The Boeing Company
Santa Susana Field Laboratory
5800 Woolsey Canyon Road
Canoga Park, CA 91304-1148

Via Email to cowens@rb4.swrcb.ca.gov

October 30, 2017
In reply, refer to SHEA-115771

Ms. Cassandra Owens
Regional Water Quality Control Board
Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, CA 90013

Dear Ms. Owens:

Subject: Final Human Health Risk Assessment for Surface Water Runoff Exiting the Santa Susana Field Laboratory via the Southern Outfalls, Santa Susana Field Laboratory, Ventura County, CA (Order Pursuant to California Water Code Section 13383; CA0001309, Cl No. 6027)

Per the requirements of the Section 13383 Order issued by the Los Angeles Regional Water Quality Control Board (Regional Board) on June 24, 2015, and the September 15, 2016 Regional Board response to comment letter, GeoSyntec Consultants provided to your office on April 28, 2017 a Human Health Risk Assessment for Surface Water Outfalls exiting the Santa Susana Field Laboratory (SSFL) via the Southern Outfalls (Human Health Risk Assessment for Surface Water Outfalls). This document was subsequently reviewed by the California Office of Environmental Health Hazard Assessment (OEHHA). On June 28, 2017 comments were provided to The Boeing Company recommending that further analysis be performed on potential downstream exposures to aquatic organisms. This additional analysis has been conducted and is included in this revised Final Human Health Risk Assessment.

This report has been reviewed by the SSFL Surface Water Expert Panel. Once the report has been deemed complete by Board staff, it will be posted on the Boeing External Website at the following address: http://www.boeing.com/aboutus/environment/santaSusana/jsra.html.

CERTIFICATION

I certify under penalty of law that this attached document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Executed on the 30th of October 2017 at The Boeing Company, Santa Susana Site.

Sincerely,

David W. Dassler, P.E.
Remediation Program Manager
Environment, Health & Safety

Enclosure: Final Human Health Risk Assessment, dated 10/30/17

Final Human Health Risk Assessment

Surface Water Outfalls
Santa Susana Field Laboratory
Ventura County, CA

Prepared for:

The Boeing Company

Prepared by:

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October 2017

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LIST OF ACRONYMS AND ABBREVIATIONS

%	percent
°	degrees
95UCL	95 percent upper confidence limit of the average sample concentration
µg/dL	micrograms per deciliter
µg/L	micrograms per liter
ACS	American Cancer Society
AOC	Administrative Order on Consent
ATSDR	Agency for Toxic Substances and Disease Registry
BMP	Best Management Practice
Cal-EPA	California Environmental Protection Agency
CMS	Corrective Measure Study
COPC	Constituent of Potential Concern
CR	Cancer Risk
CSF	Cancer Slope Factor
CSM	Conceptual Site Model
DOE	United States Department of Energy
DSFR	Data Summary and Findings Report
DTSC	Department of Toxic Substances Control
E	East
Environmental media	Air, soil, and surface/groundwater
EPC	Exposure Point Concentration
ft	feet
Geosyntec	Geosyntec Consultants, Inc.
GETS	Groundwater Extraction and Treatment System
HEAST	Health Effects Assessment Summary Tables
HHRA	Human Health Risk Assessment
HSAA	California Hazardous Substances Account Act
HI	Noncancer Hazard Index
HQ	Hazard Quotient
IQ	Intelligence Quotient
IRIS	Integrated Risk Information System
ISRA	Interim Source Removal Action

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

LARWQCB	Los Angeles Regional Water Quality Control Board
LOX	Liquid Oxygen
mL	milliliters
mL/hour	milliliters/hour
MSL	Mean Sea Level
MWH	MWH Global Inc.
N	North or Nitrogen
NASA	National Aeronautics and Space Administration
NCEA	National Center for Environmental Assessment
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NH_3	Ammonia
NJDEP	New Jersey Department of Environmental Protection
NPDES	National Pollutant Discharge Elimination System
OEHHA	Office of Environmental Health Hazard Assessment
PHG	Public Health Goal
PPRTV	Provisional Peer Reviewed Toxicity Value
PRG	Preliminary Remediation Goal
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
Rev.	Revision
RfC	Reference Concentration
RfD	Reference Dose
RFI	RCRA Facility Investigation
RSL	Regional Screening Level
SSFL	Santa Susana Field Laboratory
SVOC	Semi-Volatile Organic Compound
TDS	Total Dissolved Solids
TEF	Toxicity Equivalency Factor
TEQ	Toxicity Equivalent
THI	Target Noncancer Hazard Index
THI	Target Noncancer Hazard Quotient
TR	Target Cancer Risk
TSS	Total Suspended Solids
URF	Unit Risk Factor

LIST OF ACRONYMS AND ABBREVIATIONS (Continued)

USEPA	United States Environmental Protection Agency
VCWPD	Ventura County Watershed Protection District
VOC	Volatile Organic Compound
WHO	World Health Organization
WY	Water Year

EXECUTIVE SUMMARY

The Boeing Company is submitting this Human Health Risk Assessment (HHRA) Report (Report) prepared by Geosyntec Consultants, Inc. (Geosyntec) for the Santa Susana Field Laboratory (SSFL or Site) located in Ventura County, California. This Report documents a HHRA of surface water runoff exiting the SSFL via Outfalls 001, 002, 008, 009, 011, 018, and 019 (herein, "Outfalls"), as described in the California Water Code section 13383 Order (Order) from the Los Angeles Regional Water Quality Control Board (LARWQCB) dated June 24, 2015. The Order was proposed by the LARWQCB in response to health concerns expressed by members of the public regarding exposure to National Pollutant Discharge Elimination System (NPDES) discharges in the drainages near the SSFL. The HHRA Report provides a quantitative assessment of potential risks and hazards associated with contact with surface water discharges from the SSFL, permitted by the NPDES Permit No. CA0001309 for the Boeing Company, SSFL, Canoga Park, CA, Order No. R4-2010-0090 (NPDES Permit), to downstream populations. In accordance with the Order, the analysis used conceptual exposure scenarios that are representative of realistic (but conservative) exposures that may occur immediately downstream of the SSFL property boundary over the long-term.

The SSFL occupies approximately 2,850 acres and is located at the top of Woolsey Canyon Road in the Simi Hills, Ventura County, California. The Site is jointly owned by Boeing and the United States government and is divided into four administrative areas (Administrative Areas I, II, III, and IV) and undeveloped land areas to the north (Northern Undeveloped Zone) and south (Southern Undeveloped Land). The developed portion of the Site comprises approximately 1,500 acres. The Site layout is shown in **Figure 1**. Industrial operations at the SSFL ceased in 2006; current activities at the Site include structure demolition, soil excavation and removal, maintenance and operation of stormwater treatment systems, environmental monitoring and sampling, remediation planning, and other restoration activities.

The beneficial use designations set forth in the Los Angeles Water Quality Control Plan (Basin Plan) have been used to identify the surface water uses that may be relevant when establishing the HHRA exposure assumptions. The Basin Plan identifies intermittent recreational beneficial use designations for the creeks downstream of the Site, although the smaller tributary drainages near the SSFL boundary are not explicitly identified in the Basin Plan (LARWQCB, 1994). Therefore, people (referred to as "recreators") who might enter the drainage areas (e.g., while hiking) were identified as the receptor group that have the potential to be exposed to surface water runoff that is exiting the SSFL via

the Outfalls. The HHRA evaluated exposure associated with non-swimming water contact recreational activities (hiking, rafting and other limited recreational uses that fall under the Basin Plan Limited Water Contact Recreation (LREC-1) designation). Direct exposures to surface water, i.e., incidental ingestion and dermal contact, were identified as the most likely potentially complete exposure pathways and were evaluated quantitatively in the HHRA. In addition, the inhalation pathway and the completeness of the aquatic plant and fish consumption pathways is evaluated. Potential recreator exposures to sediment in the drainages, including areas near the Outfalls, are being addressed as part of Site closure activities in accordance with three regulatory orders under oversight by the Cal-EPA Department of Toxic Substances Control (DTSC); therefore, exposures to sediment were not evaluated in this HHRA.

Precipitation and subsequent surface water runoff occurs primarily as winter storms occur from October through March, a period that represents approximately 90% of the annual average rainfall at the Site. Surface water runoff at the Site is sampled within natural drainages at locations that are identified in the NPDES Permit as compliance monitoring "outfalls". A wide range of constituents have been monitored and assessed. Parameters vary by outfall but generally include: dioxins, metals, radionuclides, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), chloride, cyanide, fluoride, nutrients, oil and grease, perchlorate, pH, sulfate, Total Suspended Solids (TSS), and Total Dissolved Solids (TDS).

A Site surface water quality database consisting of NPDES outfall monitoring results was used as the basis for the data evaluation. Surface water data collected from Outfalls 001, 002, 008, 009, 011, 018, and 019 were evaluated, with consideration given to the changes in Site conditions over time, to identify the data set for use in the HHRA. Data selected for use in the HHRA were collected during the sampling period from February 16, 2009 to March 12, 2016 per the approved Work Plan. Over this time period, changes to water quality have occurred at the Site due to added stormwater controls, remediation, and the recent multi-year drought, with fewer NPDES exceedances occurring during recent years. Flow monitoring data from the Outfalls were used to estimate annual discharge frequencies, which were then used to estimate the number of days per year that exposure to surface water exiting each Outfall could occur (i.e., exposure frequency).

Risk-based concentrations (RBCs) were derived for each constituent of potential concern (COPC) at each Outfall. RBCs represent the concentrations of COPCs in the relevant environmental medium (i.e., surface water at each Outfall) that would be considered safe for receptors (i.e., recreators) under conservative (i.e., protective) exposure conditions. For each COPC, both an RBC based on cancer effects and an RBC based on noncancer effects was derived where applicable as not all chemicals exhibit both effects. Further,

both an "upper bound" and "lower bound" value for each RBC was determined, corresponding to the assumed upper and lower bound exposure frequencies. Potential cumulative cancer risks and noncancer hazards were then estimated by summing the ratios of measured COPC concentrations and the appropriate RBCs.

The cumulative cancer risk and noncancer hazard index posed by the presence of all chemicals detected in surface water at a given outfall were estimated. Wherever possible, the assumptions used in estimating risk and hazard were generally health-protective and conservative in nature. Consequently, the calculated cancer risk and noncancer hazard indices presented in this HHRA are biased high and will over-estimate potential risks. All cumulative cancer risk estimates and cumulative noncancer hazard index (HI) estimates were below the *de minimis* risk level of 1×10^{-6} and noncancer HI of 1. In addition, lead exposure point concentrations (EPC) for all outfalls were less than the recreator health-protective concentration of 31.8 µg/L (with the highest lead EPC being 13 µg/L).

In addition, an evaluation was conducted to assess the completeness of the aquatic plant and fish consumption pathway. Edible fish are not present in the drainages near the Outfalls and, therefore, the fish consumption pathway does not exist. While the fish consumption pathway is considered incomplete near the outfalls, there could be the potential for fishing and fish consumption at offsite locations farther downstream of SSFL where water is present in sufficient quantity year-round. An evaluation of the potential contribution of water flow and constituent concentrations to these locations was conducted. The evaluation indicates that potential exposure to SSFL's relatively minor contributions to the water volume and constituent mass in those larger downstream flows through this pathway would be *de minimis*.

Limited potentially edible plants are present within the drainage bottom and these may come in contact with surface water runoff during rain events or flow from the Groundwater Extraction and Treatment System (GETS) discharge. However, given the lack of accessibility due to more rugged terrain, low concentrations detected in surface water runoff (for many COPCs, concentrations are below the regulatory Maximum Contaminant Level [MCL] used for potable water supplies), the limited potential of COPC uptake into the edible portions of plants, and the minimal consumption that would occur in the unlikely event an individual were to occasionally harvest a plant, this pathway is considered insignificant, and any potential risks would be correspondingly low (i.e., well below the *de minimis* risk level).

The results of this HHRA indicate that, potential recreational exposures to COPCs in surface water runoff exiting the SSFL via Outfalls 001, 002, 008, 009, 011, 018, and 019

are below levels of concern as established by the California Environmental Protection Agency and the United States Environmental Protection Agency. This includes those COPCs that have had NPDES permit limit exceedances including lead and dioxins.

1. INTRODUCTION

The Boeing Company is submitting this Human Health Risk Assessment (HHRA) Report (Report) prepared by Geosyntec Consultants, Inc. (Geosyntec) for the Santa Susana Field Laboratory (SSFL or Site) located in Ventura County, California. The HHRA Report was reviewed by the Surface Water Expert Panel (Expert Panel). This Report documents a HHRA of surface water runoff exiting the SSFL via Outfalls 001, 002, 008, 009, 011, 018, and 019 (herein, "Outfalls"), as described in the California Water Code section 13383 Order (Order) from the Los Angeles Regional Water Quality Control Board (LARWQCB) dated June 24, 2015[1]. The Order was proposed by the LARWQCB in response to health concerns expressed by members of the public regarding exposure to National Pollutant Discharge Elimination System (NPDES) discharges in the drainages near the SSFL. The HHRA Report provides a quantitative assessment of potential risks and hazards associated with contact with surface water discharges from the SSFL, permitted by the NPDES Permit No. CA0001309 for the Boeing Company, SSFL, Canoga Park, CA, Order No. R4-2010-0090 (NPDES Permit), to downstream populations. In accordance with the Order, the analysis used conceptual exposure scenarios that are representative of realistic exposures that may occur immediately downstream of the SSFL property boundary over the long-term.

This HHRA Report has been prepared in accordance with the Revised Human Health Risk Assessment Work Plan (Work Plan) dated March 2016 (Geosyntec, 2016), which was approved by the LARWQCB in a letter dated September 15, 2016.

1.1 Risk Assessment Approach

A HHRA is a predictive tool used to estimate the nature and probability of adverse health effects in humans resulting from exposure to constituents in environmental media. A HHRA incorporates measurements of chemical concentrations and mathematical modeling using realistic yet conservative assumptions of exposure. As a result, a risk assessment does not represent actual risks to potentially exposed individuals but an upper-limit estimate that is used to characterize potential risk.

This HHRA addresses potential human exposures to surface water runoff that is exiting the SSFL via the Outfalls. Currently, surface water discharges from the SSFL are regulated under the NPDES Permit and surface water samples are collected at each Outfall as a part of the permit. Potential chronic health risks and hazards have been estimated in this HHRA for Constituents of Potential Concern (COPCs), including both

[1] The HHRA includes all existing outfalls specified in the Order. Outfall 020 was also listed in the Order; however, construction of Outfall 020 has not been completed and, therefore, no data are available for evaluation.

chemicals and radionuclides that have been detected in surface water as a part of the NPDES Permit monitoring.

The overall methodology used in the HHRA is consistent with current United States Environmental Protection Agency (USEPA) and California Environmental Protection Agency (Cal-EPA) guidance, agency-approved risk assessment approaches for the SSFL, and the Work Plan (USEPA 1989; 1991ab; 1992; 1995; 2011; 2016; Cal-EPA 1996; 2015; 2016).

There are five basic steps in the quantitative HHRA process, which are summarized as follows:

- Data Evaluation and Selection of COPCs: COPCs at the Site (defined as potentially hazardous constituents associated with the Site Outfall stormwater discharges that are present at concentrations higher than background levels) are identified by reviewing environmental sampling data.
- Exposure Assessment: Potentially relevant populations that could be exposed to Site-related COPCs, based on potential future uses of the drainage areas immediately adjacent to the SSFL and the designated use of the surface water, are identified. The magnitude, frequency, and duration of the exposures, and the pathways by which humans could potentially be exposed to Site-related COPCs are evaluated. The exposure scenarios are summarized in the Conceptual Site Model (CSM), which includes the sources, affected media, release mechanisms, and exposure pathways for each identified receptor population. For this HHRA, Site-specific physical characteristics including hydrology are also evaluated.
- Toxicity Assessment: The relationship between the magnitude of exposure and potential adverse health effects on each receptor (dose-response assessment) is presented for each COPC. Toxicity criteria for each COPC are identified and are then used to estimate the likelihood of adverse effects that could potentially occur at different exposure levels.
- Risk Characterization: Results of the exposure and toxicity assessments are analyzed and combined to develop COPC-specific Risk-Based Concentrations (RBCs) for each of the exposure scenarios. The RBCs represent the concentrations of constituents in the relevant environmental media (i.e., surface water) that are considered safe for potential recreational exposures under conservative exposure conditions. Comparison of the RBCs to the detected surface water concentrations is then conducted to estimate the cumulative health risks posed by the presence of multiple COPCs.

- Uncertainty Analysis: The uncertainties associated with each of the previous steps are discussed to assist decision-makers in evaluating the HHRA results in the context of the assumptions and variability in the data used.

The receptors and exposure pathways considered in this HHRA are based on future recreational use, sampling results, and likely routes of exposure. Exposures are assumed to occur to individuals who may enter the drainages for recreational purposes when water is likely be present. Therefore, exposure pathways considered in the HHRA are the direct contact pathways of incidental ingestion and dermal contact, and the inhalation pathway. In addition, the completeness (i.e., existence of a pathway from chemical source to human receptor) of the aquatic plant and fish consumption pathways is evaluated. Potential recreator exposures to sediment in the drainages, including areas near the Outfalls, are being addressed as part of Site closure activities in accordance with three regulatory orders under oversight by the Cal-EPA Department of Toxic Substances Control (DTSC); therefore, exposures to sediment were not evaluated in this HHRA.

1.2 Site Background Information

The SSFL occupies approximately 2,850 acres and is located at the top of Woolsey Canyon Road in the Simi Hills, Ventura County, California. The Site is jointly owned by Boeing and the United States government and is divided into four administrative areas (Administrative Areas I, II, III, and IV) and undeveloped land areas to both the north (Northern Undeveloped Land) and south (Southern Undeveloped Land). The developed portion of the Site comprises approximately 1,500 acres. The Site layout is shown in **Figure 1**.

Boeing owns most of Administrative Area I and all of Area III. A 40-acre portion of Area I and all of Area II are owned by the federal government and are administered by the National Aeronautics and Space Administration (NASA). Area IV and the Northern and Southern Undeveloped Areas are owned by Boeing. The United States Department of Energy (DOE) owns specific facilities located on approximately 90 acres of Area IV.

1.2.1 Current and Historical Site Activities

Industrial operations at the SSFL ceased in 2006; current activities at the Site include structure demolition, soil excavation and removal, maintenance and operation of stormwater treatment systems, environmental monitoring and sampling, remediation planning, and other restoration activities.

The SSFL became active in 1948 and historical Site activities included research, development, and testing of rocket engines, water jet pumps, lasers, liquid metal heat

exchanger components, nuclear energy, and related technologies. The principal historical Site activity was large rocket engine testing by Boeing and NASA in Administrative Areas I, II, and III, and energy technology research for the DOE in Area IV. In addition to laboratory research, rocket engine assembly, and rocket engine testing, Site uses supporting these activities (e.g., maintenance; site engineering; environment, health, and safety; and security) were ongoing. Chemicals used in the largest volumes at the SSFL were petroleum fuel hydrocarbons and chlorinated solvents. The periodic burning of off-specification fuels in ponds may have produced polychlorinated dibenzodioxins and dibenzofurans (collectively referred to as "dioxins"). Limited quantities of solid propellants, including perchlorate compounds, were used at the SSFL for research and testing operations. Various metals may have been used in machining operations, or stored or disposed of as construction debris.

1.2.2 Stormwater Management

Precipitation and subsequent surface water runoff occurs primarily as winter storms occur from October through March, a period that represents approximately 90% of annual average rainfall at the Site. Little rainfall occurs during the April through September dry season. The long-term average annual rainfall at SSFL from the 1958/1959 season through the 2015/2016 season is 16.8 inches, although cyclical periods of above average and below average rainfall are common. Surface water runoff at the Site is sampled within natural drainages at locations that are identified in the NPDES Permit as compliance monitoring "outfalls". Best Management Practices (BMPs) and advanced stormwater treatment systems have been implemented throughout the Site to treat stormwater or provide erosion and sediment control prior to discharge. Surface water discharges from the SSFL have been regulated under a NPDES permit as required by the Clean Water Act since 1976. A wide range of constituents have been monitored. Parameters vary by outfall but generally include: dioxins, metals, radionuclides, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), chloride, cyanide, fluoride, nutrients, oil and grease, perchlorate, pH, sulfate, Total Suspended Solids (TSS), and Total Dissolved Solids (TDS).

Outfalls 001 and 002, located in the southern portion of the SSFL, receive runoff from the Southern Undeveloped Land areas of the Site, which have no or minimal history of industrial activity or known surface soil contamination; this water leaves the Site without treatment. Outfalls 001 and 002 are also downstream of Outfalls 011 and 018, respectively, and receive treated stormwater flows from those outfalls, which collect and treat runoff from areas with former industrial activities. However, that runoff is treated with very advanced treatment systems, up to the design storm, and overflows are treated by media filters. Water exiting Outfalls 001 and 002 flow to Bell Creek, a tributary to the Los Angeles River. Flows from Outfalls 001 and 002, which include treated or bypass

flows from the active treatment systems at Outfalls 011 and 018, constitute approximately 60% of the total surface water discharge exiting the SSFL.

Stormwater from the northern boundary of the Site is received at Outfalls 003 through 007 and 010, from where (except in the case of very large storm events, when it may be directly discharged from those outfalls following treatment) it is pumped to Silvernale Pond for treatment prior to discharge at Outfall 018. While the majority of stormwater that exits Outfalls 003 through 007 and 010 is treated using media filters, certain conditions (e.g., equipment failures and/or storms exceeding the design flow of the outfalls) may result in the discharge of partially treated stormwater from these outfalls.

Outfalls 008 and 009 are canyon outfalls located in the eastern and northern portions of the SSFL, respectively. Because of the location, size, and terrain of the Outfall 008 and 009 watersheds, flows from these areas are generally not captured and treated by active treatment systems[2]; instead, the stormwater quality management strategy leverages distributed source controls and natural treatment systems. Interim Source Removal Action (ISRA) and BMP programs were implemented in these watersheds beginning in 2009 under the oversight of the LARWQCB, to improve compliance with NPDES Permit limits through the dual approach of remediation of surface soils that are above defined thresholds for NPDES constituents of concern, and through distributed control and/or treatment of stormwater runoff from prioritized subareas, respectively. Stormwater runoff from Happy Valley (Outfall 008) naturally flows via Dayton Canyon Creek to Chatsworth Creek. Chatsworth Creek flows south to Bell Creek southwest of the intersection of Shoup Avenue and Sherman Way. Bell Creek subsequently flows southeast to the Los Angeles River. Stormwater from the Northern Drainage (Outfall 009) naturally flows to Arroyo Simi.

At Outfalls 011 and 018, active treatment systems have been in place since 2012 for advanced treatment of stormwater. These systems also include storage ponds for detaining flows before treatment.

Outfall 019 receives treated groundwater from the groundwater extraction and treatment system (GETS) when the GETS is operating, which it discharges downstream of Outfall 001. It is anticipated that Outfall 020, once constructed, will also receive treated groundwater from the GETS, which will be discharged downstream of Outfall 002.

The beneficial use designations set forth in the Los Angeles Water Quality Control Plan (Basin Plan) have been used to identify the surface water uses that may be relevant when establishing the HHRA exposure assumptions. The Basin Plan does not explicitly

[2] An exception to this is at the helipad, located in Area II in the Outfall 009 watershed, where some runoff is captured and piped to Silvernale Pond for treatment in the Outfall 018 active treatment system.

identify the tributary drainages that cross the SSFL boundaries, however downstream creeks (Bell Creek, Dayton Canyon Creek, and Arroyo Simi) are included, and these are designated as having intermittent recreational uses (water contact and non-contact water recreation) (LARWQCB, 1994).

1.2.3 Site Closure Activities

Boeing is completing Site closure activities in Administrative Area I, Administrative Area III, and the Southern Undeveloped Land in accordance with the 2007 Consent Order for Corrective Action entered into with the Department of Toxic Substances Control (DTSC) (2007 Consent Order)

In furtherance of its obligations under the 2007 Consent Order, Boeing is preparing human health and ecological risk assessments to address contamination in environmental media (air, soil, and surface/groundwater) in Boeing areas at the SSFL, or in adjacent areas where contamination from Boeing areas has migrated within the Site or offsite. Boeing is conducting risk assessments for 21 RCRA Facility Investigation (RFI) sites and the Southern Undeveloped Land, and reporting those results in RFI Data Summary and Findings Reports (DSFRs) for DTSC review and approval. Risk assessments are performed for all environmental media present at the Site, typically including soil (which includes ephemeral sediment in drainages), surface water and fresh sediment in ponds, soil vapor, and groundwater. Based on risk assessment and other groundwater modeling results, the DSFRs identify areas for remediation planning in the Corrective Measure Study (CMS).

DOE and NASA are completing Site closure activities for soil (including ephemeral sediment) in accordance with Administrative Orders on Consent for Remedial Action (AOCs) entered into with DTSC. The DOE AOC includes Administrative Area IV and the Northern Undeveloped Land, and the NASA AOC includes Administrative Area II and a 40-acre parcel of Administrative Area I, where the Liquid Oxygen (LOX) Plant was formerly located. The AOCs require soil cleanup to Lookup Table values based on background levels or reporting limits established by DTSC for the SSFL. DOE and NASA are completing DSFRs for their portions of the SSFL. To date, NASA has published the DSFR for Administrative Area II and the Administrative Area I LOX Plant. DOE is in progress of preparing the DSFR for Area IV and the Northern Undeveloped Zone. The 2007 Consent Order governs DOE's and NASA's obligations for groundwater at the Site.

2. DATA EVALUATION AND SELECTION OF CONSTITUENTS OF POTENTIAL CONCERN (COPCS)

An initial step in the HHRA process is an evaluation of available data to develop a data set for use in the HHRA and identify COPCs. Appropriate Site data must be available to support the characterization of COPC levels and media relevant to transport processes and exposure pathways. This section discusses the data evaluation that was conducted in the HHRA, as well as the methodology that was used to identify the COPCs for the Site.

2.1 Data Evaluation

A Site surface water quality database consisting of NPDES monitoring results was used as the basis for the data evaluation. Surface water sampling has been conducted at the SSFL over multiple years as part of the NPDES Permit monitoring, including periods before and after various programs were completed, including BMPs, interim remediation (including the ISRA program), and building and other infrastructure removal projects. Samples have been analyzed for a wide range of constituents. Surface water data collected from Outfalls 001, 002, 008, 009, 011, 018, and 019 were evaluated, with consideration given to the changes in Site conditions over time, to identify the data set for use in the HHRA. Outfall 020 has not yet been constructed; therefore, no data are available for this outfall.

The data evaluation was consistent with guidance provided by USEPA in their *Risk Assessment Guidance for Superfund* (1989) and *Guidance for Data Usability in Risk Assessments* (1992). The evaluation included:

- Evaluating the quality of data with respect to sample quantification and detection limits;
- Examining laboratory qualifiers assigned to monitoring data and evaluating potential quality assurance/quality control issues; and
- Evaluating split/duplicate samples.

Data selected for use in the HHRA were collected during the sampling period from February 16, 2009 to March 12, 2016 per the approved Work Plan. This date range (herein, the "HHRA Sampling Period") was selected to accommodate data needs considering the following factors:

- Programs completed at the Site (e.g., stormwater BMPs, interim remediation and ISRA, and building and infrastructure removal activities) have resulted in

significant changes at the Site due to the removal of contaminants, structural improvements in stormwater management, and reduction in impervious surfaces. Therefore, to evaluate current and future conditions, water quality data during and following these activities were evaluated in the HHRA.

- Data that are clearly not representative of current conditions are not suitable for evaluating potential exposures to the primary constituents detected in surface water leaving the Site. Therefore, data prior to February 2009 were not included per the Work Plan.

- Sufficient samples are needed to calculate realistic estimates of the exposure point concentrations. The selected sampling period provides at least five sampling events for each Outfall, and at least five sampling results for most COPCs. For Outfall-constituent combinations where sample counts are limited, alternative summary statistics were used to address this source of uncertainty; this is discussed further in Section 3.2.

Analytical data within the HHRA period were reviewed with respect to any potential qualifiers that may significantly impact the HHRA. Only data determined to be of sufficient quality (i.e., not rejected during data validation) were considered for the HHRA. Data qualifications are discussed in the Uncertainties section (Section 7). Appendix E provides the risk assessment database.

Field duplicates are collected to evaluate the quality of sample collection as well as sample analysis. Field duplicate samples are usually two samples collected simultaneously from the same sampling location and are used as measures of the homogeneity of the medium sampled in that location and/or the precision in the sampling and sample handling (in transport and/or in the laboratory) (USEPA, 1989). Unless otherwise specified in the analytical method, duplicate samples have generally been analyzed at a frequency of five percent. Split samples constitute equivalent portions of the same sample that are analyzed separately, typically by different laboratories, to assess sample handling variability. For cases where field duplicate or split sample data were collected, a single representative concentration for the COPC in the sample was selected as follows:

- If there was a detection in both samples, the higher concentration was selected;
- If there was a detection in one sample but not the other, the detected concentration was selected; and

- If both samples were nondetects, the lowest reporting limit was selected and appropriate techniques for handling nondetect data were applied in calculating statistics later in the data evaluation.

Some samples analyzed by the laboratory were subsequently reanalyzed for the same constituent. In such cases, the result from the latest analysis was used. If the latest analysis could not be identified, the results were treated as duplicates and handled as described above.

For nondetect results, the reporting limit was conservatively used (rather than the lower value of the method detection limit) to calculate statistics for the data evaluation. This approach is discussed in the Uncertainties section (Section 7).

Dissolved and total[3] constituent concentrations were analyzed in some samples; i.e., for metals and boron. Both sets of data were evaluated in the HHRA. As a conservative approach, the quantitative risk assessment was based on the higher of the dissolved and total concentrations for each constituent. (See Section 7, Uncertainties, for further discussion.)

Dioxins/furans are complex halogenated aromatic hydrocarbon mixtures made up of chemically-related chemicals. The 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD) congener has been the most extensively studied of these halogenated aromatic hydrocarbons and is thought to be the most toxic chemical within the dioxin family. Because of their complex nature and the lack of specific toxicity information for each of the individual chemicals, dioxin/furans are evaluated in terms of their relative toxicity to that of 2,3,7,8-TCDD using Toxicity Equivalence Factors (TEFs). Concentrations of the individual 2,3,7,8-substituted congeners are then multiplied by their respective TEF, resulting in a congener concentration normalized to the toxicity of 2,3,7,8-TCDD for each species. Because the congeners all share the same mode of toxicity, the TEF-concentrations are summed resulting in a total PCDD/PCDF toxic equivalent, or total dioxin TEQ concentration, given in terms of the toxicity of 2,3,7,8-TCDD. Toxicity equivalents (TEQs) were calculated using the most current (2005) World Health Organization (WHO) TEFs (Van Berg et. al., 2006, USEPA, 2010)[4]. The method to derive total TEQ concentrations is as follows:

[3] i.e., total is the dissolved fraction plus the particulate fraction.
[4] Dioxin TEQ values calculated in this HHRA are different from those calculated for NPDES reporting as discussed in Section 7.

Step 1. For each sample, select the detected (including j-flagged data ["Detected, but Not Quantified" (DNQ)]) concentrations of each of the 2,3,7,8-substituted PCDD/PCDFs;

Step 2. Multiply each congener concentration by the appropriate TEF for the specific congener. For nondetect results the concentration was assumed to be zero (0). For each receptor, use the appropriate set of TEF values (e.g., mammalian total TEQs should be calculated with mammalian TEFs); and

Step 3. Sum the resulting values from Step 2 to calculate total TEQ concentrations.

The TEF values used in the risk assessment are presented below.

Table 1. Toxicity Equivalency Factors for Dioxin Compounds

Congener	Toxicity Equivalency Factor
Dioxins	
2,3,7,8-TCDD	1
1,2,3,7,8-PeCDD	1
1,2,3,4,7,8-HxCDD	0.1
1,2,3,6,7,8-HxCDD	0.1
1,2,3,7,8,9-HxCDD	0.1
1,2,3,4,6,7,8-HpCDD	0.01
OCDD	0.0003
Furans	
2,3,7,8-TCDF	1
1,2,3,7,8-PeCDF	0.03
2,3,4,7,8-PeCDF	0.3
1,2,3,4,7,8-HxCDF	0.1
1,2,3,6,7,8-HxCDF	0.1
1,2,3,7,8,9-HxCDF	0.1
2,3,4,6,7,8-HxCDF	0.1
1,2,3,4,6,7,8-HpCDF	0.01
1,2,3,4,7,8,9-HpCDF	0.01
OCDF	0.0003

2.2 Selection of Constituents of Potential Concern

USEPA risk assessment guidance (1989) presents a methodology for identifying which detected constituents should be included in a quantitative HHRA. These are defined by USEPA (1989) as constituents potentially related to the site whose data are of sufficient quality for use in a quantitative HHRA.

Because of the large number of surface water samples that have been analyzed from the Outfalls, the list of constituents that have been analyzed and detected during the HHRA Sampling Period is considered representative of existing SSFL surface water quality. All data from the Outfalls and HHRA Sampling Period that were determined to be of sufficient quality (i.e., not rejected during data validation) were carried forward into the COPC selection process described below. These data are summarized in **Appendix A**.

A preliminary list of COPCs was developed including all constituents (chemicals and radionuclides) detected in at least one sample. Constituents were then screened against a series of criteria. The constituents listed below were excluded from consideration as COPCs based on the criteria indicated.

- The constituent is considered an essential nutrient: iron, manganese, and calcium;
- The constituent is not commonly evaluated in human health risk assessments due to low toxicity: chloride and sulfate;
- The constituent is reported both individually and as part of a group or class; in this case, the individual constituent was retained as a COPC and the group was excluded: Radium-226 + Radium-228, Gross Alpha, and Gross Beta.

In addition to the above, ammonia (as N and NH_3) was not considered as a COPC in this evaluation. Toxicity criteria for the ingestion and dermal pathways are not available for this constituent, and the USEPA has not established a regional screening level (RSL) for ammonia in residential tap water. Nitrogen species are included in the HHRA in the form of nitrates and nitrites, which are the species of most potential concern for human health risk assessment.

All other constituents detected in at least one sample were retained as COPCs. **Table 2** presents the number of samples collected and the detection frequency at each Outfall for each of the COPCs evaluated in the HHRA. The list of COPCs is presented in **Table 3**.

3. EXPOSURE ASSESSMENT

The objectives of an exposure assessment are to identify populations that may potentially be exposed to constituents in environmental media (e.g., surface water) and the pathways by which the exposures may occur. In addition, for pathways considered complete (see discussion below), the constituent concentrations to which the individuals may potentially be exposed (exposure point concentrations, or EPCs) and the frequency, magnitude, and duration of potential exposures (exposure parameters) need to be estimated.

There must be a complete exposure pathway from the source of constituents in the environment to human receptors for exposure and intake to occur. The following five elements must be present to comprise a complete exposure pathway by which individuals may contact constituents:

- A source of a constituents;
- A mechanism of the constituent's release to the environment;
- An environmental transport medium (e.g., surface water);
- A point of potential human contact with the medium; and
- A means of entry (i.e., intake route) into the body (e.g., ingestion).

Potentially complete source-pathway-receptor relationships which were included in the HHRA are discussed in the Conceptual Site Model (CSM) section below. These source-pathway-receptor relationships provide the basis for the quantitative exposure assessment. The product of the exposure assessment is a measure of constituent intake that combines the exposure parameters for the receptors of concern (e.g., contact rates, exposure frequency, and duration) with the EPCs for the media of concern.

3.1 Conceptual Site Model

The CSM, presented in **Figure 2**, represents the current understanding of the sources of COPCs, how they may be released and transported within and among media, and the exposure pathways and routes by which they may contact human receptors. The major components of the CSM are discussed below.

3.1.1 Constituent Characteristics and Potential Exposure Routes

Potential exposure to constituents detected in surface water discharges at the Outfalls is partly dependent on the characteristics of the COPCs present. Potential exposure routes to be considered include both direct and indirect contact with surface water. For volatile chemicals detected in surface water samples, indirect exposures (i.e., outdoor inhalation) from vapors migrating from surface water to outdoor air may occur. For semi- or non-

volatile constituents, such as metals and dioxins, the direct contact routes of exposure, such as incidental ingestion or dermal contact, are the most relevant.

3.1.2 Identification of Potential Receptors and Exposure Pathways

The Basin Plan identifies intermittent recreational beneficial use designations for the creeks downstream of the Site, although the smaller tributary drainages near the SSFL boundary are not explicitly identified in the Basin Plan (LARWQCB, 1994). Therefore, people (referred to as "recreators") who might enter the drainage areas (e.g., while hiking) were identified as the receptor group that have the potential to be exposed to surface water runoff that is exiting the SSFL via the Outfalls.

The HHRA addressed potential exposures to constituents in surface water exiting the SSFL by evaluating surface water data collected at the Outfalls. The drainage areas near the Outfalls and immediately adjacent to the SSFL boundary are typically steep and difficult to access for very young children; however, older children and adults could access the drainage areas. Based on the steep configuration of the drainage areas adjacent to the SSFL, water is not expected to be pooled at depths to allow for swimming; however, there is potential for some water contact to occur during recreational activities (e.g., walking through drainages, and rafting when sufficient water depth is present). The HHRA evaluated potential exposures to child and adult recreators who were assumed to be walking through the drainages when water is present as the most likely exposure scenario, although the exposure assumptions used are protective of multiple secondary contact recreational activities including rafting.

Potential exposure pathways were evaluated for completeness, considering the sampling results and likely routes of exposure. Direct exposures to surface water, i.e., incidental ingestion and dermal contact, were identified as the most likely potentially complete exposure pathways and were evaluated quantitatively in the HHRA. The outdoor inhalation pathway was also identified as a potentially complete exposure pathway; however, due to the low concentrations of VOCs in surface water, as well as the dilution that would occur when these constituents are volatilized to the air, this pathway was determined to be insignificant for estimating risks and hazards. To evaluate the significance of this pathway a focused evaluation was conducted and is presented in Section 3.3

Fish are not present in the drainages near the Outfalls and, therefore, the fish consumption pathway is not complete. Aquatic and terrestrial plants are present within the drainage bottom and may come in contact with surface water runoff during rain events or flow

from the GETS system discharge (Outfalls 019 and 020). This is discussed further in Section 3.4

Potential recreator exposures to sediment in the drainages, including areas near the Outfalls, are being addressed as part of Site closure activities in accordance with three regulatory orders under oversight by the Cal-EPA DTSC, as discussed in Section 1.2.3, above; therefore, exposures to sediment were not evaluated in this HHRA.

3.1.3 Exposure Assumptions

An important consideration for the HHRA is the frequency of surface water flow from the Outfalls and the likelihood of exposure to this water in the drainages adjacent to the SSFL. Exposure to surface water exiting the SSFL can only occur when water is flowing at the Outfalls, which occurs typically during a rain event or within a week after a rain event. For Outfall 019, surface water comes from groundwater treatment system discharges and, therefore, flow (and potential exposure) is dependent on whether the GETS is operating and may occur any day of the year. Detention ponds at Outfall 011 and Outfall 018 allow for storage of collected stormwater and release of treated flows during post-storm dry periods. The historic flow monitoring data reflect this slightly altered hydrology. Therefore, flow (and potential exposure) at Outfalls 011, 018, 001, and 002 is dependent on when the active treatment systems are operating. For the remaining Outfalls, flow is intermittent and dependent on rainfall and onsite surface water pond operation.

Flow monitoring data from the Outfalls were used to estimate annual discharge frequencies, which were then used to estimate the number of days per year that exposure to surface water exiting each Outfall could occur (i.e., exposure frequency). The assessment of flow data first involved analyzing local rainfall data for the 50-year period of record from Water Year (WY) 1958/59 through WY 2015/16 (VCWPD, 2016).[5] The annual average rainfall during this period was 16.8 inches and the average number of "wet" days (i.e., days with at least 0.5 inches of rainfall as determined following discussion with the Expert Panel) was 10.2 days as presented below.

[5] Rainfall data from the Simi Hills – Rocketdyne Lab gage (Ventura County Watershed Protection District site 249) were analyzed for the 1958/59 through 2000/01 WYs (October 1 – September 30). This gage is located within the site boundary (Area I). Data from the Area IV gage located on the SSFL site (moved to Area I starting on January 1, 2013) were analyzed for the 2001/02 – 2015/16 WYs. This results in a 50-year period of record (POR), since rainfall records for the 1977/78 through 1984/85 WYs are incomplete for the Simi Hills – Rocketdyne Lab gage.

Table 4: Total Rainfall and Number of "Wet" Days (i.e., >=0.5" of rain) by WY, for WYs with SSFL Outfall Flow Measurement Data Available (WYs near or above the average values for both criteria are indicated in red)

WY (Oct-Sep)	Total Precipitation (in)	No. of "Wet" Days
2004/2005[1, 2]	**28.6**	**19**
2005/2006[1, 2]	**21.32**	**12**
2006/2007[2]	6.95	6
2007/2008	**16.45**	**10**
2008/2009	11.15	8
2009/2010	**19.48**	**15**
2010/2011	**25.18**	**10**
2011/2012	11.32	9
2012/2013	8.09	5
2013/2014	6.11	3
2014/2015	13.16	11
2015/2016[3]	10.03	5
Long-term Average based on 1958/59 - 2015/16 WYs	**16.8**	**10.2**

[1] No flow data available at OF 008
[2] No flow data available for OF 009
[3]Includes rainfall through July 2016

Next, a representative WY with available Outfall flow data was selected considering the following factors:

- A recent WY should be selected;
- The WY should have the same or slightly higher rainfall than the long-term average;
- The WY should have the same or slightly more "wet" days than the long-term average; and
- Sufficient Outfall flow data should be available to estimate the frequency of discharge at each Outfall.

Based on the above factors, the 2009/10 WY was selected for use in the HHRA analysis and represents a conservative estimate of long term average exposure. The 2009/10 WY had 19.5 inches of total precipitation and 15 "wet" days (i.e., slightly above the long-term averages), and a 99% complete record of flow data at Outfalls 001, 002, 008, 009, 011, and 018. Based on the data from gages, flow was estimated to occur on the number of days listed below ("flow days") for each Outfall. For Outfall 019, the number of flow days depends on the operation of the GETS rather than rainfall or hydrology. Current

operation calls for 24-hour pumping seven days per week, so continuous discharge was assumed. The total number of flow days is presented below and the daily flow information for WY 2009/2010 is presented in **Appendix B**.

Table 5. Total Number of Flow Days by Outfall

Water Year (Oct-Sep)	Outfall – Number of Flow Days						
	001	**002**	**008**	**009**	**011**	**018**	**019**
2009/2010	19	58	32	89	4	42	365

Because water flows only during the wet months, except for Outfall 019, the probability that someone might be recreating in the drainages when water was present was calculated. It was assumed that the maximum days that a recreator could be present was once per week for 50 weeks per year. This is a conservative measure, factoring in only two weeks of no contact per year, and assuming that a person visits the same area weekly even during winter months and inclement weather. Additionally, even if the frequency of visitation were higher during summer months, the presence of stormwater discharge during that time would be minimal since precipitation and subsequent surface water runoff occurs primarily as winter storms. Flow monitoring data from the outfalls were used to estimate the number of days per year that someone would be exposed to surface water exiting each outfall (EF_a). This annual exposure frequency was calculated using weekly discharge frequencies from the flow data and weekly probabilities of exposure (i.e., likelihood of exposure) from 2009/10 WY data. For each outfall, the weekly discharge frequency (DF_w) and weekly probability of exposure (p_w) were calculated as:

$DF_w = \sum_{d=1}^{7} FD_d$, where FD_d is 1 if flow was recorded on day d and 0 otherwise,

and

$p_w = \frac{DF_w}{7}$, respectively.

Recreators were assumed to be present in the drainages for one day per week (n = 1) for 50 weeks per year and each week was assumed to be independent of each other. Under these assumptions and using probability theory, the weekly exposure frequency, EF_w, follows a binomial distribution, with parameter n = 1 and $p = p_w$. Accordingly, for each outfall, the expected number of times a recreator will be exposed to surface water each week is $EF_w = n \times p_w$. For example, if the number of flow days in a week was $DF_w = 5$, then $p_w = \frac{5}{7} = 0.71$, and $EF_w = 1 \times 0.71 = 0.71$. Since independence between

weeks is assumed, then the annual exposure frequency for each outfall can be calculated as the sum of the weekly exposures:

$$EF_a = \sum_{w=1}^{52} EF_w.$$

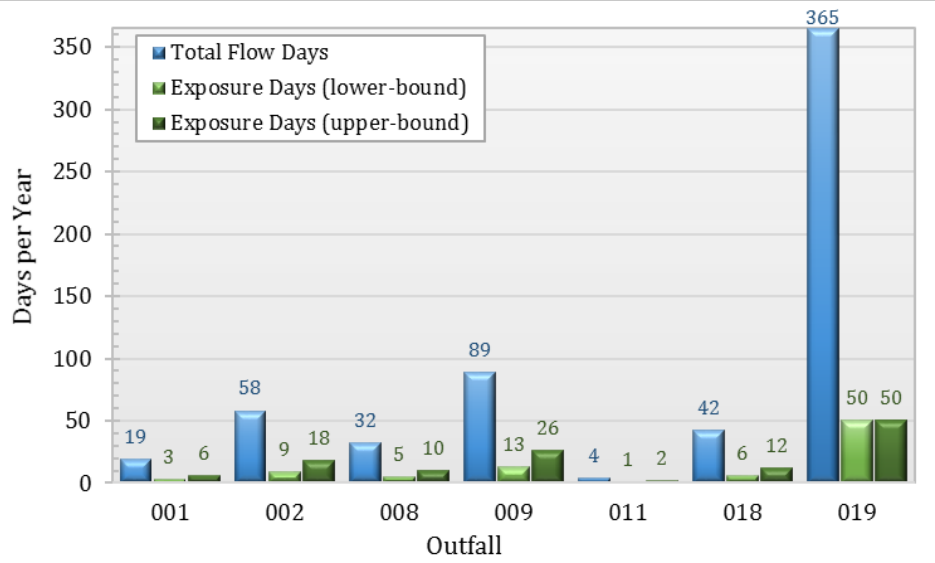
This calculation was used to connect flow days to the annual exposure frequency. To provide an upper-bound assumption, an upper bound estimate was calculated by further assuming that recreators were present in the drainages for two days per week (n = 2) during the weeks that water is present in the drainages, which is equivalent to multiplying EF_a by two. The maximum possible days of exposure is assumed to be 50 days per year; therefore Outfall 019 was assumed to have the maximum number of days of exposure for both the lower bound and upper bound since water can flow year-round from this outfall. The following exposure frequency was assumed for each outfall based on the days that water may be present.

Table 6. Exposure Frequency by Outfall

	Outfall – Exposure Frequency - Days per Year						
Exposure Frequency Estimate	**001**	**002**	**008**	**009**	**011**	**018**	**019**
Lower-bound	3	9	5	13	1	6	50
Upper-bound	6	18	10	26	2	12	50

A comparison of the flow days and exposure frequency assumptions by outfall is shown below.

Figure 3. Flow Days and Exposure Frequency by Outfall



Incidental ingestion of water is possible when walking through the drainages or during other limited contact recreational use activities when water is present. There is limited information on incidental ingestion rates of water during low-contact recreational uses of water bodies. A recent study suggests that mean and upper confidence estimates of water ingestion during limited-contact recreational activities on surface waters are about 3-4 milliliters (mL) and 10-15 mL, respectively (Dorevitch et al., 2011). The study was conducted in surface waters and outdoor swimming pools to estimate water ingestion during full- and limited-contact surface water recreation activities such as canoeing, fishing, kayaking, motor boating, and rowing, and included contact such as swimming, wading/splashing, playing, head immersion, and capsizing in vessels. Pool fishers and participants who walked around in shallow swimming pools reported no water ingestion, and most respondents who engaged in limited-contact surface water activities reported no water ingestion. By contrast, a study conducted in swimming pools with swimmers actively swimming fully immersed at least 45 minutes resulted in estimates of the average amount of water swallowed by non-adults and adults as 37 ml and 16 ml, respectively (Dufour, 2006). The USEPA refers to a value of 50 ml/hour for both children and adult swimmers (USEPA, 2015b). Given the more limited potential for incidental ingestion through hiking in the drainages or other limited contact recreational use activities, the upper-bound estimate of 15 ml estimated by Dorevitch et al. from recreational activities was used as the daily incidental ingestion rate for this HHRA.

For dermal contact, exposure is assumed to occur through contact of surface water with the lower legs and feet while walking through the water. In addition, contact may occur to the forearms and hands assuming that the recreator may pick something up from the drainage, and also to the head, assuming that there is hand-to-head contact. The combined surface area for these parts of the body was taken from the *User's Guide for Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites* (USEPA, 2016b), for children and adults.

To be conservative, exposures are assumed to be possible for relatively young children. Age ranges that were evaluated are consistent with the RSL User's Guide (USEPA, 2016b) and include children from two to six years of age and adults (i.e., assumed to be over six years of age). It was assumed that each hiking event takes two hours for adults and children and that during the entire 2-hour period contact with water is being made. This is a conservative assumption given the average temperature of the water flowing from the drainages (e.g., average temperature for Outfall 002 is 52 degrees Fahrenheit) and that an individual would not contact water at this low temperature over an entire 2-hour time period. Additional exposure parameters, such as exposure duration and body weight, were taken from the Exposure Factors Handbook (USEPA, 2011) and RSL User's Guide (USEPA, 2016b).

The exposure parameters used in the HHRA are provided in **Table 7**.

3.2 Exposure Point Concentrations

Exposure point concentrations (EPCs) are the concentrations of constituents in environmental media to which receptors may be exposed through defined exposure pathways considered complete in the CSM. Depending on the nature of the exposure, the number of samples, and the constituent distribution, the maximum detected COPC concentrations may be suitable for use as EPCs. However, long-term exposure to a single sample point is highly unlikely (i.e., a recreator is unlikely to be exposed only to the maximum concentration for each exposure event). A more realistic estimate of the EPC would be the average concentration over the assumed exposure duration. A conservative estimate of the average concentration commonly used in risk assessment is the 95 percent upper confidence limit of the average sample concentration (95UCL) (Cal-EPA, 1996; USEPA, 2014).

