistic	0.978	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	0.592	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.0889	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.116	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	20847	95% Adjusted-CLT UCL (Chen-1995)	20808
		95% Modified-t UCL (Johnson-1978)	20843

Gamma GOF Test

A-D Test Statistic	0.613	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.107	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.116	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	26.86	k star (bias corrected MLE)	25.49
Theta hat (MLE)	745.6	Theta star (bias corrected MLE)	785.9
nu hat (MLE)	3116	nu star (bias corrected)	2956
MLE Mean (bias corrected)	20029	MLE Sd (bias corrected)	3968
		Approximate Chi Square Value (0.05)	2831
Adjusted Level of Significance	0.0459	Adjusted Chi Square Value	2828

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	20916	95% Adjusted Gamma UCL (use when n<50)	20939

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.945	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk P Value	0.0181	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.112	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.116	Data appear Lognormal at 5% Significance Level

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	9.25	Mean of logged Data	9.886
Maximum of Logged Data	10.23	SD of logged Data	0.201

098329

Assuming Lognormal Distribution

95% H-UCL	21000	90% Chebyshev (MVUE) UCL	21653
95% Chebyshev (MVUE) UCL	22378	97.5% Chebyshev (MVUE) UCL	23385
99% Chebyshev (MVUE) UCL	25362		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	20833	95% Jackknife UCL	20847
95% Standard Bootstrap UCL	20824	95% Bootstrap-t UCL	20817
95% Hall's Bootstrap UCL	20798	95% Percentile Bootstrap UCL	20836
95% BCA Bootstrap UCL	20778		
90% Chebyshev(Mean, Sd) UCL	21496	95% Chebyshev(Mean, Sd) UCL	22160
97.5% Chebyshev(Mean, Sd) UCL	23082	99% Chebyshev(Mean, Sd) UCL	24893

Suggested UCL to Use

95% Student's-t UCL 20847

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Arsenic

General Statistics

Total Number of Observations	58	Number of Distinct Observations	30
		Number of Missing Observations	0
Minimum	3.2	Mean	5.4
Maximum	7.6	Median	5.3
SD	0.976	Std. Error of Mean	0.128
Coefficient of Variation	0.181	Skewness	0.406

Normal GOF Test

Shapiro Wilk Test Statistic	0.966	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	0.206	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.127	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.116	Data Not Normal at 5% Significance Level

Data appear Approximate Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	5.614	95% Adjusted-CLT UCL (Chen-1995)	5.618
		95% Modified-t UCL (Johnson-1978)	5.615

Gamma GOF Test

A-D Test Statistic	0.357	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.104	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.116	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	31.36	k star (bias corrected MLE)	29.75

098330

Theta hat (MLE)	0.172	Theta star (bias corrected MLE)	0.182
nu hat (MLE)	3638	nu star (bias corrected)	3451
MLE Mean (bias corrected)	5.4	MLE Sd (bias corrected)	0.99
		Approximate Chi Square Value (0.05)	3316
Adjusted Level of Significance	0.0459	Adjusted Chi Square Value	3312

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	5.621	95% Adjusted Gamma UCL (use when n<50)	5.626

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.979	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk P Value	0.636	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0921	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.116	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.163	Mean of logged Data	1.67
Maximum of Logged Data	2.028	SD of logged Data	0.181

Assuming Lognormal Distribution

95% H-UCL	5.63	90% Chebyshev (MVUE) UCL	5.789
95% Chebyshev (MVUE) UCL	5.965	97.5% Chebyshev (MVUE) UCL	6.209
99% Chebyshev (MVUE) UCL	6.689		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	5.611	95% Jackknife UCL	5.614
95% Standard Bootstrap UCL	5.612	95% Bootstrap-t UCL	5.621
95% Hall's Bootstrap UCL	5.621	95% Percentile Bootstrap UCL	5.614
95% BCA Bootstrap UCL	5.616		
90% Chebyshev(Mean, Sd) UCL	5.784	95% Chebyshev(Mean, Sd) UCL	5.959
97.5% Chebyshev(Mean, Sd) UCL	6.2	99% Chebyshev(Mean, Sd) UCL	6.675

Suggested UCL to Use

95% Student's-t UCL	5.614

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Cobalt

General Statistics

Total Number of Observations	58	Number of Distinct Observations	25
		Number of Missing Observations	0
Minimum	4.3	Mean	6.043
Maximum	7.4	Median	6.05
SD	0.709	Std. Error of Mean	0.0931
Coefficient of Variation	0.117	Skewness	-0.497

Normal GOF Test

Shapiro Wilk Test Statistic	0.96	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	0.119	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.0901	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.116	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		95% UCLs (Adjusted for Skewness)	
95% Student's-t UCL	6.199	95% Adjusted-CLT UCL (Chen-1995)	6.19
		95% Modified-t UCL (Johnson-1978)	6.198

Gamma GOF Test

A-D Test Statistic	0.771	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.748	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.106	**Kolmogrov-Smirnoff Gamma GOF Test**	
5% K-S Critical Value	0.116	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	69.86	k star (bias corrected MLE)	66.26
Theta hat (MLE)	0.0865	Theta star (bias corrected MLE)	0.0912
nu hat (MLE)	8104	nu star (bias corrected)	7686
MLE Mean (bias corrected)	6.043	MLE Sd (bias corrected)	0.742
		Approximate Chi Square Value (0.05)	7483
Adjusted Level of Significance	0.0459	Adjusted Chi Square Value	7478

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	6.207	95% Adjusted Gamma UCL (use when n<50)	6.211

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.937	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.00686	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.115	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.116	Data appear Lognormal at 5% Significance Level	

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.459	Mean of logged Data	1.792
Maximum of Logged Data	2.001	SD of logged Data	0.123

Assuming Lognormal Distribution

95% H-UCL	6.215	90% Chebyshev (MVUE) UCL	6.338
95% Chebyshev (MVUE) UCL	6.471	97.5% Chebyshev (MVUE) UCL	6.655
99% Chebyshev (MVUE) UCL	7.017		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	6.196	95% Jackknife UCL	6.199
95% Standard Bootstrap UCL	6.196	95% Bootstrap-t UCL	6.193
95% Hall's Bootstrap UCL	6.192	95% Percentile Bootstrap UCL	6.193
95% BCA Bootstrap UCL	6.19		
90% Chebyshev(Mean, Sd) UCL	6.322	95% Chebyshev(Mean, Sd) UCL	6.449
97.5% Chebyshev(Mean, Sd) UCL	6.625	99% Chebyshev(Mean, Sd) UCL	6.97

Suggested UCL to Use

95% Student's-t UCL	6.199

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Note: For highly negatively-skewed data, confidence limits (e.g., Chen, Johnson, Lognormal, and Gamma) may not be reliable. Chen's and Johnson's methods provide adjustments for positvely skewed data sets.

Manganese

General Statistics

Total Number of Observations	58	Number of Distinct Observations	48
		Number of Missing Observations	0
Minimum	221	Mean	378.6
Maximum	779	Median	373.5
SD	81.66	Std. Error of Mean	10.72
Coefficient of Variation	0.216	Skewness	2.106

Normal GOF Test

Shapiro Wilk Test Statistic	0.86	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	3.5794E-7	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.147	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.116	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	396.5	95% Adjusted-CLT UCL (Chen-1995)	399.4
		95% Modified-t UCL (Johnson-1978)	397

Gamma GOF Test

A-D Test Statistic	1.131	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.749	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.116	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.116	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	25.4	k star (bias corrected MLE)	24.1
Theta hat (MLE)	14.9	Theta star (bias corrected MLE)	15.71
nu hat (MLE)	2947	nu star (bias corrected)	2796
MLE Mean (bias corrected)	378.6	MLE Sd (bias corrected)	77.11
		Approximate Chi Square Value (0.05)	2674
Adjusted Level of Significance	0.0459	Adjusted Chi Square Value	2671

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	395.8	95% Adjusted Gamma UCL (use when n<50)	396.2

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.954	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk P Value	0.0559	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.104	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.116	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	5.398	Mean of logged Data	5.917
Maximum of Logged Data	6.658	SD of logged Data	0.196

Assuming Lognormal Distribution

95% H-UCL	395.7	90% Chebyshev (MVUE) UCL	407.7
95% Chebyshev (MVUE) UCL	421.1	97.5% Chebyshev (MVUE) UCL	439.6
99% Chebyshev (MVUE) UCL	476.1		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	396.2	95% Jackknife UCL	396.5
95% Standard Bootstrap UCL	396	95% Bootstrap-t UCL	400.3
95% Hall's Bootstrap UCL	407.7	95% Percentile Bootstrap UCL	397.1
95% BCA Bootstrap UCL	399.3		
90% Chebyshev(Mean, Sd) UCL	410.7	95% Chebyshev(Mean, Sd) UCL	425.3
97.5% Chebyshev(Mean, Sd) UCL	445.5	99% Chebyshev(Mean, Sd) UCL	485.2

Suggested UCL to Use

95% Approximate Gamma UCL	395.8

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Vanadium

General Statistics

Total Number of Observations	58	Number of Distinct Observations	47
		Number of Missing Observations	0
Minimum	15.9	Mean	22.58
Maximum	31.4	Median	22.5
SD	3.233	Std. Error of Mean	0.425
Coefficient of Variation	0.143	Skewness	0.263

Normal GOF Test

Shapiro Wilk Test Statistic	0.984	**Shapiro Wilk GOF Test**
5% Shapiro Wilk P Value	0.824	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.0712	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.116	Data appear Normal at 5% Significance Level

Data appear Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	23.29	95% Adjusted-CLT UCL (Chen-1995)	23.29
		95% Modified-t UCL (Johnson-1978)	23.29

Gamma GOF Test

A-D Test Statistic	0.185	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.0562	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.116	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	49.53	k star (bias corrected MLE)	46.98
Theta hat (MLE)	0.456	Theta star (bias corrected MLE)	0.481
nu hat (MLE)	5746	nu star (bias corrected)	5450
MLE Mean (bias corrected)	22.58	MLE Sd (bias corrected)	3.294
		Approximate Chi Square Value (0.05)	5279
Adjusted Level of Significance	0.0459	Adjusted Chi Square Value	5275

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	23.31	95% Adjusted Gamma UCL (use when n<50)	23.32

098334

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.985	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk P Value	0.855	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0527	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.116	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	2.766	Mean of logged Data	3.107
Maximum of Logged Data	3.447	SD of logged Data	0.144

Assuming Lognormal Distribution

95% H-UCL	23.33	90% Chebyshev (MVUE) UCL	23.86
95% Chebyshev (MVUE) UCL	24.45	97.5% Chebyshev (MVUE) UCL	25.26
99% Chebyshev (MVUE) UCL	26.85		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	23.27	95% Jackknife UCL	23.29
95% Standard Bootstrap UCL	23.27	95% Bootstrap-t UCL	23.3
95% Hall's Bootstrap UCL	23.29	95% Percentile Bootstrap UCL	23.27
95% BCA Bootstrap UCL	23.28		
90% Chebyshev(Mean, Sd) UCL	23.85	95% Chebyshev(Mean, Sd) UCL	24.43
97.5% Chebyshev(Mean, Sd) UCL	25.23	99% Chebyshev(Mean, Sd) UCL	26.8

Suggested UCL to Use

95% Student's-t UCL	23.29

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

SEDIMENT

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	9/7/2015 12:26:01 PM
From File	Aroclor 1254-SD Group 2.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	10000

Aroclor 1254-SD Group 2

General Statistics

Total Number of Observations	102	Number of Distinct Observations	75
Number of Detects	84	Number of Non-Detects	18
Number of Distinct Detects	68	Number of Distinct Non-Detects	7
Minimum Detect	0.0012	Minimum Non-Detect	0.0021
Maximum Detect	11	Maximum Non-Detect	0.0271
Variance Detects	1.605	Percent Non-Detects	17.65%
Mean Detects	0.288	SD Detects	1.267
Median Detects	0.032	CV Detects	4.398
Skewness Detects	7.721	Kurtosis Detects	63.82
Mean of Logged Detects	-3.379	SD of Logged Detects	1.932