For this HHRA, the 95UCL for each COPC at each Outfall was calculated using data from the HHRA Sampling Period (discussed in Section 2.1) and the latest version of the USEPA ProUCL software (Version 5.1.00; USEPA, 2014). Only constituents with at least eight results and five detections were eligible for 95UCL calculations. Otherwise

the maximum concentration was used. Nondetects were processed during UCL calculations using the full reporting limit. EPCs were then established for each COPC at each Outfall as follows:

- For COPCs where a 95UCL could not be calculated (e.g., due to a limited number of detected results or a small sample size), the maximum detected concentration of the COPC at an Outfall was used as the EPC for that Outfall; and
- For COPCs with a calculated 95UCL, the 95UCL was used as the EPC unless its value was greater than the maximum detected concentration at the Outfall, in which case the maximum concentration was used as the EPC.

EPCs used in the HHRA for the respective Outfalls are provided in **Tables 8** through **14** and the ProUCL output is provided in **Appendix B, Attachment B-2**.

3.3 Evaluation of Potential Volatilization from Surface Water

Volatilization of VOCs from surface waters is typically not considered a significant pathway for recreator scenarios. For example, the USEPA RSL calculator does not include the volatilization pathway in the derivation of recreator screening levels. This pathway is not typically evaluated due to the low likelihood of VOCs to persist in surface water due to off gassing and the significant dilution that would occur due to mixing in outdoor air. While this pathway is not considered significant, a quantitative evaluation was conducted on one Outfall to evaluate its significance for the Outfall discharges. Outfall 002 was chosen for the evaluation as it is the only Outfall where TCE, a primary COPC for the Site, was detected in the dataset used in the HHRA.

An air emission model for wastewater, WATER9, developed by the USEPA was selected as the modeling approach for this analysis.[6] WATER9 is an analytical model that calculates emissions of organic compounds via various pathways from wastewater and wastewater units including open channels.

The WATER9 model calculates emissions for each constituent. Emission calculations are based on the properties of the constituent, its concentration, wastewater unit types, and the path of the waste through the treatment system. The WATER9 model was used to model VOC emissions using the flow rate, water temperature and configuration of Outfall 002. The channel segment was assumed to be 300 feet representing a stretch of drainage immediately below the outfall that a recreator may be present. The Outfall 002 TCE concentration was assumed to be 0.733 µg/L, the 95UCL concentration used as the

[6] https://www3.epa.gov/ttnchie1/software/water/water9_3/index.html

EPC in the HHRA. Cis-1,2-DCE was also detected in Outfall 002 samples and was included in the evaluation at the concentration of 3 µg/L, the maximum concentration used as the EPC in the HHRA. Detailed information for the emissions estimation is provided in Appendix B, Attachment B-3. Emission estimates were 1.40-05 grams/second (g/sec) for TCE and 5.41E-05 g/sec for cis-1,2-DCE.

To calculate the ambient air concentration using the emission rates from WATER9 the USEPA air dispersion model SCREEN 3 was used. SCREEN3 is a single source Gaussian plume model which provides maximum ground-level concentrations for point, area, flare, and volume sources. SCREEN3 is a screening version of the ISC3 model. The emission source from the channel was modeled as a rectangular area source, with the long side of the channel of 300 feet (the assumed area of exposure near the Outfall, 91.44 meters), and the short side of the channel of 5.2 feet (1.58 meters).

For conservative consideration of the possible wind speeds and atmosphere conditions and consistent with best practices for screening level calculations, two Pasquill stability classes, D and F, were selected to evaluate the effect of different meteorology conditions on the ground-level concentration. Appendix B, Attachment B-3 presents the details of the modeling approach.

The modeled ambient air concentration for the two stability classes for TCE ranged from 0.087 µg/m^3 to 0.135µg/m^3. The modeled ambient air concentrations for cis-1,2-DCE for the two stability classes ranged from 0.336 µg/m^3 to 0.520 µg/m^3.

These concentrations were compared to recreator ambient air risk-based concentrations derived by using the RSL Calculator. Because the RSL Calculator does not include the inhalation pathway for the recreator scenario, the residential ambient air scenario was used and adjusted for the recreator age range, exposure time, exposure frequency, and exposure duration used for this HHRA (see Appendix B, Attachment B-3). The calculated ambient air risk-based concentrations assuming recreational use are 135 µg/m^3 for TCE and 1,950 µg/m^3 for cis-1,2-DCE. The modeled ambient air concentrations from volatilization are substantially (over 1000 times) lower than the risk-based concentrations indicating that the potential risk associated with this pathway is *de minimis* for recreator exposures.

3.4 Evaluation of Aquatic Plant and Fish Consumption Pathway

An evaluation of the edible aquatic plant and fish consumption pathway was conducted for areas around the Outfalls. Information was reviewed to determine if fish or edible aquatic plants were present at the Outfalls. An evaluation was then conducted on the

likelihood of exposure give the terrain and the primary COPCs and the potential for uptake into the edible portions of the plants that were observed.

Fish species observed at SSFL include western mosquitofish (*Gambusia affinis*) and common carp (*Cyprinus carpio*). Both species are non-native species. Western mosquitofish are not considered sportfish by the CDFW, but are commonly used as a bio-control agent for mosquitos in vector control programs, including the vector control program conducted by the County of Ventura. Mosquitofish have been observed in Silvernale Pond and R-2A Pond in past years. Common carp are considered sportfish by the CDFW. Observations of common carp are limited to R-2A Pond in past years, and are tentatively considered present at that location. Although these fish species have been seen in ponds at the SSFL located upstream of the Outfalls, they have not been observed downstream in the drainages below the Outfalls. In past years, many of the wetland features at SSFL including Silvernale Pond were observed to be dry during some point during the year (precluding the persistence of fish species), but R2-A Pond may be considered perennial. R-2A Pond is a relatively small wetland feature that functions to temporarily entrain accumulated rainfall run-off and treated groundwater, with ephemeral drainage features feeding into, and discharging from the pond. A constructed spillway and flume complex are also present downstream of R-2A Pond, creating an exit barrier. With the exception of those infrequent instances when there are substantial surface flows immediately following periods of intense rainfall, the ephemeral nature of all drainage features at SSFL precludes the presence or persistence of fish species outside of small onsite pond features such as R2-A. Therefore, the fish consumption pathway is considered incomplete for the Outfall drainages areas. While the fish consumption pathway is considered incomplete near the outfalls, there could be the potential for fishing and fish consumption at offsite locations farther downstream of SSFL where water is present in sufficient quantity year-round. An evaluation of the potential contribution of water flow and constituent concentrations to these locations is presented in Appendix B, Attachment B-4. The evaluation indicates that potential exposure to SSFL's relatively minor contributions to the water volume and constituent mass in those larger downstream flows through this pathway would be *de minimis.*

As referenced in the Final Environmental Impact Statement for Proposed Demolition and Environmental Cleanup Activities at Santa Susana Field Laboratory (NASA EIS, March 2014), the Santa Ynez Band of Chumash Indians (SYBCI) were provided with a biological inventory of species present at the NASA portions of SSFL as a part of the EIS preparation. A total of six (6) plant species were identified to be biological species of Native American concern (refer to Table 3.4-4 of the NASA EIS), including:

- Broad-leaved milkweed (*Asclepias eriocarpa*);
- Narrow-leaved milkweed (*Asclepias fascicularis*);
- Common fiddleneck (*Amsinckia menziesii*);
- Wild cucumber (*Marah macrocarpus*);
- Coast live oak (*Quercus agrifolia*); and
- Chia sage (*Salvia columbariae*).

A survey of the Outfall locations was conducted to confirm if these and other edible plants were present. The area where ephemeral surface waters would have direct contact with plants was surveyed. It was confirmed that several of the plants identified in the NASA EIS as well as other plants with potential edible, medicinal, or ceremonial uses were present, however only two species of strictly aquatic plants were observed – cattails near Outfalls 002/020 and 019 and bulrush near Outfall 002.

The majority of potentially edible plant species observed near the Outfalls are considered terrestrial plants (except for cattail and bulrush) and not aquatic plants (plants which are found in nature growing in association with free standing water). This is not surprising given the ephemeral nature of the water flow within the drainages except for the GETS discharge at Outfalls 019 and 020. These terrestrial plants could be in contact with water in the drainage bottoms when flow occurs from the Outfalls predominantly in the winter months. As a result, plant contact with surface water in most Outfalls would occur only during the winter months when more limited plant material is available since outside the growing period. In addition, individuals are less likely to be recreating in the drainages during the winter time period.

Potentially edible plants could be exposed to COPCs in surface water when water flow is occurring. However, the likelihood of significant uptake into plants of COPCs that are important to the ingestion route of exposure (e.g., dioxins, arsenic) is considered exceptionally low for the following reasons:

- COPC were detected in low concentrations in surface water and surface water only flows intermittently in the majority of the drainages; therefore, the amounts of COPCs available are low;

- Root uptake of hydrophobic organic compounds, such as dioxins, into plants is poor because these compounds have high log $K_{OW,}$ meaning they strongly sorb to soil particles and organic matter and prefer to be bound to organic matter such as the sediments in the bottom of the waterway (Engwall and Hjelm, 2000);
- If absorbed by a plant they translocate poorly, meaning they tend to bind where they are absorbed, again due to their high log K_{OW}, and do not move to leaves (typically the edible part of the plant);
- For metals (such as arsenic), surface water concentrations are low, i.e., none of the samples collected at any outfall had detections of dissolved arsenic, which is indicative that arsenic is associated with solids. Particle-bound concentrations are not as likely to be taken up by plants and plant concentrations are likely to be low.
- Plant consumption from any of the potential sources identified in the surveys would be low and therefore ingestion would not constitute any significant portion of a diet. This is due to the ephemeral nature of the water to grow plants and corresponding low availability of plants. Subsequent ingestion of COPCs from plants would likely be low due to the low concentration of COPCs in plants, and the low ingestion rate.

It is important to understand the COPC concentrations within the perspective of US regulatory programs. For many of the COPCs, concentrations in the surface water are near or below the Maximum Contaminant Limit (MCL) drinking water standards and below NPDES permit limits. For example, the maximum detected total arsenic concentration is 8.9 µg/L, below the MCL and NPDES permit limit of 10 µg/L. In addition, as mentioned above, arsenic was not detected in dissolved-phase samples. For lead, the maximum concentration of total lead is 13 µg/L and the maximum dissolved-phase concentration is 5.2 µg/L indicating that the majority of the lead in the sample may also be associated with solids. Both concentrations are below the MCL of 15 µg/L. The MCLs address potable water which can be used for a variety of purposes such as direct ingestion and the consumption of crops grown with irrigation water. If a water concentration is below the MCL it is not considered a regulatory concern for consumption and household water use including irrigation of edible plants. Therefore, metal concentrations in surface water in the drainages at concentrations at or below the MCL would not be anticipated to be of concern with respect to edible plant consumption.

Based on the presence of steep, rugged, overgrown and remote terrain, these drainages are considered to have a low likelihood for being used as plant collection areas. Some areas are too bouldery and/or overgrown to freely walk up or down the drainages, and

some of the adjacent slopes are equally as steep and/or thickly vegetated. Plant harvesters would likely be more motivated to search elsewhere in more easily accessible areas throughout the region.

In summary, edible fish are not present in the drainages near the Outfalls and, therefore, the fish consumption pathway is incomplete. Limited potentially edible plants are present within the drainage bottom and these may come in contact with surface water runoff during rain events or flow from the GETS discharge (Outfall 019 and 020). However, given the lack of accessibility due to more rugged terrain, low concentrations detected in surface water runoff (for many COPCs, concentrations are below the regulatory MCL used for potable water supplies), the limited potential of COPC uptake into the edible portions of plants, and the minimal consumption that would occur in the unlikely event an individual were to occasionally harvest a plant, this pathway is considered insignificant, and any potential risks would be correspondingly low (i.e., well below the *de minimis* risk level).

4. TOXICITY ASSESSMENT

The toxicity assessment characterizes the relationship between the magnitude of exposure to a COPC and the nature and magnitude of adverse health effects that may result from such exposure. The toxicity assessments for 1) chemical COPCs and 2) radionuclide COPCs are discussed separately below.

4.1 Toxicity Assessment for Chemicals

Consistent with regulatory risk assessment policy, adverse health effects resulting from potential chemical exposures are classified into two broad categories: cancer effects and noncancer effects. The basis for the selection of toxicity values in each of these categories is described in more detail below.

The key toxicity criteria used in HHRAs to assess exposures to chemicals are:

- Cancer slope factors (CSFs) or Unit Risk Factors (URFs) for estimating long term, chronic cancer risks from exposure to carcinogens; and
- Oral reference doses (RfDs) or Reference Concentrations (RfCs) for estimating long term hazard from exposure to noncarcinogens.

CSFs and RfDs are used to assess oral exposures, while URFs and RfCs are used to assess inhalation exposures.

For the HHRA, toxicity criteria were selected following the general hierarchy listed below and using methods consistent with the risk assessment methods being employed at the SSFL for other environmental programs:

1. California Environmental Protection Agency Office of Environmental Health Hazard Assessment (OEHHA) Toxicity Criteria Database (Cal-EPA, 2016b).
2. Integrated Risk Information System (IRIS; USEPA, 2016a).
3. Provisional Peer Reviewed Toxicity Values (PPRTV), as cited in the May 2016 version of the USEPA RSL Tables (USEPA, 2016c).
4. Provisional Peer Reviewed Toxicity Values (PPRTV) Appendix, as cited in the May 2016 version of the USEPA RSL Tables (USEPA, 2016c).
5. Agency for Toxic Substances and Disease Registry (ATSDR) Minimum Risk Levels (MRLs), as cited in the May 2016 version of the USEPA RSL Tables (USEPA, 2016c).

6. Health Effects Assessment Summary Tables (HEAST; USEPA, 1997).
7. National Center for Environmental Assessment (NCEA), as cited in the USEPA Region 9 Preliminary Remediation Goals (PRG) tables (USEPA, 2004).
8. New Jersey Department of Environmental Protection (NJDEP), as cited in the May 2016 version of the USEPA RSL Tables (USEPA, 2016c).

At the present time, Cal-EPA and USEPA have only developed toxicity criteria for the oral and inhalation routes of exposure. In the absence of values specific to the dermal route, oral toxicity criteria were used to evaluate dermal exposures to surface water, which is a conservative approach. Other COPC-specific parameters needed for the HHRA, such as dermal permeability coefficients, were obtained from the USEPA RSL Tables (USEPA, 2016c).

In order to avoid underestimating potential hazards for those COPCs for which toxicity values are not available, and consistent with guidance, a surrogate chemical approach was employed in which toxicity values developed for structurally similar compounds were assigned to the COPCs lacking toxicity criteria (e.g., endrin for endrin aldehyde; nitrate for nitrate + nitrite as nitrogen; and trivalent chromium for total chromium).

Toxicity criteria used in the HHRA for chemical COPCs are provided in **Table 15**.

The traditional RfD approach to the evaluation of chemicals is not applied to lead because most adverse human health effects data associated with exposure to lead have been correlated with concentrations of lead in blood and not with intake of lead by an individual (Cal-EPA, 1996). Blood lead concentration is an integrated measure of internal dose, reflecting total exposure from site-related and background sources. Currently, Cal-EPA uses a 1 microgram per deciliter (µg/dL) benchmark for source-specific incremental change in blood lead levels for protection of children and fetuses (Cal-EPA, 2016a) as the health criterion for lead. This benchmark is the estimated incremental increase in a child's blood lead level that would reduce their intelligence quotient (IQ) by up to one point. The Cal-EPA has established a public health goal (PHG) for lead in drinking water (Cal-EPA, 2009), representing the level of lead in drinking water that does not pose a significant risk to health. Lead EPCs at each Outfall were compared to a risk-based concentration for lead in drinking water, which was adjusted for the recreator exposure scenario using the methods in Cal-EPA, 2009. Specifically, the value for the daily drinking water consumption volume for a child was adjusted to reflect the estimated volumetric rate of water consumed during recreational activities (15 mL). The derivation of this value is presented in below.

A health-protective concentration (C) for lead in water that may be consumed during recreational activities can be calculated using the following equation based on the non-carcinogenic endpoint of a decrease in IQ in children using the methods in Cal-EPA, 2009:

$$C = \frac{(Level\ of\ Concern)*(RSC)}{(UF)*(\frac{L}{day})}$$

where,

C = health-protective concentration for lead in drinking water (µg/L);
Level of Concern = daily lead intake which results in a 1 µg/dL increase in blood lead level for children (2.86 µg/day);
RSC = relative source contribution of 50 percent (0.5);
UF = uncertainty factor of 3-fold; and
L/day = daily drinking water consumption volume for a child (0.015 L/day, adjusted for recreator scenario).

C = 31.8 µg/L

A RSC value of 0.5 was used to represent the general population because of the recent declines in relative contribution from air, water and food (Cal-EPA, 2009).

4.2 Toxicity Assessment for Radionuclides

For exposure to radionuclides, toxicity criteria and COPC-specific parameters were taken from the USEPA's Preliminary Remediation Goals for Radionuclides (http://epa-prgs.ornl.gov/radionuclides/prg_guide.html; USEPA, 2016d).

Toxicity criteria used in the HHRA for radionuclide COPCs are provided in **Table 16**.

5. RISK-BASED CONCENTRATION DERIVATION

Risk-based concentrations (RBCs) represent the concentrations of COPCs in the relevant environmental medium (i.e., surface water at each Outfall) that would be considered safe for receptors (i.e., recreators) under conservative (i.e., protective) exposure conditions. Deriving RBCs incorporates information regarding the level of human intake of the COPC (exposure assessment), the relationship between intake of the COPC and its toxicity (toxicity assessment), and the assumed target cancer risk or noncancer hazard. Potential cumulative cancer risks and noncancer hazards may then be estimated by summing the ratios of measured COPC concentrations and the appropriate RBCs, as described in Section 6.

RBCs were derived for each COPC at each Outfall using the approach outlined below. For each COPC, both an RBC based on cancer effects and an RBC based on noncancer effects was derived where applicable as not all chemicals exhibit both effects. Further, both an "upper bound" and "lower bound" value for each RBC was determined, corresponding to the assumed upper and lower bound exposure frequencies described in Section 3.1.3. The methodology used for deriving RBCs is based principally on guidelines provided by the USEPA in *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A), Interim Final* (USEPA, 1989) and *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part B: Development of Risk-Based Preliminary Remediation Goals),* (USEPA, 1991a).

5.1 Target Cancer Risk and Noncancer Hazard

Various demarcations of acceptable risk have been established by regulatory agencies. The National Oil and Hazardous Substances Pollution Contingency Plan (NCP; 40 CFR 300) indicates that lifetime incremental cancer risks posed by a site should not exceed a range of one in one million (1×10^{-6}) to one hundred in one million (1×10^{-4}) and noncarcinogenic chemicals should not be present at levels expected to cause adverse health effects (i.e., a hazard index [HI] greater than 1). In addition, other relevant guidance (USEPA, 1991b) states that sites posing a cumulative cancer risk of less than 10^{-4} and hazard index less than unity (1) for noncancer endpoints are generally not considered to pose a significant risk warranting remediation. The California Hazardous Substances Account Act (HSAA) incorporates the NCP by reference and, thus, also incorporates the acceptable risk range set forth in the NCP. In California, the Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) regulates chemical exposures to the general population and is based on an acceptable risk level of 1×10^{-5}. Cal-EPA considers the 1×10^{-6} risk level as the generally accepted point of departure for unrestricted land use.

Under most situations, cancer risks in the range of 10^{-6} to 10^{-4} may be considered to be acceptable with cancer risks less than 10^{-6} considered *de minimis*. These risk estimates may be contrasted with the background risk of Americans developing cancer. The background risk of eventually developing cancer is one chance in three (0.3 or 3×10^{-1}) for an American female, and one chance in two (0.5 or 5×10^{-1}) for an American male (American Cancer Society [ACS], 2013).

To derive RBCs for the recreator scenarios for this HHRA, a target cancer risk of 1×10^{-6}, based on the Cal-EPA point of departure cancer risk level, and a target hazard quotient (THQ for an individual constituent) for noncarcinogens of 1 were used.

5.2 Chemical RBCs

The RBCs for chemicals were calculated using the USEPA RSL online calculator (USEPA, 2016b), with inputs modified to incorporate Site-specific exposure assumptions and the applicable toxicity criteria. The equations used to calculate the RBCs for chemicals are presented in the *User's Guide for Regional Screening Levels* (USEPA, 2016b). The RBC derivations and RBCs are presented in **Appendix C**.

5.3 Radionuclide RBCs

The RBCs for radionuclides were calculated using the USEPA Preliminary Remediation Goals (PRG) online calculator (USEPA, 2016d), with inputs modified to incorporate Site-specific exposure assumptions and the applicable toxicity criteria. The equations used to calculate the RBCs for radionuclides are presented in the *User's Guide for Preliminary Remediation Goals for Radionuclides* (USEPA, 2016d). The RBC derivations and RBCs are presented in **Appendix D**.

6. RISK CHARACTERIZATION

Risk characterization integrates the results of the toxicity assessment and the exposure assessment to estimate the probability of potential cancer risks and adverse noncancer health effects associated with exposure to chemicals detected at a site. The quantitative estimates of cancer risk and noncancer hazard are then compared to acceptable standards (i.e., targets; see Section 5.1).

6.1 Human Health Cumulative Risk Methodology

As described above, the HHRA process involves the use of site, receptor, and chemical-specific data, when available. When specific data are not available, conservative (i.e., health protective) assumptions are utilized. The use of repeated, conservative assumptions can lead to estimations of cancer risk or noncancer hazard that are overly conservative, but which provide an upper-bound estimate of the actual risk or hazard. Thus, for any site, the estimated cancer risk or noncancer hazard level reflects an upper-bound estimate of the most probable risk or hazard. The most probable cancer risk or noncancer hazard is likely to be much less, and probably not measurable in a potentially exposed population.

This section presents the specific approach used to estimate the cumulative cancer risk and noncancer hazard associated with potential exposure to all COPCs detected in surface water for a given SSFL Outfall. The cumulative risk and hazard for each Outfall were estimated by comparing the concentrations of individual COPCs detected in surface water samples to the RBCs, using the following equations.

Cumulative cancer risk (at a given Outfall location):

$$R_{tot} = \left[\sum_{i=1}^{n} \left(\frac{C_{SW\,i}}{RBC_{SW\text{-}C,i}} \right) \right] \times TR$$

Cumulative noncancer hazard index (at a given Outfall location):

$$HI_{tot} = \left[\sum_{i=1}^{n} \left(\frac{C_{SW\,i}}{RBC_{SW\text{-}NC,i}} \right) \right] \times THI$$

Where:

R_{tot} = cumulative cancer risk from all COPCs detected in surface water at given Outfall (unitless);

C_{SWi} = concentration of COPC *i* detected in surface water at given Outfall

(mg/L or pCi/L);

$RBC_{SW\text{-}C,i}$ = risk-based concentration for COPC *i* in surface water at given Outfall based on cancer effects (mg/L or pCi/L);

TR = target cancer risk (unitless);

HI_{tot} = cumulative noncancer hazard index from all COPCs detected in surface water at given Outfall (unitless);

$RBC_{SW\text{-}NC,i}$ = risk-based concentration for COPC *i* in surface water at given Outfall based on noncancer effects (mg/L);

THI = target noncancer hazard index (unitless); and

n = number of COPCs for surface water at given Outfall (unitless).

For chemical COPCs, risks and hazards were calculated using the USEPA RSL online calculator (USEPA, 2016b), which incorporates the equations above. For radionuclides, RBCs were calculated using the USEPA PRG online calculator (USEPA, 2016d), and the RBCs were then used to calculate the risks from the equations above. RBCs for each COPC and Outfall are presented in **Tables 17** through **23**.

The cumulative cancer risks and noncancer hazards estimated for each Outfall were then compared to the regulatory levels discussed in Section 5.1 and below.

6.2 Human Health Risk Characterization Results

This section presents the results of the risk characterization, which integrates the results of the exposure and toxicity assessments to estimate potential cancer risks (CR) and noncancer hazard indices (HIs) associated with potential exposure of recreators to Site COPCs via surface water discharged at the Outfalls. As discussed in Section 5.1, various demarcations of acceptable risk have been established by regulatory agencies. In most situations, cancer risks in the range of 10^{-6} to 10^{-4} may be considered acceptable with cancer risks less than 10^{-6} considered *de minimis*. The cumulative CR estimates for recreators were compared to the regulatory risk range of 10^{-6} to 10^{-4}. The cumulative noncancer HI estimates were compared to a target noncancer hazard of 1. Cumulative CRs and HIs for each Outfall are summarized in **Tables 17** through **23** and discussed below. For each Outfall, both upper bound and lower bound estimates are presented, corresponding to the respective upper and lower bound estimates for the exposure frequency, discussed in Section 3.1.2. **Table 24** presents a summary of the cumulative CR estimates and cumulative noncancer HI estimates for all Outfalls. The detailed cancer risk and noncancer hazard calculation inputs and outputs are presented in **Appendix C** for chemicals and **Appendix D** for radionuclides.

Lead concentrations were compared to the recreator RBC of 31.8 µg/L, a health-protective concentration based on the Cal-EPA PHG (Cal-EPA, 2009) approach adjusted for a recreator (see Section 4.1).

6.2.1 Outfall 001

Surface water risk characterization results for recreators potentially exposed via ingestion and dermal contact to COPCs present in discharges from Outfall 001 are provided in **Table 17**.

The cumulative CR estimates ranged from 1×10^{-7} (lower bound) to 3×10^{-7} (upper bound) and were less than the target risk of 1×10^{-6}. The cumulative HI estimates ranged from 3×10^{-2} to 6×10^{-2} and were less than the target noncancer hazard of 1.

The lead EPCs ranged from 0.51 µg/L (dissolved) to 13 µg/L (total) and were less than the recreator health-protective concentration of 31.8 µg/L.

6.2.2 Outfall 002

Surface water risk characterization results for recreators potentially exposed via ingestion and dermal contact to COPCs present in discharges from Outfall 002 are provided in **Table 18**.

The cumulative CR estimates ranged from 2×10^{-7} to 5×10^{-7} and were less than the target risk of 1×10^{-6}. The cumulative HI estimates ranged from 6×10^{-2} to 1×10^{-1} and were less than the target noncancer hazard of 1.

The lead EPCs ranged from 0.39 µg/L (dissolved) to 3.1 µg/L (total) and were less than the recreator health-protective concentration of 31.8 µg/L.

6.2.3 Outfall 008

Surface water risk characterization results for recreators potentially exposed via ingestion and dermal contact to COPCs present in discharges from Outfall 008 are provided in **Table 19**.

The cumulative CR estimates ranged from 8×10^{-9} to 2×10^{-8} and were less than the target risk of 1×10^{-6}. The cumulative HI estimates ranged from 4×10^{-3} to 9×10^{-3} and were less than the target noncancer hazard of 1.

The lead EPCs ranged from 5.2 µg/L (dissolved) to 7.1 µg/L (total) and were less than the recreator health-protective concentration of 31.8 µg/L.

6.2.4 Outfall 009

Surface water risk characterization results for recreators potentially exposed via ingestion and dermal contact to COPCs present in discharges from Outfall 009 are provided in **Table 20**.

The cumulative CR estimates ranged from 2×10^{-7} to 4×10^{-7} and were less than the target risk of 1×10^{-6}. The cumulative HI estimates ranged from 6×10^{-3} to 1×10^{-2} and were less than the target noncancer hazard of 1.

The lead EPCs ranged from 0.78 µg/L (dissolved) to 4.5 µg/L (total) and were less than the recreator health-protective concentration of 31.8 µg/L.

6.2.5 Outfall 011

Surface water risk characterization results for recreators potentially exposed via ingestion and dermal contact to COPCs present in discharges from Outfall 011 are provided in **Table 21**.

The cumulative CR estimates ranged from 5×10^{-8} to 1×10^{-7} and were less than the target risk of 1×10^{-6}. The cumulative HI estimates ranged from 1×10^{-2} to 2×10^{-2} and were less than the target noncancer hazard of 1.

The lead EPCs ranged from 0.75 µg/L (dissolved) to 7.1 µg/L (total) and were less than the recreator health-protective concentration of 31.8 µg/L.

6.2.6 Outfall 018

Surface water risk characterization results for recreators potentially exposed via ingestion and dermal contact to COPCs present in discharges from Outfall 018 are provided in **Table 22**.

The cumulative CR estimates ranged from 3×10^{-7} to 5×10^{-7} and were less than the target risk of 1×10^{-6}. The cumulative HI estimates ranged from 6×10^{-2} to 1×10^{-1} and were less than the target noncancer hazard of 1.

The lead EPCs ranged from 0.78 µg/L (dissolved) to 4.7 µg/L (total) and were less than the recreator health-protective concentration of 31.8 µg/L.

6.2.7 Outfall 019

Surface water risk characterization results for recreators potentially exposed via ingestion and dermal contact to COPCs present in discharges from Outfall 019 are provided in **Table 23**. For Outfall 019, it was assumed that discharge from the Outfall may occur 365 days of the year, with an exposure frequency of 50 days/year; no upper and lower bound estimates were calculated.

The cumulative CR estimate of 9×10^{-7} was less than the target risk of 1×10^{-6}. The cumulative HI estimate of 8×10^{-3} was less than the target noncancer hazard of 1.

The lead EPCs ranged from 0.32 µg/L (dissolved) to 0.35 µg/L (total) and were less than the recreator health-protective concentration of 31.8 µg/L.

6.2.8 Risk Characterization Summary

All cumulative CR estimates and noncancer HI estimates were below the *de minimis* risk level of 1 x 10^{-6} and noncancer HI of 1. In addition, lead exposure point concentrations for all outfalls were less than the recreator health-protective concentration of 31.8 µg/L as well as below the MCL for lead of 15 µg/L (with the highest lead EPC being 13 µg/L). **Table 24** and **Table 25** below present a summary of the cumulative CR estimates and cumulative noncancer HI estimates for all Outfalls. Figures 4 and 5 present graphical summaries of the incremental cancer risk and noncancer hazard index estimates by outfall.

Table 25. Cumulative Incremental Cancer Risk and Hazard Estimates Summary by Outfall

	Units	Outfall						
		001	002	008	009	011	018	019
Lower Bound	Cancer Risk	1E-07	2E-07	8E-09	2E-07	5E-08	3E-07	9E-07
Upper Bound	Cancer Risk	3E-07	5E-07	2E-08	4E-07	1E-07	5E-07	
Lower Bound	Hazard	3E-02	6E-02	4E-03	6E-03	1E-02	6E-02	8E-03
Upper Bound	Hazard	6E-02	1E-01	9E-03	1E-02	2E-02	1E-01	

Notes:
All values below the below the *de minimis* risk level of 1 x 10^{-6} and noncancer HI of 1
Estimated lead concentrations are less than the recreator health-protective concentration

Figure 4. Comparison of Lower and Upperbound Cumulative Incremental Cancer Risk Estimates by Outfall

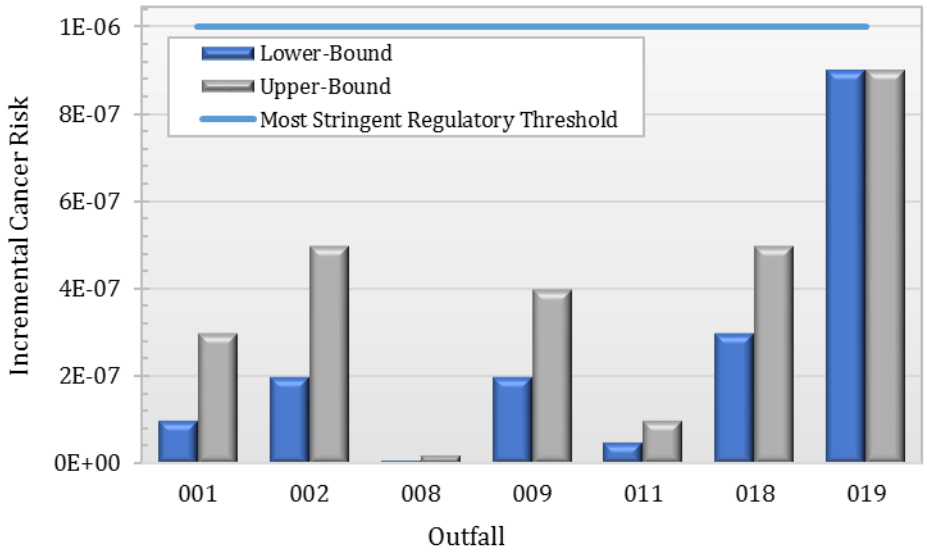
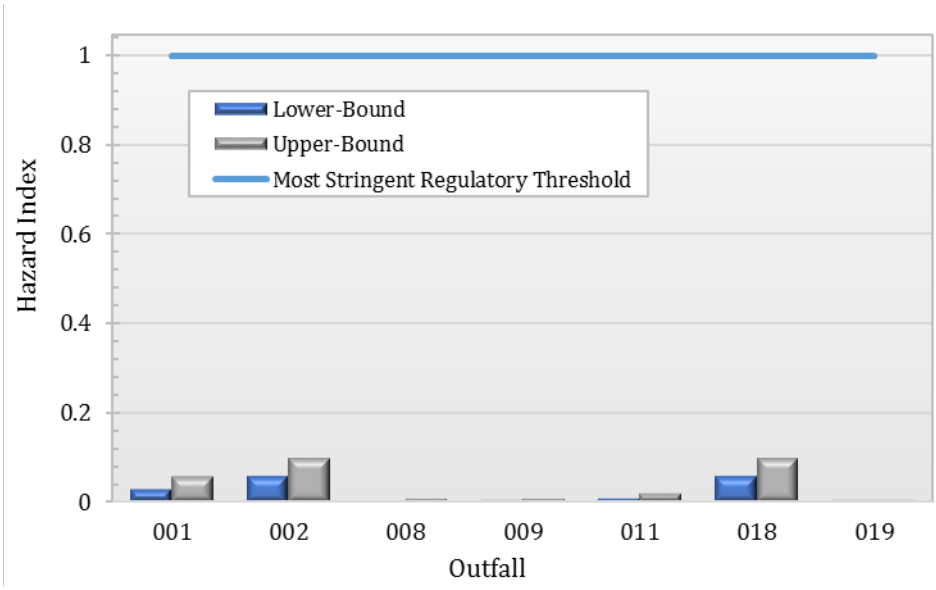
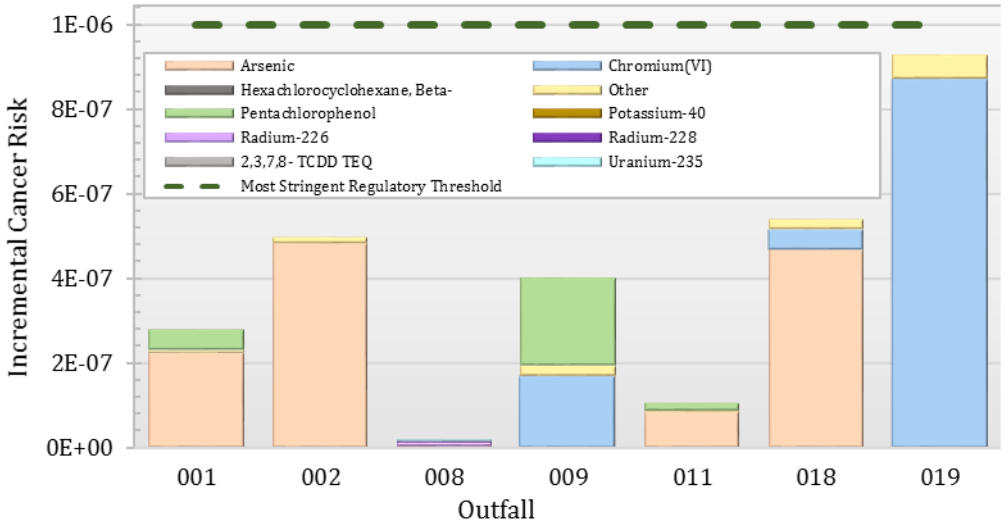


Figure 5. Comparison of Lower and Upperbound Cumulative Hazard Index Estimates by Outfall



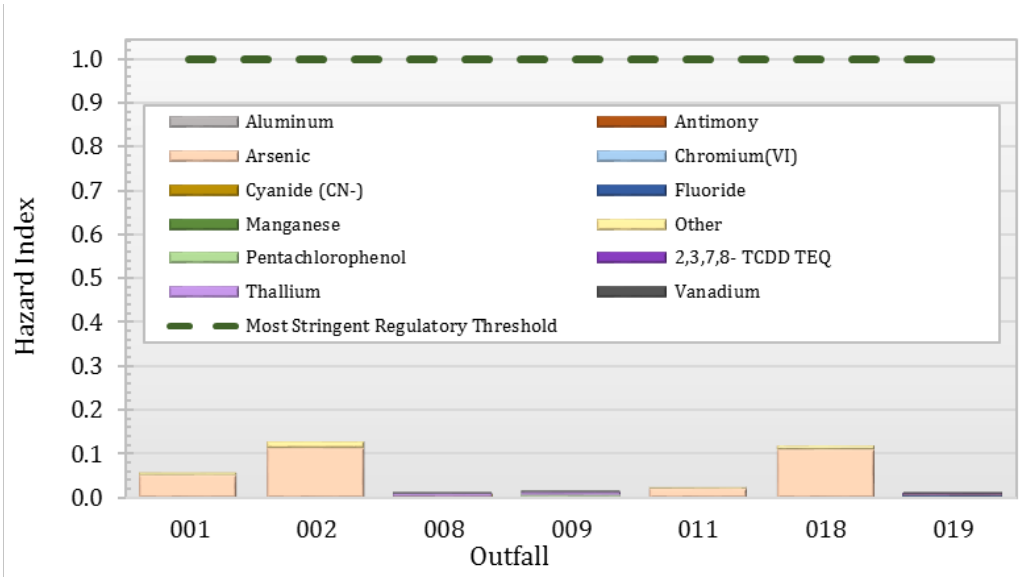
When considering each outfall and COPC contribution, using the upper-bound estimates, arsenic, hexavalent chromium and pentachlorophenol were the primary contributors to the incremental cancer risk estimates as shown in the figure below.

Figure 6. Primary Contributors to Incremental Cancer Risk Estimates by Outfall



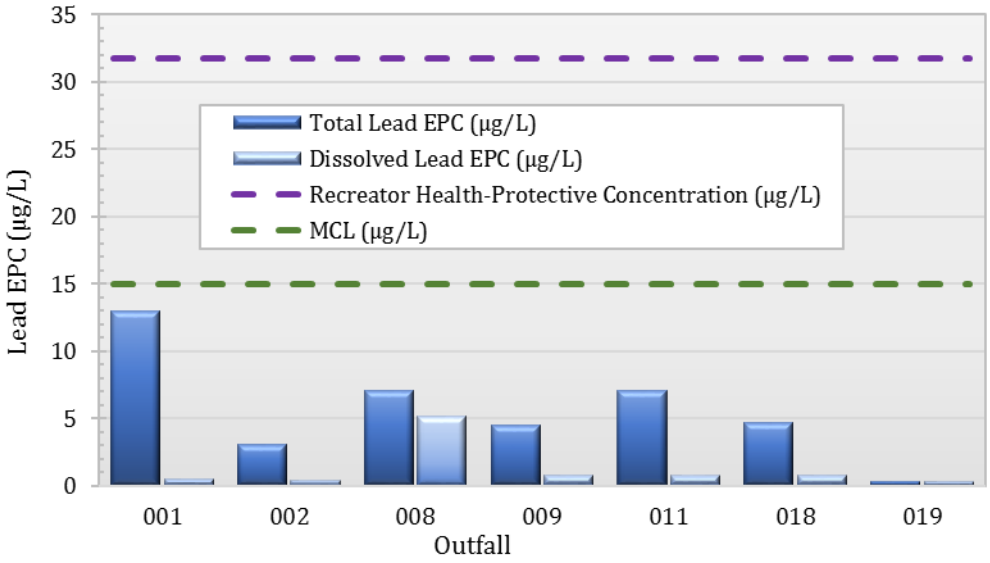
When considering each outfall and COPC contribution for noncarcinogenic effects using the upper-bound estimates, arsenic was the primary contributor to the noncancer hazard estimates as shown in the figure below.

Figure 7. Primary Contributors to Noncancer Hazard Index Estimates by Outfall



For lead, EPCs for each Outfall were compared to the recreator health-protective concentration of 31.8 µg/L. All outfall concentrations were below this value as well as the MCL of 15 µg/L as shown below.

Figure 8. Comparison of Outfall Lead Concentrations with Recreator Health-Protective Concentration and MCL



An important consideration in risk assessment is the presence of naturally occurring chemicals such as metals and some organics such as dioxins. As shown above, while estimated incremental cancer risks and noncancer hazard estimates are below regulatory thresholds, arsenic was a primary contributor to the overall risk estimates. Arsenic is naturally occurring in soils and therefore would be expected to be present in stormwater runoff.

Data from a study performed by Southern California Coastal Water Research Project (SCCWRP) in 2007 to investigate water quality from natural landscapes indicate that arsenic (the chemical that contributed the most to the incremental cancer risk and non cancer estimates in this HHRA) and lead concentrations in the SSFL outfalls are within background stormwater levels for the region (SCCWRP, 2007). This study measured surface water quality at 22 natural open space sites located in six counties and across 12 of Southern California's coastal watersheds. Sampling events were conducted during wet weather conditions during two wet seasons between December 2004 and April 2006, and each site was sampled during two to three storm events for a total of 30 site-events. Arsenic concentrations ranged from 0.1-10.4 µg/L (maximum Outfall concentration evaluated in this HHRA was 8.9 µg/L), and lead concentrations ranged from 0.1-27.6 µg/L (maximum Outfall concentration evaluated in this HHRA was 13 µg/L). Arsenic

and lead were conservatively included as Site COPCs in this HHRA even though they occur at levels in site stormwater that are within background for the region.

In addition, as discussed earlier it is important to understand the COPC concentrations within the perspective of US regulatory programs. For many of the COPCs, concentrations in the surface water are near or below the MCL drinking water standards and below NPDES permit limits. For example, the maximum detected total arsenic concentration is 8.9 µg/L, below the MCL and NPDES permit limit of 10 µg/L. The maximum hexavalent chromium concentration is 1.1 µg/L, below the MCL of 10 µg/L and the NPDES permit limit of 16 µg/L. For lead the maximum concentration of total lead is 13 µg/L, which is below the MCL of 15 µg/L. The MCLs address potable water which can be used for a variety of purposes such as direct ingestion and the consumption of crops grown with irrigation water.

7. UNCERTAINTIES

The methodology used in this HHRA is consistent with USEPA and Cal-EPA risk assessment guidance. However, the procedures used in any quantitative HHRA are conditional estimates given the many assumptions that must be made about exposure and toxicity, and the results include some uncertainty. Conservative (health-protective) assumptions were used for the inputs into the HHRA, which is consistent with agency guidance. Sources of uncertainty in an HHRA may include the following:

1) Natural variability (e.g., differences in body weight in a population);
2) Lack of knowledge about basic physical, chemical, and biological properties and processes of specific COPCs (e.g., the affinity of a chemical to sorb to particles and its solubility in water);
3) Assumptions in the models used to estimate key inputs such as exposure point concentrations;
4) Sampling and measurement error; and
5) Assumptions used to estimate exposure as they relate to actual conditions at the site.

Site-specific factors, which this assessment incorporates, decrease uncertainty. However, because the assumptions used are generally health-protective and conservative in nature, the calculated health risk estimates are likely to exceed the most probable risk posed to potential receptors at the Site.

The key uncertainties associated with this HHRA are discussed in more detail below.

<u>Exposure Assessment</u>

- Exposure Point Concentrations (EPCs).
    - Analytical data are subject to both systematic error (bias) and random error (imprecision), which may result in an over- or underestimation of risks. Samples were collected and analyzed according to the requirements of the NPDES permit, including detailed procedures outlined in a LARWQCB-approved sampling analysis plan and quality assurance plan, with elements designed to minimize these types of errors.
    - The potential for concentrations to decrease over time was not considered in this HHRA. Over the long-term exposure duration (i.e., as Site-wide remediation and restoration occurs), water quality should improve relative

to existing conditions. Therefore, the risks and hazards estimated in this HHRA are likely to be overestimations.

- There may be infrequent instances where treatment failure and/or treatment system bypass, resulting in discharges of untreated surface water, may occur. These events could potentially result in a short-term increase in COPC concentrations, however they would not likely impact long-term average concentrations.
- COPC concentrations measured at each Outfall were used to estimate risks. In reality, additional sources of surface water runoff and rainfall would enter the drainage downgradient of the outfall resulting in decreasing COPC concentrations.
- Data that were rejected during data validation were not included in the risk assessment. The number of samples rejected were small as compared to the total dataset and therefore their exclusion is not expected to impact the estimation of EPCs, significantly.
- In the calculation of EPCs, the Reporting Limit was used for nondetect results as opposed to the lower Method Detection Limit, when available. A nondetect concentration is actually a value that is below the Method Detection Limit. The use of the higher Reporting Limit likely results in a higher more conservative EPC.
- Uncertainty results from the computation of EPCs as upper confidence limits on the average value, particularly for Outfall-constituent combinations with limited available data and/or few detected results. When limited data were available, the maximum value was used as the EPC. In many cases the maximum value was used and is considered conservative as EPCs are supposed to represent long term average exposure conditions.
- For metals, both dissolved and total metal concentrations were analyzed in some samples. As a conservative approach, only total metal concentrations were evaluated in this HHRA, which likely contributed to an overestimation of risk (due to factors such as lower bioavailability of the particulate versus the dissolved forms of the metals and natural filtration processes that might occur).
- In some cases the COPCs were not detected at all in the dissolved phase. For arsenic, estimated risks and noncancer hazards are based on total arsenic concentrations. All dissolved phase samples were nondetect for arsenic. This may result in an overestimation of risks due to arsenic which

was one of the constituents with the highest incremental cancer risk estimates (but still below 1 x 10^{-6}).

- For dioxins, differences exist with how the dioxin TEQs are calculated under the NPDES permit reporting requirements and how they were calculated in this HHRA. The primary differences are the use of bioaccumulation equivalency factors (BEFs) to account for bioaccumulation effects, considering j-flagged data ("Detected, but Not Quantified" [DNQ]) and the TEF values for the octa-substituted congeners which are more commonly present in the environment.
    - BEFs account for the differing biological uptake from the water column of the various dioxin congeners. The BEF is applicable for uptake into fish tissue and fish consumption and are not applicable to direct exposures to dioxins in environmental media and therefore were not used in this risk assessment.
    - Toxicity equivalents (TEQs) were calculated based on the most current (2005) World Health Organization (WHO) Toxicity Equivalence Factors (TEFs) (Van Berg et. al., 2006, USEPA, 2010). The primary difference between the 1998 values used for NPDES reporting and the 2005 values used in the HHRA is the value for the octa-substituted congeners where the 1998 value is 0.0001 and the 2005 value is 0.0003 (i.e., resulting in higher reported dioxin TEQ EPCs).
    - The HHRA assumed that j-estimated (DNQ) values were detections at the value estimated by the laboratory whereas the calculation used for the permit reporting assumes that these values are zero. The use of j-estimated values likely results in higher EPCs.
    - The differences in TEQ calculation methods noted above result in higher concentrations reported in this risk assessment than in the NDPES compliance monitoring reports and Expert Panel submittals. For the octa-substituted congeners that are more commonly detected in the environment, both the elimination of the BEF factor and use of the 2005 TEFs result in higher concentrations used in this HHRA when compared to the BEF adjusted values reported for the NPDES permit.

- Exposure Assumptions
    - Conservative assumptions of exposure time (2 hours), exposure frequency (the number of days an individual could enter the drainage and encounter water each year) and exposure duration (the number of years the same individual would be entering the drainage) were assumed. These should be considered upper-bound estimates given the terrain and accessibility of the drainages at the Outfall locations and likely over-estimate risk.
    - An incidental water ingestion rate of 15 ml per event, based on the upper-bound estimate of water consumed during surface water recreational activities, was assumed. There is limited information on incidental ingestion rates of water during low-contact recreational uses of shallow surface water bodies. Given the low likelihood of incidental ingestion of water while hiking and compared to values measured during swimming activities this value is considered conservative.
- Modeling Uncertainty
    - With respect to the analysis of volatile constituents such as TCE, because samples were collected at the Outfalls, the EPCs used do not account for the considerable de-gassing that would occur and result in a loss of volatiles as the surface water travels down the drainage. Therefore, the estimated ambient air concentrations from the volatilization from surface water evaluation is conservative in nature.
    - With respect to particulate-bound constituents such as metals and dioxins, the same is true. The EPCs used do not account for the settling of suspended sediments as surface water travels downstream of the Outfalls, which is expected to occur as the drainages transition geomorphically from steep and narrow canyon drainages, dominated by erosional processes, to flatter and wider tributary creeks, with greater degree of deposition.
- Exposure frequency and flow-days uncertainty
    - Flow monitoring began, at select outfalls, in 2004/2005. A recent water year (WY) was selected with slightly greater rainfall than the long-term average. The long-term average rainfall based on the 1958/59 through 2015/16 water years at the SSFL was 16.8 inches, and the average number of wet days was 10.2 days. The 2009/10 WY had 19.48 inches of precipitation and 15 wet days. Therefore, this WY is a conservative representation (i.e., more wet) of an average WY at the SSFL.

- A flow day was considered to be any day that had a measurable flow (i.e., flow was not 0). This is a conservative assumption because even small trickles of flow are treated as having the same general exposure assumptions.
- Exposure Frequency (days per year when exposure may occur) was connected to the days when water may flow from the outfalls. For most outfalls, flow only occurs soon after rain events in the winter months. Recreators are less likely to be entering the drainages during rain events in the cooler winter months. Therefore, potential exposures to water flowing from the outfalls is likely to be less than assumed in this HHRA or not occur at all.
- The 2009/10 WY was selected for use in the HHRA analysis and represents a conservative estimate of long term average exposure based on analysis of rainfall records.
- To address uncertainty in the number of flow days and exposure frequency discussed above, a conservative upper-bound estimate (2 times the exposure frequency estimate based on the flow days) was included in the HHRA.

Toxicity Assessment

- Uncertainty in the toxicity assessment arises for those constituents for which animal studies serve as the basis for determining the appropriate toxicity value for effects on humans. Safety factors for noncarcinogens and conservative assumptions in the dose-response modeling for carcinogens are used to result in estimates that are considered conservative in nature.
- Acute estimates of risk are not evaluated in this risk assessment and are typically evaluated when exposures are estimated to be much higher than long-term chronic exposures. Given the low concentrations of detected constituents (below the standards for drinking water and NPDES permit limits) and the low estimated chronic health risk estimates (below regulatory thresholds of significance for chronic exposures), acute risks are not likely to be present.
- Typically, adverse effects are assumed to be additive in nature. This assumption may over or underestimate risks if there are antagonistic or synergistic effects among the constituents. Given the magnitude of the cumulative risk estimates (all below *de minimis* levels) and the conservatism in other steps of the risk assessment process the impact of this uncertainty is considered low.

- In addition, the use of surrogate chemicals to represent the COPCs that appear to be structurally similar may result in an over or underestimate of potential cancer risk or noncancer hazard for that compound. The use of surrogate chemicals is considered reasonable in risk assessment when information is not available.

Risk Characterization

- There may be COPCs present in surface water from naturally occurring sources such as erosion of soils containing metals such as arsenic and lead as well as dioxins from both anthropogenic and natural sources such as the wildfires at the Site. Studies have demonstrated that arsenic, lead and other constituents are present in surface water not affected by Site activities (SCCRWP, 2007). Additionally, dioxins in surface water could originate primarily from wildfires, regional atmospheric deposition and other naturally occurring sources (Flow Science, 2006). Because the NPDES permit limits do not distinguish between the source types of the constituents measured, this HHRA does not include a quantitative evaluation of the contribution from different sources. As a result, risk estimates presented in this HHRA may be higher due to the contribution of these background sources than if the contribution from Site-related sources were evaluated separately.

In summary, because a HHRA contains multiple sources of uncertainty, assumptions are often made so that potential health risks and hazards can be estimated quantitatively. Since the exact amount of uncertainty cannot be quantified, the HHRA uses conservative (health-protective) assumptions that are intended to overestimate rather than underestimate probable cancer risk or noncancer hazard.

8. CONCLUSIONS

This HHRA addresses potential human exposures to surface water runoff that is exiting the SSFL via the Outfalls. Currently, surface water discharges from the SSFL are regulated under the NPDES Permit and surface water samples are collected at each Outfall as a part of the permit. Potential chronic health risks and hazards have been estimated in this HHRA for Constituents of Potential Concern (COPCs), including both chemicals and radionuclides that have been identified in surface water as a part of the NPDES Permit monitoring.

The overall methodology used in the HHRA is consistent with current United States Environmental Protection Agency (USEPA) and California Environmental Protection Agency (Cal-EPA) guidance, and the Revised Human Health Risk Assessment Work Plan dated March 2016 (Geosyntec, 2016), which was approved by the LARWQCB in a letter dated September 15, 2016.

The HHRA evaluated surface water runoff exiting the SSFL via Outfalls 001, 002, 008, 009, 011, 018, and 019 using data from COPC concentrations detected in Outfall discharge samples collected from the Site during the period February 16, 2009 to March 31, 2016. The beneficial use designations set forth in the Los Angeles Water Quality Control Plan (Basin Plan) have been used to identify the surface water uses that may be relevant when establishing the HHRA exposure assumptions. The Basin Plan identifies intermittent recreational beneficial use designations for the creeks downstream of the Site, although the smaller tributary drainages near the SSFL boundary are not explicitly identified in the Basin Plan (LARWQCB, 1994). Therefore, people (referred to as "recreators") who might enter the drainage areas (e.g., while hiking) were identified as the receptor group that have the potential to be exposed to surface water runoff that is exiting the SSFL via the Outfalls.

Potential exposure pathways were evaluated for completeness, considering the sampling results and likely routes of exposure during recreational activities. Direct exposures to surface water, i.e., incidental ingestion and dermal contact, were identified as the most likely potentially complete exposure pathways and were evaluated quantitatively in the HHRA. The outdoor inhalation pathway was also identified as a potentially complete exposure pathway; however, due to the low concentrations of VOCs in surface water, as well as the dilution that would occur when these constituents are volatilized to the air, this pathway was determined to be insignificant (Section 3.3).

In addition, an evaluation was conducted of the aquatic plant and fish consumption pathway. Edible fish are not present in the drainages near the Outfalls and, therefore, the fish consumption pathway is incomplete. While the fish consumption pathway is

considered incomplete near the outfalls, there could be the potential for fishing and fish consumption at offsite locations farther downstream of SSFL where water is present in sufficient quantity year-round. An evaluation of the potential contribution of water flow and constituent concentrations to these locations was conducted. The evaluation indicates that potential exposure to SSFL's relatively minor contributions to the water volume and constituent mass in those larger downstream flows through this pathway would be *de minimis*.

Limited potentially edible plants are present within the drainage bottom and these may come in contact with surface water runoff during rain events or flow from discharge. However, given the lack of accessibility due to more rugged terrain, low concentrations detected in surface water runoff (for many COPCs, concentrations are below the regulatory MCL used for potable water supplies), the limited potential of COPC uptake into the edible portions of plants, and the minimal consumption that would occur in the unlikely event an individual were to occasionally harvest a plant, this pathway is considered insignificant, and any potential risks would be correspondingly low (i.e., well below the *de minimis* risk level).

The results of this HHRA indicate that, potential recreational exposures to COPCs in surface water runoff exiting the SSFL via Outfalls 001, 002, 008, 009, 011, 018, and 019 are below levels of concern as established by Cal-EPA and USEPA. This includes those COPCs that have had NPDES permit limit exceedances such as lead and dioxins.

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FIGURES

DRAINAGE TO MEIER CANYON

DRAINAGE TO ARROYO SIMI

UNDEVELOPED LAND

AREA I (NASA)

UNDEVELOPED LAND

AREA IV

AREA II (NASA)

AREA I

AREA III

Silvernale Pond

OUTFALL 018 WATER TREATMENT SYSTEM

OUTFALL 011 WATER TREATMENT SYSTEM

Ivy Pond

GET

R-2B Pond

R-2A Pond

Coca Pond

Perimeter Pond

DRAINAGE TO DAYTON CANYON

UNDEVELOPED LAND

DRAINAGE TO BELL CANYON

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. MAP COORDINATES IN STATE PLANE NAD 27, ZONE V.

LEGEND

- ACTIVE NPDES OUTFALL LOCATION
- POSSIBLE FUTURE NPDES OUTFALL LOCATION
- GROUNDWATER EXTRACTION TREATMENT (GET) SYSTEM
- SSFL PROPERTY BOUNDARY
- ADMINISTRATIVE AREA BOUNDARY
- EXISTING BUILDING/STRUCTURE
- STORMWATER TREATMENT SYSTEM
- STORMWATER CONVEYANCE PIPELINE WITH FLOW DIRECTION
- DIRT ROAD
- 25' ELEVATION CONTOUR
- SURFACE WATER DIVIDE
- NATURAL DRAINAGE
- EFFLUENT PATHWAY
- SURFACE WATER POND

N

0 1,200 2,400

SCALE IN FEET

HALEY ALDRICH

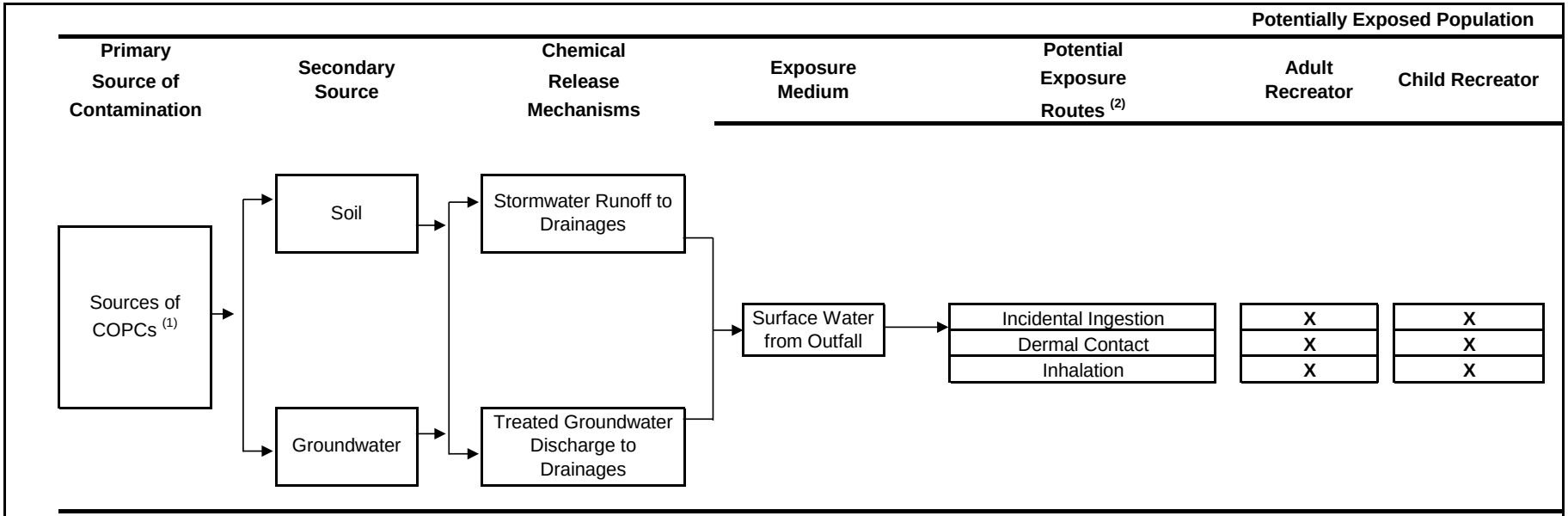
SANTA SUSANA FIELD LABORATORY
VENTURA COUNTY, CALIFORNIA

SITE MAP WITH DRAINAGES, DRAINAGE AREAS, AND SURFACE WATER BODIES

APRIL 2017

FIGURE 1

GIS FILE PATH: \\SD\Gcommon\40458_SSFL\Global\GIS\MapProjects\2017_04\129095-002-001-SiteMap.mxd — USER: gbowen — LAST SAVED: 4/28/2017 9:53:00 AM



X Potentially complete pathway will be considered for inclusion in HHRA based on sample results and exposure potential

Incomplete Pathway not considered

Notes:

1. Historical facility operations, impacted and unimpacted/natural soils, paved surfaces, atmospheric deposition
2. Potential exposures to sediment in drainages are being addressed under the three regulatory orders under DTSC oversight (See Section 1.2) Potential exposure pathway completeness to aquatic plants and fish qualitatively evaluated in HHRA

COPC - Constituent of Potential Concern

Conceptual Site Model
Human Health Risk Assessment
Surface Water Runoff from Outfalls

Geosyntec consultants

Figure 2

April 2017

TABLES

Table 2
Summary of COPC Detection Frequency by Outfall
Boeing Santa Susana Field Laboratory
Ventura County, California

Constituent of Potential Concern (COPC)	OUTFALL						
	001	002	008	009	011	018	019
Metals							
Aluminum	1 / 1	--	5 / 5	7 / 7	--	--	--
Aluminum (dissolved)	1 / 1	--	5 / 5	6 / 7	--	--	--
Antimony	1 / 4	1 / 6	6 / 14	38 / 43	3 / 3	1 / 5	0 / 3
Antimony (dissolved)	1 / 4	2 / 6	4 / 14	31 / 43	3 / 3	3 / 5	1 / 3
Arsenic	1 / 4	3 / 10	0 / 5	0 / 7	2 / 3	1 / 5	0 / 3
Barium	4 / 4	10 / 10	--	--	3 / 3	5 / 5	2 / 3
Barium (dissolved)	4 / 4	10 / 10	--	--	3 / 3	4 / 5	2 / 3
Beryllium	0 / 4	2 / 10	0 / 5	0 / 7	0 / 3	0 / 5	0 / 3
Cadmium	4 / 7	3 / 21	4 / 14	9 / 43	5 / 5	2 / 13	2 / 18
Cadmium (dissolved)	1 / 7	0 / 21	1 / 14	4 / 43	1 / 5	1 / 13	0 / 18
Chromium	3 / 4	1 / 10	4 / 5	3 / 7	2 / 3	0 / 5	1 / 3
Chromium (dissolved)	1 / 3	1 / 9	1 / 5	1 / 7	0 / 2	1 / 4	0 / 3
Chromium, Hexavalent	0 / 4	0 / 6	0 / 4	2 / 7	0 / 3	1 / 5	1 / 3
Cobalt	4 / 4	2 / 6	--	--	2 / 3	2 / 5	0 / 3
Cobalt (dissolved)	0 / 4	1 / 6	--	--	0 / 3	1 / 5	0 / 3
Copper	7 / 7	20 / 21	14 / 14	42 / 43	5 / 5	12 / 13	10 / 18
Copper (dissolved)	7 / 7	18 / 21	14 / 14	42 / 43	5 / 5	12 / 13	11 / 18
Lead	7 / 7	10 / 21	14 / 14	41 / 43	5 / 5	6 / 13	5 / 18
Lead (dissolved)	4 / 7	2 / 21	4 / 14	33 / 43	3 / 5	2 / 13	2 / 18
Manganese	7 / 7	10 / 14	--	--	5 / 5	8 / 9	1 / 3
Manganese (dissolved)	3 / 7	8 / 14	--	--	3 / 5	6 / 9	0 / 3
Mercury	0 / 7	1 / 21	1 / 14	2 / 43	1 / 5	1 / 13	0 / 18
Mercury (dissolved)	0 / 7	1 / 21	1 / 14	0 / 42	0 / 5	0 / 12	1 / 18
Nickel	3 / 4	4 / 10	4 / 5	5 / 9	2 / 3	2 / 5	1 / 3
Nickel (dissolved)	2 / 4	3 / 10	2 / 5	2 / 9	2 / 3	1 / 5	2 / 3
Selenium	2 / 7	4 / 20	5 / 14	0 / 10	1 / 5	2 / 13	5 / 18
Selenium (dissolved)	0 / 7	3 / 21	4 / 14	2 / 10	2 / 5	0 / 13	4 / 18
Silver	0 / 4	0 / 6	0 / 5	1 / 8	1 / 3	0 / 5	0 / 3
Thallium	0 / 4	0 / 6	0 / 14	3 / 43	1 / 3	0 / 5	0 / 3
Thallium (dissolved)	0 / 4	0 / 6	2 / 14	4 / 43	0 / 3	1 / 5	0 / 3
Vanadium	4 / 4	1 / 6	5 / 5	4 / 7	3 / 3	1 / 5	1 / 3
Vanadium (dissolved)	0 / 4	0 / 6	0 / 5	0 / 7	0 / 3	0 / 5	1 / 3
Zinc	7 / 7	10 / 21	13 / 14	7 / 9	5 / 5	7 / 13	7 / 18
Zinc (dissolved)	4 / 7	6 / 21	6 / 14	2 / 9	2 / 5	4 / 13	8 / 18
Organics							
1,2-Dichloroethane	0 / 7	0 / 21	0 / 5	0 / 7	0 / 5	1 / 13	0 / 18
2,3,7,8-TCDD TEQ	7 / 7	11 / 21	11 / 14	38 / 43	4 / 5	8 / 13	6 / 18
alpha-BHC	0 / 7	0 / 21	0 / 4	0 / 7	0 / 5	0 / 13	1 / 18
Benzene	0 / 6	0 / 13	0 / 5	0 / 7	0 / 5	1 / 11	0 / 18
Benzoic Acid	0 / 3	1 / 3	0 / 3	0 / 3	0 / 2	0 / 3	0 / 1
Benzyl butyl phthalate	0 / 4	0 / 6	0 / 5	0 / 7	1 / 3	1 / 5	0 / 3
beta-BHC	0 / 4	0 / 6	1 / 4	0 / 7	0 / 3	0 / 5	0 / 3
Bis(2-ethylhexyl) phthalate	0 / 7	0 / 21	1 / 5	1 / 7	0 / 5	1 / 13	3 / 18

Table 2
Summary of COPC Detection Frequency by Outfall
Boeing Santa Susana Field Laboratory
Ventura County, California

Constituent of Potential Concern (COPC)	OUTFALL						
	001	002	008	009	011	018	019
Chlorodibromomethane	0 / 4	0 / 6	0 / 5	0 / 7	0 / 3	1 / 6	0 / 3
Chloroform	0 / 6	0 / 13	0 / 5	0 / 7	0 / 5	1 / 11	0 / 18
cis-1,2-Dichloroethene	0 / 4	2 / 6	0 / 3	0 / 5	0 / 3	0 / 6	0 / 14
Dibutyl phthalate	1 / 4	1 / 6	0 / 5	0 / 7	1 / 3	0 / 5	0 / 3
Dichlorobromomethane	0 / 4	0 / 6	0 / 5	0 / 7	0 / 3	1 / 6	0 / 3
Diethyl phthalate	3 / 4	3 / 6	1 / 5	1 / 7	3 / 3	3 / 5	1 / 3
Endrin Aldehyde	0 / 4	0 / 6	1 / 4	0 / 7	0 / 3	0 / 5	0 / 3
Isophorone	0 / 4	2 / 6	0 / 5	0 / 7	1 / 3	0 / 5	0 / 3
Methylene Chloride (DCM)	0 / 4	0 / 6	0 / 5	0 / 7	0 / 3	1 / 6	0 / 3
Naphthalene	0 / 4	0 / 7	0 / 5	0 / 10	0 / 3	0 / 7	1 / 3
Pentachlorophenol	1 / 7	0 / 21	0 / 5	1 / 7	1 / 5	0 / 13	0 / 18
Trichloroethene (TCE)	0 / 7	5 / 21	0 / 5	0 / 7	0 / 5	0 / 13	0 / 18
Inorganics							
Boron	4 / 4	5 / 6	3 / 5	5 / 7	2 / 3	2 / 5	2 / 3
Boron (dissolved)	1 / 4	4 / 6	3 / 5	5 / 7	1 / 3	3 / 5	1 / 3
Cyanide Anion	0 / 7	0 / 21	1 / 10	0 / 35	0 / 5	0 / 13	0 / 18
Fluoride	4 / 4	6 / 6	5 / 5	6 / 7	3 / 3	3 / 5	3 / 3
Nitrate (as N)	7 / 7	18 / 21	14 / 14	--	5 / 5	11 / 13	8 / 18
Nitrate and Nitrite (as N)	7 / 7	13 / 21	14 / 14	42 / 43	5 / 5	7 / 13	0 / 18
Nitrite (as N)	0 / 7	1 / 21	0 / 14	--	0 / 5	1 / 13	0 / 18
Perchlorate	1 / 7	1 / 21	6 / 14	0 / 15	0 / 5	0 / 13	1 / 18
Radionuclides							
Potassium-40	0 / 7	0 / 21	1 / 14	0 / 43	0 / 5	0 / 13	0 / 18
Radium-226	1 / 7	5 / 21	7 / 14	8 / 43	3 / 5	3 / 13	1 / 18
Radium-228	1 / 6	0 / 20	2 / 13	3 / 43	1 / 4	0 / 12	0 / 18
Strontium-90	0 / 7	0 / 21	0 / 14	2 / 43	0 / 4	1 / 13	0 / 18
Tritium	0 / 7	0 / 21	0 / 14	0 / 43	0 / 5	1 / 13	0 / 18
Uranium	7 / 7	15 / 20	11 / 14	28 / 40	4 / 5	10 / 12	16 / 18

Notes:

Each cell displayed as number of detects over total number of samples
"--" not applicable

Table 3
Constituents of Potential Concern by Outfall
Boeing Santa Susana Field Laboratory
Ventura County, California

Constituent of Potential Concern (COPC)	OUTFALL						
	001	002	008	009	011	018	019
Metals							
Aluminum	X		X	X			
Aluminum (dissolved)	X		X	X			
Antimony	X	X	X	X	X	X	
Antimony (dissolved)	X	X	X	X	X	X	X
Arsenic	X	X			X	X	
Barium	X	X			X	X	X
Barium (dissolved)	X	X			X	X	X
Beryllium		X					
Cadmium	X	X	X	X	X	X	X
Cadmium (dissolved)	X		X	X	X	X	
Chromium	X	X	X	X	X		X
Chromium (dissolved)	X	X	X	X		X	
Chromium, Hexavalent				X		X	X
Cobalt	X	X			X	X	
Cobalt (dissolved)		X				X	
Copper	X	X	X	X	X	X	X
Copper (dissolved)	X	X	X	X	X	X	X
Lead	X	X	X	X	X	X	X
Lead (dissolved)	X	X	X	X	X	X	X
Manganese	X	X			X	X	X
Manganese (dissolved)	X	X			X	X	
Mercury		X	X	X	X	X	
Mercury (dissolved)		X	X				X
Nickel	X	X	X	X	X	X	X
Nickel (dissolved)	X	X	X	X	X	X	X
Selenium	X	X	X		X	X	X
Selenium (dissolved)		X	X	X	X		X
Silver				X	X		
Thallium				X	X		
Thallium (dissolved)			X	X		X	
Vanadium	X	X	X	X	X	X	X
Vanadium (dissolved)							X
Zinc	X	X	X	X	X	X	X
Zinc (dissolved)	X	X	X	X	X	X	X
Organics							
1,2-Dichloroethane						X	
2,3,7,8-TCDD TEQ	X	X	X	X	X	X	X
alpha-BHC							X
Benzene						X	
Benzoic Acid		X					
Benzyl butyl phthalate					X	X	
beta-BHC			X				
Bis(2-ethylhexyl) phthalate			X	X		X	X

Table 3
Constituents of Potential Concern by Outfall
Boeing Santa Susana Field Laboratory
Ventura County, California

Constituent of Potential Concern (COPC)	OUTFALL						
	001	002	008	009	011	018	019
Chlorodibromomethane						X	
Chloroform						X	
cis-1,2-Dichloroethene		X					
Dibutyl phthalate	X	X			X		
Dichlorobromomethane						X	
Diethyl phthalate	X	X	X	X	X	X	X
Endrin Aldehyde			X				
Isophorone		X			X		
Methylene Chloride (DCM)						X	
Naphthalene							X
Pentachlorophenol	X			X	X		
Trichloroethene (TCE)		X					
Inorganics							
Boron	X	X	X	X	X	X	X
Boron (dissolved)	X	X	X	X	X	X	X
Cyanide Anion			X				
Fluoride	X	X	X	X	X	X	X
Nitrate (as N)	X	X	X		X	X	X
Nitrate and Nitrite (as N)	X	X	X	X	X	X	
Nitrite (as N)		X				X	
Perchlorate	X	X	X				X
Radionuclides							
Potassium-40			X				
Radium-226	X	X	X	X	X	X	X
Radium-228	X		X	X	X		
Strontium-90				X		X	
Tritium						X	
Uranium	X	X	X	X	X	X	X

Notes:

"X" - selected as a COPC

For metals, either Total or Dissolved Metal selected as COPC, based on highest concentration detected

Table 7
Site-Specific Recreational User Exposure Parameters
Boeing Santa Susana Field Laboratory
Ventura County, California

Input or Exposure Parameter	Units	Future Recreator				
		Adult Total	Child 2-6 years	Adult 6-16 years	Adult 16-26 years	Source
Recreational Surface Water Ingestion Rate (IRW)	L/hr	0.0075	0.0075	0.0075	0.0075	1
Age-Adjusted Water Ingestion Rate (IFW)	L/kg	--	--	--	--	Outfall-specific
Mutagenic Age-Adjusted Water Ingestion Rate (IFWM)	L/kg	--	--	--	--	Outfall-specific
Apparent Thickness of Stratum Corneum (l_{SC})	cm	0.001	0.001	0.001	0.001	2
Skin Surface Area (SA)[a]	cm^2/day	6,032	2,373	6,032	6,032	2
Percent Dermal Absorption (ABSd)	unitless	--	--	--	--	COPC-specific; 2
Age-Adjusted Recreator Water Dermal Contact Factor (DFW)	cm^2-event/kg	--	--	--	--	Outfall-specific
Mutagenic Age-Adjusted Recreator Water Dermal Contact Factor (DFWM)	cm^2-event/kg	--	--	--	--	Outfall-specific
Exposure Duration (ED)	years	20	4	10	10	Site-specific; 3
Exposure Time (ET)[b]	hours/event	2	2	2	2	Site-specific
Events (EV)[b]	events/day	1	1	1	1	Site-specific
Body Weight (BW)	kg	80	15	80	80	3
Averaging Time for Noncarcinogens (AT_n)	days	7,300	1,460	3,650	3,650	3
Averaging Time for Carcinogens (AT_c)	days	25,550	25,550	25,550	25,550	3

		Units	Outfall						
			001	002	008	009	011	018	019
Exposure Frequency (EF)[b]	Lower Bound	days/year	3	9	5	13	1	6	50
	Upper Bound	days/year	6	18	10	26	2	12	50

Notes:

"--" not applicable

[a] SA child: weighted average of mean values for head, hands, forearms, lower legs, and feet (male and female, birth to < 6 years)
SA adult: weighted average of mean values for head, hands, forearms, lower legs, and feet (male and female, 21+ years)

[b] Based on Professional Judgment and/or individual outfall flow data

Sources:

(1) Dorevitch et al. 2011. Water ingestion during water recreation. Water Res. 2011 Feb; 45(5):2020-8

(2) USEPA 2016. Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites and User's Guide. May. www.epa.gov/region09/superfund/prg/index.html

(3) Cal-EPA 2014. Human Health Risk Assessment (HHRA) Note. HERO Note #1. Recommended DTSC Default Exposure Factors for Use in Risk Assessment at California Hazardous Waste Sites and Permitted Facilities. September 30.

Table 8
Outfall 001 Exposure Point Concentrations (EPCs)
Boeing Santa Susana Field Laboratory
Ventura County, California

CAS Number	Analyte	Units	EPC Value	EPC Type
TCDD-TEQ-DNQ	2,3,7,8-TCDD TEQ	µg/l	0.00000227	Maximum detected value
7429-90-5	Aluminum	µg/l	11000	Maximum detected value
7429-90-5 (dissolved)	Aluminum (dissolved)	µg/l	660	Maximum detected value
7440-36-0	Antimony	µg/l	0.45	Maximum detected value
7440-36-0 (dissolved)	Antimony (dissolved)	µg/l	0.32	Maximum detected value
7440-38-2	Arsenic	µg/l	7.9	Maximum detected value
7440-39-3	Barium	mg/l	0.11	Maximum detected value
7440-39-3 (dissolved)	Barium (dissolved)	mg/l	0.11	Maximum detected value
7440-42-8	Boron	mg/l	0.048	Maximum detected value
7440-42-8 (dissolved)	Boron (dissolved)	mg/l	0.052	Maximum detected value
7440-43-9	Cadmium	µg/l	0.27	Maximum detected value
7440-43-9 (dissolved)	Cadmium (dissolved)	µg/l	0.14	Maximum detected value
7440-47-3	Chromium	µg/l	15	Maximum detected value
7440-47-3 (dissolved)	Chromium (dissolved)	µg/l	2.3	Maximum detected value
7440-48-4	Cobalt	µg/l	5	Maximum detected value
7440-50-8	Copper	µg/l	14.3	Maximum detected value
7440-50-8 (dissolved)	Copper (dissolved)	µg/l	3.4	Maximum detected value
84-74-2	Dibutyl phthalate	µg/l	0.396	Maximum detected value
84-66-2	Diethyl phthalate	µg/l	0.226	Maximum detected value
16984-48-8	Fluoride	mg/l	0.22	Maximum detected value
7439-92-1	Lead	µg/l	13	Maximum detected value
7439-92-1 (dissolved)	Lead (dissolved)	µg/l	0.51	Maximum detected value
7439-96-5	Manganese	µg/l	400	Maximum detected value
7439-96-5 (dissolved)	Manganese (dissolved)	µg/l	16	Maximum detected value
7440-02-0	Nickel	µg/l	12	Maximum detected value
7440-02-0 (dissolved)	Nickel (dissolved)	µg/l	3.4	Maximum detected value
14797-55-8 (as N)	Nitrate (as N)	mg/l	1.4	Maximum detected value

Table 8
Outfall 001 Exposure Point Concentrations (EPCs)
Boeing Santa Susana Field Laboratory
Ventura County, California

CAS Number	Analyte	Units	EPC Value	EPC Type
NO3NO2 (as N)	Nitrate and Nitrite (as N)	mg/l	1.4	Maximum detected value
87-86-5	Pentachlorophenol	µg/l	1.5	Maximum detected value
14797-73-0	Perchlorate	µg/l	1.4	Maximum detected value
13982-63-3	Radium-226	pCi/l	0.31	Maximum detected value
15262-20-1	Radium-228	pCi/l	0.715	Maximum detected value
7782-49-2	Selenium	µg/l	1.3	Maximum detected value
7440-61-1	Uranium	pCi/l	0.687	Maximum detected value
7440-62-2	Vanadium	µg/l	27	Maximum detected value
7440-66-6	Zinc	µg/l	76	Maximum detected value
7440-66-6 (dissolved)	Zinc (dissolved)	µg/l	18.1	Maximum detected value

Table 9
Outfall 002 Exposure Point Concentrations (EPCs)
Boeing Santa Susana Field Laboratory
Ventura County, California

CAS Number	Analyte	Units	EPC Value	EPC Type
TCDD-TEQ-DNQ	2,3,7,8-TCDD TEQ	µg/l	0.0000014786	95% Adjusted Gamma UCL
7440-36-0	Antimony	µg/l	0.3	Maximum detected value
7440-36-0 (dissolved)	Antimony (dissolved)	µg/l	0.59	Maximum detected value
7440-38-2	Arsenic	µg/l	5.7	Maximum detected value
7440-39-3	Barium	mg/l	0.0685	95% Student's-t UCL
7440-39-3 (dissolved)	Barium (dissolved)	mg/l	0.0375	95% Student's-t UCL
65-85-0	Benzoic Acid	µg/l	2.96	Maximum detected value
7440-41-7	Beryllium	µg/l	0.31	Maximum detected value
7440-42-8	Boron	mg/l	0.085	Maximum detected value
7440-42-8 (dissolved)	Boron (dissolved)	mg/l	0.076	Maximum detected value
7440-43-9	Cadmium	µg/l	0.14	Maximum detected value
7440-47-3	Chromium	µg/l	3.3	Maximum detected value
7440-47-3 (dissolved)	Chromium (dissolved)	µg/l	1.3	Maximum detected value
156-59-2	cis-1,2-Dichloroethene	µg/l	3	Maximum detected value
7440-48-4	Cobalt	µg/l	4.8	Maximum detected value
7440-48-4 (dissolved)	Cobalt (dissolved)	µg/l	0.2	Maximum detected value
7440-50-8	Copper	µg/l	4.294	95% KM Adjusted Gamma UCL
7440-50-8 (dissolved)	Copper (dissolved)	µg/l	2.197	95% KM (t) UCL
84-74-2	Dibutyl phthalate	µg/l	0.396	Maximum detected value
84-66-2	Diethyl phthalate	µg/l	0.245	Maximum detected value
16984-48-8	Fluoride	mg/l	0.39	Maximum detected value
78-59-1	Isophorone	µg/l	0.257	Maximum detected value
7439-92-1	Lead	µg/l	3.121	Gamma Adjusted KM-UCL*
7439-92-1 (dissolved)	Lead (dissolved)	µg/l	0.39	Maximum detected value
7439-96-5	Manganese	µg/l	128.2	95% KM Bootstrap t UCL
7439-96-5 (dissolved)	Manganese (dissolved)	µg/l	17.15	95% KM (t) UCL
7439-97-6	Mercury	µg/l	0.032	Maximum detected value

Table 9
Outfall 002 Exposure Point Concentrations (EPCs)
Boeing Santa Susana Field Laboratory
Ventura County, California

CAS Number	Analyte	Units	EPC Value	EPC Type
7439-97-6 (dissolved)	Mercury (dissolved)	µg/l	0.03	Maximum detected value
7440-02-0	Nickel	µg/l	8.3	Maximum detected value
7440-02-0 (dissolved)	Nickel (dissolved)	µg/l	2	Maximum detected value
14797-55-8 (as N)	Nitrate (as N)	mg/l	1.494	95% KM (Chebyshev) UCL
NO3NO2 (as N)	Nitrate and Nitrite (as N)	mg/l	1.528	95% KM (Chebyshev) UCL
14797-65-0 (as N)	Nitrite (as N)	mg/l	0.1	Maximum detected value
14797-73-0	Perchlorate	µg/l	2.2	Maximum detected value
13982-63-3	Radium-226	pCi/l	0.456	95% KM (t) UCL
7782-49-2	Selenium	µg/l	0.61	Maximum detected value
7782-49-2 (dissolved)	Selenium (dissolved)	µg/l	0.65	Maximum detected value
79-01-6	Trichloroethene (TCE)	µg/l	0.733	95% KM (t) UCL
7440-61-1	Uranium	pCi/l	0.885	95% KM (t) UCL
7440-62-2	Vanadium	µg/l	36	Maximum detected value
7440-66-6	Zinc	µg/l	22.03	95% GROS Adjusted Gamma UCL
7440-66-6 (dissolved)	Zinc (dissolved)	µg/l	12.51	95% KM (t) UCL

Notes:

*used when k<=1 and 15 < n < 50 but k<=1

Table 10
Outfall 008 Exposure Point Concentrations (EPCs)
Boeing Santa Susana Field Laboratory
Ventura County, California

CAS Number	Analyte	Units	EPC Value	EPC Type
TCDD-TEQ-DNQ	2,3,7,8-TCDD TEQ	µg/l	0.0000026168	95% Adjusted Gamma UCL
7429-90-5	Aluminum	µg/l	12000	Maximum detected value
7429-90-5 (dissolved)	Aluminum (dissolved)	µg/l	660	Maximum detected value
7440-36-0	Antimony	µg/l	0.442	95% KM (t) UCL
7440-36-0 (dissolved)	Antimony (dissolved)	µg/l	0.42	Maximum detected value
319-85-7	beta-BHC	µg/l	0.0052	Maximum detected value
117-81-7	Bis(2-ethylhexyl) phthalate	µg/l	1.87	Maximum detected value
7440-42-8	Boron	mg/l	0.095	Maximum detected value
7440-42-8 (dissolved)	Boron (dissolved)	mg/l	0.095	Maximum detected value
7440-43-9	Cadmium	µg/l	0.46	Maximum detected value
7440-43-9 (dissolved)	Cadmium (dissolved)	µg/l	0.22	Maximum detected value
7440-47-3	Chromium	µg/l	16	Maximum detected value
7440-47-3 (dissolved)	Chromium (dissolved)	µg/l	12	Maximum detected value
7440-50-8	Copper	µg/l	9.084	95% Student's-t UCL
7440-50-8 (dissolved)	Copper (dissolved)	µg/l	2.897	95% Student's-t UCL
57-12-5	Cyanide Anion	µg/l	8.7	Maximum detected value
84-66-2	Diethyl phthalate	µg/l	0.166	Maximum detected value
7421-93-4	Endrin Aldehyde	µg/l	0.0027	Maximum detected value
16984-48-8	Fluoride	mg/l	0.26	Maximum detected value
7439-92-1	Lead	µg/l	7.1	95% Adjusted Gamma UCL
7439-92-1 (dissolved)	Lead (dissolved)	µg/l	5.2	Maximum detected value
7439-97-6	Mercury	µg/l	0.029	Maximum detected value
7439-97-6 (dissolved)	Mercury (dissolved)	µg/l	0.16	Maximum detected value
7440-02-0	Nickel	µg/l	20	Maximum detected value
7440-02-0 (dissolved)	Nickel (dissolved)	µg/l	5.3	Maximum detected value
14797-55-8 (as N)	Nitrate (as N)	mg/l	2.174	95% Chebyshev (Mean, Sd) UCL
NO3NO2 (as N)	Nitrate and Nitrite (as N)	mg/l	2.177	95% Chebyshev (Mean, Sd) UCL

Table 10
Outfall 008 Exposure Point Concentrations (EPCs)
Boeing Santa Susana Field Laboratory
Ventura County, California

CAS Number	Analyte	Units	EPC Value	EPC Type
14797-73-0	Perchlorate	µg/l	2.428	95% KM (t) UCL
13966-00-2	Potassium-40	pCi/l	21	Maximum detected value
13982-63-3	Radium-226	pCi/l	0.613	95% KM (t) UCL
15262-20-1	Radium-228	pCi/l	0.699	Maximum detected value
7782-49-2	Selenium	µg/l	0.979	95% KM (BCA) UCL
7782-49-2 (dissolved)	Selenium (dissolved)	µg/l	1.3	Maximum detected value
7440-28-0 (dissolved)	Thallium (dissolved)	µg/l	1.2	Maximum detected value
7440-61-1	Uranium	pCi/l	0.969	95% KM Adjusted Gamma UCL
7440-62-2	Vanadium	µg/l	30	Maximum detected value
7440-66-6	Zinc	µg/l	36.75	95% KM (t) UCL
7440-66-6 (dissolved)	Zinc (dissolved)	µg/l	20.87	95% KM (t) UCL

Notes:

*calculated UCL exceeded max detect

Table 11
Outfall 009 Exposure Point Concentrations (EPCs)
Boeing Santa Susana Field Laboratory
Ventura County, California

CAS Number	Analyte	Units	EPC_Value	EPC_Type
TCDD-TEQ-DNQ	2,3,7,8-TCDD TEQ	µg/l	0.0000027423	95% Adjusted Gamma UCL
7429-90-5	Aluminum	µg/l	4400	Maximum detected value
7429-90-5 (dissolved)	Aluminum (dissolved)	µg/l	920	Maximum detected value
7440-36-0	Antimony	µg/l	0.813	95% KM Adjusted Gamma UCL
7440-36-0 (dissolved)	Antimony (dissolved)	µg/l	0.795	95% KM Adjusted Gamma UCL
117-81-7	Bis(2-ethylhexyl) phthalate	µg/l	10.6	Maximum detected value
7440-42-8	Boron	mg/l	0.053	Maximum detected value
7440-42-8 (dissolved)	Boron (dissolved)	mg/l	0.05	Maximum detected value
7440-43-9	Cadmium	µg/l	0.229	95% GROS Adjusted Gamma UCL
7440-43-9 (dissolved)	Cadmium (dissolved)	µg/l	0.14	Maximum detected value
7440-47-3	Chromium	µg/l	7.9	Maximum detected value
7440-47-3 (dissolved)	Chromium (dissolved)	µg/l	2.5	Maximum detected value
18540-29-9	Chromium, Hexavalent	µg/l	0.41	Maximum detected value
7440-50-8	Copper	µg/l	5.408	95% KM Adjusted Gamma UCL
7440-50-8 (dissolved)	Copper (dissolved)	µg/l	3.611	95% KM Adjusted Gamma UCL
84-66-2	Diethyl phthalate	µg/l	0.257	Maximum detected value
16984-48-8	Fluoride	mg/l	0.2	Maximum detected value
7439-92-1	Lead	µg/l	4.539	95% GROS Adjusted Gamma UCL
7439-92-1 (dissolved)	Lead (dissolved)	µg/l	0.776	KM H-UCL
7439-97-6	Mercury	µg/l	0.11	Maximum detected value
7440-02-0	Nickel	µg/l	6.17	95% KM (t) UCL
7440-02-0 (dissolved)	Nickel (dissolved)	µg/l	2	Maximum detected value
NO3NO2 (as N)	Nitrate and Nitrite (as N)	mg/l	0.775	KM H-UCL
87-86-5	Pentachlorophenol	µg/l	1.46	Maximum detected value
13982-63-3	Radium-226	pCi/l	0.373	95% KM (t) UCL
15262-20-1	Radium-228	pCi/l	0.6	Maximum detected value
7782-49-2 (dissolved)	Selenium (dissolved)	µg/l	10	Maximum detected value

Table 11
Outfall 009 Exposure Point Concentrations (EPCs)
Boeing Santa Susana Field Laboratory
Ventura County, California

CAS Number	Analyte	Units	EPC_Value	EPC_Type
7440-22-4	Silver	µg/l	0.62	Maximum detected value
10098-97-2	Strontium-90	pCi/l	0.66	Maximum detected value
7440-28-0	Thallium	µg/l	0.43	Maximum detected value
7440-28-0 (dissolved)	Thallium (dissolved)	µg/l	0.29	Maximum detected value
7440-61-1	Uranium	pCi/l	0.305	95% KM (Chebyshev) UCL
7440-62-2	Vanadium	µg/l	13	Maximum detected value
7440-66-6	Zinc	µg/l	30.05	95% KM (t) UCL
7440-66-6 (dissolved)	Zinc (dissolved)	µg/l	14	Maximum detected value

Table 12
Outfall 011 Exposure Point Concentrations (EPCs)
Boeing Santa Susana Field Laboratory
Ventura County, California

CAS Number	Analyte	Units	EPC_Value	EPC_Type
TCDD-TEQ-DNQ	2,3,7,8-TCDD TEQ	µg/l	0.000003299	Maximum detected value
7440-36-0	Antimony	µg/l	1	Maximum detected value
7440-36-0 (dissolved)	Antimony (dissolved)	µg/l	1	Maximum detected value
7440-38-2	Arsenic	µg/l	8.9	Maximum detected value
7440-39-3	Barium	mg/l	0.068	Maximum detected value
7440-39-3 (dissolved)	Barium (dissolved)	mg/l	0.017	Maximum detected value
85-68-7	Benzyl butyl phthalate	µg/l	1.3	Maximum detected value
7440-42-8	Boron	mg/l	0.039	Maximum detected value
7440-42-8 (dissolved)	Boron (dissolved)	mg/l	0.044	Maximum detected value
7440-43-9	Cadmium	µg/l	0.3	Maximum detected value
7440-43-9 (dissolved)	Cadmium (dissolved)	µg/l	0.23	Maximum detected value
7440-47-3	Chromium	µg/l	25	Maximum detected value
7440-48-4	Cobalt	µg/l	3	Maximum detected value
7440-50-8	Copper	µg/l	8.7	Maximum detected value
7440-50-8 (dissolved)	Copper (dissolved)	µg/l	5.1	Maximum detected value
84-74-2	Dibutyl phthalate	µg/l	0.396	Maximum detected value
84-66-2	Diethyl phthalate	µg/l	0.302	Maximum detected value
16984-48-8	Fluoride	mg/l	0.21	Maximum detected value
78-59-1	Isophorone	µg/l	0.094	Maximum detected value
7439-92-1	Lead	µg/l	7.1	Maximum detected value
7439-92-1 (dissolved)	Lead (dissolved)	µg/l	0.75	Maximum detected value
7439-96-5	Manganese	µg/l	150	Maximum detected value
7439-96-5 (dissolved)	Manganese (dissolved)	µg/l	75	Maximum detected value
7439-97-6	Mercury	µg/l	0.12	Maximum detected value
7440-02-0	Nickel	µg/l	4.5	Maximum detected value
7440-02-0 (dissolved)	Nickel (dissolved)	µg/l	2.9	Maximum detected value
14797-55-8 (as N)	Nitrate (as N)	mg/l	0.97	Maximum detected value

Table 12
Outfall 011 Exposure Point Concentrations (EPCs)
Boeing Santa Susana Field Laboratory
Ventura County, California

CAS Number	Analyte	Units	EPC_Value	EPC_Type
NO3NO2 (as N)	Nitrate and Nitrite (as N)	mg/l	0.97	Maximum detected value
87-86-5	Pentachlorophenol	µg/l	1.5	Maximum detected value
13982-63-3	Radium-226	pCi/l	0.888	Maximum detected value
15262-20-1	Radium-228	pCi/l	0.33	Maximum detected value
7782-49-2	Selenium	µg/l	0.55	Maximum detected value
7782-49-2 (dissolved)	Selenium (dissolved)	µg/l	0.56	Maximum detected value
7440-22-4	Silver	µg/l	0.12	Maximum detected value
7440-28-0	Thallium	µg/l	0.2	Maximum detected value
7440-61-1	Uranium	pCi/l	0.566	Maximum detected value
7440-62-2	Vanadium	µg/l	25	Maximum detected value
7440-66-6	Zinc	µg/l	60	Maximum detected value
7440-66-6 (dissolved)	Zinc (dissolved)	µg/l	10	Maximum detected value

Table 13
Outfall 018 Exposure Point Concentrations (EPCs)
Boeing Santa Susana Field Laboratory
Ventura County, California

CAS Number	Analyte	Units	EPC_Value	EPC_Type
107-06-2	1,2-Dichloroethane	µg/l	2.4	Maximum detected value
TCDD-TEQ-DNQ	2,3,7,8-TCDD TEQ	µg/l	0.0000031084	95% Adjusted Gamma UCL
7440-36-0	Antimony	µg/l	0.33	Maximum detected value
7440-36-0 (dissolved)	Antimony (dissolved)	µg/l	0.43	Maximum detected value
7440-38-2	Arsenic	µg/l	8.3	Maximum detected value
7440-39-3	Barium	mg/l	0.062	Maximum detected value
7440-39-3 (dissolved)	Barium (dissolved)	mg/l	0.024	Maximum detected value
71-43-2	Benzene	µg/l	0.84	Maximum detected value
85-68-7	Benzyl butyl phthalate	µg/l	3.28	Maximum detected value
117-81-7	Bis(2-ethylhexyl) phthalate	µg/l	1.6	Maximum detected value
7440-42-8	Boron	mg/l	0.055	Maximum detected value
7440-42-8 (dissolved)	Boron (dissolved)	mg/l	0.2	Maximum detected value
7440-43-9	Cadmium	µg/l	0.27	Maximum detected value
7440-43-9 (dissolved)	Cadmium (dissolved)	µg/l	0.19	Maximum detected value
124-48-1	Chlorodibromomethane	µg/l	0.98	Maximum detected value
67-66-3	Chloroform	µg/l	19	Maximum detected value
7440-47-3 (dissolved)	Chromium (dissolved)	µg/l	2	Maximum detected value
18540-29-9	Chromium, Hexavalent	µg/l	0.26	Maximum detected value
7440-48-4	Cobalt	µg/l	3.5	Maximum detected value
7440-48-4 (dissolved)	Cobalt (dissolved)	µg/l	0.16	Maximum detected value
7440-50-8	Copper	µg/l	3.687	95% KM (t) UCL
7440-50-8 (dissolved)	Copper (dissolved)	µg/l	2.157	95% KM (t) UCL
75-27-4	Dichlorobromomethane	µg/l	1.2	Maximum detected value
84-66-2	Diethyl phthalate	µg/l	0.2	Maximum detected value
16984-48-8	Fluoride	mg/l	0.19	Maximum detected value
7439-92-1	Lead	µg/l	4.717	95% KM Bootstrap t UCL

Table 13
Outfall 018 Exposure Point Concentrations (EPCs)
Boeing Santa Susana Field Laboratory
Ventura County, California

CAS Number	Analyte	Units	EPC_Value	EPC_Type
7439-92-1 (dissolved)	Lead (dissolved)	µg/l	0.78	Maximum detected value
7439-96-5	Manganese	µg/l	116.6	95% KM (t) UCL
7439-96-5 (dissolved)	Manganese (dissolved)	µg/l	190	Maximum detected value*
7439-97-6	Mercury	µg/l	0.033	Maximum detected value
75-09-2	Methylene Chloride (DCM)	µg/l	0.97	Maximum detected value
7440-02-0	Nickel	µg/l	2.3	Maximum detected value
7440-02-0 (dissolved)	Nickel (dissolved)	µg/l	2	Maximum detected value
14797-55-8 (as N)	Nitrate (as N)	mg/l	0.691	95% KM Bootstrap t UCL
NO3NO2 (as N)	Nitrate and Nitrite (as N)	mg/l	0.543	95% KM (t) UCL
14797-65-0 (as N)	Nitrite (as N)	mg/l	0.11	Maximum detected value
13982-63-3	Radium-226	pCi/l	0.688	Maximum detected value
7782-49-2	Selenium	µg/l	0.54	Maximum detected value
10098-97-2	Strontium-90	pCi/l	0.61	Maximum detected value
7440-28-0 (dissolved)	Thallium (dissolved)	µg/l	0.24	Maximum detected value
10028-17-8	Tritium	pCi/l	740	Maximum detected value
7440-61-1	Uranium	pCi/l	0.283	95% KM (t) UCL
7440-62-2	Vanadium	µg/l	27	Maximum detected value
7440-66-6	Zinc	µg/l	29.2	95% KM Adjusted Gamma UCL
7440-66-6 (dissolved)	Zinc (dissolved)	µg/l	13	Maximum detected value

Notes:

*calculated UCL exceeded max detect

Table 14
Outfall 019 Exposure Point Concentrations (EPCs)
Boeing Santa Susana Field Laboratory
Ventura County, California

CAS Number	Analyte	Units	EPC_Value	EPC_Type
TCDD-TEQ-DNQ	2,3,7,8-TCDD TEQ	µg/l	0.0000032	Maximum detected value
319-84-6	alpha-BHC	µg/l	0.0025	Maximum detected value
7440-36-0 (dissolved)	Antimony (dissolved)	µg/l	0.75	Maximum detected value
7440-39-3	Barium	mg/l	0.026	Maximum detected value
7440-39-3 (dissolved)	Barium (dissolved)	mg/l	0.025	Maximum detected value
117-81-7	Bis(2-ethylhexyl) phthalate	µg/l	3.29	Maximum detected value
7440-42-8	Boron	mg/l	0.064	Maximum detected value
7440-42-8 (dissolved)	Boron (dissolved)	mg/l	0.066	Maximum detected value
7440-43-9	Cadmium	µg/l	0.18	Maximum detected value
7440-47-3	Chromium	µg/l	2.3	Maximum detected value
18540-29-9	Chromium, Hexavalent	µg/l	1.1	Maximum detected value
7440-50-8	Copper	µg/l	1.352	95% KM (t) UCL
7440-50-8 (dissolved)	Copper (dissolved)	µg/l	0.99	95% KM (t) UCL
84-66-2	Diethyl phthalate	µg/l	0.226	Maximum detected value
16984-48-8	Fluoride	mg/l	0.35	Maximum detected value
7439-92-1	Lead	µg/l	0.35	95% KM (t) UCL
7439-92-1 (dissolved)	Lead (dissolved)	µg/l	0.32	Maximum detected value
7439-96-5	Manganese	µg/l	24	Maximum detected value
7439-97-6 (dissolved)	Mercury (dissolved)	µg/l	0.23	Maximum detected value
91-20-3	Naphthalene	µg/l	0.151	Maximum detected value
7440-02-0	Nickel	µg/l	2.9	Maximum detected value
7440-02-0 (dissolved)	Nickel (dissolved)	µg/l	2.4	Maximum detected value
14797-55-8 (as N)	Nitrate (as N)	mg/l	0.112	95% KM (t) UCL
14797-73-0	Perchlorate	µg/l	0.96	Maximum detected value
13982-63-3	Radium-226	pCi/l	0.566	Maximum detected value
7782-49-2	Selenium	µg/l	0.82	95% KM (t) UCL