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.237	**Normal GOF Test on Detected Observations Only**
5% Shapiro Wilk P Value	0	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.41	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.0967	Detected Data Not Normal at 5% Significance Level

Detected Data Not Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.238	Standard Error of Mean	0.114
SD	1.148	95% KM (BCA) UCL	0.46
95% KM (t) UCL	0.427	95% KM (Percentile Bootstrap) UCL	0.447
95% KM (z) UCL	0.426	95% KM Bootstrap t UCL	1.199
90% KM Chebyshev UCL	0.581	95% KM Chebyshev UCL	0.736
97.5% KM Chebyshev UCL	0.952	99% KM Chebyshev UCL	1.376

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	5.906	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.861	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.208	**Kolmogrov-Smirnoff GOF**
5% K-S Critical Value	0.106	Detected Data Not Gamma Distributed at 5% Significance Level

Detected Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics on Detected Data Only

k hat (MLE)	0.32	k star (bias corrected MLE)	0.316
Theta hat (MLE)	0.901	Theta star (bias corrected MLE)	0.911
nu hat (MLE)	53.7	nu star (bias corrected)	53.12
MLE Mean (bias corrected)	0.288	MLE Sd (bias corrected)	0.512

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.0428	nu hat (KM)	8.737
Approximate Chi Square Value (8.74, α)	3.169	Adjusted Chi Square Value (8.74, β)	3.121
95% Gamma Approximate KM-UCL (use when n>=50)	0.655	95% Gamma Adjusted KM-UCL (use when n<50)	0.665

Gamma (KM) may not be used when k hat (KM) is < 0.1

Gamma ROS Statistics using Imputed Non-Detects

GROS may not be used when data set has > 50% NDs with many tied observations at multiple DLs

GROS may not be used when kstar of detected data is small such as < 0.1

For such situations, GROS method tends to yield inflated values of UCLs and BTVs

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0012	Mean	0.239
Maximum	11	Median	0.0175
SD	1.154	CV	4.826
k hat (MLE)	0.316	k star (bias corrected MLE)	0.313
Theta hat (MLE)	0.757	Theta star (bias corrected MLE)	0.763
nu hat (MLE)	64.44	nu star (bias corrected)	63.88
MLE Mean (bias corrected)	0.239	MLE Sd (bias corrected)	0.427
		Adjusted Level of Significance (β)	0.0476
Approximate Chi Square Value (63.88, α)	46.49	Adjusted Chi Square Value (63.88, β)	46.28
95% Gamma Approximate UCL (use when n>=50)	0.328	95% Gamma Adjusted UCL (use when n<50)	0.33

Lognormal GOF Test on Detected Observations Only

Lilliefors Test Statistic	0.0579	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.0967	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.238	Mean in Log Scale	-3.936
SD in Original Scale	1.154	SD in Log Scale	2.15
95% t UCL (assumes normality of ROS data)	0.427	95% Percentile Bootstrap UCL	0.452
95% BCA Bootstrap UCL	0.607	95% Bootstrap t UCL	1.183
95% H-UCL (Log ROS)	0.414		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	-3.9	95% H-UCL (KM -Log)	0.356
KM SD (logged)	2.081	95% Critical H Value (KM-Log)	3.396
KM Standard Error of Mean (logged)	0.208		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.238	Mean in Log Scale	-3.928
SD in Original Scale	1.154	SD in Log Scale	2.131
95% t UCL (Assumes normality)	0.427	95% H-Stat UCL	0.397

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

97.5% KM (Chebyshev) UCL	0.952

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

SURFACE WATER

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	9/6/2015 4:25:12 PM
From File	SW inputs.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	10000

Total PCBs-SW

General Statistics

Total Number of Observations	37	Number of Distinct Observations	33
		Number of Missing Observations	0
Minimum	6.9000E-5	Mean	0.00244
Maximum	0.026	Median	4.6000E-4
SD	0.0048	Std. Error of Mean	7.8844E-4
Coefficient of Variation	1.963	Skewness	3.738

Normal GOF Test

Shapiro Wilk Test Statistic	0.529	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.936	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.31	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.146	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	0.00377	95% Adjusted-CLT UCL (Chen-1995)	0.00426
		95% Modified-t UCL (Johnson-1978)	0.00386

Gamma GOF Test

A-D Test Statistic	2.006	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.808	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.202	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.153	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.551	k star (bias corrected MLE)	0.524
Theta hat (MLE)	0.00443	Theta star (bias corrected MLE)	0.00466
nu hat (MLE)	40.78	nu star (bias corrected)	38.81
MLE Mean (bias corrected)	0.00244	MLE Sd (bias corrected)	0.00337
		Approximate Chi Square Value (0.05)	25.54
Adjusted Level of Significance	0.0431	Adjusted Chi Square Value	25.07

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	0.00371	95% Adjusted Gamma UCL (use when n<50)	0.00378

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.949	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.936	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.155	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.146	Data Not Lognormal at 5% Significance Level

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-9.581	Mean of logged Data	-7.15
Maximum of Logged Data	-3.65	SD of logged Data	1.469

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Assuming Lognormal Distribution

95% H-UCL	0.00479	90% Chebyshev (MVUE) UCL	0.00421
95% Chebyshev (MVUE) UCL	0.00513	97.5% Chebyshev (MVUE) UCL	0.00641
99% Chebyshev (MVUE) UCL	0.00892		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	0.00374	95% Jackknife UCL	0.00377
95% Standard Bootstrap UCL	0.00373	95% Bootstrap-t UCL	0.00513
95% Hall's Bootstrap UCL	0.00844	95% Percentile Bootstrap UCL	0.00384
95% BCA Bootstrap UCL	0.00441		
90% Chebyshev(Mean, Sd) UCL	0.00481	95% Chebyshev(Mean, Sd) UCL	0.00588
97.5% Chebyshev(Mean, Sd) UCL	0.00737	99% Chebyshev(Mean, Sd) UCL	0.0103