Table 14
Outfall 019 Exposure Point Concentrations (EPCs)
Boeing Santa Susana Field Laboratory
Ventura County, California

CAS Number	Analyte	Units	EPC_Value	EPC_Type
7782-49-2 (dissolved)	Selenium (dissolved)	µg/l	1.1	Maximum detected value
7440-61-1	Uranium	pCi/l	0.433	Gamma Adjusted KM-UCL*
7440-62-2	Vanadium	µg/l	3.3	Maximum detected value
7440-62-2 (dissolved)	Vanadium (dissolved)	µg/l	3.2	Maximum detected value
7440-66-6	Zinc	µg/l	21.56	95% KM (t) UCL
7440-66-6 (dissolved)	Zinc (dissolved)	µg/l	23.13	95% GROS Adjusted Gamma UCL

Notes:

*used when k<=1 and 15 < n < 50 but k<=1

Table 15
Chronic Toxicity Criteria - Chemicals
Boeing Santa Susana Field Laboratory
Ventura County, California

CAS Number	Chemical of Potential Concern	Note	GI ABS	K_P (cm/hr)	Toxicity Criteria based on Cancer Effects			Toxicity Criteria based on Noncancer Effects	
					CSF $(mg/kg\text{-}day)^{-1}$	Source		RfD (mg/kg-day)	Source
	VOCs & SVOCs								
107-06-2	1,2-Dichloroethane		1	0.0042	4.7E-02	1		6.0E-03	3
1746-01-6	2,3,7,8-TCDD (TEQ)		1	0.808	1.3E+05	1		7.0E-10	2
319-84-6	alpha-BHC		1	0.0206	2.7E+00	1		8.0E-03	3
71-43-2	Benzene		1	0.0149	1.0E-01	1		4.0E-03	2
65-85-0	Benzoic Acid		1	0.00565	NC			4.0E+00	2
319-85-7	beta-BHC		1	0.0206	1.5E+00	1		NA	
117-81-7	Bis(2-Ethylhexyl) phthalate		1	1.13	3.0E-03	1		2.0E-02	2
75-27-4	Bromodichloromethane		1	0.00402	1.3E-01	1		2.0E-02	2
85-68-7	Benzyl butyl phthalate		1	0.0385	1.9E-03	3		2.0E-01	2
67-66-3	Chloroform		1	0.00683	1.9E-02	1		1.0E-02	2
156-59-2	cis-1,2-Dichloroethene		1	0.011	NC			2.0E-03	1
124-48-1	Dibromochloromethane		1	0.00289	8.4E-02	2		2.0E-02	2
84-66-2	Diethyl Phthalate		1	0.0036	NC			8.0E-01	2
84-74-2	Di-n-Butyl Phthalate		1	0.042	NC			1.0E-01	2
7421-93-4	Endrin Aldehyde		1	0.0326	NC			3.0E-04	2a
78-59-1	Isophorone		1	0.00354	9.5E-04	3		2.0E-01	2
75-09-2	Methylene chloride		1	0.00354	1.4E-02	1		6.0E-03	2
91-20-3	Naphthalene		1	0.0466	1.2E-01	1		2.0E-02	2
87-86-5	Pentachlorophenol		1	0.127	8.1E-02	1		5.0E-03	2
79-01-6	Trichloroethene		1	0.0116	4.6E-02	2		5.0E-04	2
	Inorganics								
7440-42-8	Boron		1	0.001	NC			2.0E-01	2
57-12-5	Cyanide		1	0.001	NC			6.0E-04	3

Table 15
Chronic Toxicity Criteria - Chemicals
Boeing Santa Susana Field Laboratory
Ventura County, California

CAS Number	Chemical of Potential Concern	Note	GI ABS	K_P (cm/hr)	Toxicity Criteria based on Cancer Effects			Toxicity Criteria based on Noncancer Effects	
					CSF $(mg/kg\text{-}day)^{-1}$	Source		RfD (mg/kg-day)	Source
16984-48-8	Fluoride		1	0.001	NC			4.0E-02	3
14797-55-8	Nitrate (as N)		1	0.001	NC			1.6E+00	2
NO2NO3N	Nitrite/Nitrate Nitrogen		1	0.001	NC			1.6E+00	2b
14797-65-0	Nitrite		1	0.001	NC			1.0E-01	2
14797-73-0	Perchlorate		1	0.001	NC			7.0E-04	2
	Metals								
7429-90-5	Aluminum		1	0.001	NC			1.0E+00	3
7440-36-0	Antimony		0.15	0.001	NC			4.0E-04	2
7440-38-2	Arsenic		1	0.001	9.5E+00	1		3.5E-06	1
7440-39-3	Barium		0.07	0.001	NC			2.0E-01	2
7440-41-7	Beryllium		0.007	0.001	NC			2.0E-04	4
7440-43-9	Cadmium (water)		0.05	0.001	NC	5		5.0E-04	2
18540-29-9	Chromium, Hexavalent		0.025	0.002	5.0E-01	1		3.0E-03	2
7440-47-3	Chromium, Total		0.013	0.001	NC			1.5E+00	2c
7440-48-4	Cobalt		1	0.0004	NC			3.0E-04	3
7440-50-8	Copper		1	0.001	NC			4.0E-02	3
7439-92-1	Lead	¥	1	0.0001	NC			NA	
7439-96-5	Manganese (non-diet)		1	0.001	NC			2.4E-02	3
7439-97-6	Mercury		1	0.001	NC			1.6E-04	1
7440-02-0	Nickel		0.04	0.0002	NC			1.1E-02	1
7782-49-2	Selenium		1	0.001	NC			5.0E-03	2
7440-22-4	Silver		0.04	0.0006	NC			5.0E-03	2
7440-28-0	Thallium		1	0.001	NC			1.0E-05	3
7440-62-2	Vanadium		0.026	0.001	NC			5.0E-03	3

Table 15
Chronic Toxicity Criteria - Chemicals
Boeing Santa Susana Field Laboratory
Ventura County, California

CAS Number	Chemical of Potential Concern	Note	GI ABS	K_P (cm/hr)	Toxicity Criteria based on Cancer Effects			Toxicity Criteria based on Noncancer Effects	
					CSF $(mg/kg\text{-}day)^{-1}$	Source		RfD (mg/kg-day)	Source
7440-66-6	Zinc		1	0.0006	NC			3.0E-01	2

Notes:

VOCs - volatile organic compounds

SVOCs - semi-volatile organic compounds

CSF - cancer slope factor, oral and dermal

RfD - reference dose, oral and dermal

NA - not available; route-specific toxicity value not available

NC - not considered to be a carcinogen via this route

ABS - absorption

GI ABS factors and K_P from USEPA 2016

a - Surrogate value - assumes toxicity for endrin

b - Surrogate value - assumes toxicity for nitrate

c - Surrogate value - assumes toxicity for trivalent chromium

¥ Lead exposure point concentrations compared to health-protective concentration for recreator exposure scenario

Sources:

(1) Cal-EPA (2016) OEHHA, Toxicity Criteria Database www.oehha.ca.gov/risk/chemicalDB/index.asp; and
Human Health Risk Assessment (HHRA) Note Number: 3. DTSC-modified Screening Levels (DTSC-SLs). June 2016 (Cal-EPA DTSC).

(2) USEPA IRIS (2016) Integrated Risk Information System (IRIS) https://www.epa.gov/iris

(3) USEPA (2016): USEPA (2016) Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites. May. www.epa.gov/region09/superfund/prg

(4) California Office of Environmental Health Hazard Assessment (OEHHA), Water, Public Health Goals http://www.oehha.ca.gov/water/phg/allphgs.html

(5) California Office of Environmental Health Hazard Assessment (OEHHA), Memorandum, Update of the Public Health Goal for Cadmium
http://oehha.ca.gov/media/downloads/water/chemicals/phg/122206cadmiummemo_0.pdf

Table 16
Chronic Toxicity Criteria - Radionuclides
Boeing Santa Susana Field Laboratory
Ventura County, California

CAS Number	Radionuclide	Toxicity Criteria based on Cancer Effects		
		SF_w (risk/pCi)	SF_{imm} (risk/pCi)	Source
13966-00-2	Potassium-40, Total	2.5E-11	1.6E-12	1
13982-63-3	Radium-226, Total*	3.9E-10	1.7E-11	1
15262-20-1	Radium-228, Total*	1.0E-09	8.2E-12	1
10098-97-2	Strontium-90, Total*	7.4E-11	4.0E-14	1
7440-61-1	Total Uranium[a]*	7.2E-11	1.5E-12	1
10028-17-8	Tritium, Total (Hydrogen-3)	1.1E-13	NA	1

Notes:

NA - not applicable

*Slope factor includes progeny contribution

SF_w - water ingestion slope factor

SF_{imm} - immersion slope factor

pCi - picocuries

SFs based on a target risk of $1x10^{-6}$

[a]Uranium-235 selected based on most conservative slope factors

Sources:

(1) USEPA PRGs (2014): Preliminary Remediation Goals for Radionuclides
https://epa-prgs.ornl.gov/radionuclides/

Table 17
Outfall 001 RBCs and Cumulative Cancer Risk and Noncancer Hazard
Boeing Santa Susana Field Laboratory

	Upper Bound				Lower Bound			
Chemical/Radionuclide	**RBCc**	**RBCnc**	**Carcinogenic Risk**	**Hazard Quotient***	**RBCc**	**RBCnc**	**Carcinogenic Risk**	**Hazard Quotient***
Aluminum	--	4.40E+07	--	3E-04	--	8.80E+07	--	1E-04
Antimony (metallic)	--	7.66E+03	--	6E-05	--	1.53E+04	--	3E-05
Arsenic, Inorganic	3.55E+01	1.54E+02	2E-07	5E-02	7.11E+01	3.08E+02	1E-07	3E-02
Barium	--	2.18E+06	--	5E-05	--	4.36E+06	--	3E-05
Boron	--	8.80E+06	--	6E-06	--	1.76E+07	--	3E-06
Cadmium (Water)	--	4.11E+03	--	7E-05	--	8.23E+03	--	3E-05
Chromium, Total	--	3.59E+06	--	4E-06	--	7.18E+06	--	2E-06
Cobalt	--	1.53E+04	--	3E-04	--	3.06E+04	--	2E-04
Copper	--	1.76E+06	--	8E-06	--	3.52E+06	--	4E-06
Dibutyl Phthalate	--	1.31E+05	--	3E-06	--	2.61E+05	--	2E-06
Diethyl Phthalate	--	1.19E+07	--	2E-08	--	2.38E+07	--	1E-08
Fluoride	--	1.76E+06	--	1E-04	--	3.52E+06	--	6E-05
Manganese (Non-diet)	--	1.63E+05	--	2E-03	--	3.25E+05	--	1E-03
Nickel	--	2.53E+05	--	5E-05	--	5.05E+05	--	2E-05
Nitrate	--	7.04E+07	--	2E-05	--	1.41E+08	--	1E-05
Nitrate + Nitrite (as N)	--	7.04E+07	--	2E-05	--	1.41E+08	--	1E-05
Pentachlorophenol	3.04E+01	2.37E+03	5E-08	6E-04	6.06E+01	4.73E+03	2E-08	3E-04
Perchlorate	--	3.08E+04	--	5E-05	--	6.16E+04	--	2E-05
Selenium	--	2.20E+05	--	6E-06	--	4.40E+05	--	3E-06
TCDD, 2,3,7,8- TEQ	3.93E-03	3.99E-02	6E-10	6E-05	7.86E-03	7.98E-02	3E-10	3E-05
Vanadium	--	2.32E+04	--	1E-03	--	4.63E+04	--	6E-04
Zinc	--	1.45E+07	--	5E-06	--	2.90E+07	--	3E-06
Radium-226*	1.52E+02	--	2E-09	--	3.03E+02	--	1E-09	--
Radium-228*	3.46E+02	--	2E-09	--	6.92E+02	--	1E-09	--
Uranium-235*	6.33E+02	--	1E-09	--	1.27E+03	--	5E-10	--
		Cumulative CR and HI:	**3E-07**	**6E-02**		**Cumulative CR and HI:**	**1E-07**	**3E-02**

Notes:

"--" - not applicable

*Hazard Quotient for child

CR - Cancer Risk; HI - Hazard Index

RBCc - risk-based concentration for surface water based on cancer effects; RBCnc based on noncancer effects

RBC units are µg/L for chemicals and pCi/L for radionuclides

* - risk includes progeny contribution

Target cancer risk = 10^{-6} and target noncancer hazard = 1 for recreators

Table 18
Outfall 002 RBCs and Cumulative Cancer Risk and Noncancer Hazard
Boeing Santa Susana Field Laboratory

	Upper Bound				Lower Bound			
Chemical/Radionuclide	**RBCc**	**RBCnc**	**Carcinogenic Risk**	**Hazard Quotient***	**RBCc**	**RBCnc**	**Carcinogenic Risk**	**Hazard Quotient***
Antimony (metallic)	--	2.55E+03	--	2E-04	--	5.11E+03	--	1E-04
Arsenic, Inorganic	1.19E+01	5.13E+01	5E-07	1E-01	2.39E+01	1.03E+02	2E-07	6E-02
Barium	--	7.26E+05	--	9E-05	--	1.45E+06	--	5E-05
Benzoic Acid	--	2.17E+07	--	1E-07	--	4.34E+07	--	7E-08
Beryllium	--	8.77E+01	--	4E-03	--	1.75E+02	--	2E-03
Boron	--	2.93E+06	--	3E-05	--	5.86E+06	--	1E-05
Cadmium (Water)	--	1.37E+03	--	1E-04	--	2.74E+03	--	5E-05
Chromium, Total	--	1.20E+06	--	3E-06	--	2.39E+06	--	1E-06
Cobalt	--	5.10E+03	--	9E-04	--	1.02E+04	--	5E-04
Copper	--	5.86E+05	--	7E-06	--	1.17E+06	--	4E-06
Dibutyl Phthalate	--	4.35E+04	--	9E-06	--	8.71E+04	--	5E-06
Dichloroethylene, 1,2-cis-	--	7.07E+03	--	4E-04	--	1.41E+04	--	2E-04
Diethyl Phthalate	--	3.97E+06	--	6E-08	--	7.94E+06	--	3E-08
Fluoride	--	5.86E+05	--	7E-04	--	1.17E+06	--	3E-04
Isophorone	4.56E+04	1.41E+06	6E-12	2E-07	9.13E+04	2.82E+06	3E-12	9E-08
Manganese (Non-diet)	--	5.42E+04	--	2E-03	--	1.08E+05	--	1E-03
Mercury (elemental)	--	2.35E+03	--	1E-05	--	4.69E+03	--	7E-06
Nickel	--	8.42E+04	--	1E-04	--	1.68E+05	--	5E-05
Nitrate	--	2.35E+07	--	6E-05	--	4.69E+07	--	3E-05
Nitrate + Nitrite (as N)	--	2.35E+07	--	7E-05	--	4.69E+07	--	3E-05
Nitrite	--	1.47E+06	--	7E-05	--	2.93E+06	--	3E-05
Perchlorate	--	1.03E+04	--	2E-04	--	2.05E+04	--	1E-04
Selenium	--	7.33E+04	--	9E-06	--	1.47E+05	--	4E-06
TCDD, 2,3,7,8- TEQ	1.32E-03	1.33E-02	1E-09	1E-04	2.66E-03	2.66E-02	6E-10	6E-05
Trichloroethylene	2.85E+02	1.50E+03	3E-09	5E-04	5.71E+02	3.00E+03	1E-09	2E-04
Vanadium	--	7.72E+03	--	5E-03	--	1.54E+04	--	2E-03
Zinc	--	4.84E+06	--	5E-06	--	9.68E+06	--	2E-06
Radium-226*	5.05E+01	--	9E-09	--	1.01E+02	--	5E-09	--
Uranium-235*	2.11E+02	--	4E-09	--	4.22E+02	--	2E-09	--
		Cumulative CR and HI:	**5E-07**	**1E-01**		**Cumulative CR and HI:**	**2E-07**	**6E-02**

Notes:

"--" - not applicable

*Hazard Quotient for child

CR - Cancer Risk; HI - Hazard Index

RBCc - risk-based concentration for surface water based on cancer effects; RBCnc based on noncancer effects

RBC units are μg/L for chemicals and pCi/L for radionuclides

* - risk includes progeny contribution

Target cancer risk = 10^{-6} and target noncancer hazard = 1 for recreators

Table 19
Outfall 008 RBCs and Cumulative Cancer Risk and Noncancer Hazard
Boeing Santa Susana Field Laboratory

	Upper Bound				Lower Bound			
Chemical/Radionuclide	**RBCc**	**RBCnc**	**Carcinogenic Risk**	**Hazard Quotient***	**RBCc**	**RBCnc**	**Carcinogenic Risk**	**Hazard Quotient***
Aluminum	--	2.64E+07	--	5E-04	--	5.28E+07	--	2E-04
Antimony (metallic)	--	4.60E+03	--	1E-04	--	9.19E+03	--	5E-05
Bis(2-ethylhexyl)phthalate	1.03E+05	6.84E+05	2E-11	3E-06	2.08E+05	1.37E+06	9E-12	1E-06
Boron	--	5.28E+06	--	2E-05	--	1.06E+07	--	9E-06
Cadmium (Water)	--	2.47E+03	--	2E-04	--	4.94E+03	--	9E-05
Chromium, Total	--	2.16E+06	--	7E-06	--	4.31E+06	--	4E-06
Copper	--	1.06E+06	--	9E-06	--	2.11E+06	--	4E-06
Cyanide (CN-)	--	1.58E+04	--	5E-04	--	3.17E+04	--	3E-04
Diethyl Phthalate	--	7.14E+06	--	2E-08	--	1.43E+07	--	1E-08
Endrin aldehyde	--	3.19E+02	--	8E-06	--	6.38E+02	--	4E-06
Fluoride	--	1.06E+06	--	2E-04	--	2.11E+06	--	1E-04
Hexachlorocyclohexane, Beta-	5.06E+00	--	1E-09	--	1.01E+01	--	5E-10	--
Mercury (elemental)	--	4.22E+03	--	4E-05	--	8.45E+03	--	2E-05
Nickel	--	1.52E+05	--	1E-04	--	3.03E+05	--	7E-05
Nitrate	--	4.22E+07	--	5E-05	--	8.45E+07	--	3E-05
Nitrate + Nitrite (as N)	--	4.22E+07	--	5E-05	--	8.45E+07	--	3E-05
Perchlorate	--	1.85E+04	--	1E-04	--	3.69E+04	--	7E-05
Selenium	--	1.32E+05	--	1E-05	--	2.64E+05	--	5E-06
TCDD, 2,3,7,8- TEQ	2.37E-03	2.40E-02	1E-09	1E-04	4.79E-03	4.79E-02	5E-10	5E-05
Thallium	--	2.64E+02	--	5E-03	--	5.28E+02	--	2E-03
Vanadium	--	1.39E+04	--	2E-03	--	2.78E+04	--	1E-03
Zinc	--	8.71E+06	--	4E-06	--	1.74E+07	--	2E-06
Potassium-40	1.12E+04	--	2E-09	--	2.25E+04	--	9E-10	--
Radium-226*	9.09E+01	--	7E-09	--	1.82E+02	--	3E-09	--
Radium-228*	2.08E+02	--	3E-09	--	4.15E+02	--	2E-09	--
Uranium-235*	3.80E+02	--	3E-09	--	7.60E+02	--	1E-09	--
		Cumulative CR and HI:	**2E-08**	**9E-03**		**Cumulative CR and HI:**	**8E-09**	**4E-03**

Notes:

"--" - not applicable

*Hazard Quotient for child

CR - Cancer Risk; HI - Hazard Index

RBCc - risk-based concentration for surface water based on cancer effects; RBCnc based on noncancer effects

RBC units are µg/L for chemicals and pCi/L for radionuclides

* - risk includes progeny contribution

Target cancer risk = 10^{-6} and target noncancer hazard = 1 for recreators

Table 20
Outfall 009 RBCs and Cumulative Cancer Risk and Noncancer Hazard
Boeing Santa Susana Field Laboratory

	Upper Bound				Lower Bound			
Chemical/Radionuclide	**RBCc**	**RBCnc**	**Carcinogenic Risk**	**Hazard Quotient***	**RBCc**	**RBCnc**	**Carcinogenic Risk**	**Hazard Quotient***
Aluminum	--	1.02E+07	--	4E-04	--	2.03E+07	--	2E-04
Antimony (metallic)	--	1.77E+03	--	5E-04	--	3.54E+03	--	2E-04
Bis(2-ethylhexyl)phthalate	3.96E+04	2.63E+05	3E-10	4E-05	7.96E+04	5.26E+05	1E-10	2E-05
Boron	--	2.03E+06	--	3E-05	--	4.06E+06	--	1E-05
Cadmium (Water)	--	9.49E+02	--	2E-04	--	1.90E+03	--	1E-04
Chromium(VI)	2.44E+00	1.60E+03	2E-07	3E-04	4.88E+00	3.19E+03	8E-08	1E-04
Chromium, Total	--	8.29E+05	--	1E-05	--	1.66E+06	--	5E-06
Copper	--	4.06E+05	--	1E-05	--	8.12E+05	--	7E-06
Diethyl Phthalate	--	2.75E+06	--	9E-08	--	5.49E+06	--	5E-08
Fluoride	--	4.06E+05	--	5E-04	--	8.12E+05	--	2E-04
Mercury (elemental)	--	1.62E+03	--	7E-05	--	3.25E+03	--	3E-05
Nickel	--	5.83E+04	--	1E-04	--	1.17E+05	--	5E-05
Nitrate + Nitrite (as N)	--	1.62E+07	--	5E-05	--	3.25E+07	--	2E-05
Pentachlorophenol	7.01E+00	5.47E+02	2E-07	3E-03	1.40E+01	1.09E+03	1E-07	1E-03
Selenium	--	5.08E+04	--	2E-04	--	1.02E+05	--	1E-04
Silver	--	1.21E+04	--	5E-05	--	2.42E+04	--	3E-05
TCDD, 2,3,7,8- TEQ	9.14E-04	9.21E-03	3E-09	3E-04	1.84E-03	1.84E-02	1E-09	1E-04
Thallium	--	1.02E+02	--	4E-03	--	2.03E+02	--	2E-03
Vanadium	--	5.35E+03	--	2E-03	--	1.07E+04	--	1E-03
Zinc	--	3.35E+06	--	9E-06	--	6.70E+06	--	4E-06
Radium-226*	3.50E+01	--	1E-08	--	6.99E+01	--	5E-09	--
Radium-228*	7.98E+01	--	8E-09	--	1.60E+02	--	4E-09	--
Strontium-90*	1.45E+03	--	5E-10	--	2.89E+03	--	2E-10	--
Uranium-235*	1.46E+02	--	2E-09	--	2.92E+02	--	1E-09	--
		Cumulative CR and HI:	**4E-07**	**1E-02**		**Cumulative CR and HI:**	**2E-07**	**6E-03**

Notes:

"--" - not applicable

*Hazard Quotient for child

CR - Cancer Risk; HI - Hazard Index

RBCc - risk-based concentration for surface water based on cancer effects; RBCnc based on noncancer effects

RBC units are µg/L for chemicals and pCi/L for radionuclides

* - risk includes progeny contribution

Target cancer risk = 10^{-6} and target noncancer hazard = 1 for recreators

Table 21
Outfall 011 RBCs and Cumulative Cancer Risk and Noncancer Hazard
Boeing Santa Susana Field Laboratory

	Upper Bound				Lower Bound			
Chemical/Radionuclide	**RBCc**	**RBCnc**	**Carcinogenic Risk**	**Hazard Quotient***	**RBCc**	**RBCnc**	**Carcinogenic Risk**	**Hazard Quotient***
Antimony (metallic)	--	2.30E+04	--	4E-05	--	4.60E+04	--	2E-05
Arsenic, Inorganic	1.05E+02	4.62E+02	8E-08	2E-02	2.19E+02	9.24E+02	4E-08	1E-02
Barium	--	6.53E+06	--	1E-05	--	1.31E+07	--	5E-06
Boron	--	2.64E+07	--	2E-06	--	5.28E+07	--	8E-07
Butyl Benzyl Phthalate	9.45E+03	6.89E+05	1E-10	2E-06	1.89E+04	1.37E+06	7E-11	9E-07
Cadmium (Water)	--	1.23E+04	--	2E-05	--	2.47E+04	--	1E-05
Chromium, Total	--	1.08E+07	--	2E-06	--	2.16E+07	--	1E-06
Cobalt	--	4.59E+04	--	7E-05	--	9.18E+04	--	3E-05
Copper	--	5.28E+06	--	2E-06	--	1.06E+07	--	8E-07
Dibutyl Phthalate	--	3.92E+05	--	1E-06	--	7.82E+05	--	5E-07
Diethyl Phthalate	--	3.57E+07	--	8E-09	--	7.14E+07	--	4E-09
Fluoride	--	5.28E+06	--	4E-05	--	1.06E+07	--	2E-05
Isophorone	4.07E+05	1.27E+07	2E-13	7E-09	8.26E+05	2.53E+07	1E-13	4E-09
Manganese (Non-diet)	--	4.88E+05	--	3E-04	--	9.76E+05	--	2E-04
Mercury (elemental)	--	2.11E+04	--	6E-06	--	4.22E+04	--	3E-06
Nickel	--	7.58E+05	--	6E-06	--	1.52E+06	--	3E-06
Nitrate	--	2.11E+08	--	5E-06	--	4.22E+08	--	2E-06
Nitrate + Nitrite (as N)	--	2.11E+08	--	5E-06	--	4.22E+08	--	2E-06
Pentachlorophenol	9.11E+01	7.11E+03	2E-08	2E-04	1.82E+02	1.42E+04	8E-09	1E-04
Selenium	--	6.60E+05	--	8E-07	--	1.32E+06	--	4E-07
Silver	--	1.57E+05	--	8E-07	--	3.14E+05	--	4E-07
TCDD, 2,3,7,8- TEQ	1.16E-02	1.20E-01	3E-10	3E-05	2.46E-02	2.40E-01	1E-10	1E-05
Thallium	--	1.32E+03	--	2E-04	--	2.64E+03	--	8E-05
Vanadium	--	6.95E+04	--	4E-04	--	1.39E+05	--	2E-04
Zinc	--	4.36E+07	--	1E-06	--	8.71E+07	--	7E-07
Radium-226*	4.55E+02	--	2E-09	--	9.09E+02	--	1E-09	--
Radium-228*	1.04E+03	--	3E-10	--	2.08E+03	--	2E-10	--
Uranium-235*	1.90E+03	--	3E-10	--	3.80E+03	--	1E-10	--
		Cumulative CR and HI:	**1E-07**	**2E-02**		**Cumulative CR and HI:**	**5E-08**	**1E-02**

Notes:

"--" - not applicable

*Hazard Quotient for child

CR - Cancer Risk; HI - Hazard Index

RBCc - risk-based concentration for surface water based on cancer effects; RBCnc based on noncancer effects

RBC units are µg/L for chemicals and pCi/L for radionuclides

* - risk includes progeny contribution

Target cancer risk = 10^{-6} and target noncancer hazard = 1 for recreators

Table 22
Outfall 018 RBCs and Cumulative Cancer Risk and Noncancer Hazard
Boeing Santa Susana Field Laboratory

	Upper Bound				Lower Bound			
Chemical/Radionuclide	**RBCc**	**RBCnc**	**Carcinogenic Risk**	**Hazard Quotient***	**RBCc**	**RBCnc**	**Carcinogenic Risk**	**Hazard Quotient***
Antimony (metallic)	--	3.83E+03	--	1E-04	--	7.66E+03	--	6E-05
Arsenic, Inorganic	1.79E+01	7.70E+01	5E-07	1E-01	3.55E+01	1.54E+02	2E-07	5E-02
Barium	--	1.09E+06	--	6E-05	--	2.18E+06	--	3E-05
Benzene	2.41E+02	1.74E+04	3E-09	5E-05	4.82E+02	3.49E+04	2E-09	2E-05
Bis(2-ethylhexyl)phthalate	8.60E+04	5.70E+05	2E-11	3E-06	1.70E+05	1.14E+06	9E-12	1E-06
Boron	--	4.40E+06	--	5E-05	--	8.80E+06	--	2E-05
Bromodichloromethane	4.13E+02	1.80E+05	3E-09	7E-06	8.25E+02	3.59E+05	1E-09	3E-06
Butyl Benzyl Phthalate	1.58E+03	1.15E+05	2E-09	3E-05	3.14E+03	2.29E+05	1E-09	1E-05
Cadmium (Water)	--	2.06E+03	--	1E-04	--	4.11E+03	--	7E-05
Chloroform	2.18E+03	7.15E+04	9E-09	3E-04	4.35E+03	1.43E+05	4E-09	1E-04
Chromium(VI)	5.28E+00	3.46E+03	5E-08	8E-05	1.06E+01	6.92E+03	2E-08	4E-05
Chromium, Total	--	1.80E+06	--	1E-06	--	3.59E+06	--	6E-07
Cobalt	--	7.65E+03	--	5E-04	--	1.53E+04	--	2E-04
Copper	--	8.80E+05	--	4E-06	--	1.76E+06	--	2E-06
Dibromochloromethane	6.63E+02	1.85E+05	1E-09	5E-06	1.32E+03	3.70E+05	7E-10	3E-06
Dichloroethane, 1,2-	1.38E+03	6.33E+04	2E-09	4E-05	2.75E+03	1.27E+05	9E-10	2E-05
Diethyl Phthalate	--	5.95E+06	--	3E-08	--	1.19E+07	--	2E-08
Fluoride	--	8.80E+05	--	2E-04	--	1.76E+06	--	1E-04
Manganese (Non-diet)	--	8.13E+04	--	2E-03	--	1.63E+05	--	1E-03
Mercury (elemental)	--	3.52E+03	--	9E-06	--	7.04E+03	--	5E-06
Methylene Chloride	2.34E+03	7.22E+04	4E-10	1E-05	4.68E+03	1.44E+05	2E-10	7E-06
Nickel	--	1.26E+05	--	2E-05	--	2.53E+05	--	9E-06
Nitrate	--	3.52E+07	--	2E-05	--	7.04E+07	--	1E-05
Nitrate + Nitrite (as N)	--	3.52E+07	--	2E-05	--	7.04E+07	--	8E-06
Nitrite	--	2.20E+06	--	5E-05	--	4.40E+06	--	3E-05
Selenium	--	1.10E+05	--	5E-06	--	2.20E+05	--	2E-06
TCDD, 2,3,7,8- TEQ	1.99E-03	2.00E-02	2E-09	2E-04	3.93E-03	3.99E-02	8E-10	8E-05
Thallium	--	2.20E+02	--	1E-03	--	4.40E+02	--	5E-04
Vanadium	--	1.16E+04	--	2E-03	--	2.32E+04	--	1E-03
Zinc	--	7.26E+06	--	4E-06	--	1.45E+07	--	2E-06
Hydrogen-3 (Tritium)	4.57E+06	--	2E-10	--	9.13E+06	--	8E-11	--
Radium-226*	7.58E+01	--	9E-09	--	1.52E+02	--	5E-09	--
Strontium-90*	3.13E+03	--	2E-10	--	6.27E+03	--	1E-10	--
Uranium-235*	3.16E+02	--	9E-10	--	6.33E+02	--	4E-10	--
		Cumulative CR and HI:	**5E-07**	**1E-01**		**Cumulative CR and HI:**	**3E-07**	**6E-02**

Notes:

"--" - not applicable

*Hazard Quotient for child

CR - Cancer Risk; HI - Hazard Index

RBCc - risk-based concentration for surface water based on cancer effects; RBCnc based on noncancer effects

RBC units are µg/L for chemicals and pCi/L for radionuclides

* - risk includes progeny contribution

Target cancer risk = 10^{-6} and target noncancer hazard = 1 for recreators

Bold/shaded values indicate over target risk of 10^{-6}

Table 23
Outfall 019 RBCs and Cumulative Cancer Risk and Noncancer Hazard
Boeing Santa Susana Field Laboratory

	Single Estimate¥			
Chemical/Radionuclide	**RBCc**	**RBCnc**	**Carcinogenic Risk**	**Hazard Quotient***
Antimony (metallic)	--	9.19E+02	--	8E-04
Barium	--	2.61E+05	--	1E-04
Bis(2-ethylhexyl)phthalate	2.06E+04	1.37E+05	2E-10	2E-05
Boron	--	1.06E+06	--	6E-05
Cadmium (Water)	--	4.94E+02	--	4E-04
Chromium(VI)	1.27E+00	8.30E+02	9E-07	1E-03
Chromium, Total	--	4.31E+05	--	5E-06
Copper	--	2.11E+05	--	6E-06
Diethyl Phthalate	--	1.43E+06	--	2E-07
Fluoride	--	2.11E+05	--	2E-03
Hexachlorocyclohexane, Alpha-	5.63E-01	2.31E+03	4E-09	1E-06
Manganese (Non-diet)	--	1.95E+04	--	1E-03
Mercury (elemental)	--	8.45E+02	--	3E-04
Naphthalene	1.39E+01	6.34E+03	1E-08	2E-05
Nickel	--	3.03E+04	--	1E-04
Nitrate	--	8.45E+06	--	1E-05
Perchlorate	--	3.69E+03	--	3E-04
Selenium	--	2.64E+04	--	4E-05
TCDD, 2,3,7,8- TEQ	4.76E-04	4.79E-03	7E-09	7E-04
Vanadium	--	2.78E+03	--	1E-03
Zinc	--	1.74E+06	--	1E-05
Radium-226*	1.82E+01	--	3E-08	--
Uranium-235*	7.60E+01	--	6E-09	--
		Cumulative CR and HI:	**9E-07**	**8E-03**

Notes:

"--" - not applicable

¥ One estimate for Outfall 19 using 50 days/year as Exposure Frequency

*Hazard Quotient for child

CR - Cancer Risk; HI - Hazard Index

RBCc - risk-based concentration for surface water based on cancer effects; RBCnc based on noncancer effects

RBC units are µg/L for chemicals and pCi/L for radionuclides

* - risk includes progeny contribution

Target cancer risk = 10^{-6} and target noncancer hazard = 1 for recreators

Table 24
Upper and Lower Bound Incremental Cancer Risk and Noncancer Hazard Summary
Boeing Santa Susana Field Laboratory

	Units	Outfall						
		001	002	008	009	011	018	019
Lower Bound	Cancer Risk	1E-07	2E-07	8E-09	2E-07	5E-08	3E-07	9E-07
Upper Bound	Cancer Risk	3E-07	5E-07	2E-08	4E-07	1E-07	5E-07	
Lower Bound	Hazard	3E-02	6E-02	4E-03	6E-03	1E-02	6E-02	8E-03
Upper Bound	Hazard	6E-02	1E-01	9E-03	1E-02	2E-02	1E-01	

Notes:

Target cancer risk = 10^{-6} and target noncancer hazard = 1 for recreators

All values below the target cancer risk and noncancer hazard values

APPENDICES

APPENDIX A

Summary of Analytical Data

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 001	71-55-6	1,1,1-Trichloroethane	6	0	0.0%	µg/l	0.5	0.5	0.3	0.3	--	--	--	--	--
OUTFALL 001	79-34-5	1,1,2,2-Tetrachloroethane	4	0	0.0%	µg/l	0.5	0.5	0.3	0.3	--	--	--	--	--
OUTFALL 001	79-00-5	1,1,2-Trichloroethane	6	0	0.0%	µg/l	0.5	0.5	0.3	0.3	--	--	--	--	--
OUTFALL 001	75-34-3	1,1-Dichloroethane	6	0	0.0%	µg/l	0.5	0.5	0.4	0.4	--	--	--	--	--
OUTFALL 001	75-35-4	1,1-Dichloroethene	7	0	0.0%	µg/l	0.5	2	0.42	0.42	--	--	--	--	--
OUTFALL 001	57-14-7	1,1-Dimethylhydrazine	4	0	0.0%	µg/l	5	5	1.13	1.42	--	--	--	--	--
OUTFALL 001	120-82-1	1,2,4-Trichlorobenzene	4	0	0.0%	µg/l	0.94	0.948	0.094	0.0948	--	--	--	--	--
OUTFALL 001	95-50-1	1,2-Dichlorobenzene	5	0	0.0%	µg/l	0.47	0.5	0.094	0.32	--	--	--	--	--
OUTFALL 001	107-06-2	1,2-Dichloroethane	7	0	0.0%	µg/l	0.5	0.5	0.28	0.28	--	--	--	--	--
OUTFALL 001	78-87-5	1,2-Dichloropropane	4	0	0.0%	µg/l	0.5	0.5	0.35	0.35	--	--	--	--	--
OUTFALL 001	541-73-1	1,3-Dichlorobenzene	5	0	0.0%	µg/l	0.47	0.5	0.094	0.35	--	--	--	--	--
OUTFALL 001	106-46-7	1,4-Dichlorobenzene	5	0	0.0%	µg/l	0.47	0.5	0.189	0.37	--	--	--	--	--
OUTFALL 001	123-91-1	1,4-Dioxane	4	0	0.0%	µg/l	2	2	1	1	--	--	--	--	--
OUTFALL 001	95-95-4	2,4,5-Trichlorophenol	2	0	0.0%	µg/l	1.9	1.9	0.19	0.19	--	--	--	--	--
OUTFALL 001	88-06-2	2,4,6-Trichlorophenol	7	0	0.0%	µg/l	0.94	5.7	0.094	0.095	--	--	--	--	--
OUTFALL 001	120-83-2	2,4-Dichlorophenol	4	0	0.0%	µg/l	1.89	1.9	0.189	0.19	--	--	--	--	--
OUTFALL 001	105-67-9	2,4-Dimethylphenol	4	0	0.0%	µg/l	1.89	1.9	0.28	0.284	--	--	--	--	--
OUTFALL 001	51-28-5	2,4-Dinitrophenol	4	0	0.0%	µg/l	4.7	4.74	0.849	0.853	--	--	--	--	--
OUTFALL 001	121-14-2	2,4-Dinitrotoluene	7	0	0.0%	µg/l	4.7	8.6	0.189	0.19	--	--	--	--	--
OUTFALL 001	606-20-2	2,6-Dinitrotoluene	4	0	0.0%	µg/l	4.7	4.74	0.094	0.0948	--	--	--	--	--
OUTFALL 001	91-58-7	2-Chloronaphthalene	4	0	0.0%	µg/l	0.47	0.474	0.094	0.0948	--	--	--	--	--
OUTFALL 001	95-57-8	2-Chlorophenol	4	0	0.0%	µg/l	0.94	0.948	0.189	0.19	--	--	--	--	--
OUTFALL 001	534-52-1	2-Methyl-4,6-Dinitrophenol	4	0	0.0%	µg/l	4.7	4.74	0.189	0.284	--	--	--	--	--
OUTFALL 001	91-57-6	2-Methylnaphthalene	3	0	0.0%	µg/l	0.94	0.948	0.094	0.19	--	--	--	--	--
OUTFALL 001	95-48-7	2-Methylphenol (o-cresol)	3	0	0.0%	µg/l	1.9	1.9	0.094	0.0948	--	--	--	--	--
OUTFALL 001	88-74-4	2-Nitroaniline	3	0	0.0%	µg/l	4.7	4.74	0.094	0.0948	--	--	--	--	--
OUTFALL 001	88-75-5	2-Nitrophenol	4	0	0.0%	µg/l	1.89	1.9	0.094	0.0948	--	--	--	--	--
OUTFALL 001	91-94-1	3,3-Dichlorobenzidine	4	0	0.0%	µg/l	4.7	4.74	0.474	4.72	--	--	--	--	--
OUTFALL 001	72-54-8	4,4'-DDD	4	0	0.0%	µg/l	0.0047	0.0049	0.0019	0.0039	--	--	--	--	--
OUTFALL 001	72-55-9	4,4'-DDE	3	0	0.0%	µg/l	0.0047	0.0049	0.0028	0.0029	--	--	--	--	--
OUTFALL 001	50-29-3	4,4'-DDT	3	0	0.0%	µg/l	0.0094	0.0097	0.0038	0.0039	--	--	--	--	--
OUTFALL 001	101-55-3	4-Bromophenyl phenyl ether	4	0	0.0%	µg/l	0.94	0.948	0.094	0.19	--	--	--	--	--
OUTFALL 001	59-50-7	4-Chloro-3-methylphenol (p-Chlorocresol)	4	0	0.0%	µg/l	1.89	1.9	0.189	0.19	--	--	--	--	--
OUTFALL 001	106-47-8	4-Chloroaniline	3	0	0.0%	µg/l	1.9	1.9	0.094	0.284	--	--	--	--	--
OUTFALL 001	7005-72-3	4-Chlorophenyl Phenyl Ether	4	0	0.0%	µg/l	0.47	0.474	0.094	0.19	--	--	--	--	--
OUTFALL 001	100-02-7	4-Nitrophenol	4	0	0.0%	µg/l	4.7	4.74	2.36	2.4	--	--	--	--	--
OUTFALL 001	83-32-9	Acenaphthene	4	0	0.0%	µg/l	0.47	0.474	0.094	0.19	--	--	--	--	--
OUTFALL 001	208-96-8	Acenaphthylene	4	0	0.0%	µg/l	0.47	0.474	0.094	0.19	--	--	--	--	--
OUTFALL 001	107-02-8	Acrolein	4	0	0.0%	µg/l	5	5	4	4	--	--	--	--	--
OUTFALL 001	107-13-1	Acrylonitrile	4	0	0.0%	µg/l	2	2	0.7	1.2	--	--	--	--	--
OUTFALL 001	309-00-2	Aldrin	4	0	0.0%	µg/l	0.0047	0.0049	0.0014	0.0015	--	--	--	--	--
OUTFALL 001	319-84-6	alpha-BHC	7	0	0.0%	µg/l	0.0047	0.05	0.0024	0.0053	--	--	--	--	--
OUTFALL 001	7429-90-5	Aluminum	1	1	100.0%	µg/l	--	--	--	--	11000	11000	11000	11000	Maximum detected value
OUTFALL 001	7429-90-5 (dissolved)	Aluminum (dissolved)	1	1	100.0%	µg/l	--	--	--	--	660	660	660	660	Maximum detected value

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 001	7664-41-7 (as NH3)	Ammonia (as NH3)	7	3	42.9%	mg/l	0.5	0.5	0.5	0.5	0.56	0.84	0.65	0.84	Maximum detected value
OUTFALL 001	62-53-3	Aniline	3	0	0.0%	µg/l	9.4	9.48	0.28	0.284	--	--	--	--	--
OUTFALL 001	120-12-7	Anthracene	4	0	0.0%	µg/l	0.47	0.474	0.094	0.0948	--	--	--	--	--
OUTFALL 001	7440-36-0	Antimony	4	1	25.0%	µg/l	2	4	0.2	0.6	0.45	0.45	0.45	0.45	Maximum detected value
OUTFALL 001	7440-36-0 (dissolved)	Antimony (dissolved)	4	1	25.0%	µg/l	2	10	0.2	1.5	0.32	0.32	0.32	0.32	Maximum detected value
OUTFALL 001	12674-11-2	Aroclor 1016	4	0	0.0%	µg/l	0.47	0.49	0.24	0.24	--	--	--	--	--
OUTFALL 001	11104-28-2	Aroclor 1221	4	0	0.0%	µg/l	0.47	0.49	0.24	0.24	--	--	--	--	--
OUTFALL 001	11141-16-5	Aroclor 1232	4	0	0.0%	µg/l	0.47	0.49	0.24	0.24	--	--	--	--	--
OUTFALL 001	53469-21-9	Aroclor 1242	4	0	0.0%	µg/l	0.47	0.49	0.24	0.24	--	--	--	--	--
OUTFALL 001	12672-29-6	Aroclor 1248	4	0	0.0%	µg/l	0.47	0.49	0.24	0.24	--	--	--	--	--
OUTFALL 001	11097-69-1	Aroclor 1254	4	0	0.0%	µg/l	0.47	0.49	0.24	0.24	--	--	--	--	--
OUTFALL 001	11096-82-5	Aroclor 1260	4	0	0.0%	µg/l	0.47	0.49	0.24	0.24	--	--	--	--	--
OUTFALL 001	7440-38-2	Arsenic	4	1	25.0%	µg/l	10	10	7	7	7.9	7.9	7.9	7.9	Maximum detected value
OUTFALL 001	7440-38-2 (dissolved)	Arsenic (dissolved)	4	0	0.0%	µg/l	10	10	7	7	--	--	--	--	--
OUTFALL 001	7440-39-3	Barium	4	4	100.0%	mg/l	--	--	--	--	0.043	0.11	0.0755	0.11	Maximum detected value
OUTFALL 001	7440-39-3 (dissolved)	Barium (dissolved)	4	4	100.0%	mg/l	--	--	--	--	0.013	0.11	0.03925	0.11	Maximum detected value
OUTFALL 001	56-55-3	Benz[a]anthracene	4	0	0.0%	µg/l	4.7	4.74	0.094	0.0948	--	--	--	--	--
OUTFALL 001	71-43-2	Benzene	6	0	0.0%	µg/l	0.5	0.5	0.28	0.28	--	--	--	--	--
OUTFALL 001	92-87-5	Benzidine	3	0	0.0%	µg/l	4.7	4.74	0.948	4.7	--	--	--	--	--
OUTFALL 001	50-32-8	Benzo(a)pyrene	4	0	0.0%	µg/l	1.89	1.9	0.094	0.0948	--	--	--	--	--
OUTFALL 001	205-99-2	Benzo(b)fluoranthene	4	0	0.0%	µg/l	1.89	1.9	0.094	0.0948	--	--	--	--	--
OUTFALL 001	191-24-2	Benzo(g,h,i)perylene	4	0	0.0%	µg/l	4.7	4.74	0.094	0.0948	--	--	--	--	--
OUTFALL 001	207-08-9	Benzo[k]fluoranthene	4	0	0.0%	µg/l	0.47	0.474	0.094	0.19	--	--	--	--	--
OUTFALL 001	65-85-0	Benzoic Acid	3	0	0.0%	µg/l	19	19	2.8	2.84	--	--	--	--	--
OUTFALL 001	100-51-6	Benzyl alcohol	3	0	0.0%	µg/l	4.7	4.74	0.094	0.0948	--	--	--	--	--
OUTFALL 001	85-68-7	Benzyl butyl phthalate	4	0	0.0%	µg/l	4.7	4.74	0.66	0.664	--	--	--	--	--
OUTFALL 001	7440-41-7	Beryllium	4	0	0.0%	µg/l	2	2	0.9	0.9	--	--	--	--	--
OUTFALL 001	7440-41-7 (dissolved)	Beryllium (dissolved)	4	0	0.0%	µg/l	2	2	0.9	0.9	--	--	--	--	--
OUTFALL 001	319-85-7	beta-BHC	4	0	0.0%	µg/l	0.0094	0.0097	0.0038	0.0039	--	--	--	--	--
OUTFALL 001	111-91-1	Bis(2-Chloroethoxy)Methane	4	0	0.0%	µg/l	0.47	0.474	0.094	0.0948	--	--	--	--	--
OUTFALL 001	111-44-4	Bis(2-Chloroethyl) Ether	4	0	0.0%	µg/l	0.47	0.474	0.094	0.0948	--	--	--	--	--
OUTFALL 001	39638-32-9	Bis(2-chloroisopropyl) ether	4	0	0.0%	µg/l	0.47	0.474	0.094	0.0948	--	--	--	--	--
OUTFALL 001	117-81-7	Bis(2-ethylhexyl) phthalate	7	0	0.0%	µg/l	4.7	4.8	1.6	1.61	--	--	--	--	--
OUTFALL 001	7440-42-8	Boron	4	4	100.0%	mg/l	--	--	--	--	0.042	0.048	0.04475	0.048	Maximum detected value
OUTFALL 001	7440-42-8 (dissolved)	Boron (dissolved)	4	1	25.0%	mg/l	0.05	0.07	0.02	0.02	0.052	0.052	0.052	0.052	Maximum detected value
OUTFALL 001	75-25-2	Bromoform	4	0	0.0%	µg/l	0.5	0.5	0.4	0.4	--	--	--	--	--
OUTFALL 001	7440-43-9	Cadmium	7	4	57.1%	µg/l	1	5	0.1	0.5	0.1	0.27	0.19	0.27	Maximum detected value
OUTFALL 001	7440-43-9 (dissolved)	Cadmium (dissolved)	7	1	14.3%	µg/l	1	5	0.1	0.5	0.14	0.14	0.14	0.14	Maximum detected value
OUTFALL 001	56-23-5	Carbon Tetrachloride	6	0	0.0%	µg/l	0.5	0.5	0.28	0.28	--	--	--	--	--
OUTFALL 001	10045-97-3	Cesium-137	7	0	0.0%	pCi/l	20	20	1.46	18	--	--	--	--	--

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 001	57-74-9	Chlordane	4	0	0.0%	µg/l	0.094	0.097	0.0078	0.075	--	--	--	--	--
OUTFALL 001	108-90-7	Chlorobenzene	4	0	0.0%	µg/l	0.5	0.5	0.36	0.36	--	--	--	--	--
OUTFALL 001	124-48-1	Chlorodibromomethane	4	0	0.0%	µg/l	0.5	0.5	0.4	0.4	--	--	--	--	--
OUTFALL 001	67-66-3	Chloroform	6	0	0.0%	µg/l	0.5	0.5	0.33	0.33	--	--	--	--	--
OUTFALL 001	74-87-3	Chloromethane	4	0	0.0%	µg/l	0.5	0.5	0.4	0.4	--	--	--	--	--
OUTFALL 001	7440-47-3	Chromium	4	3	75.0%	µg/l	10	10	2	2	8.3	15	11.43	15	Maximum detected value
OUTFALL 001	7440-47-3 (dissolved)	Chromium (dissolved)	3	1	33.3%	µg/l	5	5	2	2	2.3	2.3	2.3	2.3	Maximum detected value
OUTFALL 001	18540-29-9	Chromium, Hexavalent	4	0	0.0%	µg/l	1	1	0.25	0.25	--	--	--	--	--
OUTFALL 001	218-01-9	Chrysene	4	0	0.0%	µg/l	0.47	0.474	0.094	0.0948	--	--	--	--	--
OUTFALL 001	156-59-2	cis-1,2-Dichloroethene	4	0	0.0%	µg/l	0.5	0.5	0.32	0.32	--	--	--	--	--
OUTFALL 001	10061-01-5	cis-1,3-Dichloropropene	4	0	0.0%	µg/l	0.5	0.5	0.22	0.22	--	--	--	--	--
OUTFALL 001	7440-48-4	Cobalt	4	4	100.0%	µg/l	--	--	--	--	2.5	5	3.175	5	Maximum detected value
OUTFALL 001	7440-48-4 (dissolved)	Cobalt (dissolved)	4	0	0.0%	µg/l	10	10	2	2	--	--	--	--	--
OUTFALL 001	Ra226Ra228	Combined Radium-226 and Radium-228	6	1	16.7%	pCi/l	0.8	1.2	0.48	1.15	1.33	1.33	1.33	1.33	Maximum detected value
OUTFALL 001	7440-50-8	Copper	7	7	100.0%	µg/l	--	--	--	--	4	14.3	8.49	14.3	Maximum detected value
OUTFALL 001	7440-50-8 (dissolved)	Copper (dissolved)	7	7	100.0%	µg/l	--	--	--	--	2.1	3.4	2.54	3.4	Maximum detected value
OUTFALL 001	57-12-5	Cyanide Anion	7	0	0.0%	µg/l	5	5	2.2	3	--	--	--	--	--
OUTFALL 001	110-82-7	Cyclohexane	5	0	0.0%	µg/l	1	2.5	0.4	2.5	--	--	--	--	--
OUTFALL 001	319-86-8	delta-BHC	4	0	0.0%	µg/l	0.0047	0.0049	0.0033	0.0034	--	--	--	--	--
OUTFALL 001	53-70-3	Dibenz[a,h]anthracene	4	0	0.0%	µg/l	0.47	0.474	0.094	0.0948	--	--	--	--	--
OUTFALL 001	132-64-9	Dibenzofuran	3	0	0.0%	µg/l	0.47	0.474	0.094	0.0948	--	--	--	--	--
OUTFALL 001	84-74-2	Dibutyl phthalate	4	1	25.0%	µg/l	1.9	1.9	0.19	0.284	0.396	0.396	0.396	0.396	Maximum detected value
OUTFALL 001	75-27-4	Dichlorobromomethane	4	0	0.0%	µg/l	0.5	0.5	0.3	0.3	--	--	--	--	--
OUTFALL 001	60-57-1	Dieldrin	4	0	0.0%	µg/l	0.0047	0.0049	0.0019	0.0019	--	--	--	--	--
OUTFALL 001	84-66-2	Diethyl phthalate	4	3	75.0%	µg/l	0.948	0.948	0.0948	0.0948	0.11	0.226	0.16	0.226	Maximum detected value
OUTFALL 001	131-11-3	Dimethyl phthalate	4	0	0.0%	µg/l	0.47	0.474	0.094	0.19	--	--	--	--	--
OUTFALL 001	117-84-0	Di-n-octyl phthalate	4	0	0.0%	µg/l	4.7	4.74	0.094	0.19	--	--	--	--	--
OUTFALL 001	DioxinTEQMamNoNDs	TCDD-TEQ	7	7	100.0%	µg/l	--	--	--	--	1.87E-07	2.27E-06	8.71E-07	2.27E-06	Maximum detected value
OUTFALL 001	959-98-8	Endosulfan I	4	0	0.0%	µg/l	0.0047	0.0049	0.0019	0.0029	--	--	--	--	--
OUTFALL 001	33213-65-9	Endosulfan II	4	0	0.0%	µg/l	0.0047	0.0049	0.0019	0.0028	--	--	--	--	--
OUTFALL 001	1031-07-8	Endosulfan Sulfate	4	0	0.0%	µg/l	0.0094	0.0097	0.0028	0.0029	--	--	--	--	--
OUTFALL 001	72-20-8	Endrin	4	0	0.0%	µg/l	0.0047	0.0049	0.0019	0.0019	--	--	--	--	--
OUTFALL 001	7421-93-4	Endrin Aldehyde	4	0	0.0%	µg/l	0.0094	0.0097	0.0019	0.0019	--	--	--	--	--
OUTFALL 001	53494-70-5	Endrin Ketone	2	0	0.0%	µg/l	0.0094	0.0094	0.0028	0.0028	--	--	--	--	--
OUTFALL 001	75-00-3	Ethyl Chloride	4	0	0.0%	µg/l	0.5	1	0.4	0.4	--	--	--	--	--
OUTFALL 001	100-41-4	Ethylbenzene	6	0	0.0%	µg/l	0.5	0.5	0.25	0.25	--	--	--	--	--
OUTFALL 001	206-44-0	Fluoranthene	4	0	0.0%	µg/l	0.47	0.474	0.094	0.0948	--	--	--	--	--
OUTFALL 001	86-73-7	Fluorene	4	0	0.0%	µg/l	0.47	0.474	0.094	0.0948	--	--	--	--	--
OUTFALL 001	16984-48-8	Fluoride	4	4	100.0%	mg/l	--	--	--	--	0.061	0.22	0.16	0.22	Maximum detected value
OUTFALL 001	75-69-4	Freon 11	6	0	0.0%	µg/l	0.5	0.5	0.34	0.34	--	--	--	--	--

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 001	76-13-1	Freon 113	6	0	0.0%	µg/l	2	5	0.5	0.5	--	--	--	--	--
OUTFALL 001	354-23-4	Freon-123A	5	0	0.0%	µg/l	2	2.5	1.1	2.5	--	--	--	--	--
OUTFALL 001	58-89-9	gamma-BHC (Lindane)	4	0	0.0%	µg/l	0.0097	0.019	0.0028	0.0029	--	--	--	--	--
OUTFALL 001	12587-46-1	Gross Alpha	7	7	100.0%	pCi/l	--	--	--	--	1.89	17.1	6.6	17.1	Maximum detected value
OUTFALL 001	12587-47-2	Gross Beta	7	7	100.0%	pCi/l	--	--	--	--	3.06	16.2	7.8	16.2	Maximum detected value
OUTFALL 001	76-44-8	Heptachlor	4	0	0.0%	µg/l	0.0094	0.0097	0.0028	0.0029	--	--	--	--	--
OUTFALL 001	1024-57-3	Heptachlor Epoxide	4	0	0.0%	µg/l	0.0047	0.0049	0.0024	0.0024	--	--	--	--	--
OUTFALL 001	118-74-1	Hexachlorobenzene	4	0	0.0%	µg/l	0.94	0.948	0.094	0.0948	--	--	--	--	--
OUTFALL 001	87-68-3	Hexachlorobutadiene (HCBD)	4	0	0.0%	µg/l	1.89	1.9	0.189	0.19	--	--	--	--	--
OUTFALL 001	77-47-4	Hexachlorocyclopentadiene	4	0	0.0%	µg/l	4.7	4.74	0.094	0.0948	--	--	--	--	--
OUTFALL 001	67-72-1	Hexachloroethane	4	0	0.0%	µg/l	2.8	2.84	0.189	0.19	--	--	--	--	--
OUTFALL 001	302-01-2	Hydrazine	4	0	0.0%	µg/l	1	1	0.439	0.6	--	--	--	--	--
OUTFALL 001	122-66-7	Hydrazine, 1,2-diphenyl-	4	0	0.0%	µg/l	0.94	0.948	0.094	0.19	--	--	--	--	--
OUTFALL 001	193-39-5	Indeno(1,2,3-cd)pyrene	4	0	0.0%	µg/l	1.89	1.9	0.094	0.0948	--	--	--	--	--
OUTFALL 001	78-59-1	Isophorone	4	0	0.0%	µg/l	0.94	0.948	0.094	0.0948	--	--	--	--	--
OUTFALL 001	7439-92-1	Lead	7	7	100.0%	µg/l	--	--	--	--	0.98	13	6.37	13	Maximum detected value
OUTFALL 001	7439-92-1 (dissolved)	Lead (dissolved)	7	4	57.1%	µg/l	1	5	0.2	1	0.29	0.51	0.375	0.51	Maximum detected value
OUTFALL 001	7439-96-5	Manganese	7	7	100.0%	µg/l	--	--	--	--	28	400	160.7	400	Maximum detected value
OUTFALL 001	7439-96-5 (dissolved)	Manganese (dissolved)	7	3	42.9%	µg/l	20	20	7	7	7.7	16	11.9	16	Maximum detected value
OUTFALL 001	7439-97-6	Mercury	7	0	0.0%	µg/l	0.2	0.2	0.027	0.1	--	--	--	--	--
OUTFALL 001	7439-97-6 (dissolved)	Mercury (dissolved)	7	0	0.0%	µg/l	0.2	0.2	0.027	0.1	--	--	--	--	--
OUTFALL 001	72-43-5	Methoxychlor	2	0	0.0%	µg/l	0.0047	0.0047	0.0033	0.0033	--	--	--	--	--
OUTFALL 001	74-83-9	Methyl Bromide	4	0	0.0%	µg/l	0.5	1	0.42	0.42	--	--	--	--	--
OUTFALL 001	60-34-4	Methyl Hydrazine	4	0	0.0%	µg/l	5	5	0.857	1.77	--	--	--	--	--
OUTFALL 001	75-09-2	Methylene Chloride (DCM)	4	0	0.0%	µg/l	1	1	0.95	0.95	--	--	--	--	--
OUTFALL 001	99-09-2	m-Nitroaniline	3	0	0.0%	µg/l	4.7	4.74	0.19	0.948	--	--	--	--	--
OUTFALL 001	91-20-3	Naphthalene	4	0	0.0%	µg/l	0.94	0.948	0.094	0.0948	--	--	--	--	--
OUTFALL 001	7440-02-0	Nickel	4	3	75.0%	µg/l	10	10	2	2	6.1	12	8.2	12	Maximum detected value
OUTFALL 001	7440-02-0 (dissolved)	Nickel (dissolved)	4	2	50.0%	µg/l	10	10	2	2	2.5	3.4	2.95	3.4	Maximum detected value
OUTFALL 001	14797-55-8 (as N)	Nitrate (as N)	7	7	100.0%	mg/l	--	--	--	--	0.4	1.4	0.69	1.4	Maximum detected value
OUTFALL 001	NO3NO2 (as N)	Nitrate and Nitrite (as N)	7	7	100.0%	mg/l	--	--	--	--	0.4	1.4	0.69	1.4	Maximum detected value
OUTFALL 001	14797-65-0 (as N)	Nitrite (as N)	7	0	0.0%	mg/l	0.15	0.15	0.09	0.11	--	--	--	--	--
OUTFALL 001	98-95-3	Nitrobenzene	4	0	0.0%	µg/l	0.94	0.948	0.094	0.0948	--	--	--	--	--
OUTFALL 001	62-75-9	n-Nitrosodimethylamine (NDMA)	7	0	0.0%	µg/l	1.89	7.6	0.094	0.095	--	--	--	--	--
OUTFALL 001	86-30-6	n-Nitrosodiphenylamine	4	0	0.0%	µg/l	0.94	0.948	0.094	0.0948	--	--	--	--	--
OUTFALL 001	621-64-7	n-Nitrosodipropylamine	4	0	0.0%	µg/l	1.89	1.9	0.094	0.0948	--	--	--	--	--
OUTFALL 001	106-44-5	p-Cresol	3	0	0.0%	µg/l	4.7	4.74	0.19	0.19	--	--	--	--	--
OUTFALL 001	87-86-5	Pentachlorophenol	7	1	14.3%	µg/l	1.89	7.6	0.094	0.379	1.5	1.5	1.5	1.5	Maximum detected value
OUTFALL 001	14797-73-0	Perchlorate	7	1	14.3%	µg/l	1	4	0.9	0.9	1.4	1.4	1.4	1.4	Maximum detected value

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 001	85-01-8	Phenanthrene	4	0	0.0%	µg/l	0.47	0.474	0.094	0.0948	--	--	--	--	--
OUTFALL 001	108-95-2	Phenol	4	0	0.0%	µg/l	0.94	0.948	0.28	0.284	--	--	--	--	--
OUTFALL 001	100-01-6	p-Nitroaniline	3	0	0.0%	µg/l	4.7	4.74	0.47	0.474	--	--	--	--	--
OUTFALL 001	13966-00-2	Potassium-40	7	0	0.0%	pCi/l	25	300	18.1	300	--	--	--	--	--
OUTFALL 001	129-00-0	Pyrene	4	0	0.0%	µg/l	0.47	0.474	0.094	0.0948	--	--	--	--	--
OUTFALL 001	13982-63-3	Radium-226	7	1	14.3%	pCi/l	1	1	0.21	0.711	0.31	0.31	0.31	0.31	Maximum detected value
OUTFALL 001	15262-20-1	Radium-228	6	1	16.7%	pCi/l	1	1	0.456	0.67	0.715	0.715	0.715	0.715	Maximum detected value
OUTFALL 001	7782-49-2	Selenium	7	2	28.6%	µg/l	2	10	0.5	2.5	0.52	1.3	0.91	1.3	Maximum detected value
OUTFALL 001	7782-49-2 (dissolved)	Selenium (dissolved)	7	0	0.0%	µg/l	2	10	0.3	2.5	--	--	--	--	--
OUTFALL 001	7440-22-4	Silver	4	0	0.0%	µg/l	1	10	0.1	6	--	--	--	--	--
OUTFALL 001	7440-22-4 (dissolved)	Silver (dissolved)	4	0	0.0%	µg/l	1	10	0.1	6	--	--	--	--	--
OUTFALL 001	10098-97-2	Strontium-90	7	0	0.0%	pCi/l	2	3	0.49	0.935	--	--	--	--	--
OUTFALL 001	127-18-4	Tetrachloroethene (PCE)	6	0	0.0%	µg/l	0.5	0.5	0.32	0.32	--	--	--	--	--
OUTFALL 001	7440-28-0	Thallium	4	0	0.0%	µg/l	1	2	0.2	0.4	--	--	--	--	--
OUTFALL 001	7440-28-0 (dissolved)	Thallium (dissolved)	4	0	0.0%	µg/l	1	5	0.2	1	--	--	--	--	--
OUTFALL 001	108-88-3	Toluene	6	0	0.0%	µg/l	0.5	0.5	0.36	0.36	--	--	--	--	--
OUTFALL 001	8001-35-2	Toxaphene	4	0	0.0%	µg/l	0.47	0.49	0.24	0.24	--	--	--	--	--
OUTFALL 001	156-60-5	trans-1,2-Dichloroethene	4	0	0.0%	µg/l	0.5	0.5	0.3	0.3	--	--	--	--	--
OUTFALL 001	10061-02-6	trans-1,3-Dichloropropene	4	0	0.0%	µg/l	0.5	0.5	0.32	0.32	--	--	--	--	--
OUTFALL 001	79-01-6	Trichloroethene (TCE)	7	0	0.0%	µg/l	0.5	2	0.26	0.26	--	--	--	--	--
OUTFALL 001	10028-17-8	Tritium	7	0	0.0%	pCi/l	500	500	96	300	--	--	--	--	--
OUTFALL 001	7440-61-1	Uranium	7	7	100.0%	pCi/l	--	--	--	--	0.177	0.687	0.44	0.687	Maximum detected value
OUTFALL 001	7440-62-2	Vanadium	4	4	100.0%	µg/l	--	--	--	--	12	27	19.5	27	Maximum detected value
OUTFALL 001	7440-62-2 (dissolved)	Vanadium (dissolved)	4	0	0.0%	µg/l	10	10	3	3	--	--	--	--	--
OUTFALL 001	110-75-8	Vinyl 2-Chloroethyl ether	4	0	0.0%	µg/l	2	5	1.8	1.8	--	--	--	--	--
OUTFALL 001	75-01-4	Vinyl Chloride	6	0	0.0%	µg/l	0.5	0.5	0.4	0.4	--	--	--	--	--
OUTFALL 001	1330-20-7	Xylenes, Total	6	0	0.0%	µg/l	1	1.5	0.9	0.9	--	--	--	--	--
OUTFALL 001	7440-66-6	Zinc	7	7	100.0%	µg/l	--	--	--	--	11.3	76	38.13	76	Maximum detected value
OUTFALL 001	7440-66-6 (dissolved)	Zinc (dissolved)	7	4	57.1%	µg/l	20	20	6	6	10	18.1	13.78	18.1	Maximum detected value
OUTFALL 002	71-55-6	1,1,1-Trichloroethane	13	0	0.0%	µg/l	0.5	0.5	0.25	0.3	--	--	--	--	--
OUTFALL 002	79-34-5	1,1,2,2-Tetrachloroethane	6	0	0.0%	µg/l	0.5	0.5	0.25	0.3	--	--	--	--	--
OUTFALL 002	79-00-5	1,1,2-Trichloroethane	13	0	0.0%	µg/l	0.5	0.5	0.25	0.3	--	--	--	--	--
OUTFALL 002	75-34-3	1,1-Dichloroethane	13	0	0.0%	µg/l	0.5	0.5	0.25	0.4	--	--	--	--	--
OUTFALL 002	75-35-4	1,1-Dichloroethene	21	0	0.0%	µg/l	0.5	2	0.25	0.42	--	--	--	--	--
OUTFALL 002	57-14-7	1,1-Dimethylhydrazine	4	0	0.0%	µg/l	5	5	1.13	1.42	--	--	--	--	--
OUTFALL 002	120-82-1	1,2,4-Trichlorobenzene	6	0	0.0%	µg/l	0.94	0.99	0.094	0.478	--	--	--	--	--
OUTFALL 002	95-50-1	1,2-Dichlorobenzene	7	0	0.0%	µg/l	0.47	0.5	0.094	0.25	--	--	--	--	--
OUTFALL 002	107-06-2	1,2-Dichloroethane	21	0	0.0%	µg/l	0.5	0.5	0.25	0.28	--	--	--	--	--
OUTFALL 002	78-87-5	1,2-Dichloropropane	6	0	0.0%	µg/l	0.5	0.5	0.25	0.35	--	--	--	--	--
OUTFALL 002	541-73-1	1,3-Dichlorobenzene	7	0	0.0%	µg/l	0.47	0.5	0.094	0.25	--	--	--	--	--
OUTFALL 002	106-46-7	1,4-Dichlorobenzene	7	0	0.0%	µg/l	0.47	0.5	0.189	0.25	--	--	--	--	--
OUTFALL 002	123-91-1	1,4-Dioxane	6	0	0.0%	µg/l	2	2	0.5	1	--	--	--	--	--

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 002	95-95-4	2,4,5-Trichlorophenol	2	0	0.0%	µg/l	1.9	2	0.19	0.2	--	--	--	--	--
OUTFALL 002	88-06-2	2,4,6-Trichlorophenol	21	0	0.0%	µg/l	0.94	5.71	0.094	0.503	--	--	--	--	--
OUTFALL 002	120-83-2	2,4-Dichlorophenol	6	0	0.0%	µg/l	1.89	2	0.189	0.957	--	--	--	--	--
OUTFALL 002	105-67-9	2,4-Dimethylphenol	6	0	0.0%	µg/l	1.89	2	0.28	0.957	--	--	--	--	--
OUTFALL 002	51-28-5	2,4-Dinitrophenol	6	0	0.0%	µg/l	4.7	5	0.849	1.91	--	--	--	--	--
OUTFALL 002	121-14-2	2,4-Dinitrotoluene	21	0	0.0%	µg/l	4.7	8.6	0.189	2.01	--	--	--	--	--
OUTFALL 002	606-20-2	2,6-Dinitrotoluene	6	0	0.0%	µg/l	4.7	5	0.094	1.91	--	--	--	--	--
OUTFALL 002	91-58-7	2-Chloronaphthalene	6	0	0.0%	µg/l	0.47	0.5	0.094	0.191	--	--	--	--	--
OUTFALL 002	95-57-8	2-Chlorophenol	6	0	0.0%	µg/l	0.94	0.99	0.189	0.478	--	--	--	--	--
OUTFALL 002	534-52-1	2-Methyl-4,6-Dinitrophenol	6	0	0.0%	µg/l	4.7	5	0.189	1.91	--	--	--	--	--
OUTFALL 002	91-57-6	2-Methylnaphthalene	3	0	0.0%	µg/l	0.94	0.99	0.094	0.189	--	--	--	--	--
OUTFALL 002	95-48-7	2-Methylphenol (o-cresol)	3	0	0.0%	µg/l	1.89	2	0.094	0.099	--	--	--	--	--
OUTFALL 002	88-74-4	2-Nitroaniline	3	0	0.0%	µg/l	4.7	5	0.094	0.099	--	--	--	--	--
OUTFALL 002	88-75-5	2-Nitrophenol	6	0	0.0%	µg/l	1.89	2	0.094	0.957	--	--	--	--	--
OUTFALL 002	91-94-1	3,3-Dichlorobenzidine	5	0	0.0%	µg/l	4.7	5	0.472	5	--	--	--	--	--
OUTFALL 002	72-54-8	4,4'-DDD	6	0	0.0%	µg/l	0.0047	0.005	0.0019	0.004	--	--	--	--	--
OUTFALL 002	72-55-9	4,4'-DDE	6	0	0.0%	µg/l	0.0047	0.005	0.0028	0.003	--	--	--	--	--
OUTFALL 002	50-29-3	4,4'-DDT	6	0	0.0%	µg/l	0.0094	0.0099	0.0038	0.004	--	--	--	--	--
OUTFALL 002	101-55-3	4-Bromophenyl phenyl ether	6	0	0.0%	µg/l	0.94	0.99	0.094	0.478	--	--	--	--	--
OUTFALL 002	59-50-7	4-Chloro-3-methylphenol (p-Chlorocresol)	6	0	0.0%	µg/l	1.89	2	0.189	0.2	--	--	--	--	--
OUTFALL 002	106-47-8	4-Chloroaniline	3	0	0.0%	µg/l	1.89	2	0.094	0.283	--	--	--	--	--
OUTFALL 002	7005-72-3	4-Chlorophenyl Phenyl Ether	6	0	0.0%	µg/l	0.47	0.5	0.094	0.191	--	--	--	--	--
OUTFALL 002	100-02-7	4-Nitrophenol	6	0	0.0%	µg/l	4.7	5	1.89	2.5	--	--	--	--	--
OUTFALL 002	83-32-9	Acenaphthene	6	0	0.0%	µg/l	0.47	0.5	0.094	0.191	--	--	--	--	--
OUTFALL 002	208-96-8	Acenaphthylene	6	0	0.0%	µg/l	0.47	0.5	0.094	0.191	--	--	--	--	--
OUTFALL 002	107-02-8	Acrolein	6	0	0.0%	µg/l	5	5	2.5	4	--	--	--	--	--
OUTFALL 002	107-13-1	Acrylonitrile	6	0	0.0%	µg/l	2	2	0.7	1.2	--	--	--	--	--
OUTFALL 002	309-00-2	Aldrin	6	0	0.0%	µg/l	0.0047	0.005	0.0014	0.0015	--	--	--	--	--
OUTFALL 002	319-84-6	alpha-BHC	21	0	0.0%	µg/l	0.0047	0.05	0.0024	0.0053	--	--	--	--	--
OUTFALL 002	7664-41-7 (as N)	Ammonia (as N)	1	0	0.0%	mg/l	0.5	0.5	0.1	0.1	--	--	--	--	--
OUTFALL 002	7664-41-7 (as NH3)	Ammonia (as NH3)	20	5	25.0%	mg/l	0.5	0.5	0.5	0.5	0.206	0.56	0.313	0.319	95% GROS Adjusted Gamma UCL
OUTFALL 002	62-53-3	Aniline	3	0	0.0%	µg/l	9.4	9.9	0.28	0.3	--	--	--	--	--
OUTFALL 002	120-12-7	Anthracene	6	0	0.0%	µg/l	0.47	0.5	0.094	0.191	--	--	--	--	--
OUTFALL 002	7440-36-0	Antimony	6	1	16.7%	µg/l	0.51	2	0.2	0.5	0.3	0.3	0.3	0.3	Maximum detected value
OUTFALL 002	7440-36-0 (dissolved)	Antimony (dissolved)	6	2	33.3%	µg/l	2	2	0.2	0.5	0.48	0.59	0.535	0.59	Maximum detected value
OUTFALL 002	12674-11-2	Aroclor 1016	6	0	0.0%	µg/l	0.47	0.5	0.24	0.25	--	--	--	--	--
OUTFALL 002	11104-28-2	Aroclor 1221	6	0	0.0%	µg/l	0.47	0.5	0.24	0.25	--	--	--	--	--
OUTFALL 002	11141-16-5	Aroclor 1232	6	0	0.0%	µg/l	0.47	0.5	0.24	0.25	--	--	--	--	--
OUTFALL 002	53469-21-9	Aroclor 1242	6	0	0.0%	µg/l	0.47	0.5	0.24	0.25	--	--	--	--	--
OUTFALL 002	12672-29-6	Aroclor 1248	6	0	0.0%	µg/l	0.47	0.5	0.24	0.25	--	--	--	--	--
OUTFALL 002	11097-69-1	Aroclor 1254	6	0	0.0%	µg/l	0.47	0.5	0.24	0.25	--	--	--	--	--
OUTFALL 002	11096-82-5	Aroclor 1260	6	0	0.0%	µg/l	0.47	0.5	0.24	0.25	--	--	--	--	--
OUTFALL 002	7440-38-2	Arsenic	10	3	30.0%	µg/l	1	10	0.9	7	1.5	5.7	3.03	5.7	Maximum detected value
OUTFALL 002	7440-38-2 (dissolved)	Arsenic (dissolved)	10	0	0.0%	µg/l	1	10	0.9	7	--	--	--	--	--

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 002	7440-39-3	Barium	10	10	100.0%	mg/l	--	--	--	--	0.013	0.13	0.0497	0.0685	95% Student's-t UCL
OUTFALL 002	7440-39-3 (dissolved)	Barium (dissolved)	10	10	100.0%	mg/l	--	--	--	--	0.012	0.048	0.0317	0.0375	95% Student's-t UCL
OUTFALL 002	56-55-3	Benz[a]anthracene	6	0	0.0%	µg/l	4.7	5	0.094	1.91	--	--	--	--	--
OUTFALL 002	71-43-2	Benzene	13	0	0.0%	µg/l	0.5	0.5	0.25	0.28	--	--	--	--	--
OUTFALL 002	92-87-5	Benzidine	4	0	0.0%	µg/l	4.7	9.57	0.943	5	--	--	--	--	--
OUTFALL 002	50-32-8	Benzo(a)pyrene	6	0	0.0%	µg/l	0.478	2	0.094	0.472	--	--	--	--	--
OUTFALL 002	205-99-2	Benzo(b)fluoranthene	6	0	0.0%	µg/l	1.89	2	0.094	0.957	--	--	--	--	--
OUTFALL 002	191-24-2	Benzo(g,h,i)perylene	6	0	0.0%	µg/l	4.7	5	0.094	1.91	--	--	--	--	--
OUTFALL 002	207-08-9	Benzo[k]fluoranthene	6	0	0.0%	µg/l	0.47	0.5	0.094	0.239	--	--	--	--	--
OUTFALL 002	65-85-0	Benzoic Acid	3	1	33.3%	µg/l	19	20	2.8	3	2.96	2.96	2.96	2.96	Maximum detected value
OUTFALL 002	100-51-6	Benzyl alcohol	3	0	0.0%	µg/l	4.7	5	0.094	0.099	--	--	--	--	--
OUTFALL 002	85-68-7	Benzyl butyl phthalate	6	0	0.0%	µg/l	4.7	5	0.66	1.91	--	--	--	--	--
OUTFALL 002	7440-41-7	Beryllium	10	2	20.0%	µg/l	0.5	2	0.1	1	0.14	0.31	0.225	0.31	Maximum detected value
OUTFALL 002	7440-41-7 (dissolved)	Beryllium (dissolved)	10	0	0.0%	µg/l	0.5	2	0.1	1	--	--	--	--	--
OUTFALL 002	319-85-7	beta-BHC	6	0	0.0%	µg/l	0.0094	0.0099	0.0038	0.004	--	--	--	--	--
OUTFALL 002	108-60-1	Bis(2-chloro-1-methylethyl) ether	2	0	0.0%	µg/l	0.472	0.478	0.189	0.191	--	--	--	--	--
OUTFALL 002	111-91-1	Bis(2-Chloroethoxy)Methane	6	0	0.0%	µg/l	0.47	0.5	0.094	0.191	--	--	--	--	--
OUTFALL 002	111-44-4	Bis(2-Chloroethyl) Ether	6	0	0.0%	µg/l	0.47	0.5	0.094	0.191	--	--	--	--	--
OUTFALL 002	39638-32-9	Bis(2-chloroisopropyl) ether	4	0	0.0%	µg/l	0.47	0.5	0.094	0.099	--	--	--	--	--
OUTFALL 002	117-81-7	Bis(2-ethylhexyl) phthalate	21	0	0.0%	µg/l	4.7	5.03	1.6	2.01	--	--	--	--	--
OUTFALL 002	7440-42-8	Boron	6	5	83.3%	mg/l	0.096	0.096	0.02	0.02	0.052	0.085	0.065	0.085	Maximum detected value
OUTFALL 002	7440-42-8 (dissolved)	Boron (dissolved)	6	4	66.7%	mg/l	0.092	0.093	0.02	0.02	0.046	0.076	0.060	0.076	Maximum detected value
OUTFALL 002	75-25-2	Bromoform	6	0	0.0%	µg/l	0.5	1	0.4	0.4	--	--	--	--	--
OUTFALL 002	7440-43-9	Cadmium	21	3	14.3%	µg/l	1	1	0.1	0.25	0.11	0.14	0.12	0.14	Maximum detected value
OUTFALL 002	7440-43-9 (dissolved)	Cadmium (dissolved)	21	0	0.0%	µg/l	1	1	0.1	0.25	--	--	--	--	--
OUTFALL 002	56-23-5	Carbon Tetrachloride	13	0	0.0%	µg/l	0.5	0.5	0.25	0.28	--	--	--	--	--
OUTFALL 002	10045-97-3	Cesium-137	21	0	0.0%	pCi/l	12.8	21	1.05	20	--	--	--	--	--
OUTFALL 002	57-74-9	Chlordane	6	0	0.0%	µg/l	0.094	0.099	0.0076	0.079	--	--	--	--	--
OUTFALL 002	108-90-7	Chlorobenzene	6	0	0.0%	µg/l	0.5	0.5	0.25	0.36	--	--	--	--	--
OUTFALL 002	124-48-1	Chlorodibromomethane	6	0	0.0%	µg/l	0.5	0.5	0.25	0.4	--	--	--	--	--
OUTFALL 002	67-66-3	Chloroform	13	0	0.0%	µg/l	0.5	0.5	0.25	0.33	--	--	--	--	--
OUTFALL 002	74-87-3	Chloromethane	6	0	0.0%	µg/l	0.5	0.5	0.25	0.4	--	--	--	--	--
OUTFALL 002	7440-47-3	Chromium	10	1	10.0%	µg/l	2	20	0.9	2.5	3.3	3.3	3.3	3.3	Maximum detected value
OUTFALL 002	7440-47-3 (dissolved)	Chromium (dissolved)	9	1	11.1%	µg/l	2	5	0.9	2.5	1.3	1.3	1.3	1.3	Maximum detected value
OUTFALL 002	18540-29-9	Chromium, Hexavalent	6	0	0.0%	µg/l	1	1	0.25	0.25	--	--	--	--	--
OUTFALL 002	218-01-9	Chrysene	6	0	0.0%	µg/l	0.47	0.5	0.094	0.191	--	--	--	--	--
OUTFALL 002	156-59-2	cis-1,2-Dichloroethene	6	2	33.3%	µg/l	0.5	0.5	0.25	0.32	0.63	3	1.815	3	Maximum detected value
OUTFALL 002	10061-01-5	cis-1,3-Dichloropropene	6	0	0.0%	µg/l	0.5	0.5	0.22	0.25	--	--	--	--	--
OUTFALL 002	7440-48-4	Cobalt	6	2	33.3%	µg/l	10	10	2	2.5	0.2	4.8	2.5	4.8	Maximum detected value
OUTFALL 002	7440-48-4 (dissolved)	Cobalt (dissolved)	6	1	16.7%	µg/l	10	10	2	2.5	0.2	0.2	0.2	0.2	Maximum detected value

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 002	Ra226Ra228	Combined Radium-226 and Radium-228	20	3	15.0%	pCi/l	--	1.28	--	1.28	0.63	0.78	0.70	0.78	Maximum detected value
OUTFALL 002	7440-50-8	Copper	21	20	95.2%	µg/l	3.4	3.4	0.5	0.5	0.97	10.00	3.21	4.29	95% KM Adjusted Gamma UCL
OUTFALL 002	7440-50-8 (dissolved)	Copper (dissolved)	21	18	85.7%	µg/l	1.8	2	0.5	0.5	0.77	3.60	1.99	2.20	95% KM (t) UCL
OUTFALL 002	57-12-5	Cyanide Anion	21	0	0.0%	µg/l	5	5	2.2	3	--	--	--	--	--
OUTFALL 002	110-82-7	Cyclohexane	7	0	0.0%	µg/l	1	2.5	0.4	2.5	--	--	--	--	--
OUTFALL 002	319-86-8	delta-BHC	6	0	0.0%	µg/l	0.0047	0.005	0.0033	0.0035	--	--	--	--	--
OUTFALL 002	53-70-3	Dibenz[a,h]anthracene	6	0	0.0%	µg/l	0.47	0.5	0.094	0.239	--	--	--	--	--
OUTFALL 002	132-64-9	Dibenzofuran	3	0	0.0%	µg/l	0.47	0.5	0.094	0.099	--	--	--	--	--
OUTFALL 002	84-74-2	Dibutyl phthalate	6	1	16.7%	µg/l	1.89	2	0.19	0.957	0.396	0.396	0.396	0.396	Maximum detected value
OUTFALL 002	75-27-4	Dichlorobromomethane	6	0	0.0%	µg/l	0.5	0.5	0.25	0.3	--	--	--	--	--
OUTFALL 002	60-57-1	Dieldrin	6	0	0.0%	µg/l	0.0047	0.005	0.0019	0.002	--	--	--	--	--
OUTFALL 002	84-66-2	Diethyl phthalate	6	3	50.0%	µg/l	0.943	0.957	0.0943	0.478	0.11	0.245	0.158	0.245	Maximum detected value
OUTFALL 002	131-11-3	Dimethyl phthalate	6	0	0.0%	µg/l	0.47	0.5	0.094	0.239	--	--	--	--	--
OUTFALL 002	117-84-0	Di-n-octyl phthalate	6	0	0.0%	µg/l	4.7	5	0.094	1.91	--	--	--	--	--
OUTFALL 002	DioxinTEQMamNoNDs	TCDD-TEQ	21	11	52.4%	µg/l	--	--	--	--	2.64E-09	1.992E-06	5.15E-07	1.4785E-06	95% Adjusted Gamma UCL
OUTFALL 002	959-98-8	Endosulfan I	6	0	0.0%	µg/l	0.0047	0.005	0.0019	0.0029	--	--	--	--	--
OUTFALL 002	33213-65-9	Endosulfan II	6	0	0.0%	µg/l	0.0047	0.005	0.0019	0.003	--	--	--	--	--
OUTFALL 002	1031-07-8	Endosulfan Sulfate	6	0	0.0%	µg/l	0.0094	0.0099	0.0028	0.003	--	--	--	--	--
OUTFALL 002	72-20-8	Endrin	6	0	0.0%	µg/l	0.0047	0.005	0.0019	0.002	--	--	--	--	--
OUTFALL 002	7421-93-4	Endrin Aldehyde	6	0	0.0%	µg/l	0.0094	0.0099	0.0019	0.002	--	--	--	--	--
OUTFALL 002	53494-70-5	Endrin Ketone	2	0	0.0%	µg/l	0.0094	0.0095	0.0028	0.0029	--	--	--	--	--
OUTFALL 002	75-00-3	Ethyl Chloride	6	0	0.0%	µg/l	0.5	1	0.4	0.4	--	--	--	--	--
OUTFALL 002	100-41-4	Ethylbenzene	13	0	0.0%	µg/l	0.5	0.5	0.25	0.25	--	--	--	--	--
OUTFALL 002	206-44-0	Fluoranthene	6	0	0.0%	µg/l	0.47	0.5	0.094	0.191	--	--	--	--	--
OUTFALL 002	86-73-7	Fluorene	6	0	0.0%	µg/l	0.47	0.5	0.094	0.191	--	--	--	--	--
OUTFALL 002	16984-48-8	Fluoride	6	6	100.0%	mg/l	--	--	--	--	0.17	0.39	0.25	0.39	Maximum detected value
OUTFALL 002	75-69-4	Freon 11	13	0	0.0%	µg/l	0.5	0.5	0.25	0.34	--	--	--	--	--
OUTFALL 002	76-13-1	Freon 113	10	0	0.0%	µg/l	2	5	0.5	0.5	--	--	--	--	--
OUTFALL 002	354-23-4	Freon-123A	7	0	0.0%	µg/l	2	2.5	1	2.5	--	--	--	--	--
OUTFALL 002	58-89-9	gamma-BHC (Lindane)	6	0	0.0%	µg/l	0.0095	0.02	0.0028	0.003	--	--	--	--	--
OUTFALL 002	12587-46-1	Gross Alpha	21	11	52.4%	pCi/l	2.1	3	0.768	2.1	0.905	6.8	2.93	3.193	95% GROS Adjusted Gamma UCL
OUTFALL 002	12587-47-2	Gross Beta	21	21	100.0%	pCi/l	--	--	--	--	1.94	9.5	4.06	4.763	95% Adjusted Gamma UCL
OUTFALL 002	76-44-8	Heptachlor	6	0	0.0%	µg/l	0.0094	0.0099	0.0028	0.003	--	--	--	--	--
OUTFALL 002	1024-57-3	Heptachlor Epoxide	6	0	0.0%	µg/l	0.0047	0.005	0.0024	0.0025	--	--	--	--	--
OUTFALL 002	118-74-1	Hexachlorobenzene	6	0	0.0%	µg/l	0.94	0.99	0.094	0.478	--	--	--	--	--
OUTFALL 002	87-68-3	Hexachlorobutadiene (HCBD)	6	0	0.0%	µg/l	1.89	2	0.189	0.478	--	--	--	--	--
OUTFALL 002	77-47-4	Hexachlorocyclopentadiene	6	0	0.0%	µg/l	4.7	5	0.094	1.91	--	--	--	--	--
OUTFALL 002	67-72-1	Hexachloroethane	6	0	0.0%	µg/l	2.8	3	0.189	0.478	--	--	--	--	--
OUTFALL 002	302-01-2	Hydrazine	4	0	0.0%	µg/l	1	1	0.439	0.6	--	--	--	--	--
OUTFALL 002	122-66-7	Hydrazine, 1,2-diphenyl-	6	0	0.0%	µg/l	0.94	0.99	0.094	0.478	--	--	--	--	--
OUTFALL 002	193-39-5	Indeno(1,2,3-cd)pyrene	6	0	0.0%	µg/l	1.89	2	0.094	0.957	--	--	--	--	--

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 002	78-59-1	Isophorone	6	2	33.3%	µg/l	0.94	0.957	0.094	0.478	0.12	0.26	0.19	0.26	Maximum detected value
OUTFALL 002	7439-92-1	Lead	21	10	47.6%	µg/l	0.5	1	0.2	0.5	0.24	11.00	2.34	3.12	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)
OUTFALL 002	7439-92-1 (dissolved)	Lead (dissolved)	21	2	9.5%	µg/l	1	1	0.2	0.5	0.26	0.39	0.33	0.39	Maximum detected value
OUTFALL 002	179601-23-1	m&p-Xylenes	1	0	0.0%	µg/l	1	1	0.5	0.5	--	--	--	--	--
OUTFALL 002	7439-96-5	Manganese	14	10	71.4%	µg/l	20	20	7	10	6.2	240	58.5	124.5	95% KM Bootstrap t UCL
OUTFALL 002	7439-96-5 (dissolved)	Manganese (dissolved)	14	8	57.1%	µg/l	20	20	7	10	4.8	42	14.525	17.15	95% KM (t) UCL
OUTFALL 002	7439-97-6	Mercury	21	1	4.8%	µg/l	0.2	0.2	0.1	0.1	0.032	0.032	0.032	0.032	Maximum detected value
OUTFALL 002	7439-97-6 (dissolved)	Mercury (dissolved)	21	1	4.8%	µg/l	0.2	0.2	0.1	0.1	0.03	0.03	0.03	0.03	Maximum detected value
OUTFALL 002	72-43-5	Methoxychlor	2	0	0.0%	µg/l	0.0047	0.0048	0.0033	0.0033	--	--	--	--	--
OUTFALL 002	74-83-9	Methyl Bromide	6	0	0.0%	µg/l	0.5	1	0.25	0.42	--	--	--	--	--
OUTFALL 002	60-34-4	Methyl Hydrazine	5	0	0.0%	µg/l	5	10	0.25	1.77	--	--	--	--	--
OUTFALL 002	75-09-2	Methylene Chloride (DCM)	6	0	0.0%	µg/l	1	2	0.88	0.95	--	--	--	--	--
OUTFALL 002	99-09-2	m-Nitroaniline	3	0	0.0%	µg/l	4.7	5	0.19	0.943	--	--	--	--	--
OUTFALL 002	91-20-3	Naphthalene	7	0	0.0%	µg/l	0.94	1	0.094	0.478	--	--	--	--	--
OUTFALL 002	7440-02-0	Nickel	10	4	40.0%	µg/l	10	13	2	5	1.2	8.3	3.7	8.3	Maximum detected value
OUTFALL 002	7440-02-0 (dissolved)	Nickel (dissolved)	10	3	30.0%	µg/l	2	10	0.5	5	1.2	2	1.67	2	Maximum detected value
OUTFALL 002	14797-55-8 (as N)	Nitrate (as N)	21	18	85.7%	mg/l	0.11	0.11	0.06	0.06	0.088	3.5	0.68	1.494	95% KM (Chebyshev) UCL
OUTFALL 002	NO3NO2 (as N)	Nitrate and Nitrite (as N)	21	13	61.9%	mg/l	0.26	0.26	0.15	0.15	0.15	3.5	0.91	1.528	95% KM (Chebyshev) UCL
OUTFALL 002	14797-65-0 (as N)	Nitrite (as N)	21	1	4.8%	mg/l	0.15	0.15	0.07	0.11	0.1	0.1	0.1	0.1	Maximum detected value
OUTFALL 002	98-95-3	Nitrobenzene	6	0	0.0%	µg/l	0.94	0.99	0.094	0.478	--	--	--	--	--
OUTFALL 002	62-75-9	n-Nitrosodimethylamine (NDMA)	21	0	0.0%	µg/l	1.89	7.6	0.094	1.01	--	--	--	--	--
OUTFALL 002	86-30-6	n-Nitrosodiphenylamine	6	0	0.0%	µg/l	0.94	0.99	0.094	0.478	--	--	--	--	--
OUTFALL 002	621-64-7	n-Nitrosodipropylamine	6	0	0.0%	µg/l	1.89	2	0.094	0.957	--	--	--	--	--
OUTFALL 002	95-47-6	o-Xylene	1	0	0.0%	µg/l	0.5	0.5	0.25	0.25	--	--	--	--	--
OUTFALL 002	106-44-5	p-Cresol	3	0	0.0%	µg/l	4.7	5	0.189	0.2	--	--	--	--	--
OUTFALL 002	87-86-5	Pentachlorophenol	21	0	0.0%	µg/l	1.89	7.6	0.094	1.01	--	--	--	--	--
OUTFALL 002	14797-73-0	Perchlorate	21	1	4.8%	µg/l	1	4	0.9	0.95	2.2	2.2	2.2	2.2	Maximum detected value
OUTFALL 002	85-01-8	Phenanthrene	6	0	0.0%	µg/l	0.47	0.5	0.094	0.191	--	--	--	--	--
OUTFALL 002	108-95-2	Phenol	6	0	0.0%	µg/l	0.94	0.99	0.28	0.478	--	--	--	--	--
OUTFALL 002	100-01-6	p-Nitroaniline	3	0	0.0%	µg/l	4.7	5	0.47	0.5	--	--	--	--	--
OUTFALL 002	13966-00-2	Potassium-40	21	0	0.0%	pCi/l	25	290	13.8	290	--	--	--	--	--
OUTFALL 002	129-00-0	Pyrene	6	0	0.0%	µg/l	0.47	0.5	0.094	0.191	--	--	--	--	--
OUTFALL 002	13982-63-3	Radium-226	21	5	23.8%	pCi/l	0.0599	1	0.0599	0.827	0.123	0.667	0.337	0.456	95% KM (t) UCL
OUTFALL 002	15262-20-1	Radium-228	20	0	0.0%	pCi/l	0.396	1	0.381	0.95	--	--	--	--	--
OUTFALL 002	7782-49-2	Selenium	20	4	20.0%	µg/l	2	2	0.5	0.5	0.51	0.61	0.55	0.61	Maximum detected value
OUTFALL 002	7782-49-2 (dissolved)	Selenium (dissolved)	21	3	14.3%	µg/l	2	2	0.3	0.5	0.51	0.65	0.59	0.65	Maximum detected value
OUTFALL 002	7440-22-4	Silver	6	0	0.0%	µg/l	1	10	0.1	6	--	--	--	--	--

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 002	7440-22-4 (dissolved)	Silver (dissolved)	6	0	0.0%	µg/l	1	10	0.1	6	--	--	--	--	--
OUTFALL 002	10098-97-2	Strontium-90	21	0	0.0%	pCi/l	0.627	3	0.34	1.65	--	--	--	--	--
OUTFALL 002	127-18-4	Tetrachloroethene (PCE)	13	0	0.0%	µg/l	0.5	0.5	0.25	0.32	--	--	--	--	--
OUTFALL 002	7440-28-0	Thallium	6	0	0.0%	µg/l	1	1	0.2	0.5	--	--	--	--	--
OUTFALL 002	7440-28-0 (dissolved)	Thallium (dissolved)	6	0	0.0%	µg/l	1	1	0.2	0.5	--	--	--	--	--
OUTFALL 002	108-88-3	Toluene	13	0	0.0%	µg/l	0.5	0.5	0.25	0.36	--	--	--	--	--
OUTFALL 002	8001-35-2	Toxaphene	6	0	0.0%	µg/l	0.47	0.5	0.24	0.25	--	--	--	--	--
OUTFALL 002	156-60-5	trans-1,2-Dichloroethene	6	0	0.0%	µg/l	0.5	0.5	0.25	0.3	--	--	--	--	--
OUTFALL 002	10061-02-6	trans-1,3-Dichloropropene	6	0	0.0%	µg/l	0.5	0.5	0.25	0.32	--	--	--	--	--
OUTFALL 002	79-01-6	Trichloroethene (TCE)	21	5	23.8%	µg/l	0.5	2	0.25	0.26	0.43	1.8	0.908	0.733	95% KM (t) UCL
OUTFALL 002	10028-17-8	Tritium	21	0	0.0%	pCi/l	496	500	93	496	--	--	--	--	--
OUTFALL 002	7440-61-1	Uranium	20	15	75.0%	pCi/l	0.244	1.48	0.11	0.902	0.147	1.68	0.77	0.885	95% KM (t) UCL
OUTFALL 002	7440-62-2	Vanadium	6	1	16.7%	µg/l	10	10	3	5	36	36	36	36	Maximum detected value
OUTFALL 002	7440-62-2 (dissolved)	Vanadium (dissolved)	6	0	0.0%	µg/l	10	10	3	5	--	--	--	--	--
OUTFALL 002	110-75-8	Vinyl 2-Chloroethyl ether	6	0	0.0%	µg/l	2	5	1	1.8	--	--	--	--	--
OUTFALL 002	75-01-4	Vinyl Chloride	13	0	0.0%	µg/l	0.5	0.5	0.25	0.4	--	--	--	--	--
OUTFALL 002	1330-20-7	Xylenes, Total	13	0	0.0%	µg/l	1	1.5	0.5	0.9	--	--	--	--	--
OUTFALL 002	7440-66-6	Zinc	21	10	47.6%	µg/l	20	20	6	10	5.8	56	18.18	22.03	95% GROS Adjusted Gamma UCL
OUTFALL 002	7440-66-6 (dissolved)	Zinc (dissolved)	21	6	28.6%	µg/l	20	20	6	10	3.7	17.6	9.03	12.51	95% KM (t) UCL
OUTFALL 008	71-55-6	1,1,1-Trichloroethane	5	0	0.0%	µg/l	0.5	0.5	0.25	0.3	--	--	--	--	--
OUTFALL 008	79-34-5	1,1,2,2-Tetrachloroethane	5	0	0.0%	µg/l	0.5	0.5	0.25	0.3	--	--	--	--	--
OUTFALL 008	79-00-5	1,1,2-Trichloroethane	5	0	0.0%	µg/l	0.5	0.5	0.25	0.3	--	--	--	--	--
OUTFALL 008	75-34-3	1,1-Dichloroethane	5	0	0.0%	µg/l	0.5	0.5	0.25	0.4	--	--	--	--	--
OUTFALL 008	75-35-4	1,1-Dichloroethene	5	0	0.0%	µg/l	0.5	0.5	0.25	0.42	--	--	--	--	--
OUTFALL 008	96-18-4	1,2,3-Trichloropropane	1	0	0.0%	µg/l	0.5	0.5	0.4	0.4	--	--	--	--	--
OUTFALL 008	120-82-1	1,2,4-Trichlorobenzene	5	0	0.0%	µg/l	0.948	9.62	0.0948	2.4	--	--	--	--	--
OUTFALL 008	106-93-4	1,2-Dibromoethane	1	0	0.0%	µg/l	0.5	0.5	0.4	0.4	--	--	--	--	--
OUTFALL 008	95-50-1	1,2-Dichlorobenzene	6	0	0.0%	µg/l	0.474	9.6	0.0948	2.9	--	--	--	--	--
OUTFALL 008	107-06-2	1,2-Dichloroethane	5	0	0.0%	µg/l	0.5	0.5	0.25	0.28	--	--	--	--	--
OUTFALL 008	78-87-5	1,2-Dichloropropane	5	0	0.0%	µg/l	0.5	0.5	0.25	0.35	--	--	--	--	--
OUTFALL 008	541-73-1	1,3-Dichlorobenzene	6	0	0.0%	µg/l	0.474	9.6	0.0948	2.9	--	--	--	--	--
OUTFALL 008	106-46-7	1,4-Dichlorobenzene	6	0	0.0%	µg/l	0.474	9.6	0.19	2.4	--	--	--	--	--
OUTFALL 008	95-95-4	2,4,5-Trichlorophenol	2	0	0.0%	µg/l	19	19	2.8	2.9	--	--	--	--	--
OUTFALL 008	88-06-2	2,4,6-Trichlorophenol	5	0	0.0%	µg/l	0.948	19.2	0.0948	4.33	--	--	--	--	--
OUTFALL 008	120-83-2	2,4-Dichlorophenol	5	0	0.0%	µg/l	1.9	9.62	0.19	3.37	--	--	--	--	--
OUTFALL 008	105-67-9	2,4-Dimethylphenol	5	0	0.0%	µg/l	1.9	19.2	0.284	3.37	--	--	--	--	--
OUTFALL 008	51-28-5	2,4-Dinitrophenol	5	0	0.0%	µg/l	4.74	19.2	0.853	7.7	--	--	--	--	--
OUTFALL 008	121-14-2	2,4-Dinitrotoluene	5	0	0.0%	µg/l	4.74	9.62	0.19	3.37	--	--	--	--	--
OUTFALL 008	606-20-2	2,6-Dinitrotoluene	5	0	0.0%	µg/l	4.74	9.62	0.0948	1.92	--	--	--	--	--
OUTFALL 008	91-58-7	2-Chloronaphthalene	5	0	0.0%	µg/l	0.474	9.62	0.0948	2.9	--	--	--	--	--
OUTFALL 008	95-57-8	2-Chlorophenol	5	0	0.0%	µg/l	0.948	9.62	0.19	2.9	--	--	--	--	--
OUTFALL 008	534-52-1	2-Methyl-4,6-Dinitrophenol	5	0	0.0%	µg/l	4.74	19.2	0.284	3.85	--	--	--	--	--
OUTFALL 008	91-57-6	2-Methylnaphthalene	3	0	0.0%	µg/l	0.948	9.6	0.19	1.9	--	--	--	--	--
OUTFALL 008	95-48-7	2-Methylphenol (o-cresol)	3	0	0.0%	µg/l	1.9	9.6	0.0948	2.9	--	--	--	--	--
OUTFALL 008	88-74-4	2-Nitroaniline	3	0	0.0%	µg/l	4.74	19	0.0948	1.9	--	--	--	--	--