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	0.00588

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

4,4-DDT-SW

General Statistics

Total Number of Observations	25	Number of Distinct Observations	6
Number of Detects	2	Number of Non-Detects	23
Number of Distinct Detects	2	Number of Distinct Non-Detects	4
Minimum Detect	0.031	Minimum Non-Detect	0.093
Maximum Detect	0.074	Maximum Non-Detect	0.1
Variance Detects	9.2450E-4	Percent Non-Detects	92%
Mean Detects	0.0525	SD Detects	0.0304
Median Detects	0.0525	CV Detects	0.579
Skewness Detects	N/A	Kurtosis Detects	N/A
Mean of Logged Detects	-3.039	SD of Logged Detects	0.615

Warning: Data set has only 2 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Not Enough Data to Perform GOF Test

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	0.0525	Standard Error of Mean	0.0215
SD	0.0215	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.0893	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.0879	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.117	95% KM Chebyshev UCL	0.146
97.5% KM Chebyshev UCL	0.187	99% KM Chebyshev UCL	0.266

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	5.609	k star (bias corrected MLE)	N/A
Theta hat (MLE)	0.00936	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	22.44	nu star (bias corrected)	N/A

MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	5.963	nu hat (KM)	298.1
		Adjusted Level of Significance (β)	0.0395
Approximate Chi Square Value (298.13, α)	259.1	Adjusted Chi Square Value (298.13, β)	256.7
95% Gamma Approximate KM-UCL (use when n>=50)	0.0604	95% Gamma Adjusted KM-UCL (use when n<50)	0.061

Lognormal GOF Test on Detected Observations Only

Not Enough Data to Perform GOF Test

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.0601	Mean in Log Scale	-3.039
SD in Original Scale	0.0411	SD in Log Scale	0.702
95% t UCL (assumes normality of ROS data)	0.0742	95% Percentile Bootstrap UCL	0.074
95% BCA Bootstrap UCL	0.0749	95% Bootstrap t UCL	0.0771
95% H-UCL (Log ROS)	0.0834		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.0483	Mean in Log Scale	-3.039
SD in Original Scale	0.00649	SD in Log Scale	0.129
95% t UCL (Assumes normality)	0.0505	95% H-Stat UCL	0.0505

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	0.0893	95% KM (% Bootstrap) UCL	N/A

Warning: One or more Recommended UCL(s) not available!

Warning: Recommended UCL exceeds the maximum observation

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Bis(2-ethylhexyl)phthalate-SW

General Statistics

Total Number of Observations	25	Number of Distinct Observations	9
Number of Detects	3	Number of Non-Detects	22
Number of Distinct Detects	3	Number of Distinct Non-Detects	6
Minimum Detect	2.2	Minimum Non-Detect	4.5
Maximum Detect	140	Maximum Non-Detect	5
Variance Detects	6279	Percent Non-Detects	88%
Mean Detects	48.5	SD Detects	79.24
Median Detects	3.3	CV Detects	1.634
Skewness Detects	1.732	Kurtosis Detects	N/A
Mean of Logged Detects	2.308	SD of Logged Detects	2.29

Warning: Data set has only 3 Detected Values.
This is not enough to compute meaningful or reliable statistics and estimates.

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.756	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.382	**Lilliefors GOF Test**

5% Lilliefors Critical Value	0.512	Detected Data appear Normal at 5% Significance Level	

Detected Data appear Approximate Normal at 5% Significance Level

Kaplan-Meier (KM) Statistics using Normal Critical Values and other Nonparametric UCLs

Mean	8.24	Standard Error of Mean	6.604
SD	26.9	95% KM (BCA) UCL	N/A
95% KM (t) UCL	19.54	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	19.1	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	28.05	95% KM Chebyshev UCL	37.03
97.5% KM Chebyshev UCL	49.48	99% KM Chebyshev UCL	73.95

Gamma GOF Tests on Detected Observations Only

Not Enough Data to Perform GOF Test

Gamma Statistics on Detected Data Only

k hat (MLE)	0.416	k star (bias corrected MLE)	N/A
Theta hat (MLE)	116.7	Theta star (bias corrected MLE)	N/A
nu hat (MLE)	2.494	nu star (bias corrected)	N/A
MLE Mean (bias corrected)	N/A	MLE Sd (bias corrected)	N/A

Gamma Kaplan-Meier (KM) Statistics

k hat (KM)	0.0938	nu hat (KM)	4.691
		Adjusted Level of Significance (β)	0.0395
Approximate Chi Square Value (4.69, α)	1.012	Adjusted Chi Square Value (4.69, β)	0.903
95% Gamma Approximate KM-UCL (use when n>=50)	38.19	95% Gamma Adjusted KM-UCL (use when n<50)	42.79

Gamma (KM) may not be used when k hat (KM) is < 0.1

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.822	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.767	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.353	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.512	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	10.16	Mean in Log Scale	1.226
SD in Original Scale	27.48	SD in Log Scale	1.282
95% t UCL (assumes normality of ROS data)	19.56	95% Percentile Bootstrap UCL	20.66
95% BCA Bootstrap UCL	27.04	95% Bootstrap t UCL	59.58
95% H-UCL (Log ROS)	16.46		

UCLs using Lognormal Distribution and KM Estimates when Detected data are Lognormally Distributed

KM Mean (logged)	1.149	95% H-UCL (KM -Log)	6.273
KM SD (logged)	0.799	95% Critical H Value (KM-Log)	2.254
KM Standard Error of Mean (logged)	0.254		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	7.902	Mean in Log Scale	1.034
SD in Original Scale	27.52	SD in Log Scale	0.818
95% t UCL (Assumes normality)	17.32	95% H-Stat UCL	5.744

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Normal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (t) UCL	19.54	95% KM (Percentile Bootstrap) UCL	N/A

Warning: One or more Recommended UCL(s) not available!

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
Recommendations are based upon data size, data distribution, and skewness.
These recommendations are based upon the results of the simulation studies summarized in Singh, Maichle, and Lee (2006).
However, simulations results will not cover all Real World data sets; for additional insight the user may want to consult a statistician.