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 008	88-75-5	2-Nitrophenol	5	0	0.0%	µg/l	1.9	9.62	0.0948	3.37	--	--	--	--	--
OUTFALL 008	91-94-1	3,3-Dichlorobenzidine	5	0	0.0%	µg/l	4.74	19.2	0.474	7.21	--	--	--	--	--
OUTFALL 008	72-54-8	4,4'-DDD	4	0	0.0%	µg/l	0.0047	0.0048	0.0019	0.0038	--	--	--	--	--
OUTFALL 008	72-55-9	4,4'-DDE	4	0	0.0%	µg/l	0.0047	0.0048	0.0028	0.0029	--	--	--	--	--
OUTFALL 008	50-29-3	4,4'-DDT	4	0	0.0%	µg/l	0.0094	0.0096	0.0038	0.0038	--	--	--	--	--
OUTFALL 008	101-55-3	4-Bromophenyl phenyl ether	5	0	0.0%	µg/l	0.948	9.62	0.19	2.9	--	--	--	--	--
OUTFALL 008	59-50-7	4-Chloro-3-methylphenol (p-Chlorocresol)	5	0	0.0%	µg/l	1.9	19.2	0.19	2.4	--	--	--	--	--
OUTFALL 008	106-47-8	4-Chloroaniline	3	0	0.0%	µg/l	1.9	9.6	0.284	1.9	--	--	--	--	--
OUTFALL 008	7005-72-3	4-Chlorophenyl Phenyl Ether	5	0	0.0%	µg/l	0.474	9.62	0.19	2.4	--	--	--	--	--
OUTFALL 008	100-02-7	4-Nitrophenol	5	0	0.0%	µg/l	4.74	19.2	1.91	5.3	--	--	--	--	--
OUTFALL 008	83-32-9	Acenaphthene	5	0	0.0%	µg/l	0.474	9.62	0.19	2.9	--	--	--	--	--
OUTFALL 008	208-96-8	Acenaphthylene	5	0	0.0%	µg/l	0.474	9.62	0.19	2.9	--	--	--	--	--
OUTFALL 008	107-02-8	Acrolein	5	0	0.0%	µg/l	5	5	2.5	4	--	--	--	--	--
OUTFALL 008	107-13-1	Acrylonitrile	5	0	0.0%	µg/l	2	2	0.7	1.2	--	--	--	--	--
OUTFALL 008	309-00-2	Aldrin	4	0	0.0%	µg/l	0.0047	0.0048	0.0014	0.0014	--	--	--	--	--
OUTFALL 008	319-84-6	alpha-BHC	4	0	0.0%	µg/l	0.0047	0.05	0.0024	0.0053	--	--	--	--	--
OUTFALL 008	7429-90-5	Aluminum	5	5	100.0%	µg/l	--	--	--	--	3100	12000	6980	12000	Maximum detected value
OUTFALL 008	7429-90-5 (dissolved)	Aluminum (dissolved)	5	5	100.0%	µg/l	--	--	--	--	56	660	267.2	660	Maximum detected value
OUTFALL 008	7664-41-7 (as NH3)	Ammonia (as NH3)	14	2	14.3%	mg/l	0.4	0.5	0.157	0.5	0.14	1.1	0.62	1.1	Maximum detected value
OUTFALL 008	62-53-3	Aniline	3	0	0.0%	µg/l	9.4	9.6	0.284	3.3	--	--	--	--	--
OUTFALL 008	120-12-7	Anthracene	5	0	0.0%	µg/l	0.474	9.62	0.0948	2.4	--	--	--	--	--
OUTFALL 008	7440-36-0	Antimony	14	6	42.9%	µg/l	2	10	0.3	1.5	0.35	0.48	0.405	0.442	95% KM (t) UCL
OUTFALL 008	7440-36-0 (dissolved)	Antimony (dissolved)	14	4	28.6%	µg/l	2	10	0.3	1.5	0.3	0.42	0.3525	0.42	Maximum detected value
OUTFALL 008	12674-11-2	Aroclor 1016	4	0	0.0%	µg/l	0.47	0.48	0.24	0.24	--	--	--	--	--
OUTFALL 008	11104-28-2	Aroclor 1221	4	0	0.0%	µg/l	0.47	0.48	0.24	0.24	--	--	--	--	--
OUTFALL 008	11141-16-5	Aroclor 1232	4	0	0.0%	µg/l	0.47	0.48	0.24	0.24	--	--	--	--	--
OUTFALL 008	53469-21-9	Aroclor 1242	4	0	0.0%	µg/l	0.47	0.48	0.24	0.24	--	--	--	--	--
OUTFALL 008	12672-29-6	Aroclor 1248	4	0	0.0%	µg/l	0.47	0.48	0.24	0.24	--	--	--	--	--
OUTFALL 008	11097-69-1	Aroclor 1254	4	0	0.0%	µg/l	0.47	0.48	0.24	0.24	--	--	--	--	--
OUTFALL 008	11096-82-5	Aroclor 1260	4	0	0.0%	µg/l	0.47	0.48	0.24	0.24	--	--	--	--	--
OUTFALL 008	7440-38-2	Arsenic	5	0	0.0%	µg/l	10	10	5	7	--	--	--	--	--
OUTFALL 008	7440-38-2 (dissolved)	Arsenic (dissolved)	5	0	0.0%	µg/l	10	10	5	7	--	--	--	--	--
OUTFALL 008	1332-21-4	Asbestos	5	0	0.0%	ons of fib	6.8	22	6.8	22	--	--	--	--	--
OUTFALL 008	56-55-3	Benz[a]anthracene	5	0	0.0%	µg/l	4.74	9.62	0.0948	2.4	--	--	--	--	--
OUTFALL 008	71-43-2	Benzene	5	0	0.0%	µg/l	0.5	0.5	0.25	0.28	--	--	--	--	--
OUTFALL 008	92-87-5	Benzidine	5	0	0.0%	µg/l	4.74	19.2	0.948	9.62	--	--	--	--	--
OUTFALL 008	50-32-8	Benzo(a)pyrene	5	0	0.0%	µg/l	0.478	9.62	0.0948	2.9	--	--	--	--	--
OUTFALL 008	205-99-2	Benzo(b)fluoranthene	5	0	0.0%	µg/l	1.9	9.62	0.0948	1.92	--	--	--	--	--
OUTFALL 008	191-24-2	Benzo(g,h,i)perylene	5	0	0.0%	µg/l	4.74	9.62	0.0948	3.85	--	--	--	--	--
OUTFALL 008	207-08-9	Benzo[k]fluoranthene	5	0	0.0%	µg/l	0.474	9.62	0.19	2.4	--	--	--	--	--
OUTFALL 008	65-85-0	Benzoic Acid	3	0	0.0%	µg/l	19	19	2.84	9.6	--	--	--	--	--
OUTFALL 008	100-51-6	Benzyl alcohol	3	0	0.0%	µg/l	4.74	19	0.0948	3.3	--	--	--	--	--
OUTFALL 008	85-68-7	Benzyl butyl phthalate	5	0	0.0%	µg/l	4.74	19.2	0.664	3.85	--	--	--	--	--
OUTFALL 008	7440-41-7	Beryllium	5	0	0.0%	µg/l	2	10	0.9	4.5	--	--	--	--	--

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 008	7440-41-7 (dissolved)	Beryllium (dissolved)	5	0	0.0%	µg/l	2	2	0.9	1	--	--	--	--	--
OUTFALL 008	319-85-7	beta-BHC	4	1	25.0%	µg/l	0.0094	0.0096	0.0038	0.0038	0.0052	0.0052	0.0052	0.0052	Maximum detected value
OUTFALL 008	108-60-1	Bis(2-chloro-1-methylethyl) ether	1	0	0.0%	µg/l	0.478	0.478	0.191	0.191	--	--	--	--	--
OUTFALL 008	111-91-1	Bis(2-Chloroethoxy)Methane	5	0	0.0%	µg/l	0.474	9.62	0.0948	2.9	--	--	--	--	--
OUTFALL 008	111-44-4	Bis(2-Chloroethyl) Ether	5	0	0.0%	µg/l	0.474	9.62	0.0948	2.9	--	--	--	--	--
OUTFALL 008	39638-32-9	Bis(2-chloroisopropyl) ether	4	0	0.0%	µg/l	0.474	9.62	0.0948	2.4	--	--	--	--	--
OUTFALL 008	117-81-7	Bis(2-ethylhexyl) phthalate	5	1	20.0%	µg/l	4.78	48.1	1.91	3.85	1.87	1.87	1.87	1.87	Maximum detected value
OUTFALL 008	7440-42-8	Boron	5	3	60.0%	mg/l	0.062	0.25	0.02	0.1	0.061	0.095	7.63E-02	0.095	Maximum detected value
OUTFALL 008	7440-42-8 (dissolved)	Boron (dissolved)	5	3	60.0%	mg/l	0.054	0.12	0.02	0.02	0.06	0.095	7.97E-02	0.095	Maximum detected value
OUTFALL 008	75-25-2	Bromoform	5	0	0.0%	µg/l	0.5	1	0.4	0.4	--	--	--	--	--
OUTFALL 008	7440-43-9	Cadmium	14	4	28.6%	µg/l	1	5	0.1	0.5	0.12	0.46	0.245	0.46	Maximum detected value
OUTFALL 008	7440-43-9 (dissolved)	Cadmium (dissolved)	14	1	7.1%	µg/l	1	5	0.1	0.5	0.22	0.22	0.22	0.22	Maximum detected value
OUTFALL 008	56-23-5	Carbon Tetrachloride	5	0	0.0%	µg/l	0.5	0.5	0.25	0.28	--	--	--	--	--
OUTFALL 008	10045-97-3	Cesium-137	14	0	0.0%	pCi/l	12.4	20	1.29	18	--	--	--	--	--
OUTFALL 008	57-74-9	Chlordane	4	0	0.0%	µg/l	0.094	0.096	0.038	0.077	--	--	--	--	--
OUTFALL 008	108-90-7	Chlorobenzene	5	0	0.0%	µg/l	0.5	0.5	0.25	0.36	--	--	--	--	--
OUTFALL 008	124-48-1	Chlorodibromomethane	5	0	0.0%	µg/l	0.5	0.5	0.25	0.4	--	--	--	--	--
OUTFALL 008	67-66-3	Chloroform	5	0	0.0%	µg/l	0.5	0.5	0.25	0.33	--	--	--	--	--
OUTFALL 008	74-87-3	Chloromethane	5	0	0.0%	µg/l	0.5	0.5	0.25	0.4	--	--	--	--	--
OUTFALL 008	2921-88-2	Chloropyrifos	5	0	0.0%	µg/l	0.95	1	0.01	1	--	--	--	--	--
OUTFALL 008	7440-47-3	Chromium	5	4	80.0%	µg/l	5	5	2	2	3.8	16	10.68	16	Maximum detected value
OUTFALL 008	7440-47-3 (dissolved)	Chromium (dissolved)	5	1	20.0%	µg/l	5	5	2	2.5	12	12	12	12	Maximum detected value
OUTFALL 008	18540-29-9	Chromium, Hexavalent	4	0	0.0%	µg/l	1	1	0.25	0.25	--	--	--	--	--
OUTFALL 008	218-01-9	Chrysene	5	0	0.0%	µg/l	0.474	9.62	0.0948	2.4	--	--	--	--	--
OUTFALL 008	156-59-2	cis-1,2-Dichloroethene	3	0	0.0%	µg/l	0.5	0.5	0.25	0.32	--	--	--	--	--
OUTFALL 008	10061-01-5	cis-1,3-Dichloropropene	5	0	0.0%	µg/l	0.5	0.5	0.22	0.25	--	--	--	--	--
OUTFALL 008	Ra226Ra228	Combined Radium-226 and Radium-228	13	1	7.7%	pCi/l	--	1.99	--	1.99	2.03	2.03	2.03	2.03	Maximum detected value
OUTFALL 008	7440-50-8	Copper	14	14	100.0%	µg/l	--	--	--	--	1.3	18	6.87	9.084	95% Student's-t UCL
OUTFALL 008	7440-50-8 (dissolved)	Copper (dissolved)	14	14	100.0%	µg/l	--	--	--	--	1.1	4.6	2.41	2.897	95% Student's-t UCL
OUTFALL 008	57-12-5	Cyanide Anion	10	1	10.0%	µg/l	5	5	2.2	3	8.7	8.7	8.7	8.7	Maximum detected value
OUTFALL 008	319-86-8	delta-BHC	4	0	0.0%	µg/l	0.0047	0.0048	0.0033	0.0034	--	--	--	--	--
OUTFALL 008	333-41-5	Diazinon	5	0	0.0%	µg/l	0.24	0.25	0.038	0.25	--	--	--	--	--
OUTFALL 008	53-70-3	Dibenz[a,h]anthracene	5	0	0.0%	µg/l	0.474	19.2	0.0948	2.9	--	--	--	--	--
OUTFALL 008	132-64-9	Dibenzofuran	3	0	0.0%	µg/l	0.474	9.6	0.0948	3.8	--	--	--	--	--
OUTFALL 008	84-74-2	Dibutyl phthalate	5	0	0.0%	µg/l	1.9	19.2	0.284	2.9	--	--	--	--	--
OUTFALL 008	75-27-4	Dichlorobromomethane	5	0	0.0%	µg/l	0.5	0.5	0.25	0.3	--	--	--	--	--
OUTFALL 008	60-57-1	Dieldrin	4	0	0.0%	µg/l	0.0047	0.0048	0.0019	0.0019	--	--	--	--	--
OUTFALL 008	84-66-2	Diethyl phthalate	5	1	20.0%	µg/l	0.957	9.62	0.478	3.37	0.166	0.166	0.166	0.166	Maximum detected value
OUTFALL 008	108-20-3	Diisopropyl Ether	1	0	0.0%	µg/l	0.5	0.5	0.25	0.25	--	--	--	--	--
OUTFALL 008	131-11-3	Dimethyl phthalate	5	0	0.0%	µg/l	0.474	9.62	0.19	2.4	--	--	--	--	--

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 008	117-84-0	Di-n-octyl phthalate	5	0	0.0%	µg/l	4.74	19.2	0.19	3.37	--	--	--	--	--
OUTFALL 008	DioxinTEQMamNoNDs	TCDD-TEQ	14	11	78.6%	µg/l	--	--	--	--	1.47E-09	2.802E-06	7.47E-07	2.6168E-06	95% Adjusted Gamma UCL
OUTFALL 008	959-98-8	Endosulfan I	4	0	0.0%	µg/l	0.0047	0.0048	0.0019	0.0029	--	--	--	--	--
OUTFALL 008	33213-65-9	Endosulfan II	4	0	0.0%	µg/l	0.0047	0.0048	0.0019	0.0029	--	--	--	--	--
OUTFALL 008	1031-07-8	Endosulfan Sulfate	4	0	0.0%	µg/l	0.0094	0.0096	0.0028	0.0029	--	--	--	--	--
OUTFALL 008	72-20-8	Endrin	4	0	0.0%	µg/l	0.0047	0.0048	0.0019	0.0019	--	--	--	--	--
OUTFALL 008	7421-93-4	Endrin Aldehyde	4	1	25.0%	µg/l	0.0094	0.0096	0.0019	0.0019	0.0027	0.0027	0.0027	0.0027	Maximum detected value
OUTFALL 008	53494-70-5	Endrin Ketone	2	0	0.0%	µg/l	0.0094	0.0094	0.0028	0.0028	--	--	--	--	--
OUTFALL 008	75-00-3	Ethyl Chloride	5	0	0.0%	µg/l	0.5	1	0.4	0.4	--	--	--	--	--
OUTFALL 008	100-41-4	Ethylbenzene	5	0	0.0%	µg/l	0.5	0.5	0.25	0.25	--	--	--	--	--
OUTFALL 008	637-92-3	Ethyl-t-Butyl Ether (ETBE)	1	0	0.0%	µg/l	0.5	0.5	0.28	0.28	--	--	--	--	--
OUTFALL 008	206-44-0	Fluoranthene	5	0	0.0%	µg/l	0.474	9.62	0.0948	2.9	--	--	--	--	--
OUTFALL 008	86-73-7	Fluorene	5	0	0.0%	µg/l	0.474	9.62	0.0948	2.9	--	--	--	--	--
OUTFALL 008	16984-48-8	Fluoride	5	5	100.0%	mg/l	--	--	--	--	0.1	0.26	0.198	0.26	Maximum detected value
OUTFALL 008	75-69-4	Freon 11	5	0	0.0%	µg/l	0.5	0.5	0.25	0.34	--	--	--	--	--
OUTFALL 008	76-13-1	Freon 113	2	0	0.0%	µg/l	5	5	0.5	0.5	--	--	--	--	--
OUTFALL 008	58-89-9	gamma-BHC (Lindane)	4	0	0.0%	µg/l	0.0095	0.019	0.0028	0.0029	--	--	--	--	--
OUTFALL 008	12587-46-1	Gross Alpha	14	11	78.6%	pCi/l	3	3	1.6	2.5	0.928	25.8	7.26	14.08	95% KM Bootstrap t UCL
OUTFALL 008	12587-47-2	Gross Beta	14	14	100.0%	pCi/l	--	--	--	--	2.2	25.4	7.13	10.61	95% Adjusted Gamma UCL
OUTFALL 008	76-44-8	Heptachlor	4	0	0.0%	µg/l	0.0094	0.0096	0.0028	0.0029	--	--	--	--	--
OUTFALL 008	1024-57-3	Heptachlor Epoxide	4	0	0.0%	µg/l	0.0047	0.0048	0.0024	0.0024	--	--	--	--	--
OUTFALL 008	118-74-1	Hexachlorobenzene	5	0	0.0%	µg/l	0.948	9.62	0.0948	2.9	--	--	--	--	--
OUTFALL 008	87-68-3	Hexachlorobutadiene (HCBD)	5	0	0.0%	µg/l	1.9	9.62	0.19	3.85	--	--	--	--	--
OUTFALL 008	77-47-4	Hexachlorocyclopentadiene	5	0	0.0%	µg/l	4.74	19.2	0.0948	4.81	--	--	--	--	--
OUTFALL 008	67-72-1	Hexachloroethane	5	0	0.0%	µg/l	2.84	9.62	0.19	3.37	--	--	--	--	--
OUTFALL 008	122-66-7	Hydrazine, 1,2-diphenyl-	5	0	0.0%	µg/l	0.948	19.2	0.19	2.4	--	--	--	--	--
OUTFALL 008	193-39-5	Indeno(1,2,3-cd)pyrene	5	0	0.0%	µg/l	1.9	19.2	0.0948	3.37	--	--	--	--	--
OUTFALL 008	78-59-1	Isophorone	5	0	0.0%	µg/l	0.948	9.62	0.0948	2.9	--	--	--	--	--
OUTFALL 008	7439-92-1	Lead	14	14	100.0%	µg/l	--	--	--	--	0.38	10	4.07	7.1	95% Adjusted Gamma UCL
OUTFALL 008	7439-92-1 (dissolved)	Lead (dissolved)	14	4	28.6%	µg/l	1	5	0.2	1	0.21	5.2	1.5525	5.2	Maximum detected value
OUTFALL 008	7439-97-6	Mercury	14	1	7.1%	µg/l	0.2	0.2	0.1	0.1	0.029	0.029	0.029	0.029	Maximum detected value
OUTFALL 008	7439-97-6 (dissolved)	Mercury (dissolved)	14	1	7.1%	µg/l	0.2	0.2	0.027	0.1	0.16	0.16	0.16	0.16	Maximum detected value
OUTFALL 008	72-43-5	Methoxychlor	2	0	0.0%	µg/l	0.0047	0.0047	0.0033	0.0033	--	--	--	--	--
OUTFALL 008	74-83-9	Methyl Bromide	5	0	0.0%	µg/l	0.5	1	0.25	0.42	--	--	--	--	--
OUTFALL 008	1634-04-4	Methyl tert-Butyl Ether (MTBE)	1	0	0.0%	µg/l	0.5	0.5	0.32	0.32	--	--	--	--	--
OUTFALL 008	75-09-2	Methylene Chloride (DCM)	5	0	0.0%	µg/l	1	2	0.88	0.95	--	--	--	--	--
OUTFALL 008	99-09-2	m-Nitroaniline	3	0	0.0%	µg/l	4.74	19	0.948	2.9	--	--	--	--	--
OUTFALL 008	91-20-3	Naphthalene	5	0	0.0%	µg/l	0.948	9.62	0.0948	2.9	--	--	--	--	--
OUTFALL 008	7440-02-0	Nickel	5	4	80.0%	µg/l	10	10	5	5	3.5	20	8.93	20	Maximum detected value
OUTFALL 008	7440-02-0 (dissolved)	Nickel (dissolved)	5	2	40.0%	µg/l	10	10	2	5	2.7	5.3	4	5.3	Maximum detected value

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 008	14797-55-8 (as N)	Nitrate (as N)	14	14	100.0%	mg/l	--	--	--	--	0.34	4.3	0.98	2.174	95% Chebyshev (Mean, Sd) UCL
OUTFALL 008	NO3NO2 (as N)	Nitrate and Nitrite (as N)	14	14	100.0%	mg/l	--	--	--	--	0.34	4.3	0.99	2.177	95% Chebyshev (Mean, Sd) UCL
OUTFALL 008	14797-65-0 (as N)	Nitrite (as N)	14	0	0.0%	mg/l	0.15	0.15	0.07	0.11	--	--	--	--	--
OUTFALL 008	98-95-3	Nitrobenzene	5	0	0.0%	µg/l	0.948	19.2	0.0948	2.9	--	--	--	--	--
OUTFALL 008	62-75-9	n-Nitrosodimethylamine (NDMA)	5	0	0.0%	µg/l	1.9	19.2	0.0948	2.4	--	--	--	--	--
OUTFALL 008	86-30-6	n-Nitrosodiphenylamine	5	0	0.0%	µg/l	0.948	9.62	0.0948	1.92	--	--	--	--	--
OUTFALL 008	621-64-7	n-Nitrosodipropylamine	5	0	0.0%	µg/l	1.9	9.62	0.0948	3.37	--	--	--	--	--
OUTFALL 008	106-44-5	p-Cresol	3	0	0.0%	µg/l	4.74	9.6	0.19	2.9	--	--	--	--	--
OUTFALL 008	87-86-5	Pentachlorophenol	5	0	0.0%	µg/l	1.9	19.2	0.379	3.37	--	--	--	--	--
OUTFALL 008	14797-73-0	Perchlorate	14	6	42.9%	µg/l	4	4	0.9	0.95	0.9	2.5	1.97	2.428	95% KM (t) UCL
OUTFALL 008	85-01-8	Phenanthrene	5	0	0.0%	µg/l	0.474	9.62	0.0948	3.37	--	--	--	--	--
OUTFALL 008	108-95-2	Phenol	5	0	0.0%	µg/l	0.948	9.62	0.284	1.92	--	--	--	--	--
OUTFALL 008	100-01-6	p-Nitroaniline	3	0	0.0%	µg/l	4.74	19	0.474	3.8	--	--	--	--	--
OUTFALL 008	13966-00-2	Potassium-40	14	1	7.1%	pCi/l	25	290	15.7	290	21	21	21	21	Maximum detected value
OUTFALL 008	129-00-0	Pyrene	5	0	0.0%	µg/l	0.474	9.62	0.0948	3.85	--	--	--	--	--
OUTFALL 008	13982-63-3	Radium-226	14	7	50.0%	pCi/l	0.218	1	0.218	0.781	0.104	1.41	0.51	0.613	95% KM (t) UCL
OUTFALL 008	15262-20-1	Radium-228	13	2	15.4%	pCi/l	0.636	1.7	--	1	0.615	0.699	0.657	0.699	Maximum detected value
OUTFALL 008	7782-49-2	Selenium	14	5	35.7%	µg/l	2	10	0.3	2.5	0.51	1.3	0.72	0.979	95% KM (t) UCL
OUTFALL 008	7782-49-2 (dissolved)	Selenium (dissolved)	14	4	28.6%	µg/l	2	10	0.5	2.5	0.5	1.3	0.77	1.3	Maximum detected value
OUTFALL 008	7440-22-4	Silver	5	0	0.0%	µg/l	10	50	5	30	--	--	--	--	--
OUTFALL 008	7440-22-4 (dissolved)	Silver (dissolved)	5	0	0.0%	µg/l	10	10	5	6	--	--	--	--	--
OUTFALL 008	10098-97-2	Strontium-90	14	0	0.0%	pCi/l	0.725	3	0.41	2	--	--	--	--	--
OUTFALL 008	994-05-8	Tert-Amyl Methyl Ether (TAME)	1	0	0.0%	µg/l	0.5	0.5	0.33	0.33	--	--	--	--	--
OUTFALL 008	75-65-0	Tert-Butyl Alcohol (TBA)	1	0	0.0%	µg/l	10	10	6.5	6.5	--	--	--	--	--
OUTFALL 008	127-18-4	Tetrachloroethene (PCE)	5	0	0.0%	µg/l	0.5	0.5	0.25	0.32	--	--	--	--	--
OUTFALL 008	7440-28-0	Thallium	14	0	0.0%	µg/l	1	5	0.2	1	--	--	--	--	--
OUTFALL 008	7440-28-0 (dissolved)	Thallium (dissolved)	14	2	14.3%	µg/l	1	1	0.2	0.5	0.29	1.2	0.745	1.2	Maximum detected value
OUTFALL 008	108-88-3	Toluene	5	0	0.0%	µg/l	0.5	0.5	0.25	0.36	--	--	--	--	--
OUTFALL 008	8001-35-2	Toxaphene	4	0	0.0%	µg/l	0.47	0.48	0.24	0.24	--	--	--	--	--
OUTFALL 008	156-60-5	trans-1,2-Dichloroethene	5	0	0.0%	µg/l	0.5	0.5	0.25	0.3	--	--	--	--	--
OUTFALL 008	10061-02-6	trans-1,3-Dichloropropene	5	0	0.0%	µg/l	0.5	0.5	0.25	0.32	--	--	--	--	--
OUTFALL 008	79-01-6	Trichloroethene (TCE)	5	0	0.0%	µg/l	0.5	0.5	0.25	0.26	--	--	--	--	--
OUTFALL 008	10028-17-8	Tritium	14	0	0.0%	pCi/l	313	500	95	314	--	--	--	--	--
OUTFALL 008	7440-61-1	Uranium	14	11	78.6%	pCi/l	0.693	1.38	0.21	0.841	0.439	1.61	0.8	0.969	95% KM Adjusted Gamma UCL
OUTFALL 008	7440-62-2	Vanadium	5	5	100.0%	µg/l	--	--	--	--	6.6	30	16.28	30	Maximum detected value
OUTFALL 008	7440-62-2 (dissolved)	Vanadium (dissolved)	5	0	0.0%	µg/l	10	10	3	5	--	--	--	--	--
OUTFALL 008	110-75-8	Vinyl 2-Chloroethyl ether	5	0	0.0%	µg/l	2	5	1	1.8	--	--	--	--	--
OUTFALL 008	75-01-4	Vinyl Chloride	5	0	0.0%	µg/l	0.5	0.5	0.25	0.4	--	--	--	--	--
OUTFALL 008	1330-20-7	Xylenes, Total	5	0	0.0%	µg/l	1	1.5	0.5	0.9	--	--	--	--	--
OUTFALL 008	7440-66-6	Zinc	14	13	92.9%	µg/l	20	20	5	5	11.8	64	30.07	36.75	95% KM (t) UCL
OUTFALL 008	7440-66-6 (dissolved)	Zinc (dissolved)	14	6	42.9%	µg/l	20	20	5	6	7.03	49	21.97	20.87	95% KM (t) UCL
OUTFALL 009	71-55-6	1,1,1-Trichloroethane	7	0	0.0%	µg/l	0.5	0.5	0.25	0.3	--	--	--	--	--

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 009	79-34-5	1,1,2,2-Tetrachloroethane	7	0	0.0%	µg/l	0.5	0.5	0.25	0.3	--	--	--	--	--
OUTFALL 009	79-00-5	1,1,2-Trichloroethane	7	0	0.0%	µg/l	0.5	0.5	0.25	0.3	--	--	--	--	--
OUTFALL 009	75-34-3	1,1-Dichloroethane	7	0	0.0%	µg/l	0.5	0.5	0.25	0.4	--	--	--	--	--
OUTFALL 009	75-35-4	1,1-Dichloroethene	7	0	0.0%	µg/l	0.5	0.5	0.25	0.42	--	--	--	--	--
OUTFALL 009	96-18-4	1,2,3-Trichloropropane	2	0	0.0%	µg/l	0.5	0.5	0.4	0.4	--	--	--	--	--
OUTFALL 009	120-82-1	1,2,4-Trichlorobenzene	7	0	0.0%	µg/l	0.948	9.8	0.0948	2.45	--	--	--	--	--
OUTFALL 009	106-93-4	1,2-Dibromoethane	2	0	0.0%	µg/l	0.5	0.5	0.4	0.4	--	--	--	--	--
OUTFALL 009	95-50-1	1,2-Dichlorobenzene	10	0	0.0%	µg/l	0.474	9.8	0.0948	2.94	--	--	--	--	--
OUTFALL 009	107-06-2	1,2-Dichloroethane	7	0	0.0%	µg/l	0.5	0.5	0.25	0.28	--	--	--	--	--
OUTFALL 009	78-87-5	1,2-Dichloropropane	7	0	0.0%	µg/l	0.5	0.5	0.25	0.35	--	--	--	--	--
OUTFALL 009	541-73-1	1,3-Dichlorobenzene	10	0	0.0%	µg/l	0.474	9.8	0.0948	2.94	--	--	--	--	--
OUTFALL 009	106-46-7	1,4-Dichlorobenzene	10	0	0.0%	µg/l	0.474	9.8	0.19	2.45	--	--	--	--	--
OUTFALL 009	95-95-4	2,4,5-Trichlorophenol	1	0	0.0%	µg/l	19	19	2.8	2.8	--	--	--	--	--
OUTFALL 009	88-06-2	2,4,6-Trichlorophenol	7	0	0.0%	µg/l	0.948	19.6	0.0948	4.41	--	--	--	--	--
OUTFALL 009	120-83-2	2,4-Dichlorophenol	7	0	0.0%	µg/l	1.9	9.8	0.19	3.43	--	--	--	--	--
OUTFALL 009	105-67-9	2,4-Dimethylphenol	7	0	0.0%	µg/l	1.9	19.6	0.284	3.43	--	--	--	--	--
OUTFALL 009	51-28-5	2,4-Dinitrophenol	7	0	0.0%	µg/l	4.74	19.6	0.853	7.84	--	--	--	--	--
OUTFALL 009	121-14-2	2,4-Dinitrotoluene	7	0	0.0%	µg/l	4.74	9.8	0.19	3.43	--	--	--	--	--
OUTFALL 009	606-20-2	2,6-Dinitrotoluene	7	0	0.0%	µg/l	4.74	9.8	0.0948	1.96	--	--	--	--	--
OUTFALL 009	91-58-7	2-Chloronaphthalene	7	0	0.0%	µg/l	0.474	9.8	0.0948	2.94	--	--	--	--	--
OUTFALL 009	95-57-8	2-Chlorophenol	7	0	0.0%	µg/l	0.948	9.8	0.19	2.94	--	--	--	--	--
OUTFALL 009	534-52-1	2-Methyl-4,6-Dinitrophenol	7	0	0.0%	µg/l	4.74	19.6	0.284	3.92	--	--	--	--	--
OUTFALL 009	91-57-6	2-Methylnaphthalene	3	0	0.0%	µg/l	0.948	9.8	0.19	1.96	--	--	--	--	--
OUTFALL 009	95-48-7	2-Methylphenol (o-cresol)	3	0	0.0%	µg/l	1.9	9.8	0.0948	2.94	--	--	--	--	--
OUTFALL 009	88-74-4	2-Nitroaniline	3	0	0.0%	µg/l	4.74	19.6	0.0948	1.96	--	--	--	--	--
OUTFALL 009	88-75-5	2-Nitrophenol	7	0	0.0%	µg/l	1.9	9.8	0.0948	3.43	--	--	--	--	--
OUTFALL 009	91-94-1	3,3-Dichlorobenzidine	7	0	0.0%	µg/l	4.74	19.6	0.474	7.35	--	--	--	--	--
OUTFALL 009	72-54-8	4,4'-DDD	7	0	0.0%	µg/l	0.0047	0.0049	0.0019	0.0039	--	--	--	--	--
OUTFALL 009	72-55-9	4,4'-DDE	7	0	0.0%	µg/l	0.0047	0.0049	0.0028	0.0029	--	--	--	--	--
OUTFALL 009	50-29-3	4,4'-DDT	7	0	0.0%	µg/l	0.0094	0.0098	0.0038	0.0039	--	--	--	--	--
OUTFALL 009	101-55-3	4-Bromophenyl phenyl ether	7	0	0.0%	µg/l	0.948	9.8	0.19	2.94	--	--	--	--	--
OUTFALL 009	59-50-7	4-Chloro-3-methylphenol (p-Chlorocresol)	7	0	0.0%	µg/l	1.9	19.6	0.19	2.45	--	--	--	--	--
OUTFALL 009	106-47-8	4-Chloroaniline	3	0	0.0%	µg/l	1.9	9.8	0.284	1.96	--	--	--	--	--
OUTFALL 009	7005-72-3	4-Chlorophenyl Phenyl Ether	7	0	0.0%	µg/l	0.474	9.8	0.19	2.45	--	--	--	--	--
OUTFALL 009	100-02-7	4-Nitrophenol	7	0	0.0%	µg/l	4.74	19.6	1.9	5.39	--	--	--	--	--
OUTFALL 009	83-32-9	Acenaphthene	7	0	0.0%	µg/l	0.474	9.8	0.19	2.94	--	--	--	--	--
OUTFALL 009	208-96-8	Acenaphthylene	7	0	0.0%	µg/l	0.474	9.8	0.19	2.94	--	--	--	--	--
OUTFALL 009	107-02-8	Acrolein	7	0	0.0%	µg/l	5	5	2.5	4	--	--	--	--	--
OUTFALL 009	107-13-1	Acrylonitrile	7	0	0.0%	µg/l	2	2	1	1.2	--	--	--	--	--
OUTFALL 009	309-00-2	Aldrin	7	0	0.0%	µg/l	0.0047	0.0049	0.0014	0.0015	--	--	--	--	--
OUTFALL 009	AlkCarb	Alkalinity, Carbonate	1	0	0.0%	mg/l	4	4	--	--	--	--	--	--	--
OUTFALL 009	AlkHydroxide	Alkalinity, Hydroxide	1	0	0.0%	mg/l	4	4	--	--	--	--	--	--	--
OUTFALL 009	319-84-6	alpha-BHC	7	0	0.0%	µg/l	0.0047	0.0049	0.0024	0.0025	--	--	--	--	--
OUTFALL 009	7429-90-5	Aluminum	7	7	100.0%	µg/l	--	--	--	--	370	4400	1704.3	4400	Maximum detected value
OUTFALL 009	7429-90-5 (dissolved)	Aluminum (dissolved)	7	6	85.7%	µg/l	50	50	40	40	99	920	283.2	920	Maximum detected value

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 009	62-53-3	Aniline	3	0	0.0%	µg/l	9.4	9.8	0.284	3.43	--	--	--	--	--
OUTFALL 009	120-12-7	Anthracene	7	0	0.0%	µg/l	0.474	9.8	0.0948	2.45	--	--	--	--	--
OUTFALL 009	7440-36-0	Antimony	43	38	88.4%	µg/l	0.71	2	0.3	0.5	0.3	1.9	0.71	0.813	95% KM Adjusted Gamma UCL
OUTFALL 009	7440-36-0 (dissolved)	Antimony (dissolved)	43	31	72.1%	µg/l	0.76	2	0.3	0.5	0.3	1.7	0.70	0.795	95% KM Adjusted Gamma UCL
OUTFALL 009	12674-11-2	Aroclor 1016	7	0	0.0%	µg/l	0.47	0.51	0.24	0.26	--	--	--	--	--
OUTFALL 009	11104-28-2	Aroclor 1221	7	0	0.0%	µg/l	0.47	0.51	0.24	0.26	--	--	--	--	--
OUTFALL 009	11141-16-5	Aroclor 1232	7	0	0.0%	µg/l	0.47	0.51	0.24	0.26	--	--	--	--	--
OUTFALL 009	53469-21-9	Aroclor 1242	7	0	0.0%	µg/l	0.47	0.51	0.24	0.26	--	--	--	--	--
OUTFALL 009	12672-29-6	Aroclor 1248	7	0	0.0%	µg/l	0.47	0.51	0.24	0.26	--	--	--	--	--
OUTFALL 009	11097-69-1	Aroclor 1254	7	0	0.0%	µg/l	0.47	0.51	0.24	0.26	--	--	--	--	--
OUTFALL 009	11096-82-5	Aroclor 1260	7	0	0.0%	µg/l	0.47	0.51	0.24	0.26	--	--	--	--	--
OUTFALL 009	7440-38-2	Arsenic	7	0	0.0%	µg/l	10	10	5	7	--	--	--	--	--
OUTFALL 009	7440-38-2 (dissolved)	Arsenic (dissolved)	7	0	0.0%	µg/l	10	10	5	7.5	--	--	--	--	--
OUTFALL 009	1332-21-4	Asbestos	10	0	0.0%	ons of fib	0.4	11	0.4	11	--	--	--	--	--
OUTFALL 009	56-55-3	Benz[a]anthracene	7	0	0.0%	µg/l	4.74	9.8	0.0948	2.45	--	--	--	--	--
OUTFALL 009	71-43-2	Benzene	7	0	0.0%	µg/l	0.5	0.5	0.25	0.28	--	--	--	--	--
OUTFALL 009	92-87-5	Benzidine	7	0	0.0%	µg/l	4.74	19.6	0.948	9.8	--	--	--	--	--
OUTFALL 009	50-32-8	Benzo(a)pyrene	7	0	0.0%	µg/l	1.9	9.8	0.0948	2.94	--	--	--	--	--
OUTFALL 009	205-99-2	Benzo(b)fluoranthene	7	0	0.0%	µg/l	1.9	9.8	0.0948	1.96	--	--	--	--	--
OUTFALL 009	191-24-2	Benzo(g,h,i)perylene	7	0	0.0%	µg/l	4.74	9.8	0.0948	3.92	--	--	--	--	--
OUTFALL 009	207-08-9	Benzo[k]fluoranthene	7	0	0.0%	µg/l	0.474	9.8	0.19	2.45	--	--	--	--	--
OUTFALL 009	65-85-0	Benzoic Acid	3	0	0.0%	µg/l	4.74	19.6	2.84	9.8	--	--	--	--	--
OUTFALL 009	100-51-6	Benzyl alcohol	3	0	0.0%	µg/l	4.74	19.6	0.0948	3.43	--	--	--	--	--
OUTFALL 009	85-68-7	Benzyl butyl phthalate	7	0	0.0%	µg/l	4.74	19.6	0.664	3.92	--	--	--	--	--
OUTFALL 009	7440-41-7	Beryllium	7	0	0.0%	µg/l	2	2	0.9	1	--	--	--	--	--
OUTFALL 009	7440-41-7 (dissolved)	Beryllium (dissolved)	7	0	0.0%	µg/l	2	2	0.9	1	--	--	--	--	--
OUTFALL 009	319-85-7	beta-BHC	7	0	0.0%	µg/l	0.0094	0.0098	0.0038	0.0039	--	--	--	--	--
OUTFALL 009	108-60-1	Bis(2-chloro-1-methylethyl) ether	3	0	0.0%	µg/l	0.474	0.481	0.19	0.192	--	--	--	--	--
OUTFALL 009	111-91-1	Bis(2-Chloroethoxy)Methane	7	0	0.0%	µg/l	0.474	9.8	0.0948	2.94	--	--	--	--	--
OUTFALL 009	111-44-4	Bis(2-Chloroethyl) Ether	7	0	0.0%	µg/l	0.474	9.8	0.0948	2.94	--	--	--	--	--
OUTFALL 009	39638-32-9	Bis(2-chloroisopropyl) ether	4	0	0.0%	µg/l	0.474	9.8	0.0948	2.45	--	--	--	--	--
OUTFALL 009	117-81-7	Bis(2-ethylhexyl) phthalate	7	1	14.3%	µg/l	4.74	49	1.61	3.92	10.6	10.6	10.6	10.6	Maximum detected value
OUTFALL 009	7440-42-8	Boron	7	5	71.4%	mg/l	0.05	0.053	0.02	0.02	0.039	0.053	0.0448	0.053	Maximum detected value
OUTFALL 009	7440-42-8 (dissolved)	Boron (dissolved)	7	5	71.4%	mg/l	0.05	0.056	0.02	0.02	0.039	0.05	0.0438	0.05	Maximum detected value
OUTFALL 009	75-25-2	Bromoform	7	0	0.0%	µg/l	0.5	1	0.25	0.4	--	--	--	--	--
OUTFALL 009	7440-43-9	Cadmium	43	9	20.9%	µg/l	1	1	0.1	0.25	0.11	0.43	0.19	0.229	95% GROS Adjusted Gamma UCL
OUTFALL 009	7440-43-9 (dissolved)	Cadmium (dissolved)	43	4	9.3%	µg/l	1	1	0.1	0.25	0.11	0.14	0.1225	0.14	Maximum detected value
OUTFALL 009	56-23-5	Carbon Tetrachloride	7	0	0.0%	µg/l	0.5	0.5	0.25	0.28	--	--	--	--	--
OUTFALL 009	10045-97-3	Cesium-137	43	0	0.0%	pCi/l	8.35	20	0.863	20	--	--	--	--	--
OUTFALL 009	57-74-9	Chlordane	7	0	0.0%	µg/l	0.094	0.098	0.0078	0.078	--	--	--	--	--
OUTFALL 009	108-90-7	Chlorobenzene	7	0	0.0%	µg/l	0.5	0.5	0.25	0.36	--	--	--	--	--
OUTFALL 009	124-48-1	Chlorodibromomethane	7	0	0.0%	µg/l	0.5	0.5	0.25	0.4	--	--	--	--	--

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 009	67-66-3	Chloroform	7	0	0.0%	µg/l	0.5	0.5	0.25	0.33	--	--	--	--	--
OUTFALL 009	74-87-3	Chloromethane	7	0	0.0%	µg/l	0.5	0.5	0.25	0.4	--	--	--	--	--
OUTFALL 009	2921-88-2	Chloropyrifos	7	0	0.0%	µg/l	0.95	1.4	0.01	1	--	--	--	--	--
OUTFALL 009	7440-47-3	Chromium	7	3	42.9%	µg/l	5	5	2	2.5	2	7.9	5.1	7.9	Maximum detected value
OUTFALL 009	7440-47-3 (dissolved)	Chromium (dissolved)	7	1	14.3%	µg/l	5	5	2	2.5	2.5	2.5	2.5	2.5	Maximum detected value
OUTFALL 009	18540-29-9	Chromium, Hexavalent	7	2	28.6%	µg/l	1	1	0.25	0.25	0.28	0.41	0.345	0.41	Maximum detected value
OUTFALL 009	218-01-9	Chrysene	7	0	0.0%	µg/l	0.474	9.8	0.0948	2.45	--	--	--	--	--
OUTFALL 009	156-59-2	cis-1,2-Dichloroethene	5	0	0.0%	µg/l	0.5	0.5	0.25	0.32	--	--	--	--	--
OUTFALL 009	10061-01-5	cis-1,3-Dichloropropene	7	0	0.0%	µg/l	0.5	0.5	0.22	0.25	--	--	--	--	--
OUTFALL 009	Ra226Ra228	Combined Radium-226 and Radium-228	43	3	7.0%	pCi/l	--	1.55	--	1.55	0.67	0.848	0.766	0.848	Maximum detected value
OUTFALL 009	7440-50-8	Copper	43	42	97.7%	µg/l	5.3	5.3	0.5	0.5	1.6	9.6	4.82	5.408	95% KM Adjusted Gamma UCL
OUTFALL 009	7440-50-8 (dissolved)	Copper (dissolved)	43	42	97.7%	µg/l	2.7	2.7	0.5	0.5	1.3	7.1	3.26	3.611	95% KM Adjusted Gamma UCL
OUTFALL 009	57-12-5	Cyanide Anion	35	0	0.0%	µg/l	5	5	2.2	3	--	--	--	--	--
OUTFALL 009	319-86-8	delta-BHC	7	0	0.0%	µg/l	0.0047	0.0049	0.0033	0.0034	--	--	--	--	--
OUTFALL 009	333-41-5	Diazinon	7	0	0.0%	µg/l	0.24	0.47	0.038	0.25	--	--	--	--	--
OUTFALL 009	53-70-3	Dibenz[a,h]anthracene	7	0	0.0%	µg/l	0.474	19.6	0.0948	2.94	--	--	--	--	--
OUTFALL 009	132-64-9	Dibenzofuran	3	0	0.0%	µg/l	0.474	9.8	0.0948	3.92	--	--	--	--	--
OUTFALL 009	84-74-2	Dibutyl phthalate	7	0	0.0%	µg/l	1.9	19.6	0.284	2.94	--	--	--	--	--
OUTFALL 009	75-27-4	Dichlorobromomethane	7	0	0.0%	µg/l	0.5	0.5	0.25	0.3	--	--	--	--	--
OUTFALL 009	60-57-1	Dieldrin	7	0	0.0%	µg/l	0.0047	0.0049	0.0019	0.002	--	--	--	--	--
OUTFALL 009	84-66-2	Diethyl phthalate	7	1	14.3%	µg/l	0.948	9.8	0.474	3.43	0.257	0.257	0.257	0.257	Maximum detected value
OUTFALL 009	108-20-3	Diisopropyl Ether	2	0	0.0%	µg/l	0.5	0.5	0.25	0.25	--	--	--	--	--
OUTFALL 009	131-11-3	Dimethyl phthalate	7	0	0.0%	µg/l	0.474	9.8	0.19	2.45	--	--	--	--	--
OUTFALL 009	117-84-0	Di-n-octyl phthalate	7	0	0.0%	µg/l	4.74	19.6	0.19	3.43	--	--	--	--	--
OUTFALL 009	DioxinTEQMamNoNDs	TCDD-TEQ	43	38	88.4%	µg/l	--	--	--	--	1.7E-09	8.1E-06	1.8E-06	2.7E-06	95% Adjusted Gamma UCL
OUTFALL 009	959-98-8	Endosulfan I	7	0	0.0%	µg/l	0.0047	0.0049	0.0019	0.0029	--	--	--	--	--
OUTFALL 009	33213-65-9	Endosulfan II	7	0	0.0%	µg/l	0.0047	0.0049	0.0019	0.0029	--	--	--	--	--
OUTFALL 009	1031-07-8	Endosulfan Sulfate	7	0	0.0%	µg/l	0.0094	0.0098	0.0028	0.0029	--	--	--	--	--
OUTFALL 009	72-20-8	Endrin	7	0	0.0%	µg/l	0.0047	0.0049	0.0019	0.002	--	--	--	--	--
OUTFALL 009	7421-93-4	Endrin Aldehyde	7	0	0.0%	µg/l	0.0094	0.0098	0.0019	0.002	--	--	--	--	--
OUTFALL 009	53494-70-5	Endrin Ketone	1	0	0.0%	µg/l	0.0094	0.0094	0.0028	0.0028	--	--	--	--	--
OUTFALL 009	75-00-3	Ethyl Chloride	7	0	0.0%	µg/l	0.5	1	0.25	0.4	--	--	--	--	--
OUTFALL 009	100-41-4	Ethylbenzene	7	0	0.0%	µg/l	0.5	0.5	0.25	0.25	--	--	--	--	--
OUTFALL 009	637-92-3	Ethyl-t-Butyl Ether (ETBE)	2	0	0.0%	µg/l	0.5	0.5	0.28	0.28	--	--	--	--	--
OUTFALL 009	206-44-0	Fluoranthene	7	0	0.0%	µg/l	0.474	9.8	0.0948	2.94	--	--	--	--	--
OUTFALL 009	86-73-7	Fluorene	7	0	0.0%	µg/l	0.474	9.8	0.0948	2.94	--	--	--	--	--
OUTFALL 009	16984-48-8	Fluoride	7	6	85.7%	mg/l	0.5	0.5	0.25	0.25	0.12	0.2	0.155	0.2	Maximum detected value
OUTFALL 009	75-69-4	Freon 11	7	0	0.0%	µg/l	0.5	0.5	0.25	0.34	--	--	--	--	--
OUTFALL 009	76-13-1	Freon 113	1	0	0.0%	µg/l	5	5	0.5	0.5	--	--	--	--	--
OUTFALL 009	58-89-9	gamma-BHC (Lindane)	7	0	0.0%	µg/l	0.0095	0.019	0.0028	0.0029	--	--	--	--	--