Arsenic-SW

General Statistics

Total Number of Observations	25	Number of Distinct Observations	15
		Number of Missing Observations	0
Minimum	3.9	Mean	6.456
Maximum	15.1	Median	4.7
SD	3.548	Std. Error of Mean	0.71
Coefficient of Variation	0.55	Skewness	1.607

Normal GOF Test

Shapiro Wilk Test Statistic	0.617	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.918	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.389	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.177	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	7.67	95% Adjusted-CLT UCL (Chen-1995)	7.867
		95% Modified-t UCL (Johnson-1978)	7.708

Gamma GOF Test

A-D Test Statistic	4.309	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.747	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.385	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.175	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	4.874	k star (bias corrected MLE)	4.315
Theta hat (MLE)	1.325	Theta star (bias corrected MLE)	1.496
nu hat (MLE)	243.7	nu star (bias corrected)	215.8
MLE Mean (bias corrected)	6.456	MLE Sd (bias corrected)	3.108
		Approximate Chi Square Value (0.05)	182.8
Adjusted Level of Significance	0.0395	Adjusted Chi Square Value	180.7

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	7.621	95% Adjusted Gamma UCL (use when n<50)	7.709

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.669	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.918	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.373	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.177	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.361	Mean of logged Data	1.759
Maximum of Logged Data	2.715	SD of logged Data	0.432

Assuming Lognormal Distribution

95% H-UCL	7.538	90% Chebyshev (MVUE) UCL	8.043
95% Chebyshev (MVUE) UCL	8.811	97.5% Chebyshev (MVUE) UCL	9.877

99% Chebyshev (MVUE) UCL	11.97		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	7.623	95% Jackknife UCL	7.67
95% Standard Bootstrap UCL	7.603	95% Bootstrap-t UCL	8.072
95% Hall's Bootstrap UCL	7.497	95% Percentile Bootstrap UCL	7.676
95% BCA Bootstrap UCL	7.944		
90% Chebyshev(Mean, Sd) UCL	8.585	95% Chebyshev(Mean, Sd) UCL	9.549
97.5% Chebyshev(Mean, Sd) UCL	10.89	99% Chebyshev(Mean, Sd) UCL	13.52

Suggested UCL to Use

95% Student's-t UCL	7.67	or 95% Modified-t UCL	7.708

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Manganese-SW

General Statistics

Total Number of Observations	25	Number of Distinct Observations	24
		Number of Missing Observations	0
Minimum	6.1	Mean	114
Maximum	342	Median	106
SD	64.45	Std. Error of Mean	12.89
Coefficient of Variation	0.565	Skewness	1.942

Normal GOF Test

Shapiro Wilk Test Statistic	0.828	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.918	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.254	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.177	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	136.1	95% Adjusted-CLT UCL (Chen-1995)	140.6
		95% Modified-t UCL (Johnson-1978)	136.9

Gamma GOF Test

A-D Test Statistic	1.001	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.751	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.186	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.176	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.046	k star (bias corrected MLE)	2.707
Theta hat (MLE)	37.44	Theta star (bias corrected MLE)	42.12
nu hat (MLE)	152.3	nu star (bias corrected)	135.3
MLE Mean (bias corrected)	114	MLE Sd (bias corrected)	69.3
		Approximate Chi Square Value (0.05)	109.5
Adjusted Level of Significance	0.0395	Adjusted Chi Square Value	107.9

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	141	95% Adjusted Gamma UCL (use when n<50)	143

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.776	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.918	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.205	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.177	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	1.808	Mean of logged Data	4.563
Maximum of Logged Data	5.835	SD of logged Data	0.711

Assuming Lognormal Distribution

95% H-UCL	168.9	90% Chebyshev (MVUE) UCL	178.1
95% Chebyshev (MVUE) UCL	203.5	97.5% Chebyshev (MVUE) UCL	238.8
99% Chebyshev (MVUE) UCL	308.1		

Nonparametric Distribution Free UCL Statistics

Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	135.2	95% Jackknife UCL	136.1
95% Standard Bootstrap UCL	134.7	95% Bootstrap-t UCL	144.5
95% Hall's Bootstrap UCL	184.3	95% Percentile Bootstrap UCL	135.8
95% BCA Bootstrap UCL	141.1		
90% Chebyshev(Mean, Sd) UCL	152.7	95% Chebyshev(Mean, Sd) UCL	170.2
97.5% Chebyshev(Mean, Sd) UCL	194.5	99% Chebyshev(Mean, Sd) UCL	242.3

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	170.2

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

ATTACHMENT 4

TOTAL PCB/DIOXIN TCDD TEQ DETERMINATION

Sample BUF 170F

Congener	Sample Conc. (mg/kg)	TEF	TEQ
PCB-118	12	0.00003	3.60E-04
PCB-105	4.7	0.00003	1.41E-04
PCB-156/157	2	0.00003	6.00E-05
PCB-167	0.59	0.00003	1.77E-05
PCB-114	0.16	0.00003	4.80E-06
PCB-123	0.11	0.00003	3.30E-06
PCB-189	0.046	0.00003	1.38E-06
Total Dioxin-like	**19.606**	**Total TCDD TEQ**	**5.88E-04**
Total PCB	**150**		
Total PCB w/o dioxin	**130.4**		

Sample BUF 158F

Congener	Sample Conc. (mg/kg)	TEF	TEQ
PCB-118	1.5	0.00003	4.50E-05
PCB-105	0.53	0.00003	1.59E-05
PCB-156/157	0.24	0.00003	7.20E-06
PCB-167	0.068	0.00003	2.04E-06
PCB-114	0.029	0.00003	8.70E-07
PCB-123	0.016	0.00003	4.80E-07
PCB-189	0.0057	0.00003	1.71E-07
PCB-81	0.0044	0.00003	1.32E-07
Total Dioxin-like	**2.3931**	**Total TCDD TEQ**	**7.18E-05**
Total PCB	**17**		
Total PCB w/o dioxin	**14.6**		

Sample BUF 126F

Congener	Sample Conc. (mg/kg)	TEF	TEQ
PCB-118	0.00086	0.00003	2.58E-08
PCB-105	0.00036	0.00003	1.08E-08
PCB-156/157	0.00015	0.00003	4.50E-09
PCB-167	0.00005	0.00003	1.50E-09
PCB-77	0.00002	0.0001	2.00E-09
PCB-123	0.000019	0.00003	5.70E-10
PCB-114	0.000018	0.00003	5.40E-10
PCB-189	0.0000062	0.00003	1.86E-10
Total Dioxin-like	**0.0014832**	**Total TCDD TEQ**	**4.59E-08**
Total PCB	**0.016**		
Total PCB w/o dioxin	**0.0145**		

Sample CAR 111F

Congener	Sample Conc. (mg/kg)	TEF	TEQ
PCB-118	0.28	0.00003	8.40E-06
PCB-105	0.093	0.00003	2.79E-06
PCB-156	0.042	0.00003	1.26E-06
PCB-157	0.042	0.00003	1.26E-06
PCB-167	0.014	0.00003	4.20E-07
PCB-114	0.0053	0.00003	1.59E-07
PCB-123	0.0038	0.00003	1.14E-07
PCB-189	0.00077	0.00003	2.31E-08
PCB-77	0.00047	0.0001	4.70E-08
PCB-126	0.00011	0.1	1.10E-05
PCB-81	0.000099	0.00003	2.97E-09
PCB-169	0.000081	0.03	2.43E-06
Total Dioxin-like	**0.48163**	**Total TCDD TEQ**	**2.79E-05**
Total PCB	**7.2**		
Total PCB w/o dioxin	**6.72**		

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Sample CAR 127F

Congener	Sample Conc. (mg/kg)	TEF	TEQ
PCB-118	0.4	0.00003	1.20E-05
PCB-105	0.15	0.00003	4.50E-06
PCB-156/157	0.067	0.00003	2.01E-06
PCB-167	0.019	0.00003	5.70E-07
PCB-114	0.0064	0.00003	1.92E-07
PCB-123	0.0049	0.00003	1.47E-07
PCB-189	0.0016	0.00003	4.80E-08
PCB-77	0.00084	0.0001	8.40E-08
Total Dioxin-like	**0.64974**	**Total TCDD TEQ**	**1.96E-05**
Total PCB	**4.5**		
Total PCB w/o dioxin	**3.85**		

Sample CAR 185F

Congener	Sample Conc. (mg/kg)	TEF	TEQ
PCB-118	0.00041	0.00003	1.23E-08
PCB-105	0.00011	0.00003	3.30E-09
PCB-156/157	0.000076	0.00003	2.28E-09
PCB-167	0.00003	0.00003	9.00E-10
PCB-114	0.000008	0.00003	2.40E-10
PCB-123	0.0000045	0.00003	1.35E-10
PCB-77	0.0000039	0.0001	3.90E-10
PCB-189	0.000003	0.00003	9.00E-11
Total Dioxin-like	**0.0006454**	**Total TCDD TEQ**	**1.96E-08**
Total PCB	**0.005**		
Total PCB w/o dioxin	**0.00435**		

Sample CAT 113F

Congener	Sample Conc. (mg/kg)	TEF	TEQ
PCB-118	0.13	0.00003	3.90E-06
PCB-105	0.037	0.00003	1.11E-06
PCB-156	0.019	0.00003	5.70E-07
PCB-157	0.019	0.00003	5.70E-07
PCB-167	0.0067	0.00003	2.01E-07
PCB-114	0.0022	0.00003	6.60E-08
PCB-123	0.0017	0.00003	5.10E-08
PCB-189	0.00036	0.00003	1.08E-08
PCB-77	0.00011	0.0001	1.10E-08
PCB-126	0.000087	0.1	8.70E-06
PCB-169	0.000039	0.03	1.17E-06
Total Dioxin-like	**0.216196**	**Total TCDD TEQ**	**1.64E-05**
Total PCB	**2.2**		
Total PCB w/o dioxin	**1.98**		

Sample CAT 140F

Congener	Sample Conc. (mg/kg)	TEF	TEQ
PCB-118	0.001	0.00003	3.00E-08
PCB-105	0.00031	0.00003	9.30E-09
PCB-156/157	0.00023	0.00003	6.90E-09
PCB-167	0.000076	0.00003	2.28E-09
PCB-114	0.00002	0.00003	6.00E-10
PCB-123	0.000011	0.00003	3.30E-10
PCB-189	0.0000087	0.00003	2.61E-10
PCB-77	0.0000017	0.0001	1.70E-10
Total Dioxin-like	**0.0016574**	**Total TCDD TEQ**	**4.98E-08**
Total PCB	**0.0097**		
Total PCB w/o dioxin	**0.00804**		

Sample CAT 143F

Congener	Sample Conc. (mg/kg)	TEF	TEQ
PCB-118	0.0013	0.00003	3.90E-08
PCB-105	0.00049	0.00003	1.47E-08
PCB-156/157	0.00035	0.00003	1.05E-08
PCB-167	0.00012	0.00003	3.60E-09
PCB-114	0.000023	0.00003	6.90E-10
PCB-189	0.0000084	0.00003	2.52E-10
Total Dioxin-like	**0.0022914**	**Total TCDD TEQ**	**6.87E-08**
Total PCB	**0.015**		
Total PCB w/o dioxin	**0.0127**		

Sample CAT 156F

Congener	Sample Conc. (mg/kg)	TEF	TEQ
PCB-118	0.46	0.00003	1.38E-05
PCB-105	0.16	0.00003	4.80E-06
PCB-156/157	0.081	0.00003	2.43E-06
PCB-167	0.025	0.00003	7.50E-07
PCB-114	0.008	0.00003	2.40E-07
PCB-123	0.005	0.00003	1.50E-07
PCB-189	0.0018	0.00003	5.40E-08
Total Dioxin-like	**0.7408**	**Total TCDD TEQ**	**2.22E-05**
Total PCB	**4**		
Total PCB w/o dioxin	**3.26**		

Sample DRM 184F

Congener	Sample Conc. (mg/kg)	TEF	TEQ
PCB-118	0.0012	0.00003	3.60E-08
PCB-105	0.00036	0.00003	1.08E-08
PCB-156/157	0.00023	0.00003	6.90E-09
PCB-167	0.000079	0.00003	2.37E-09
PCB-114	0.000023	0.00003	6.90E-10
PCB-123	0.000017	0.00003	5.10E-10
PCB-189	0.0000079	0.00003	2.37E-10
PCB-77	0.0000056	0.0001	5.60E-10
Total Dioxin-like	**0.0019225**	**Total TCDD TEQ**	**5.81E-08**
Total PCB	**0.014**		
Total PCB w/o dioxin	**0.0121**		