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 009	12587-46-1	Gross Alpha	43	30	69.8%	pCi/l	0.978	35.8	0.341	35.8	0.142	5.82	1.50	1.732	95% KM Adjusted Gamma UCL
OUTFALL 009	12587-47-2	Gross Beta	43	38	88.4%	pCi/l	1.97	25.4	0.948	25.4	1.13	9.9	2.73	3.979	95% KM (Chebyshev) UCL
OUTFALL 009	76-44-8	Heptachlor	7	0	0.0%	µg/l	0.0094	0.0098	0.0028	0.0029	--	--	--	--	--
OUTFALL 009	1024-57-3	Heptachlor Epoxide	7	0	0.0%	µg/l	0.0047	0.0049	0.0024	0.0025	--	--	--	--	--
OUTFALL 009	118-74-1	Hexachlorobenzene	7	0	0.0%	µg/l	0.948	9.8	0.0948	2.94	--	--	--	--	--
OUTFALL 009	87-68-3	Hexachlorobutadiene (HCBD)	7	0	0.0%	µg/l	1.9	9.8	0.19	3.92	--	--	--	--	--
OUTFALL 009	77-47-4	Hexachlorocyclopentadiene	7	0	0.0%	µg/l	4.74	19.6	0.0948	4.9	--	--	--	--	--
OUTFALL 009	67-72-1	Hexachloroethane	7	0	0.0%	µg/l	2.84	9.8	0.19	3.43	--	--	--	--	--
OUTFALL 009	122-66-7	Hydrazine, 1,2-diphenyl-	7	0	0.0%	µg/l	0.948	19.6	0.19	2.45	--	--	--	--	--
OUTFALL 009	193-39-5	Indeno(1,2,3-cd)pyrene	7	0	0.0%	µg/l	1.9	19.6	0.0948	3.43	--	--	--	--	--
OUTFALL 009	78-59-1	Isophorone	7	0	0.0%	µg/l	0.948	9.8	0.0948	2.94	--	--	--	--	--
OUTFALL 009	7439-92-1	Lead	43	41	95.3%	µg/l	1	1	0.2	0.2	0.42	13	3.62	4.539	95% GROS Adjusted Gamma UCL
OUTFALL 009	7439-92-1 (dissolved)	Lead (dissolved)	43	33	76.7%	µg/l	1	1	0.2	0.5	0.21	7.1	0.76	0.776	KM H-UCL
OUTFALL 009	7439-97-6	Mercury	43	2	4.7%	µg/l	0.2	0.2	0.027	0.1	0.027	0.11	0.0685	0.11	Maximum detected value
OUTFALL 009	7439-97-6 (dissolved)	Mercury (dissolved)	42	0	0.0%	µg/l	0.2	0.2	0.027	0.1	--	--	--	--	--
OUTFALL 009	72-43-5	Methoxychlor	1	0	0.0%	µg/l	0.0047	0.0047	0.0033	0.0033	--	--	--	--	--
OUTFALL 009	74-83-9	Methyl Bromide	7	0	0.0%	µg/l	0.5	1	0.25	0.42	--	--	--	--	--
OUTFALL 009	1634-04-4	Methyl tert-Butyl Ether (MTBE)	2	0	0.0%	µg/l	0.5	0.5	0.32	0.32	--	--	--	--	--
OUTFALL 009	75-09-2	Methylene Chloride (DCM)	7	0	0.0%	µg/l	1	2	0.88	0.95	--	--	--	--	--
OUTFALL 009	99-09-2	m-Nitroaniline	3	0	0.0%	µg/l	4.74	19.6	0.948	2.94	--	--	--	--	--
OUTFALL 009	91-20-3	Naphthalene	10	0	0.0%	µg/l	0.5	9.8	0.0948	2.94	--	--	--	--	--
OUTFALL 009	7440-02-0	Nickel	9	5	55.6%	µg/l	10	10	2	5	2.2	7.3	4.18	6.17	95% KM (t) UCL
OUTFALL 009	7440-02-0 (dissolved)	Nickel (dissolved)	9	2	22.2%	µg/l	10	10	2	5	1.3	2	1.65	2	Maximum detected value
OUTFALL 009	NO3NO2 (as N)	Nitrate and Nitrite (as N)	43	42	97.7%	mg/l	0.26	0.26	0.15	0.15	0.26	3	0.69	0.775	KM H-UCL
OUTFALL 009	98-95-3	Nitrobenzene	7	0	0.0%	µg/l	0.948	19.6	0.0948	2.94	--	--	--	--	--
OUTFALL 009	62-75-9	n-Nitrosodimethylamine (NDMA)	7	0	0.0%	µg/l	1.9	19.6	0.0948	2.45	--	--	--	--	--
OUTFALL 009	86-30-6	n-Nitrosodiphenylamine	7	0	0.0%	µg/l	0.948	9.8	0.0948	1.96	--	--	--	--	--
OUTFALL 009	621-64-7	n-Nitrosodipropylamine	7	0	0.0%	µg/l	1.9	9.8	0.0948	3.43	--	--	--	--	--
OUTFALL 009	68153-81-1	Oil & Grease	1	0	0.0%	mg/l	5.2	5.2	1.5	1.5	--	--	--	--	--
OUTFALL 009	106-44-5	p-Cresol	3	0	0.0%	µg/l	4.74	9.8	0.19	2.94	--	--	--	--	--
OUTFALL 009	87-86-5	Pentachlorophenol	7	1	14.3%	µg/l	1.9	19.6	0.379	3.43	1.46	1.46	1.46	1.46	Maximum detected value
OUTFALL 009	14797-73-0	Perchlorate	15	0	0.0%	µg/l	4	4	0.9	0.95	--	--	--	--	--
OUTFALL 009	85-01-8	Phenanthrene	7	0	0.0%	µg/l	0.474	9.8	0.0948	3.43	--	--	--	--	--
OUTFALL 009	108-95-2	Phenol	7	0	0.0%	µg/l	0.948	9.8	0.284	1.96	--	--	--	--	--
OUTFALL 009	100-01-6	p-Nitroaniline	3	0	0.0%	µg/l	4.74	19.6	0.474	3.92	--	--	--	--	--
OUTFALL 009	13966-00-2	Potassium-40	43	0	0.0%	pCi/l	25	300	12	300	--	--	--	--	--
OUTFALL 009	129-00-0	Pyrene	7	0	0.0%	µg/l	0.474	9.8	0.0948	3.92	--	--	--	--	--
OUTFALL 009	13982-63-3	Radium-226	43	8	18.6%	pCi/l	0.0449	1	0.0449	0.833	0.064	0.78	0.307	0.373	95% KM (t) UCL
OUTFALL 009	15262-20-1	Radium-228	43	3	7.0%	pCi/l	0.389	2.83	0.291	2.83	0.38	0.6	0.47	0.6	Maximum detected value
OUTFALL 009	7782-49-2	Selenium	10	0	0.0%	µg/l	2	12	0.5	8	--	--	--	--	--
OUTFALL 009	7782-49-2 (dissolved)	Selenium (dissolved)	10	2	20.0%	µg/l	2	2	0.5	0.5	0.64	10	5.32	10	Maximum detected value

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 009	7440-22-4	Silver	8	1	12.5%	µg/l	1	10	0.5	6	0.62	0.62	0.62	0.62	Maximum detected value
OUTFALL 009	7440-22-4 (dissolved)	Silver (dissolved)	8	0	0.0%	µg/l	1	10	0.5	6	--	--	--	--	--
OUTFALL 009	10098-97-2	Strontium-90	43	2	4.7%	pCi/l	0.565	3	0.342	1.94	0.355	0.66	0.5075	0.66	Maximum detected value
OUTFALL 009	994-05-8	Tert-Amyl Methyl Ether (TAME)	2	0	0.0%	µg/l	0.5	0.5	0.33	0.33	--	--	--	--	--
OUTFALL 009	75-65-0	Tert-Butyl Alcohol (TBA)	2	0	0.0%	µg/l	10	10	6.5	6.5	--	--	--	--	--
OUTFALL 009	127-18-4	Tetrachloroethene (PCE)	7	0	0.0%	µg/l	0.5	0.5	0.25	0.32	--	--	--	--	--
OUTFALL 009	7440-28-0	Thallium	43	3	7.0%	µg/l	1	1	0.2	0.5	0.23	0.43	0.3	0.43	Maximum detected value
OUTFALL 009	7440-28-0 (dissolved)	Thallium (dissolved)	43	4	9.3%	µg/l	1	1	0.2	0.5	0.2	0.29	0.2375	0.29	Maximum detected value
OUTFALL 009	108-88-3	Toluene	7	0	0.0%	µg/l	0.5	0.5	0.25	0.36	--	--	--	--	--
OUTFALL 009	8001-35-2	Toxaphene	7	0	0.0%	µg/l	0.47	0.49	0.24	0.25	--	--	--	--	--
OUTFALL 009	156-60-5	trans-1,2-Dichloroethene	7	0	0.0%	µg/l	0.5	0.5	0.25	0.3	--	--	--	--	--
OUTFALL 009	10061-02-6	trans-1,3-Dichloropropene	7	0	0.0%	µg/l	0.5	0.5	0.25	0.32	--	--	--	--	--
OUTFALL 009	79-01-6	Trichloroethene (TCE)	7	0	0.0%	µg/l	0.5	0.5	0.25	0.26	--	--	--	--	--
OUTFALL 009	10028-17-8	Tritium	43	0	0.0%	pCi/l	200	500	76	395	--	--	--	--	--
OUTFALL 009	7440-61-1	Uranium	40	28	70.0%	pCi/l	0.167	1.39	0.108	1	0.046	1.02	0.18	0.305	95% KM (Chebyshev) UCL
OUTFALL 009	7440-62-2	Vanadium	7	4	57.1%	µg/l	10	10	3	5	3.7	13	7.3	13	Maximum detected value
OUTFALL 009	7440-62-2 (dissolved)	Vanadium (dissolved)	7	0	0.0%	µg/l	10	10	3	5	--	--	--	--	--
OUTFALL 009	110-75-8	Vinyl 2-Chloroethyl ether	7	0	0.0%	µg/l	2	5	1	1.8	--	--	--	--	--
OUTFALL 009	75-01-4	Vinyl Chloride	7	0	0.0%	µg/l	0.5	0.5	0.25	0.4	--	--	--	--	--
OUTFALL 009	1330-20-7	Xylenes, Total	7	0	0.0%	µg/l	1	1.5	0.5	0.9	--	--	--	--	--
OUTFALL 009	7440-66-6	Zinc	9	7	77.8%	µg/l	20	20	6	9	11	50	23.29	30.05	95% KM (t) UCL
OUTFALL 009	7440-66-6 (dissolved)	Zinc (dissolved)	9	2	22.2%	µg/l	9.4	20	2.5	10	9.7	14	11.85	14	Maximum detected value
OUTFALL 011	71-55-6	1,1,1-Trichloroethane	5	0	0.0%	µg/l	0.5	0.5	0.3	0.3	--	--	--	--	--
OUTFALL 011	79-34-5	1,1,2,2-Tetrachloroethane	3	0	0.0%	µg/l	0.5	0.5	0.3	0.3	--	--	--	--	--
OUTFALL 011	79-00-5	1,1,2-Trichloroethane	5	0	0.0%	µg/l	0.5	0.5	0.3	0.3	--	--	--	--	--
OUTFALL 011	75-34-3	1,1-Dichloroethane	5	0	0.0%	µg/l	0.5	0.5	0.4	0.4	--	--	--	--	--
OUTFALL 011	75-35-4	1,1-Dichloroethene	5	0	0.0%	µg/l	0.5	0.5	0.42	0.42	--	--	--	--	--
OUTFALL 011	57-14-7	1,1-Dimethylhydrazine	3	0	0.0%	µg/l	5	5	1.13	1.42	--	--	--	--	--
OUTFALL 011	120-82-1	1,2,4-Trichlorobenzene	3	0	0.0%	µg/l	0.94	0.943	0.094	0.0943	--	--	--	--	--
OUTFALL 011	95-50-1	1,2-Dichlorobenzene	5	0	0.0%	µg/l	0.47	0.5	0.094	0.32	--	--	--	--	--
OUTFALL 011	107-06-2	1,2-Dichloroethane	5	0	0.0%	µg/l	0.5	0.5	0.28	0.28	--	--	--	--	--
OUTFALL 011	78-87-5	1,2-Dichloropropane	3	0	0.0%	µg/l	0.5	0.5	0.35	0.35	--	--	--	--	--
OUTFALL 011	541-73-1	1,3-Dichlorobenzene	5	0	0.0%	µg/l	0.47	0.5	0.094	0.35	--	--	--	--	--
OUTFALL 011	106-46-7	1,4-Dichlorobenzene	5	0	0.0%	µg/l	0.47	0.5	0.189	0.37	--	--	--	--	--
OUTFALL 011	123-91-1	1,4-Dioxane	3	0	0.0%	µg/l	2	2	1	1	--	--	--	--	--
OUTFALL 011	95-95-4	2,4,5-Trichlorophenol	2	0	0.0%	µg/l	1.9	1.9	0.19	0.19	--	--	--	--	--
OUTFALL 011	88-06-2	2,4,6-Trichlorophenol	5	0	0.0%	µg/l	0.94	5.7	0.094	0.0943	--	--	--	--	--
OUTFALL 011	120-83-2	2,4-Dichlorophenol	3	0	0.0%	µg/l	1.89	1.9	0.189	0.19	--	--	--	--	--
OUTFALL 011	105-67-9	2,4-Dimethylphenol	3	0	0.0%	µg/l	1.89	1.9	0.28	0.283	--	--	--	--	--
OUTFALL 011	51-28-5	2,4-Dinitrophenol	3	0	0.0%	µg/l	4.7	4.72	0.849	0.85	--	--	--	--	--
OUTFALL 011	121-14-2	2,4-Dinitrotoluene	5	0	0.0%	µg/l	4.7	8.5	0.189	0.19	--	--	--	--	--
OUTFALL 011	606-20-2	2,6-Dinitrotoluene	3	0	0.0%	µg/l	4.7	4.72	0.094	0.0943	--	--	--	--	--

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 011	91-58-7	2-Chloronaphthalene	3	0	0.0%	µg/l	0.47	0.472	0.094	0.0943	--	--	--	--	--
OUTFALL 011	95-57-8	2-Chlorophenol	3	0	0.0%	µg/l	0.94	0.943	0.189	0.19	--	--	--	--	--
OUTFALL 011	534-52-1	2-Methyl-4,6-Dinitrophenol	2	0	0.0%	µg/l	4.7	4.72	0.189	0.19	--	--	--	--	--
OUTFALL 011	91-57-6	2-Methylnaphthalene	2	0	0.0%	µg/l	0.94	0.94	0.094	0.094	--	--	--	--	--
OUTFALL 011	95-48-7	2-Methylphenol (o-cresol)	2	0	0.0%	µg/l	1.9	1.9	0.094	0.094	--	--	--	--	--
OUTFALL 011	88-74-4	2-Nitroaniline	2	0	0.0%	µg/l	4.7	4.7	0.094	0.094	--	--	--	--	--
OUTFALL 011	88-75-5	2-Nitrophenol	3	0	0.0%	µg/l	1.89	1.9	0.094	0.0943	--	--	--	--	--
OUTFALL 011	91-94-1	3,3-Dichlorobenzidine	3	0	0.0%	µg/l	4.7	4.72	4.7	4.72	--	--	--	--	--
OUTFALL 011	72-54-8	4,4'-DDD	3	0	0.0%	µg/l	0.0047	0.0047	0.0019	0.0038	--	--	--	--	--
OUTFALL 011	72-55-9	4,4'-DDE	3	0	0.0%	µg/l	0.0047	0.0047	0.0028	0.0028	--	--	--	--	--
OUTFALL 011	50-29-3	4,4'-DDT	3	0	0.0%	µg/l	0.0094	0.0094	0.0038	0.0038	--	--	--	--	--
OUTFALL 011	101-55-3	4-Bromophenyl phenyl ether	3	0	0.0%	µg/l	0.94	0.943	0.094	0.0943	--	--	--	--	--
OUTFALL 011	59-50-7	4-Chloro-3-methylphenol (p-Chlorocresol)	3	0	0.0%	µg/l	1.89	1.9	0.189	0.19	--	--	--	--	--
OUTFALL 011	106-47-8	4-Chloroaniline	2	0	0.0%	µg/l	1.9	1.9	0.094	0.094	--	--	--	--	--
OUTFALL 011	7005-72-3	4-Chlorophenyl Phenyl Ether	3	0	0.0%	µg/l	0.47	0.472	0.094	0.0943	--	--	--	--	--
OUTFALL 011	100-02-7	4-Nitrophenol	3	0	0.0%	µg/l	4.7	4.72	2.36	2.4	--	--	--	--	--
OUTFALL 011	83-32-9	Acenaphthene	3	0	0.0%	µg/l	0.47	0.472	0.094	0.0943	--	--	--	--	--
OUTFALL 011	208-96-8	Acenaphthylene	3	0	0.0%	µg/l	0.47	0.472	0.094	0.0943	--	--	--	--	--
OUTFALL 011	107-02-8	Acrolein	3	0	0.0%	µg/l	5	5	4	4	--	--	--	--	--
OUTFALL 011	107-13-1	Acrylonitrile	3	0	0.0%	µg/l	2	2	0.7	1.2	--	--	--	--	--
OUTFALL 011	309-00-2	Aldrin	3	0	0.0%	µg/l	0.0047	0.0047	0.0014	0.0014	--	--	--	--	--
OUTFALL 011	319-84-6	alpha-BHC	5	0	0.0%	µg/l	0.0047	0.0095	0.0024	0.0024	--	--	--	--	--
OUTFALL 011	7664-41-7 (as NH3)	Ammonia (as NH3)	5	1	20.0%	mg/l	0.5	0.5	0.5	0.5	0.56	0.56	0.56	0.56	Maximum detected value
OUTFALL 011	62-53-3	Aniline	2	0	0.0%	µg/l	9.4	9.4	0.28	0.28	--	--	--	--	--
OUTFALL 011	120-12-7	Anthracene	3	0	0.0%	µg/l	0.47	0.472	0.094	0.0943	--	--	--	--	--
OUTFALL 011	7440-36-0	Antimony	3	3	100.0%	µg/l	--	--	--	--	0.65	1	0.82	1	Maximum detected value
OUTFALL 011	7440-36-0 (dissolved)	Antimony (dissolved)	3	3	100.0%	µg/l	--	--	--	--	0.58	1	0.74	1	Maximum detected value
OUTFALL 011	12674-11-2	Aroclor 1016	3	0	0.0%	µg/l	0.47	0.47	0.24	0.24	--	--	--	--	--
OUTFALL 011	11104-28-2	Aroclor 1221	3	0	0.0%	µg/l	0.47	0.47	0.24	0.24	--	--	--	--	--
OUTFALL 011	11141-16-5	Aroclor 1232	3	0	0.0%	µg/l	0.47	0.47	0.24	0.24	--	--	--	--	--
OUTFALL 011	53469-21-9	Aroclor 1242	3	0	0.0%	µg/l	0.47	0.47	0.24	0.24	--	--	--	--	--
OUTFALL 011	12672-29-6	Aroclor 1248	3	0	0.0%	µg/l	0.47	0.47	0.24	0.24	--	--	--	--	--
OUTFALL 011	11097-69-1	Aroclor 1254	3	0	0.0%	µg/l	0.47	0.47	0.24	0.24	--	--	--	--	--
OUTFALL 011	11096-82-5	Aroclor 1260	3	0	0.0%	µg/l	0.47	0.47	0.24	0.24	--	--	--	--	--
OUTFALL 011	7440-38-2	Arsenic	3	2	66.7%	µg/l	10	10	7	7	7.9	8.9	8.4	8.9	Maximum detected value
OUTFALL 011	7440-38-2 (dissolved)	Arsenic (dissolved)	3	0	0.0%	µg/l	10	10	7	7	--	--	--	--	--
OUTFALL 011	7440-39-3	Barium	3	3	100.0%	mg/l	--	--	--	--	0.026	0.068	4.07E-02	0.068	Maximum detected value
OUTFALL 011	7440-39-3 (dissolved)	Barium (dissolved)	3	3	100.0%	mg/l	--	--	--	--	0.0082	0.017	1.37E-02	0.017	Maximum detected value
OUTFALL 011	56-55-3	Benz[a]anthracene	3	0	0.0%	µg/l	4.7	4.72	0.094	0.0943	--	--	--	--	--
OUTFALL 011	71-43-2	Benzene	5	0	0.0%	µg/l	0.5	0.5	0.28	0.28	--	--	--	--	--
OUTFALL 011	92-87-5	Benzidine	2	0	0.0%	µg/l	4.7	4.7	4.7	4.7	--	--	--	--	--
OUTFALL 011	50-32-8	Benzo(a)pyrene	3	0	0.0%	µg/l	1.89	1.9	0.094	0.0943	--	--	--	--	--
OUTFALL 011	205-99-2	Benzo(b)fluoranthene	3	0	0.0%	µg/l	1.89	1.9	0.094	0.0943	--	--	--	--	--

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 011	191-24-2	Benzo(g,h,i)perylene	3	0	0.0%	µg/l	4.7	4.72	0.094	0.0943	--	--	--	--	--
OUTFALL 011	207-08-9	Benzo[k]fluoranthene	3	0	0.0%	µg/l	0.47	0.472	0.094	0.0943	--	--	--	--	--
OUTFALL 011	65-85-0	Benzoic Acid	2	0	0.0%	µg/l	19	19	2.8	2.8	--	--	--	--	--
OUTFALL 011	100-51-6	Benzyl alcohol	2	0	0.0%	µg/l	4.7	4.7	0.094	0.094	--	--	--	--	--
OUTFALL 011	85-68-7	Benzyl butyl phthalate	3	1	33.3%	µg/l	4.7	4.72	0.66	0.66	1.3	1.3	1.3	1.3	Maximum detected value
OUTFALL 011	7440-41-7	Beryllium	3	0	0.0%	µg/l	2	2	0.9	0.9	--	--	--	--	--
OUTFALL 011	7440-41-7 (dissolved)	Beryllium (dissolved)	3	0	0.0%	µg/l	2	2	0.9	0.9	--	--	--	--	--
OUTFALL 011	319-85-7	beta-BHC	3	0	0.0%	µg/l	0.0094	0.0094	0.0038	0.0038	--	--	--	--	--
OUTFALL 011	111-91-1	Bis(2-Chloroethoxy)Methane	3	0	0.0%	µg/l	0.47	0.472	0.094	0.0943	--	--	--	--	--
OUTFALL 011	111-44-4	Bis(2-Chloroethyl) Ether	3	0	0.0%	µg/l	0.47	0.472	0.094	0.0943	--	--	--	--	--
OUTFALL 011	39638-32-9	Bis(2-chloroisopropyl) ether	3	0	0.0%	µg/l	0.47	0.472	0.094	0.0943	--	--	--	--	--
OUTFALL 011	117-81-7	Bis(2-ethylhexyl) phthalate	5	0	0.0%	µg/l	4.7	4.72	1.6	1.6	--	--	--	--	--
OUTFALL 011	7440-42-8	Boron	3	2	66.7%	mg/l	0.05	0.05	0.02	0.02	0.033	0.039	0.036	0.039	Maximum detected value
OUTFALL 011	7440-42-8 (dissolved)	Boron (dissolved)	3	1	33.3%	mg/l	0.05	0.05	0.02	0.02	0.044	0.044	0.044	0.044	Maximum detected value
OUTFALL 011	75-25-2	Bromoform	3	0	0.0%	µg/l	0.5	0.5	0.4	0.4	--	--	--	--	--
OUTFALL 011	7440-43-9	Cadmium	5	5	100.0%	µg/l	--	--	--	--	0.1	0.3	0.18	0.3	Maximum detected value
OUTFALL 011	7440-43-9 (dissolved)	Cadmium (dissolved)	5	1	20.0%	µg/l	1	1	0.1	0.11	0.23	0.23	0.23	0.23	Maximum detected value
OUTFALL 011	56-23-5	Carbon Tetrachloride	5	0	0.0%	µg/l	0.5	0.5	0.28	0.28	--	--	--	--	--
OUTFALL 011	10045-97-3	Cesium-137	5	0	0.0%	pCi/l	20	20	1.28	18	--	--	--	--	--
OUTFALL 011	57-74-9	Chlordane	3	0	0.0%	µg/l	0.094	0.094	0.038	0.075	--	--	--	--	--
OUTFALL 011	108-90-7	Chlorobenzene	3	0	0.0%	µg/l	0.5	0.5	0.36	0.36	--	--	--	--	--
OUTFALL 011	124-48-1	Chlorodibromomethane	3	0	0.0%	µg/l	0.5	0.5	0.4	0.4	--	--	--	--	--
OUTFALL 011	67-66-3	Chloroform	5	0	0.0%	µg/l	0.5	0.5	0.33	0.33	--	--	--	--	--
OUTFALL 011	74-87-3	Chloromethane	3	0	0.0%	µg/l	0.5	0.5	0.4	0.4	--	--	--	--	--
OUTFALL 011	7440-47-3	Chromium	3	2	66.7%	µg/l	5	5	2	2	5.9	25	15.45	25	Maximum detected value
OUTFALL 011	7440-47-3 (dissolved)	Chromium (dissolved)	2	0	0.0%	µg/l	5	5	2	2	--	--	--	--	--
OUTFALL 011	18540-29-9	Chromium, Hexavalent	3	0	0.0%	µg/l	1	1	0.25	0.25	--	--	--	--	--
OUTFALL 011	218-01-9	Chrysene	3	0	0.0%	µg/l	0.47	0.472	0.094	0.0943	--	--	--	--	--
OUTFALL 011	156-59-2	cis-1,2-Dichloroethene	3	0	0.0%	µg/l	0.5	0.5	0.32	0.32	--	--	--	--	--
OUTFALL 011	10061-01-5	cis-1,3-Dichloropropene	3	0	0.0%	µg/l	0.5	0.5	0.22	0.22	--	--	--	--	--
OUTFALL 011	7440-48-4	Cobalt	3	2	66.7%	µg/l	10	10	2	2	2.2	3	2.6	3	Maximum detected value
OUTFALL 011	7440-48-4 (dissolved)	Cobalt (dissolved)	3	0	0.0%	µg/l	10	10	2	2	--	--	--	--	--
OUTFALL 011	Ra226Ra228	Combined Radium-226 and Radium-228	4	1	25.0%	pCi/l	0.51	0.96	0.51	0.96	1.15	1.15	1.15	1.15	Maximum detected value
OUTFALL 011	7440-50-8	Copper	5	5	100.0%	µg/l	--	--	--	--	5.15	8.7	6.688	8.7	Maximum detected value
OUTFALL 011	7440-50-8 (dissolved)	Copper (dissolved)	5	5	100.0%	µg/l	--	--	--	--	1.5	5.1	2.564	5.1	Maximum detected value
OUTFALL 011	57-12-5	Cyanide Anion	5	0	0.0%	µg/l	5	5	2.2	2.2	--	--	--	--	--
OUTFALL 011	110-82-7	Cyclohexane	4	0	0.0%	µg/l	1	2.5	0.4	2.5	--	--	--	--	--
OUTFALL 011	319-86-8	delta-BHC	3	0	0.0%	µg/l	0.0047	0.0047	0.0033	0.0033	--	--	--	--	--
OUTFALL 011	53-70-3	Dibenz[a,h]anthracene	3	0	0.0%	µg/l	0.47	0.472	0.094	0.0943	--	--	--	--	--
OUTFALL 011	132-64-9	Dibenzofuran	2	0	0.0%	µg/l	0.47	0.47	0.094	0.094	--	--	--	--	--

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 011	84-74-2	Dibutyl phthalate	3	1	33.3%	µg/l	1.9	1.9	0.19	0.19	0.396	0.396	0.396	0.396	Maximum detected value
OUTFALL 011	75-27-4	Dichlorobromomethane	3	0	0.0%	µg/l	0.5	0.5	0.3	0.3	--	--	--	--	--
OUTFALL 011	60-57-1	Dieldrin	3	0	0.0%	µg/l	0.0047	0.0047	0.0019	0.0019	--	--	--	--	--
OUTFALL 011	84-66-2	Diethyl phthalate	3	3	100.0%	µg/l	--	--	--	--	0.15	0.302	0.24	0.302	Maximum detected value
OUTFALL 011	131-11-3	Dimethyl phthalate	3	0	0.0%	µg/l	0.47	0.472	0.094	0.0943	--	--	--	--	--
OUTFALL 011	117-84-0	Di-n-octyl phthalate	3	0	0.0%	µg/l	4.7	4.72	0.094	0.0943	--	--	--	--	--
OUTFALL 011	DioxinTEQMamNoNDs	TCDD-TEQ	5	4	80.0%	µg/l	--	--	--	--	4.80E-07	3.30E-06	1.62E-06	3.30E-06	Maximum detected value
OUTFALL 011	959-98-8	Endosulfan I	3	0	0.0%	µg/l	0.0047	0.0047	0.0019	0.0019	--	--	--	--	--
OUTFALL 011	33213-65-9	Endosulfan II	3	0	0.0%	µg/l	0.0047	0.0047	0.0028	0.0028	--	--	--	--	--
OUTFALL 011	1031-07-8	Endosulfan Sulfate	3	0	0.0%	µg/l	0.0094	0.0094	0.0028	0.0028	--	--	--	--	--
OUTFALL 011	72-20-8	Endrin	3	0	0.0%	µg/l	0.0047	0.0047	0.0019	0.0019	--	--	--	--	--
OUTFALL 011	7421-93-4	Endrin Aldehyde	3	0	0.0%	µg/l	0.0094	0.0094	0.0019	0.0019	--	--	--	--	--
OUTFALL 011	53494-70-5	Endrin Ketone	2	0	0.0%	µg/l	0.0094	0.0094	0.0028	0.0028	--	--	--	--	--
OUTFALL 011	75-00-3	Ethyl Chloride	3	0	0.0%	µg/l	1	1	0.4	0.4	--	--	--	--	--
OUTFALL 011	100-41-4	Ethylbenzene	5	0	0.0%	µg/l	0.5	0.5	0.25	0.25	--	--	--	--	--
OUTFALL 011	206-44-0	Fluoranthene	3	0	0.0%	µg/l	0.47	0.472	0.094	0.0943	--	--	--	--	--
OUTFALL 011	86-73-7	Fluorene	3	0	0.0%	µg/l	0.47	0.472	0.094	0.0943	--	--	--	--	--
OUTFALL 011	16984-48-8	Fluoride	3	3	100.0%	mg/l	--	--	--	--	0.12	0.21	0.17	0.21	Maximum detected value
OUTFALL 011	75-69-4	Freon 11	5	0	0.0%	µg/l	0.5	0.5	0.34	0.34	--	--	--	--	--
OUTFALL 011	76-13-1	Freon 113	5	0	0.0%	µg/l	5	5	0.5	0.5	--	--	--	--	--
OUTFALL 011	354-23-4	Freon-123A	4	0	0.0%	µg/l	2	2.5	1.1	2.5	--	--	--	--	--
OUTFALL 011	58-89-9	gamma-BHC (Lindane)	3	0	0.0%	µg/l	0.019	0.019	0.0028	0.0028	--	--	--	--	--
OUTFALL 011	12587-46-1	Gross Alpha	5	5	100.0%	pCi/l	--	--	--	--	2	5.1	3.512	5.1	Maximum detected value
OUTFALL 011	12587-47-2	Gross Beta	5	5	100.0%	pCi/l	--	--	--	--	3.9	15.2	7.314	15.2	Maximum detected value
OUTFALL 011	76-44-8	Heptachlor	3	0	0.0%	µg/l	0.0094	0.0094	0.0028	0.0028	--	--	--	--	--
OUTFALL 011	1024-57-3	Heptachlor Epoxide	3	0	0.0%	µg/l	0.0047	0.0047	0.0024	0.0024	--	--	--	--	--
OUTFALL 011	118-74-1	Hexachlorobenzene	3	0	0.0%	µg/l	0.94	0.943	0.094	0.0943	--	--	--	--	--
OUTFALL 011	87-68-3	Hexachlorobutadiene (HCBD)	3	0	0.0%	µg/l	1.89	1.9	0.189	0.19	--	--	--	--	--
OUTFALL 011	77-47-4	Hexachlorocyclopentadiene	3	0	0.0%	µg/l	4.7	4.72	0.094	0.0943	--	--	--	--	--
OUTFALL 011	67-72-1	Hexachloroethane	3	0	0.0%	µg/l	2.8	2.83	0.189	0.19	--	--	--	--	--
OUTFALL 011	302-01-2	Hydrazine	3	0	0.0%	µg/l	1	1	0.439	0.6	--	--	--	--	--
OUTFALL 011	122-66-7	Hydrazine, 1,2-diphenyl-	3	0	0.0%	µg/l	0.94	0.943	0.094	0.0943	--	--	--	--	--
OUTFALL 011	193-39-5	Indeno(1,2,3-cd)pyrene	3	0	0.0%	µg/l	1.89	1.9	0.094	0.0943	--	--	--	--	--
OUTFALL 011	78-59-1	Isophorone	3	1	33.3%	µg/l	0.94	0.943	0.094	0.0943	0.094	0.094	0.094	0.094	Maximum detected value
OUTFALL 011	7439-92-1	Lead	5	5	100.0%	µg/l	--	--	--	--	2.2	7.1	4.62	7.1	Maximum detected value
OUTFALL 011	7439-92-1 (dissolved)	Lead (dissolved)	5	3	60.0%	µg/l	1	1	0.2	0.3	0.2	0.75	0.43	0.75	Maximum detected value
OUTFALL 011	7439-96-5	Manganese	5	5	100.0%	µg/l	--	--	--	--	55	150	105.4	150	Maximum detected value
OUTFALL 011	7439-96-5 (dissolved)	Manganese (dissolved)	5	3	60.0%	µg/l	2.7	20	1	7	1.5	75	33.2	75	Maximum detected value
OUTFALL 011	7439-97-6	Mercury	5	1	20.0%	µg/l	0.2	0.2	0.027	0.1	0.12	0.12	0.12	0.12	Maximum detected value

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 011	7439-97-6 (dissolved)	Mercury (dissolved)	5	0	0.0%	µg/l	0.2	0.2	0.027	0.1	--	--	--	--	--
OUTFALL 011	72-43-5	Methoxychlor	2	0	0.0%	µg/l	0.0047	0.0047	0.0033	0.0033	--	--	--	--	--
OUTFALL 011	74-83-9	Methyl Bromide	3	0	0.0%	µg/l	1	1	0.42	0.42	--	--	--	--	--
OUTFALL 011	60-34-4	Methyl Hydrazine	3	0	0.0%	µg/l	5	5	0.857	1.77	--	--	--	--	--
OUTFALL 011	75-09-2	Methylene Chloride (DCM)	3	0	0.0%	µg/l	1	1	0.95	0.95	--	--	--	--	--
OUTFALL 011	99-09-2	m-Nitroaniline	2	0	0.0%	µg/l	4.7	4.7	0.19	0.19	--	--	--	--	--
OUTFALL 011	91-20-3	Naphthalene	3	0	0.0%	µg/l	0.94	0.943	0.094	0.0943	--	--	--	--	--
OUTFALL 011	7440-02-0	Nickel	3	2	66.7%	µg/l	14	14	2	2	2.1	4.5	3.3	4.5	Maximum detected value
OUTFALL 011	7440-02-0 (dissolved)	Nickel (dissolved)	3	2	66.7%	µg/l	10	10	2	2	2.2	2.9	2.55	2.9	Maximum detected value
OUTFALL 011	14797-55-8 (as N)	Nitrate (as N)	5	5	100.0%	mg/l	--	--	--	--	0.22	0.97	0.604	0.97	Maximum detected value
OUTFALL 011	NO3NO2 (as N)	Nitrate and Nitrite (as N)	5	5	100.0%	mg/l	--	--	--	--	0.22	0.97	0.624	0.97	Maximum detected value
OUTFALL 011	14797-65-0 (as N)	Nitrite (as N)	5	0	0.0%	mg/l	0.15	0.15	0.09	0.09	--	--	--	--	--
OUTFALL 011	98-95-3	Nitrobenzene	3	0	0.0%	µg/l	0.94	0.943	0.094	0.0943	--	--	--	--	--
OUTFALL 011	62-75-9	n-Nitrosodimethylamine (NDMA)	5	0	0.0%	µg/l	1.89	7.5	0.094	0.0943	--	--	--	--	--
OUTFALL 011	86-30-6	n-Nitrosodiphenylamine	3	0	0.0%	µg/l	0.94	0.943	0.094	0.0943	--	--	--	--	--
OUTFALL 011	621-64-7	n-Nitrosodipropylamine	3	0	0.0%	µg/l	1.89	1.9	0.094	0.0943	--	--	--	--	--
OUTFALL 011	106-44-5	p-Cresol	2	0	0.0%	µg/l	4.7	4.7	0.19	0.19	--	--	--	--	--
OUTFALL 011	87-86-5	Pentachlorophenol	5	1	20.0%	µg/l	1.89	7.5	0.094	0.0943	1.5	1.5	1.5	1.5	Maximum detected value
OUTFALL 011	14797-73-0	Perchlorate	5	0	0.0%	µg/l	1	4	0.9	0.9	--	--	--	--	--
OUTFALL 011	85-01-8	Phenanthrene	3	0	0.0%	µg/l	0.47	0.472	0.094	0.0943	--	--	--	--	--
OUTFALL 011	108-95-2	Phenol	3	0	0.0%	µg/l	0.94	0.943	0.28	0.283	--	--	--	--	--
OUTFALL 011	100-01-6	p-Nitroaniline	2	0	0.0%	µg/l	4.7	4.7	0.47	0.47	--	--	--	--	--
OUTFALL 011	13966-00-2	Potassium-40	5	0	0.0%	pCi/l	25	300	16.2	300	--	--	--	--	--
OUTFALL 011	129-00-0	Pyrene	3	0	0.0%	µg/l	0.47	0.472	0.094	0.0943	--	--	--	--	--
OUTFALL 011	13982-63-3	Radium-226	5	3	60.0%	pCi/l	1	1	0.2	0.544	0.19	0.888	0.48	0.888	Maximum detected value
OUTFALL 011	15262-20-1	Radium-228	4	1	25.0%	pCi/l	1	1	0.42	0.556	0.33	0.33	0.33	0.33	Maximum detected value
OUTFALL 011	7782-49-2	Selenium	5	1	20.0%	µg/l	2	2	0.3	0.5	0.55	0.55	0.55	0.55	Maximum detected value
OUTFALL 011	7782-49-2 (dissolved)	Selenium (dissolved)	5	2	40.0%	µg/l	2	2	0.5	0.5	0.48	0.56	0.52	0.56	Maximum detected value
OUTFALL 011	7440-22-4	Silver	3	1	33.3%	µg/l	1	1	0.1	0.3	0.12	0.12	0.12	0.12	Maximum detected value
OUTFALL 011	7440-22-4 (dissolved)	Silver (dissolved)	3	0	0.0%	µg/l	1	1	0.1	0.3	--	--	--	--	--
OUTFALL 011	10098-97-2	Strontium-90	4	0	0.0%	pCi/l	2	4.3	0.47	3	--	--	--	--	--
OUTFALL 011	127-18-4	Tetrachloroethene (PCE)	5	0	0.0%	µg/l	0.5	0.5	0.32	0.32	--	--	--	--	--
OUTFALL 011	7440-28-0	Thallium	3	1	33.3%	µg/l	1	1	0.2	0.2	0.2	0.2	0.2	0.2	Maximum detected value
OUTFALL 011	7440-28-0 (dissolved)	Thallium (dissolved)	3	0	0.0%	µg/l	1	1	0.2	0.2	--	--	--	--	--
OUTFALL 011	108-88-3	Toluene	5	0	0.0%	µg/l	0.5	0.5	0.36	0.36	--	--	--	--	--
OUTFALL 011	8001-35-2	Toxaphene	3	0	0.0%	µg/l	0.47	0.47	0.24	0.24	--	--	--	--	--
OUTFALL 011	156-60-5	trans-1,2-Dichloroethene	3	0	0.0%	µg/l	0.5	0.5	0.3	0.3	--	--	--	--	--
OUTFALL 011	10061-02-6	trans-1,3-Dichloropropene	3	0	0.0%	µg/l	0.5	0.5	0.32	0.32	--	--	--	--	--
OUTFALL 011	79-01-6	Trichloroethene (TCE)	5	0	0.0%	µg/l	0.5	0.5	0.26	0.26	--	--	--	--	--
OUTFALL 011	10028-17-8	Tritium	5	0	0.0%	pCi/l	500	500	94	310	--	--	--	--	--

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 011	7440-61-1	Uranium	5	4	80.0%	pCi/l	0.693	0.693	0.21	0.21	0.321	0.566	0.4305	0.566	Maximum detected value
OUTFALL 011	7440-62-2	Vanadium	3	3	100.0%	µg/l	--	--	--	--	4.5	25	12.3	25	Maximum detected value
OUTFALL 011	7440-62-2 (dissolved)	Vanadium (dissolved)	3	0	0.0%	µg/l	10	10	3	3	--	--	--	--	--
OUTFALL 011	110-75-8	Vinyl 2-Chloroethyl ether	3	0	0.0%	µg/l	5	5	1.8	1.8	--	--	--	--	--
OUTFALL 011	75-01-4	Vinyl Chloride	5	0	0.0%	µg/l	0.5	0.5	0.4	0.4	--	--	--	--	--
OUTFALL 011	1330-20-7	Xylenes, Total	5	0	0.0%	µg/l	1.5	1.5	0.9	0.9	--	--	--	--	--
OUTFALL 011	7440-66-6	Zinc	5	5	100.0%	µg/l	--	--	--	--	17	60	33.14	60	Maximum detected value
OUTFALL 011	7440-66-6 (dissolved)	Zinc (dissolved)	5	2	40.0%	µg/l	20	20	6	6	6.2	10	8.1	10	Maximum detected value
OUTFALL 018	71-55-6	1,1,1-Trichloroethane	11	0	0.0%	µg/l	0.5	0.5	0.25	0.3	--	--	--	--	--
OUTFALL 018	79-34-5	1,1,2,2-Tetrachloroethane	6	0	0.0%	µg/l	0.5	0.5	0.25	0.3	--	--	--	--	--
OUTFALL 018	79-00-5	1,1,2-Trichloroethane	11	0	0.0%	µg/l	0.5	0.5	0.25	0.3	--	--	--	--	--
OUTFALL 018	75-34-3	1,1-Dichloroethane	11	0	0.0%	µg/l	0.5	0.5	0.25	0.4	--	--	--	--	--
OUTFALL 018	75-35-4	1,1-Dichloroethene	13	0	0.0%	µg/l	0.5	2	0.25	0.42	--	--	--	--	--
OUTFALL 018	57-14-7	1,1-Dimethylhydrazine	4	0	0.0%	µg/l	5	5	1.13	1.42	--	--	--	--	--
OUTFALL 018	96-18-4	1,2,3-Trichloropropane	1	0	0.0%	µg/l	0.5	0.5	0.4	0.4	--	--	--	--	--
OUTFALL 018	120-82-1	1,2,4-Trichlorobenzene	5	0	0.0%	µg/l	0.94	1	0.094	0.476	--	--	--	--	--
OUTFALL 018	106-93-4	1,2-Dibromoethane	1	0	0.0%	µg/l	0.5	0.5	0.4	0.4	--	--	--	--	--
OUTFALL 018	95-50-1	1,2-Dichlorobenzene	10	0	0.0%	µg/l	0.47	0.5	0.094	0.32	--	--	--	--	--
OUTFALL 018	107-06-2	1,2-Dichloroethane	13	1	7.7%	µg/l	0.5	0.5	0.25	0.28	2.4	2.4	2.4	2.4	Maximum detected value
OUTFALL 018	78-87-5	1,2-Dichloropropane	6	0	0.0%	µg/l	0.5	0.5	0.25	0.35	--	--	--	--	--
OUTFALL 018	541-73-1	1,3-Dichlorobenzene	10	0	0.0%	µg/l	0.47	0.5	0.094	0.35	--	--	--	--	--
OUTFALL 018	106-46-7	1,4-Dichlorobenzene	10	0	0.0%	µg/l	0.47	0.5	0.189	0.37	--	--	--	--	--
OUTFALL 018	123-91-1	1,4-Dioxane	5	0	0.0%	µg/l	2	2	0.5	1	--	--	--	--	--
OUTFALL 018	95-95-4	2,4,5-Trichlorophenol	2	0	0.0%	µg/l	1.9	1.9	0.19	0.19	--	--	--	--	--
OUTFALL 018	88-06-2	2,4,6-Trichlorophenol	13	0	0.0%	µg/l	0.94	5.8	0.094	0.476	--	--	--	--	--
OUTFALL 018	120-83-2	2,4-Dichlorophenol	5	0	0.0%	µg/l	1.89	2	0.189	0.952	--	--	--	--	--
OUTFALL 018	105-67-9	2,4-Dimethylphenol	5	0	0.0%	µg/l	1.89	2	0.28	0.952	--	--	--	--	--
OUTFALL 018	51-28-5	2,4-Dinitrophenol	5	0	0.0%	µg/l	4.7	5	0.849	1.9	--	--	--	--	--
OUTFALL 018	121-14-2	2,4-Dinitrotoluene	13	0	0.0%	µg/l	4.7	8.7	0.189	1.9	--	--	--	--	--
OUTFALL 018	606-20-2	2,6-Dinitrotoluene	5	0	0.0%	µg/l	4.7	5	0.094	1.9	--	--	--	--	--
OUTFALL 018	91-58-7	2-Chloronaphthalene	5	0	0.0%	µg/l	0.47	0.5	0.094	0.19	--	--	--	--	--
OUTFALL 018	95-57-8	2-Chlorophenol	5	0	0.0%	µg/l	0.94	1	0.189	0.476	--	--	--	--	--
OUTFALL 018	534-52-1	2-Methyl-4,6-Dinitrophenol	4	0	0.0%	µg/l	4.72	5	0.19	1.9	--	--	--	--	--
OUTFALL 018	91-57-6	2-Methylnaphthalene	3	0	0.0%	µg/l	0.94	0.95	0.094	0.189	--	--	--	--	--
OUTFALL 018	95-48-7	2-Methylphenol (o-cresol)	3	0	0.0%	µg/l	1.89	1.9	0.094	0.095	--	--	--	--	--
OUTFALL 018	88-74-4	2-Nitroaniline	3	0	0.0%	µg/l	4.7	4.8	0.094	0.095	--	--	--	--	--
OUTFALL 018	88-75-5	2-Nitrophenol	5	0	0.0%	µg/l	1.89	2	0.094	0.952	--	--	--	--	--
OUTFALL 018	91-94-1	3,3-Dichlorobenzidine	4	0	0.0%	µg/l	4.7	5	0.472	5	--	--	--	--	--
OUTFALL 018	72-54-8	4,4'-DDD	5	0	0.0%	µg/l	0.0047	0.0054	0.0019	0.0043	--	--	--	--	--
OUTFALL 018	72-55-9	4,4'-DDE	5	0	0.0%	µg/l	0.0047	0.0054	0.0028	0.0032	--	--	--	--	--
OUTFALL 018	50-29-3	4,4'-DDT	5	0	0.0%	µg/l	0.0094	0.011	0.0038	0.0043	--	--	--	--	--
OUTFALL 018	101-55-3	4-Bromophenyl phenyl ether	5	0	0.0%	µg/l	0.94	1	0.094	0.476	--	--	--	--	--
OUTFALL 018	59-50-7	4-Chloro-3-methylphenol (p-Chlorocresol)	5	0	0.0%	µg/l	1.89	2	0.189	0.2	--	--	--	--	--