Sample GAR 186F

Congener	Sample Conc. (mg/kg)	TEF	TEQ
PCB-118	0.054	0.00003	1.62E-06
PCB-105	0.016	0.00003	4.80E-07
PCB-156/157	0.0095	0.00003	2.85E-07
PCB-167	0.0036	0.00003	1.08E-07
PCB-114	0.0011	0.00003	3.30E-08
PCB-123	0.00056	0.00003	1.68E-08
PCB-189	0.0003	0.00003	9.00E-09
PCB-77	0.00019	0.0001	1.90E-08
Total Dioxin-like	**0.08525**	**Total TCDD TEQ**	**2.57E-06**
Total PCB	**0.41**		
Total PCB w/o dioxin	**0.325**		

Sample LMB 112F

Congener	Sample Conc. (mg/kg)	TEF	TEQ
PCB-118	0.089	0.00003	2.67E-06
PCB-105	0.029	0.00003	8.70E-07
PCB-156	0.014	0.00003	4.20E-07
PCB-157	0.014	0.00003	4.20E-07
PCB-167	0.0042	0.00003	1.26E-07
PCB-114	0.0016	0.00003	4.80E-08
PCB-123	0.0013	0.00003	3.90E-08
PCB-189	0.0003	0.00003	9.00E-09
PCB-77	0.00019	0.0001	1.90E-08
PCB-126	0.000048	0.1	4.80E-06
PCB-169	0.000041	0.03	1.23E-06
PCB-81	0.000021	0.00003	6.30E-10
Total Dioxin-like	**0.1537**	**Total TCDD TEQ**	**1.07E-05**
Total PCB	**2.1**		
Total PCB w/o dioxin	**1.95**		

Sample LMB 128F

Congener	Sample Conc. (mg/kg)	TEF	TEQ
PCB-118	0.0016	0.00003	4.80E-08
PCB-105	0.00052	0.00003	1.56E-08
PCB-156/157	0.00032	0.00003	9.60E-09
PCB-167	0.000099	0.00003	2.97E-09
PCB-114	0.000028	0.00003	8.40E-10
PCB-123	0.000017	0.00003	5.10E-10
PCB-189	0.0000083	0.00003	2.49E-10
PCB-77	0.0000041	0.0001	4.10E-10
Total Dioxin-like	**0.0025964**	**Total TCDD TEQ**	**7.82E-08**
Total PCB	**0.015**		
Total PCB w/o dioxin	**0.0124**		

Sample LMB 141F

Congener	Sample Conc. (mg/kg)	TEF	TEQ
PCB-118	0.0029	0.00003	8.70E-08
PCB-105	0.00091	0.00003	2.73E-08
PCB-156/157	0.00055	0.00003	1.65E-08
PCB-167	0.00019	0.00003	5.70E-09
PCB-114	0.000048	0.00003	1.44E-09
PCB-123	0.00003	0.00003	9.00E-10
PCB-189	0.000016	0.00003	4.80E-10
PCB-77	0.000014	0.0001	1.40E-09
Total Dioxin-like	**0.004658**	**Total TCDD TEQ**	**1.41E-07**
Total PCB	**0.03**		
Total PCB w/o dioxin	**0.0253**		

Sample LMB 142F

Congener	Sample Conc. (mg/kg)	TEF	TEQ
PCB-118	0.003	0.00003	9.00E-08
PCB-105	0.00092	0.00003	2.76E-08
PCB-156/157	0.00055	0.00003	1.65E-08
PCB-167	0.00019	0.00003	5.70E-09
PCB-114	0.000046	0.00003	1.38E-09
PCB-123	0.000039	0.00003	1.17E-09
PCB-189	0.000016	0.00003	4.80E-10
PCB-77	0.000014	0.0001	1.40E-09
Total Dioxin-like	**0.004775**	**Total TCDD TEQ**	**1.44E-07**
Total PCB	**0.03**		
Total PCB w/o dioxin	**0.0252**		

Sample LMB 155F

Congener	Sample Conc. (mg/kg)	TEF	TEQ
PCB-118	0.091	0.00003	2.73E-06
PCB-105	0.029	0.00003	8.70E-07
PCB-156/157	0.013	0.00003	3.90E-07
PCB-167	0.0047	0.00003	1.41E-07
PCB-114	0.0016	0.00003	4.80E-08
PCB-123	0.001	0.00003	3.00E-08
PCB-189	0.00029	0.00003	8.70E-09
PCB-77	0.00021	0.0001	2.10E-08
Total Dioxin-like	**0.1408**	**Total TCDD TEQ**	**4.24E-06**
Total PCB	**0.83**		
Total PCB w/o dioxin	**0.689**		

Sample LMB 171F

Congener	Sample Conc. (mg/kg)	TEF	TEQ
PCB-118	0.022	0.00003	6.60E-07
PCB-105	0.0067	0.00003	2.01E-07
PCB-156/157	0.0031	0.00003	9.30E-08
PCB-167	0.0012	0.00003	3.60E-08
PCB-114	0.0004	0.00003	1.20E-08
PCB-123	0.00021	0.00003	6.30E-09
PCB-189	0.000067	0.00003	2.01E-09
Total Dioxin-like	**0.033677**	**Total TCDD TEQ**	**1.01E-06**
Total PCB	**0.18**		
Total PCB w/o dioxin	**0.146**		

Sample LMB 172F

Congener	Sample Conc. (mg/kg)	TEF	TEQ
PCB-118	0.0079	0.00003	2.37E-07
PCB-105	0.0023	0.00003	6.90E-08
PCB-156/157	0.0017	0.00003	5.10E-08
PCB-167	0.00057	0.00003	1.71E-08
PCB-114	0.00016	0.00003	4.80E-09
PCB-123	0.000096	0.00003	2.88E-09
PCB-189	0.000039	0.00003	1.17E-09
Total Dioxin-like	**0.012765**	**Total TCDD TEQ**	**3.83E-07**
Total PCB	**0.059**		
Total PCB w/o dioxin	**0.0462**		

Sample WHB 157F

Congener	Sample Conc. (mg/kg)	TEF	TEQ
PCB-118	0.035	0.00003	1.05E-06
PCB-105	0.01	0.00003	3.00E-07
PCB-156/157	0.0052	0.00003	1.56E-07
PCB-167	0.0018	0.00003	5.40E-08
PCB-114	0.00081	0.00003	2.43E-08
PCB-123	0.00037	0.00003	1.11E-08
PCB-77	0.00012	0.0001	1.20E-08
PCB-189	0.000094	0.00003	2.82E-09
Total Dioxin-like	**0.053394**	**Total TCDD TEQ**	**1.61E-06**
Total PCB	**0.27**		
Total PCB w/o dioxin	**0.217**		

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	8/17/2015 10:29:02 AM
From File	Total PCBs inputs.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	10000

TCDD TEQ

General Statistics

Total Number of Observations	20	Number of Distinct Observations	20
		Number of Missing Observations	0
Minimum	1.9600E-8	Mean	3.8351E-5
Maximum	5.8800E-4	Median	1.3100E-6
SD	1.3050E-4	Std. Error of Mean	2.9180E-5
Coefficient of Variation	N/A	Skewness	4.352

Normal GOF Test

Shapiro Wilk Test Statistic	0.317	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.905	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.432	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.198	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	8.8806E-5	95% Adjusted-CLT UCL (Chen-1995)	1.1669E-4
		95% Modified-t UCL (Johnson-1978)	9.3539E-5

Gamma GOF Test

A-D Test Statistic	1.371	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.885	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.185	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.214	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.215	k star (bias corrected MLE)	0.216
Theta hat (MLE)	1.7859E-4	Theta star (bias corrected MLE)	1.7767E-4
nu hat (MLE)	8.59	nu star (bias corrected)	8.634
MLE Mean (bias corrected)	3.8351E-5	MLE Sd (bias corrected)	8.2545E-5
		Approximate Chi Square Value (0.05)	3.108
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	2.851

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	1.0655E-4	95% Adjusted Gamma UCL (use when n<50)	1.1616E-4

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.935	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.905	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.17	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.198	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-17.75	Mean of logged Data	-13.56
Maximum of Logged Data	-7.439	SD of logged Data	2.974

Assuming Lognormal Distribution

95% H-UCL	0.00698	90% Chebyshev (MVUE) UCL	1.6176E-4
95% Chebyshev (MVUE) UCL	2.1325E-4	97.5% Chebyshev (MVUE) UCL	2.8472E-4
99% Chebyshev (MVUE) UCL	4.2509E-4		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	8.6347E-5	95% Jackknife UCL	8.8806E-5
95% Standard Bootstrap UCL	8.4981E-5	95% Bootstrap-t UCL	5.3772E-4
95% Hall's Bootstrap UCL	2.9174E-4	95% Percentile Bootstrap UCL	9.5277E-5
95% BCA Bootstrap UCL	1.3064E-4		
90% Chebyshev(Mean, Sd) UCL	1.2589E-4	95% Chebyshev(Mean, Sd) UCL	1.6554E-4
97.5% Chebyshev(Mean, Sd) UCL	2.2058E-4	99% Chebyshev(Mean, Sd) UCL	3.2868E-4

Suggested UCL to Use

95% Adjusted Gamma UCL 1.1616E-4

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.

Total PCBs

General Statistics

Total Number of Observations	20	Number of Distinct Observations	20
		Number of Missing Observations	0
Minimum	0.00435	Mean	8.215
Maximum	130.4	Median	0.182
SD	28.97	Std. Error of Mean	6.478
Coefficient of Variation	3.527	Skewness	4.37

Normal GOF Test

Shapiro Wilk Test Statistic	0.307	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.905	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.421	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.198	Data Not Normal at 5% Significance Level

Data Not Normal at 5% Significance Level

Assuming Normal Distribution

95% Normal UCL		**95% UCLs (Adjusted for Skewness)**	
95% Student's-t UCL	19.42	95% Adjusted-CLT UCL (Chen-1995)	25.63
		95% Modified-t UCL (Johnson-1978)	20.47

Gamma GOF Test

A-D Test Statistic	1.621	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.89	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.193	**Kolmogrov-Smirnoff Gamma GOF Test**
5% K-S Critical Value	0.215	Detected data appear Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.204	k star (bias corrected MLE)	0.207
Theta hat (MLE)	40.22	Theta star (bias corrected MLE)	39.7
nu hat (MLE)	8.17	nu star (bias corrected)	8.278
MLE Mean (bias corrected)	8.215	MLE Sd (bias corrected)	18.06

		Approximate Chi Square Value (0.05)	2.897
Adjusted Level of Significance	0.038	Adjusted Chi Square Value	2.651

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	23.47	95% Adjusted Gamma UCL (use when n<50)	25.66

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.929	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.905	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.17	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.198	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-5.438	Mean of logged Data	-1.485
Maximum of Logged Data	4.871	SD of logged Data	2.965

Assuming Lognormal Distribution

95% H-UCL	1164	90% Chebyshev (MVUE) UCL	27.76
95% Chebyshev (MVUE) UCL	36.59	97.5% Chebyshev (MVUE) UCL	48.84
99% Chebyshev (MVUE) UCL	72.91		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	18.87	95% Jackknife UCL	19.42
95% Standard Bootstrap UCL	18.53	95% Bootstrap-t UCL	134.3
95% Hall's Bootstrap UCL	76.52	95% Percentile Bootstrap UCL	20.81
95% BCA Bootstrap UCL	28.2		
90% Chebyshev(Mean, Sd) UCL	27.65	95% Chebyshev(Mean, Sd) UCL	36.45
97.5% Chebyshev(Mean, Sd) UCL	48.67	99% Chebyshev(Mean, Sd) UCL	72.67

Suggested UCL to Use

95% Adjusted Gamma UCL	25.66

Note: Suggestions regarding the selection of a 95% UCL are provided to help the user to select the most appropriate 95% UCL.
These recommendations are based upon the results of the simulation studies summarized in Singh, Singh, and Iaci (2002)
and Singh and Singh (2003). However, simulations results will not cover all Real World data sets.
For additional insight the user may want to consult a statistician.