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 018	106-47-8	4-Chloroaniline	3	0	0.0%	µg/l	1.89	1.9	0.094	0.283	--	--	--	--	--
OUTFALL 018	7005-72-3	4-Chlorophenyl Phenyl Ether	5	0	0.0%	µg/l	0.47	0.5	0.094	0.19	--	--	--	--	--
OUTFALL 018	100-02-7	4-Nitrophenol	5	0	0.0%	µg/l	4.7	5	1.9	2.5	--	--	--	--	--
OUTFALL 018	83-32-9	Acenaphthene	5	0	0.0%	µg/l	0.47	0.5	0.094	0.19	--	--	--	--	--
OUTFALL 018	208-96-8	Acenaphthylene	5	0	0.0%	µg/l	0.47	0.5	0.094	0.19	--	--	--	--	--
OUTFALL 018	107-02-8	Acrolein	4	0	0.0%	µg/l	5	5	2.5	4	--	--	--	--	--
OUTFALL 018	107-13-1	Acrylonitrile	5	0	0.0%	µg/l	2	2	0.7	1.2	--	--	--	--	--
OUTFALL 018	309-00-2	Aldrin	5	0	0.0%	µg/l	0.0047	0.0054	0.0014	0.0016	--	--	--	--	--
OUTFALL 018	319-84-6	alpha-BHC	13	0	0.0%	µg/l	0.0047	0.05	0.0024	0.0053	--	--	--	--	--
OUTFALL 018	7664-41-7 (as N)	Ammonia (as N)	1	1	100.0%	mg/l	--	--	--	--	0.411	0.411	0.411	0.411	Maximum detected value
OUTFALL 018	7664-41-7 (as NH3)	Ammonia (as NH3)	12	3	25.0%	mg/l	0.5	0.5	0.5	0.5	0.28	0.56	0.37	0.56	Maximum detected value
OUTFALL 018	62-53-3	Aniline	3	0	0.0%	µg/l	9.4	9.5	0.28	0.29	--	--	--	--	--
OUTFALL 018	120-12-7	Anthracene	5	0	0.0%	µg/l	0.47	0.5	0.094	0.19	--	--	--	--	--
OUTFALL 018	7440-36-0	Antimony	5	1	20.0%	µg/l	0.84	2	0.2	0.5	0.33	0.33	0.33	0.33	Maximum detected value
OUTFALL 018	7440-36-0 (dissolved)	Antimony (dissolved)	5	3	60.0%	µg/l	2	2	0.2	0.5	0.3	0.43	0.38	0.43	Maximum detected value
OUTFALL 018	12674-11-2	Aroclor 1016	5	0	0.0%	µg/l	0.47	0.54	0.24	0.27	--	--	--	--	--
OUTFALL 018	11104-28-2	Aroclor 1221	5	0	0.0%	µg/l	0.47	0.54	0.24	0.27	--	--	--	--	--
OUTFALL 018	11141-16-5	Aroclor 1232	5	0	0.0%	µg/l	0.47	0.54	0.24	0.27	--	--	--	--	--
OUTFALL 018	53469-21-9	Aroclor 1242	5	0	0.0%	µg/l	0.47	0.54	0.24	0.27	--	--	--	--	--
OUTFALL 018	12672-29-6	Aroclor 1248	5	0	0.0%	µg/l	0.47	0.54	0.24	0.27	--	--	--	--	--
OUTFALL 018	11097-69-1	Aroclor 1254	5	0	0.0%	µg/l	0.47	0.54	0.24	0.27	--	--	--	--	--
OUTFALL 018	11096-82-5	Aroclor 1260	5	0	0.0%	µg/l	0.47	0.54	0.24	0.27	--	--	--	--	--
OUTFALL 018	7440-38-2	Arsenic	5	1	20.0%	µg/l	10	10	5	7.9	8.3	8.3	8.3	8.3	Maximum detected value
OUTFALL 018	7440-38-2 (dissolved)	Arsenic (dissolved)	5	0	0.0%	µg/l	10	10	5	7	--	--	--	--	--
OUTFALL 018	7440-39-3	Barium	5	5	100.0%	mg/l	--	--	--	--	0.01	0.062	0.0264	0.062	Maximum detected value
OUTFALL 018	7440-39-3 (dissolved)	Barium (dissolved)	5	4	80.0%	mg/l	0.01	0.01	0.006	0.006	0.01	0.024	0.01675	0.024	Maximum detected value
OUTFALL 018	56-55-3	Benz[a]anthracene	5	0	0.0%	µg/l	4.7	5	0.094	1.9	--	--	--	--	--
OUTFALL 018	71-43-2	Benzene	11	1	9.1%	µg/l	0.5	0.5	0.25	0.28	0.84	0.84	0.84	0.84	Maximum detected value
OUTFALL 018	92-87-5	Benzidine	4	0	0.0%	µg/l	4.7	5	0.943	5	--	--	--	--	--
OUTFALL 018	50-32-8	Benzo(a)pyrene	5	0	0.0%	µg/l	1.89	2	0.094	0.476	--	--	--	--	--
OUTFALL 018	205-99-2	Benzo(b)fluoranthene	5	0	0.0%	µg/l	1.89	2	0.094	0.952	--	--	--	--	--
OUTFALL 018	191-24-2	Benzo(g,h,i)perylene	5	0	0.0%	µg/l	4.7	5	0.094	1.9	--	--	--	--	--
OUTFALL 018	207-08-9	Benzo[k]fluoranthene	5	0	0.0%	µg/l	0.47	0.5	0.094	0.238	--	--	--	--	--
OUTFALL 018	65-85-0	Benzoic Acid	3	0	0.0%	µg/l	18.9	19	2.8	2.9	--	--	--	--	--
OUTFALL 018	100-51-6	Benzyl alcohol	3	0	0.0%	µg/l	4.7	4.8	0.094	0.095	--	--	--	--	--
OUTFALL 018	85-68-7	Benzyl butyl phthalate	5	1	20.0%	µg/l	4.7	5	0.66	0.7	3.28	3.28	3.28	3.28	Maximum detected value
OUTFALL 018	7440-41-7	Beryllium	5	0	0.0%	µg/l	2	2	0.9	1	--	--	--	--	--
OUTFALL 018	7440-41-7 (dissolved)	Beryllium (dissolved)	5	0	0.0%	µg/l	2	2	0.9	1	--	--	--	--	--
OUTFALL 018	319-85-7	beta-BHC	5	0	0.0%	µg/l	0.0094	0.011	0.0038	0.0043	--	--	--	--	--
OUTFALL 018	108-60-1	Bis(2-chloro-1-methylethyl) ether	1	0	0.0%	µg/l	0.476	0.476	0.19	0.19	--	--	--	--	--
OUTFALL 018	111-91-1	Bis(2-Chloroethoxy)Methane	5	0	0.0%	µg/l	0.47	0.5	0.094	0.19	--	--	--	--	--

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 018	111-44-4	Bis(2-Chloroethyl) Ether	5	0	0.0%	µg/l	0.47	0.5	0.094	0.19	--	--	--	--	--
OUTFALL 018	39638-32-9	Bis(2-chloroisopropyl) ether	4	0	0.0%	µg/l	0.47	0.5	0.094	0.1	--	--	--	--	--
OUTFALL 018	117-81-7	Bis(2-ethylhexyl) phthalate	13	1	7.7%	µg/l	4.7	5	1.6	1.9	1.6	1.6	1.6	1.6	Maximum detected value
OUTFALL 018	7440-42-8	Boron	5	2	40.0%	mg/l	0.05	0.22	0.02	0.02	0.052	0.055	0.0535	0.055	Maximum detected value
OUTFALL 018	7440-42-8 (dissolved)	Boron (dissolved)	5	3	60.0%	mg/l	0.05	0.11	0.02	0.02	0.053	0.2	0.1	0.2	Maximum detected value
OUTFALL 018	75-25-2	Bromoform	6	0	0.0%	µg/l	0.5	1	0.4	0.4	--	--	--	--	--
OUTFALL 018	7440-43-9	Cadmium	13	2	15.4%	µg/l	1	1	0.1	0.25	0.12	0.27	0.195	0.27	Maximum detected value
OUTFALL 018	7440-43-9 (dissolved)	Cadmium (dissolved)	13	1	7.7%	µg/l	1	1	0.1	0.25	0.19	0.19	0.19	0.19	Maximum detected value
OUTFALL 018	56-23-5	Carbon Tetrachloride	11	0	0.0%	µg/l	0.5	0.5	0.25	0.28	--	--	--	--	--
OUTFALL 018	10045-97-3	Cesium-137	13	0	0.0%	pCi/l	13.3	22	1.25	20	--	--	--	--	--
OUTFALL 018	57-74-9	Chlordane	5	0	0.0%	µg/l	0.094	0.11	0.0076	0.086	--	--	--	--	--
OUTFALL 018	108-90-7	Chlorobenzene	6	0	0.0%	µg/l	0.5	0.5	0.25	0.36	--	--	--	--	--
OUTFALL 018	124-48-1	Chlorodibromomethane	6	1	16.7%	µg/l	0.5	0.5	0.25	0.4	0.98	0.98	0.98	0.98	Maximum detected value
OUTFALL 018	67-66-3	Chloroform	11	1	9.1%	µg/l	0.5	0.5	0.25	0.33	19	19	19	19	Maximum detected value
OUTFALL 018	74-87-3	Chloromethane	6	0	0.0%	µg/l	0.5	0.5	0.25	0.4	--	--	--	--	--
OUTFALL 018	7440-47-3	Chromium	5	0	0.0%	µg/l	5	15	2	2.5	--	--	--	--	--
OUTFALL 018	7440-47-3 (dissolved)	Chromium (dissolved)	4	1	25.0%	µg/l	5	5	2	2.5	2	2	2	2	Maximum detected value
OUTFALL 018	18540-29-9	Chromium, Hexavalent	5	1	20.0%	µg/l	1	1	0.25	0.25	0.26	0.26	0.26	0.26	Maximum detected value
OUTFALL 018	218-01-9	Chrysene	5	0	0.0%	µg/l	0.47	0.5	0.094	0.19	--	--	--	--	--
OUTFALL 018	156-59-2	cis-1,2-Dichloroethene	6	0	0.0%	µg/l	0.5	0.5	0.25	0.32	--	--	--	--	--
OUTFALL 018	10061-01-5	cis-1,3-Dichloropropene	6	0	0.0%	µg/l	0.5	0.5	0.22	0.25	--	--	--	--	--
OUTFALL 018	7440-48-4	Cobalt	5	2	40.0%	µg/l	10	10	2	2.5	0.1	3.5	1.8	3.5	Maximum detected value
OUTFALL 018	7440-48-4 (dissolved)	Cobalt (dissolved)	5	1	20.0%	µg/l	10	10	2	2.5	0.16	0.16	0.16	0.16	Maximum detected value
OUTFALL 018	Ra226Ra228	Combined Radium-226 and Radium-228	12	0	0.0%	pCi/l	--	1.31	--	1.31	--	--	--	--	--
OUTFALL 018	7440-50-8	Copper	13	12	92.3%	µg/l	2	2	0.5	0.5	0.665	9.6	2.59	3.687	95% KM (t) UCL
OUTFALL 018	7440-50-8 (dissolved)	Copper (dissolved)	13	12	92.3%	µg/l	2	2	0.5	0.5	0.55	4.1	1.73	2.157	95% KM (t) UCL
OUTFALL 018	57-12-5	Cyanide Anion	13	0	0.0%	µg/l	5	5	2.2	3	--	--	--	--	--
OUTFALL 018	110-82-7	Cyclohexane	6	0	0.0%	µg/l	1	2.5	0.4	2.5	--	--	--	--	--
OUTFALL 018	319-86-8	delta-BHC	5	0	0.0%	µg/l	0.0047	0.0054	0.0033	0.0038	--	--	--	--	--
OUTFALL 018	53-70-3	Dibenz[a,h]anthracene	5	0	0.0%	µg/l	0.47	0.5	0.094	0.238	--	--	--	--	--
OUTFALL 018	132-64-9	Dibenzofuran	3	0	0.0%	µg/l	0.47	0.48	0.094	0.095	--	--	--	--	--
OUTFALL 018	84-74-2	Dibutyl phthalate	5	0	0.0%	µg/l	1.89	2	0.19	0.952	--	--	--	--	--
OUTFALL 018	75-27-4	Dichlorobromomethane	6	1	16.7%	µg/l	0.5	0.5	0.25	0.3	1.2	1.2	1.2	1.2	Maximum detected value
OUTFALL 018	60-57-1	Dieldrin	5	0	0.0%	µg/l	0.0047	0.0054	0.0019	0.0022	--	--	--	--	--
OUTFALL 018	84-66-2	Diethyl phthalate	5	3	60.0%	µg/l	0.94	0.952	0.094	0.476	0.11	0.2	0.17	0.2	Maximum detected value
OUTFALL 018	108-20-3	Diisopropyl Ether	1	0	0.0%	µg/l	0.5	0.5	0.25	0.25	--	--	--	--	--
OUTFALL 018	131-11-3	Dimethyl phthalate	5	0	0.0%	µg/l	0.47	0.5	0.094	0.238	--	--	--	--	--
OUTFALL 018	117-84-0	Di-n-octyl phthalate	5	0	0.0%	µg/l	4.7	5	0.094	1.9	--	--	--	--	--

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 018	DioxinTEQMamNoNDs	TCDD-TEQ	13	8	61.5%	µg/l	--	--	--	--	1.80E-07	4.64E-06	1.10E-06	3.11E-06	95% Adjusted Gamma UCL
OUTFALL 018	959-98-8	Endosulfan I	5	0	0.0%	µg/l	0.0047	0.0054	0.0019	0.0029	--	--	--	--	--
OUTFALL 018	33213-65-9	Endosulfan II	5	0	0.0%	µg/l	0.0047	0.0054	0.0019	0.0032	--	--	--	--	--
OUTFALL 018	1031-07-8	Endosulfan Sulfate	5	0	0.0%	µg/l	0.0094	0.011	0.0028	0.0032	--	--	--	--	--
OUTFALL 018	72-20-8	Endrin	5	0	0.0%	µg/l	0.0047	0.0054	0.0019	0.0022	--	--	--	--	--
OUTFALL 018	7421-93-4	Endrin Aldehyde	5	0	0.0%	µg/l	0.0094	0.011	0.0019	0.0022	--	--	--	--	--
OUTFALL 018	53494-70-5	Endrin Ketone	2	0	0.0%	µg/l	0.0094	0.0094	0.0028	0.0028	--	--	--	--	--
OUTFALL 018	75-00-3	Ethyl Chloride	6	0	0.0%	µg/l	0.5	1	0.4	0.4	--	--	--	--	--
OUTFALL 018	100-41-4	Ethylbenzene	11	0	0.0%	µg/l	0.5	0.5	0.25	0.25	--	--	--	--	--
OUTFALL 018	637-92-3	Ethyl-t-Butyl Ether (ETBE)	1	0	0.0%	µg/l	0.5	0.5	0.28	0.28	--	--	--	--	--
OUTFALL 018	206-44-0	Fluoranthene	5	0	0.0%	µg/l	0.47	0.5	0.094	0.19	--	--	--	--	--
OUTFALL 018	86-73-7	Fluorene	5	0	0.0%	µg/l	0.47	0.5	0.094	0.19	--	--	--	--	--
OUTFALL 018	16984-48-8	Fluoride	5	3	60.0%	mg/l	0.15	0.5	0.02	0.25	0.1	0.19	0.13	0.19	Maximum detected value
OUTFALL 018	75-69-4	Freon 11	11	0	0.0%	µg/l	0.5	0.5	0.25	0.34	--	--	--	--	--
OUTFALL 018	76-13-1	Freon 113	8	0	0.0%	µg/l	2	5	0.5	0.5	--	--	--	--	--
OUTFALL 018	354-23-4	Freon-123A	6	0	0.0%	µg/l	2	2.5	1	2.5	--	--	--	--	--
OUTFALL 018	58-89-9	gamma-BHC (Lindane)	5	0	0.0%	µg/l	0.0095	0.022	0.0028	0.0032	--	--	--	--	--
OUTFALL 018	12587-46-1	Gross Alpha	13	4	30.8%	pCi/l	2.51	3	0.516	3	0.49	2.2	1.18	2.2	Maximum detected value
OUTFALL 018	12587-47-2	Gross Beta	13	13	100.0%	pCi/l	--	--	--	--	1.52	6.8	4.17	4.824	95% Student's-t UCL
OUTFALL 018	76-44-8	Heptachlor	5	0	0.0%	µg/l	0.0094	0.011	0.0028	0.0032	--	--	--	--	--
OUTFALL 018	1024-57-3	Heptachlor Epoxide	5	0	0.0%	µg/l	0.0047	0.0054	0.0024	0.0027	--	--	--	--	--
OUTFALL 018	118-74-1	Hexachlorobenzene	5	0	0.0%	µg/l	0.94	1	0.094	0.476	--	--	--	--	--
OUTFALL 018	87-68-3	Hexachlorobutadiene (HCBD)	5	0	0.0%	µg/l	1.89	2	0.189	0.476	--	--	--	--	--
OUTFALL 018	77-47-4	Hexachlorocyclopentadiene	5	0	0.0%	µg/l	4.7	5	0.094	1.9	--	--	--	--	--
OUTFALL 018	67-72-1	Hexachloroethane	5	0	0.0%	µg/l	2.8	3	0.189	0.476	--	--	--	--	--
OUTFALL 018	302-01-2	Hydrazine	4	0	0.0%	µg/l	1	1	0.439	0.6	--	--	--	--	--
OUTFALL 018	122-66-7	Hydrazine, 1,2-diphenyl-	5	0	0.0%	µg/l	0.94	1	0.094	0.476	--	--	--	--	--
OUTFALL 018	193-39-5	Indeno(1,2,3-cd)pyrene	5	0	0.0%	µg/l	1.89	2	0.094	0.952	--	--	--	--	--
OUTFALL 018	78-59-1	Isophorone	5	0	0.0%	µg/l	0.94	1	0.094	0.476	--	--	--	--	--
OUTFALL 018	7439-92-1	Lead	13	6	46.2%	µg/l	1	1	0.2	0.5	0.23	8.2	2.16	4.717	95% KM Bootstrap t UCL
OUTFALL 018	7439-92-1 (dissolved)	Lead (dissolved)	13	2	15.4%	µg/l	1	1	0.2	0.5	0.23	0.78	0.505	0.78	Maximum detected value
OUTFALL 018	179601-23-1	m&p-Xylenes	1	0	0.0%	µg/l	1	1	0.5	0.5	--	--	--	--	--
OUTFALL 018	7439-96-5	Manganese	9	8	88.9%	µg/l	20	20	10	10	8.8	210	77.6	116.6	95% KM (t) UCL
OUTFALL 018	7439-96-5 (dissolved)	Manganese (dissolved)	9	6	66.7%	µg/l	20	20	7	10	8.8	190	48.25	190	Maximum detected value (calculated UCL exceeded max detect)
OUTFALL 018	7439-97-6	Mercury	13	1	7.7%	µg/l	0.2	0.2	0.1	0.1	0.033	0.033	0.033	0.033	Maximum detected value
OUTFALL 018	7439-97-6 (dissolved)	Mercury (dissolved)	12	0	0.0%	µg/l	0.2	0.2	0.027	0.1	--	--	--	--	--
OUTFALL 018	72-43-5	Methoxychlor	2	0	0.0%	µg/l	0.0047	0.0047	0.0033	0.0033	--	--	--	--	--
OUTFALL 018	74-83-9	Methyl Bromide	6	0	0.0%	µg/l	0.5	1	0.25	0.42	--	--	--	--	--
OUTFALL 018	60-34-4	Methyl Hydrazine	4	0	0.0%	µg/l	5	5	0.857	1.77	--	--	--	--	--
OUTFALL 018	1634-04-4	Methyl tert-Butyl Ether (MTBE)	1	0	0.0%	µg/l	0.5	0.5	0.32	0.32	--	--	--	--	--
OUTFALL 018	75-09-2	Methylene Chloride (DCM)	6	1	16.7%	µg/l	1	2	0.88	0.95	0.97	0.97	0.97	0.97	Maximum detected value

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 018	99-09-2	m-Nitroaniline	3	0	0.0%	µg/l	4.7	4.8	0.19	0.943	--	--	--	--	--
OUTFALL 018	91-20-3	Naphthalene	7	0	0.0%	µg/l	0.5	1	0.094	0.476	--	--	--	--	--
OUTFALL 018	7440-02-0	Nickel	5	2	40.0%	µg/l	10	10	2	5	2.2	2.3	2.25	2.3	Maximum detected value
OUTFALL 018	7440-02-0 (dissolved)	Nickel (dissolved)	5	1	20.0%	µg/l	10	10	2	5	2	2	2	2	Maximum detected value
OUTFALL 018	14797-55-8 (as N)	Nitrate (as N)	13	11	84.6%	mg/l	0.11	0.11	0.06	0.06	0.08	1.1	0.37	0.72	95% KM Bootstrap t UCL
OUTFALL 018	NO3NO2 (as N)	Nitrate and Nitrite (as N)	13	7	53.8%	mg/l	0.26	0.26	0.15	0.19	0.15	1.1	0.54	0.543	95% KM (t) UCL
OUTFALL 018	14797-65-0 (as N)	Nitrite (as N)	13	1	7.7%	mg/l	0.15	0.15	0.09	0.11	0.11	0.11	0.11	0.11	Maximum detected value
OUTFALL 018	98-95-3	Nitrobenzene	5	0	0.0%	µg/l	0.94	1	0.094	0.476	--	--	--	--	--
OUTFALL 018	62-75-9	n-Nitrosodimethylamine (NDMA)	13	0	0.0%	µg/l	1.89	7.7	0.094	0.952	--	--	--	--	--
OUTFALL 018	86-30-6	n-Nitrosodiphenylamine	5	0	0.0%	µg/l	0.94	1	0.094	0.476	--	--	--	--	--
OUTFALL 018	621-64-7	n-Nitrosodipropylamine	5	0	0.0%	µg/l	1.89	2	0.094	0.952	--	--	--	--	--
OUTFALL 018	95-47-6	o-Xylene	1	0	0.0%	µg/l	0.5	0.5	0.25	0.25	--	--	--	--	--
OUTFALL 018	106-44-5	p-Cresol	3	0	0.0%	µg/l	4.7	4.8	0.189	0.19	--	--	--	--	--
OUTFALL 018	87-86-5	Pentachlorophenol	13	0	0.0%	µg/l	1.89	7.7	0.094	0.952	--	--	--	--	--
OUTFALL 018	14797-73-0	Perchlorate	13	0	0.0%	µg/l	1	4	0.9	0.95	--	--	--	--	--
OUTFALL 018	85-01-8	Phenanthrene	5	0	0.0%	µg/l	0.47	0.5	0.094	0.19	--	--	--	--	--
OUTFALL 018	108-95-2	Phenol	5	0	0.0%	µg/l	0.94	1	0.28	0.476	--	--	--	--	--
OUTFALL 018	100-01-6	p-Nitroaniline	3	0	0.0%	µg/l	4.7	4.8	0.47	0.48	--	--	--	--	--
OUTFALL 018	13966-00-2	Potassium-40	13	0	0.0%	pCi/l	25	300	23.3	300	--	--	--	--	--
OUTFALL 018	129-00-0	Pyrene	5	0	0.0%	µg/l	0.47	0.5	0.094	0.19	--	--	--	--	--
OUTFALL 018	13982-63-3	Radium-226	13	3	23.1%	pCi/l	0.0747	1	0.066	0.794	0.075	0.688	0.33	0.688	Maximum detected value
OUTFALL 018	15262-20-1	Radium-228	12	0	0.0%	pCi/l	0.427	1	0.394	0.69	--	--	--	--	--
OUTFALL 018	7782-49-2	Selenium	13	2	15.4%	µg/l	2	2	0.5	0.5	0.47	0.54	0.505	0.54	Maximum detected value
OUTFALL 018	7782-49-2 (dissolved)	Selenium (dissolved)	13	0	0.0%	µg/l	2	2	0.3	0.5	--	--	--	--	--
OUTFALL 018	7440-22-4	Silver	5	0	0.0%	µg/l	1	10	0.1	6	--	--	--	--	--
OUTFALL 018	7440-22-4 (dissolved)	Silver (dissolved)	5	0	0.0%	µg/l	1	10	0.1	6	--	--	--	--	--
OUTFALL 018	10098-97-2	Strontium-90	13	1	7.7%	pCi/l	0.453	3	0.38	0.999	0.61	0.61	0.61	0.61	Maximum detected value
OUTFALL 018	994-05-8	Tert-Amyl Methyl Ether (TAME)	1	0	0.0%	µg/l	0.5	0.5	0.33	0.33	--	--	--	--	--
OUTFALL 018	75-65-0	Tert-Butyl Alcohol (TBA)	1	0	0.0%	µg/l	10	10	6.5	6.5	--	--	--	--	--
OUTFALL 018	127-18-4	Tetrachloroethene (PCE)	11	0	0.0%	µg/l	0.5	0.5	0.25	0.32	--	--	--	--	--
OUTFALL 018	7440-28-0	Thallium	5	0	0.0%	µg/l	1	1	0.2	0.5	--	--	--	--	--
OUTFALL 018	7440-28-0 (dissolved)	Thallium (dissolved)	5	1	20.0%	µg/l	1	1	0.2	0.5	0.24	0.24	0.24	0.24	Maximum detected value
OUTFALL 018	108-88-3	Toluene	11	0	0.0%	µg/l	0.5	0.5	0.25	0.36	--	--	--	--	--
OUTFALL 018	8001-35-2	Toxaphene	5	0	0.0%	µg/l	0.47	0.54	0.24	0.27	--	--	--	--	--
OUTFALL 018	156-60-5	trans-1,2-Dichloroethene	6	0	0.0%	µg/l	0.5	0.5	0.25	0.3	--	--	--	--	--
OUTFALL 018	10061-02-6	trans-1,3-Dichloropropene	6	0	0.0%	µg/l	0.5	0.5	0.25	0.32	--	--	--	--	--
OUTFALL 018	79-01-6	Trichloroethene (TCE)	13	0	0.0%	µg/l	0.5	2	0.25	0.26	--	--	--	--	--
OUTFALL 018	10028-17-8	Tritium	13	1	7.7%	pCi/l	349	500	91	349	740	740	740	740	Maximum detected value
OUTFALL 018	7440-61-1	Uranium	12	10	83.3%	pCi/l	0.693	1.39	0.21	0.43	0.022	0.475	0.1982	0.283	95% KM (t) UCL
OUTFALL 018	7440-62-2	Vanadium	5	1	20.0%	µg/l	10	10	3	5	27	27	27	27	Maximum detected value

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 018	7440-62-2 (dissolved)	Vanadium (dissolved)	5	0	0.0%	µg/l	10	10	3	5	--	--	--	--	--
OUTFALL 018	110-75-8	Vinyl 2-Chloroethyl ether	5	0	0.0%	µg/l	2	5	1	1.8	--	--	--	--	--
OUTFALL 018	75-01-4	Vinyl Chloride	11	0	0.0%	µg/l	0.5	0.5	0.25	0.4	--	--	--	--	--
OUTFALL 018	1330-20-7	Xylenes, Total	11	0	0.0%	µg/l	1	1.5	0.5	0.9	--	--	--	--	--
OUTFALL 018	7440-66-6	Zinc	13	7	53.8%	µg/l	20	20	5	10	6.36	63	19.7	29.2	95% KM Adjusted Gamma UCL
OUTFALL 018	7440-66-6 (dissolved)	Zinc (dissolved)	13	4	30.8%	µg/l	20	20	5	10	6.7	13	9.74	13	Maximum detected value
OUTFALL 019	71-55-6	1,1,1-Trichloroethane	18	0	0.0%	µg/l	0.5	0.5	0.3	0.3	--	--	--	--	--
OUTFALL 019	79-34-5	1,1,2,2-Tetrachloroethane	3	0	0.0%	µg/l	0.5	0.5	0.3	0.3	--	--	--	--	--
OUTFALL 019	79-00-5	1,1,2-Trichloroethane	18	0	0.0%	µg/l	0.5	0.5	0.3	0.3	--	--	--	--	--
OUTFALL 019	75-34-3	1,1-Dichloroethane	18	0	0.0%	µg/l	0.5	0.5	0.4	0.4	--	--	--	--	--
OUTFALL 019	75-35-4	1,1-Dichloroethene	18	0	0.0%	µg/l	0.5	0.5	0.42	0.42	--	--	--	--	--
OUTFALL 019	57-14-7	1,1-Dimethylhydrazine	3	0	0.0%	µg/l	5	5	1.13	2.05	--	--	--	--	--
OUTFALL 019	120-82-1	1,2,4-Trichlorobenzene	3	0	0.0%	µg/l	0.943	47.4	0.0943	11.8	--	--	--	--	--
OUTFALL 019	95-50-1	1,2-Dichlorobenzene	6	0	0.0%	µg/l	0.472	47.4	0.0943	14.2	--	--	--	--	--
OUTFALL 019	107-06-2	1,2-Dichloroethane	18	0	0.0%	µg/l	0.5	0.5	0.28	0.28	--	--	--	--	--
OUTFALL 019	78-87-5	1,2-Dichloropropane	3	0	0.0%	µg/l	0.5	0.5	0.35	0.35	--	--	--	--	--
OUTFALL 019	541-73-1	1,3-Dichlorobenzene	6	0	0.0%	µg/l	0.472	47.4	0.0943	14.2	--	--	--	--	--
OUTFALL 019	106-46-7	1,4-Dichlorobenzene	6	0	0.0%	µg/l	0.472	47.4	0.189	11.8	--	--	--	--	--
OUTFALL 019	123-91-1	1,4-Dioxane	3	0	0.0%	µg/l	2	2	1	1	--	--	--	--	--
OUTFALL 019	88-06-2	2,4,6-Trichlorophenol	18	0	0.0%	µg/l	0.943	94.8	0.094	21.3	--	--	--	--	--
OUTFALL 019	120-83-2	2,4-Dichlorophenol	3	0	0.0%	µg/l	1.89	47.4	0.189	16.6	--	--	--	--	--
OUTFALL 019	105-67-9	2,4-Dimethylphenol	3	0	0.0%	µg/l	1.89	94.8	0.283	16.6	--	--	--	--	--
OUTFALL 019	51-28-5	2,4-Dinitrophenol	3	0	0.0%	µg/l	4.72	94.8	0.849	37.9	--	--	--	--	--
OUTFALL 019	121-14-2	2,4-Dinitrotoluene	18	0	0.0%	µg/l	4.7	47.4	0.189	16.6	--	--	--	--	--
OUTFALL 019	606-20-2	2,6-Dinitrotoluene	3	0	0.0%	µg/l	4.72	47.4	0.0943	9.48	--	--	--	--	--
OUTFALL 019	91-58-7	2-Chloronaphthalene	3	0	0.0%	µg/l	0.472	47.4	0.0943	14.2	--	--	--	--	--
OUTFALL 019	95-57-8	2-Chlorophenol	3	0	0.0%	µg/l	0.943	47.4	0.189	14.2	--	--	--	--	--
OUTFALL 019	534-52-1	2-Methyl-4,6-Dinitrophenol	3	0	0.0%	µg/l	4.72	94.8	0.189	19	--	--	--	--	--
OUTFALL 019	91-57-6	2-Methylnaphthalene	1	0	0.0%	µg/l	9.48	9.48	1.9	1.9	--	--	--	--	--
OUTFALL 019	95-48-7	2-Methylphenol (o-cresol)	1	0	0.0%	µg/l	9.48	9.48	2.84	2.84	--	--	--	--	--
OUTFALL 019	88-74-4	2-Nitroaniline	1	0	0.0%	µg/l	19	19	1.9	1.9	--	--	--	--	--
OUTFALL 019	88-75-5	2-Nitrophenol	3	0	0.0%	µg/l	1.89	47.4	0.0943	16.6	--	--	--	--	--
OUTFALL 019	91-94-1	3,3-Dichlorobenzidine	3	0	0.0%	µg/l	4.72	94.8	4.72	35.5	--	--	--	--	--
OUTFALL 019	72-54-8	4,4'-DDD	3	0	0.0%	µg/l	0.0047	0.0047	0.0038	0.0038	--	--	--	--	--
OUTFALL 019	72-55-9	4,4'-DDE	3	0	0.0%	µg/l	0.0047	0.0047	0.0028	0.0028	--	--	--	--	--
OUTFALL 019	50-29-3	4,4'-DDT	3	0	0.0%	µg/l	0.0094	0.0094	0.0038	0.0038	--	--	--	--	--
OUTFALL 019	101-55-3	4-Bromophenyl phenyl ether	3	0	0.0%	µg/l	0.943	47.4	0.0943	14.2	--	--	--	--	--
OUTFALL 019	59-50-7	4-Chloro-3-methylphenol (p-Chlorocresol)	3	0	0.0%	µg/l	1.89	94.8	0.189	11.8	--	--	--	--	--
OUTFALL 019	106-47-8	4-Chloroaniline	1	0	0.0%	µg/l	9.48	9.48	1.9	1.9	--	--	--	--	--
OUTFALL 019	7005-72-3	4-Chlorophenyl Phenyl Ether	3	0	0.0%	µg/l	0.472	47.4	0.0943	11.8	--	--	--	--	--
OUTFALL 019	100-02-7	4-Nitrophenol	3	0	0.0%	µg/l	4.72	94.8	2.36	26.1	--	--	--	--	--
OUTFALL 019	83-32-9	Acenaphthene	3	0	0.0%	µg/l	0.472	47.4	0.0943	14.2	--	--	--	--	--
OUTFALL 019	208-96-8	Acenaphthylene	3	0	0.0%	µg/l	0.472	47.4	0.0943	14.2	--	--	--	--	--
OUTFALL 019	107-02-8	Acrolein	3	0	0.0%	µg/l	5	5	4	4	--	--	--	--	--
OUTFALL 019	107-13-1	Acrylonitrile	3	0	0.0%	µg/l	2	2	1.2	1.2	--	--	--	--	--

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 019	309-00-2	Aldrin	3	0	0.0%	µg/l	0.0047	0.0047	0.0014	0.0014	--	--	--	--	--
OUTFALL 019	319-84-6	alpha-BHC	18	1	5.6%	µg/l	0.0047	0.0095	0.0024	0.0024	0.0025	0.0025	0.0025	0.0025	Maximum detected value
OUTFALL 019	7664-41-7 (as NH3)	Ammonia (as NH3)	18	10	55.6%	mg/l	0.4	0.5	0.157	0.5	0.28	0.84	0.364	0.387	95% KM (t) UCL
OUTFALL 019	62-53-3	Aniline	1	0	0.0%	µg/l	9.48	9.48	3.32	3.32	--	--	--	--	--
OUTFALL 019	120-12-7	Anthracene	3	0	0.0%	µg/l	0.472	47.4	0.0943	11.8	--	--	--	--	--
OUTFALL 019	7440-36-0	Antimony	3	0	0.0%	µg/l	2	2	0.3	0.3	--	--	--	--	--
OUTFALL 019	7440-36-0 (dissolved)	Antimony (dissolved)	3	1	33.3%	µg/l	2	2	0.3	0.3	0.75	0.75	0.75	0.75	Maximum detected value
OUTFALL 019	12674-11-2	Aroclor 1016	3	0	0.0%	µg/l	0.47	0.47	0.24	0.24	--	--	--	--	--
OUTFALL 019	11104-28-2	Aroclor 1221	3	0	0.0%	µg/l	0.47	0.47	0.24	0.24	--	--	--	--	--
OUTFALL 019	11141-16-5	Aroclor 1232	3	0	0.0%	µg/l	0.47	0.47	0.24	0.24	--	--	--	--	--
OUTFALL 019	53469-21-9	Aroclor 1242	3	0	0.0%	µg/l	0.47	0.47	0.24	0.24	--	--	--	--	--
OUTFALL 019	12672-29-6	Aroclor 1248	3	0	0.0%	µg/l	0.47	0.47	0.24	0.24	--	--	--	--	--
OUTFALL 019	11097-69-1	Aroclor 1254	3	0	0.0%	µg/l	0.47	0.47	0.24	0.24	--	--	--	--	--
OUTFALL 019	11096-82-5	Aroclor 1260	3	0	0.0%	µg/l	0.47	0.47	0.24	0.24	--	--	--	--	--
OUTFALL 019	7440-38-2	Arsenic	3	0	0.0%	µg/l	10	10	7	7	--	--	--	--	--
OUTFALL 019	7440-38-2 (dissolved)	Arsenic (dissolved)	3	0	0.0%	µg/l	10	10	7	7	--	--	--	--	--
OUTFALL 019	7440-39-3	Barium	3	2	66.7%	mg/l	0.01	0.01	0.006	0.006	0.0081	0.026	0.01705	0.026	Maximum detected value
OUTFALL 019	7440-39-3 (dissolved)	Barium (dissolved)	3	2	66.7%	mg/l	0.01	0.01	0.006	0.006	0.0088	0.025	0.0169	0.025	Maximum detected value
OUTFALL 019	56-55-3	Benz[a]anthracene	3	0	0.0%	µg/l	4.72	47.4	0.0943	11.8	--	--	--	--	--
OUTFALL 019	71-43-2	Benzene	18	0	0.0%	µg/l	0.5	0.5	0.28	0.28	--	--	--	--	--
OUTFALL 019	92-87-5	Benzidine	3	0	0.0%	µg/l	4.72	94.8	4.72	47.4	--	--	--	--	--
OUTFALL 019	50-32-8	Benzo(a)pyrene	3	0	0.0%	µg/l	1.89	47.4	0.0943	14.2	--	--	--	--	--
OUTFALL 019	205-99-2	Benzo(b)fluoranthene	3	0	0.0%	µg/l	1.89	47.4	0.0943	9.48	--	--	--	--	--
OUTFALL 019	191-24-2	Benzo(g,h,i)perylene	3	0	0.0%	µg/l	4.72	47.4	0.0943	19	--	--	--	--	--
OUTFALL 019	207-08-9	Benzo[k]fluoranthene	3	0	0.0%	µg/l	0.472	47.4	0.0943	11.8	--	--	--	--	--
OUTFALL 019	65-85-0	Benzoic Acid	1	0	0.0%	µg/l	19	19	9.48	9.48	--	--	--	--	--
OUTFALL 019	100-51-6	Benzyl alcohol	1	0	0.0%	µg/l	19	19	3.32	3.32	--	--	--	--	--
OUTFALL 019	85-68-7	Benzyl butyl phthalate	3	0	0.0%	µg/l	4.72	94.8	0.66	19	--	--	--	--	--
OUTFALL 019	7440-41-7	Beryllium	3	0	0.0%	µg/l	2	2	0.9	0.9	--	--	--	--	--
OUTFALL 019	7440-41-7 (dissolved)	Beryllium (dissolved)	3	0	0.0%	µg/l	2	2	0.9	0.9	--	--	--	--	--
OUTFALL 019	319-85-7	beta-BHC	3	0	0.0%	µg/l	0.0094	0.0094	0.0038	0.0038	--	--	--	--	--
OUTFALL 019	111-91-1	Bis(2-Chloroethoxy)Methane	3	0	0.0%	µg/l	0.472	47.4	0.0943	14.2	--	--	--	--	--
OUTFALL 019	111-44-4	Bis(2-Chloroethyl) Ether	3	0	0.0%	µg/l	0.472	47.4	0.0943	14.2	--	--	--	--	--
OUTFALL 019	39638-32-9	Bis(2-chloroisopropyl) ether	3	0	0.0%	µg/l	0.472	47.4	0.0943	11.8	--	--	--	--	--
OUTFALL 019	117-81-7	Bis(2-ethylhexyl) phthalate	18	3	16.7%	µg/l	4.7	237	1.6	19	1.7	3.29	2.5	3.29	Maximum detected value
OUTFALL 019	7440-42-8	Boron	3	2	66.7%	mg/l	0.05	0.05	0.02	0.02	0.021	0.064	0.0425	0.064	Maximum detected value
OUTFALL 019	7440-42-8 (dissolved)	Boron (dissolved)	3	1	33.3%	mg/l	0.05	0.05	0.02	0.02	0.066	0.066	0.066	0.066	Maximum detected value
OUTFALL 019	75-25-2	Bromoform	3	0	0.0%	µg/l	0.5	0.5	0.4	0.4	--	--	--	--	--
OUTFALL 019	7440-43-9	Cadmium	18	2	11.1%	µg/l	1	1	0.1	0.1	0.12	0.18	0.15	0.18	Maximum detected value
OUTFALL 019	7440-43-9 (dissolved)	Cadmium (dissolved)	18	0	0.0%	µg/l	1	1	0.1	0.1	--	--	--	--	--
OUTFALL 019	56-23-5	Carbon Tetrachloride	18	0	0.0%	µg/l	0.5	0.5	0.28	0.28	--	--	--	--	--
OUTFALL 019	10045-97-3	Cesium-137	18	0	0.0%	pCi/l	20	20	1.1	12.4	--	--	--	--	--

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 019	57-74-9	Chlordane	3	0	0.0%	µg/l	0.094	0.094	0.0075	0.075	--	--	--	--	--
OUTFALL 019	108-90-7	Chlorobenzene	3	0	0.0%	µg/l	0.5	0.5	0.36	0.36	--	--	--	--	--
OUTFALL 019	124-48-1	Chlorodibromomethane	3	0	0.0%	µg/l	0.5	0.5	0.4	0.4	--	--	--	--	--
OUTFALL 019	67-66-3	Chloroform	18	0	0.0%	µg/l	0.5	0.5	0.33	0.33	--	--	--	--	--
OUTFALL 019	74-87-3	Chloromethane	3	0	0.0%	µg/l	0.5	0.5	0.4	0.4	--	--	--	--	--
OUTFALL 019	7440-47-3	Chromium	3	1	33.3%	µg/l	5	5	2	2	2.3	2.3	2.3	2.3	Maximum detected value
OUTFALL 019	7440-47-3 (dissolved)	Chromium (dissolved)	3	0	0.0%	µg/l	5	5	2	2	--	--	--	--	--
OUTFALL 019	18540-29-9	Chromium, Hexavalent	3	1	33.3%	µg/l	1	1	0.25	0.25	1.1	1.1	1.1	1.1	Maximum detected value
OUTFALL 019	218-01-9	Chrysene	3	0	0.0%	µg/l	0.472	47.4	0.0943	11.8	--	--	--	--	--
OUTFALL 019	156-59-2	cis-1,2-Dichloroethene	14	0	0.0%	µg/l	0.5	0.5	0.32	0.32	--	--	--	--	--
OUTFALL 019	10061-01-5	cis-1,3-Dichloropropene	3	0	0.0%	µg/l	0.5	0.5	0.22	0.22	--	--	--	--	--
OUTFALL 019	7440-48-4	Cobalt	3	0	0.0%	µg/l	10	10	2	2	--	--	--	--	--
OUTFALL 019	7440-48-4 (dissolved)	Cobalt (dissolved)	3	0	0.0%	µg/l	10	10	2	2	--	--	--	--	--
OUTFALL 019	Ra226Ra228	Combined Radium-226 and Radium-228	18	0	0.0%	pCi/l	0.51	1.52	0.51	1.52	--	--	--	--	--
OUTFALL 019	7440-50-8	Copper	18	10	55.6%	µg/l	2	5.2	0.5	0.5	0.58	2.61	1.253	1.352	95% KM (t) UCL
OUTFALL 019	7440-50-8 (dissolved)	Copper (dissolved)	18	11	61.1%	µg/l	2	2	0.5	0.5	0.51	1.4	0.84	0.99	95% KM (t) UCL
OUTFALL 019	57-12-5	Cyanide Anion	18	0	0.0%	µg/l	5	5	2.2	3	--	--	--	--	--
OUTFALL 019	110-82-7	Cyclohexane	3	0	0.0%	µg/l	1	2	0.4	0.4	--	--	--	--	--
OUTFALL 019	319-86-8	delta-BHC	3	0	0.0%	µg/l	0.0047	0.0047	0.0033	0.0033	--	--	--	--	--
OUTFALL 019	53-70-3	Dibenz[a,h]anthracene	3	0	0.0%	µg/l	0.472	94.8	0.0943	14.2	--	--	--	--	--
OUTFALL 019	132-64-9	Dibenzofuran	1	0	0.0%	µg/l	9.48	9.48	3.79	3.79	--	--	--	--	--
OUTFALL 019	84-74-2	Dibutyl phthalate	3	0	0.0%	µg/l	1.89	94.8	0.189	14.2	--	--	--	--	--
OUTFALL 019	75-27-4	Dichlorobromomethane	3	0	0.0%	µg/l	0.5	0.5	0.3	0.3	--	--	--	--	--
OUTFALL 019	60-57-1	Dieldrin	3	0	0.0%	µg/l	0.0047	0.0047	0.0019	0.0019	--	--	--	--	--
OUTFALL 019	84-66-2	Diethyl phthalate	3	1	33.3%	µg/l	9.48	47.4	3.32	16.6	0.226	0.226	0.226	0.226	Maximum detected value
OUTFALL 019	131-11-3	Dimethyl phthalate	3	0	0.0%	µg/l	0.472	47.4	0.0943	11.8	--	--	--	--	--
OUTFALL 019	117-84-0	Di-n-octyl phthalate	3	0	0.0%	µg/l	4.72	94.8	0.0943	16.6	--	--	--	--	--
OUTFALL 019	DioxinTEQMamNoNDs	TCDD-TEQ	18	6	33.3%	µg/l	--	--	--	--	1.3E-09	3.2E-06	6.9E-07	3.2E-06	Maximum detected value
OUTFALL 019	959-98-8	Endosulfan I	3	0	0.0%	µg/l	0.0047	0.0047	0.0019	0.0028	--	--	--	--	--
OUTFALL 019	33213-65-9	Endosulfan II	3	0	0.0%	µg/l	0.0047	0.0047	0.0019	0.0028	--	--	--	--	--
OUTFALL 019	1031-07-8	Endosulfan Sulfate	3	0	0.0%	µg/l	0.0094	0.0094	0.0028	0.0028	--	--	--	--	--
OUTFALL 019	72-20-8	Endrin	3	0	0.0%	µg/l	0.0047	0.0047	0.0019	0.0019	--	--	--	--	--
OUTFALL 019	7421-93-4	Endrin Aldehyde	3	0	0.0%	µg/l	0.0094	0.0094	0.0019	0.0019	--	--	--	--	--
OUTFALL 019	75-00-3	Ethyl Chloride	3	0	0.0%	µg/l	0.5	1	0.4	0.4	--	--	--	--	--
OUTFALL 019	100-41-4	Ethylbenzene	18	0	0.0%	µg/l	0.5	0.5	0.25	0.25	--	--	--	--	--
OUTFALL 019	206-44-0	Fluoranthene	3	0	0.0%	µg/l	0.472	47.4	0.0943	14.2	--	--	--	--	--
OUTFALL 019	86-73-7	Fluorene	3	0	0.0%	µg/l	0.472	47.4	0.0943	14.2	--	--	--	--	--
OUTFALL 019	16984-48-8	Fluoride	3	3	100.0%	mg/l	--	--	--	--	0.19	0.35	0.29	0.35	Maximum detected value
OUTFALL 019	75-69-4	Freon 11	18	0	0.0%	µg/l	0.5	0.5	0.34	0.34	--	--	--	--	--
OUTFALL 019	76-13-1	Freon 113	18	0	0.0%	µg/l	2	5	0.5	0.5	--	--	--	--	--
OUTFALL 019	354-23-4	Freon-123A	3	0	0.0%	µg/l	2	2	1.1	1.1	--	--	--	--	--
OUTFALL 019	58-89-9	gamma-BHC (Lindane)	3	0	0.0%	µg/l	0.0094	0.019	0.0028	0.0028	--	--	--	--	--
OUTFALL 019	12587-46-1	Gross Alpha	18	0	0.0%	pCi/l	3	6	1.13	3	--	--	--	--	--

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 019	12587-47-2	Gross Beta	18	11	61.1%	pCi/l	4	8	1.75	2.45	2.15	11.8	5.12	5.874	95% KM Adjusted Gamma UCL
OUTFALL 019	76-44-8	Heptachlor	3	0	0.0%	µg/l	0.0094	0.0094	0.0028	0.0028	--	--	--	--	--
OUTFALL 019	1024-57-3	Heptachlor Epoxide	3	0	0.0%	µg/l	0.0047	0.0047	0.0024	0.0024	--	--	--	--	--
OUTFALL 019	118-74-1	Hexachlorobenzene	3	0	0.0%	µg/l	0.943	47.4	0.0943	14.2	--	--	--	--	--
OUTFALL 019	87-68-3	Hexachlorobutadiene (HCBD)	3	0	0.0%	µg/l	1.89	47.4	0.189	19	--	--	--	--	--
OUTFALL 019	77-47-4	Hexachlorocyclopentadiene	3	0	0.0%	µg/l	4.72	94.8	0.0943	23.7	--	--	--	--	--
OUTFALL 019	67-72-1	Hexachloroethane	3	0	0.0%	µg/l	2.83	47.4	0.189	16.6	--	--	--	--	--
OUTFALL 019	302-01-2	Hydrazine	3	0	0.0%	µg/l	1	1	0.439	0.51	--	--	--	--	--
OUTFALL 019	122-66-7	Hydrazine, 1,2-diphenyl-	3	0	0.0%	µg/l	0.943	94.8	0.0943	11.8	--	--	--	--	--
OUTFALL 019	193-39-5	Indeno(1,2,3-cd)pyrene	3	0	0.0%	µg/l	1.89	94.8	0.0943	16.6	--	--	--	--	--
OUTFALL 019	78-59-1	Isophorone	3	0	0.0%	µg/l	0.943	47.4	0.0943	14.2	--	--	--	--	--
OUTFALL 019	7439-92-1	Lead	18	5	27.8%	µg/l	1	1	0.2	0.2	0.22	0.37	0.294	0.35	95% KM (t) UCL
OUTFALL 019	7439-92-1 (dissolved)	Lead (dissolved)	18	2	11.1%	µg/l	1	1	0.2	0.2	0.2	0.32	0.26	0.32	Maximum detected value
OUTFALL 019	7439-96-5	Manganese	3	1	33.3%	µg/l	20	20	7	7	24	24	24	24	Maximum detected value
OUTFALL 019	7439-96-5 (dissolved)	Manganese (dissolved)	3	0	0.0%	µg/l	20	20	7	7	--	--	--	--	--
OUTFALL 019	7439-97-6	Mercury	18	0	0.0%	µg/l	0.2	0.2	0.1	0.1	--	--	--	--	--
OUTFALL 019	7439-97-6 (dissolved)	Mercury (dissolved)	18	1	5.6%	µg/l	0.2	0.2	0.1	0.1	0.23	0.23	0.23	0.23	Maximum detected value
OUTFALL 019	74-83-9	Methyl Bromide	3	0	0.0%	µg/l	0.5	1	0.42	0.42	--	--	--	--	--
OUTFALL 019	60-34-4	Methyl Hydrazine	3	0	0.0%	µg/l	5	5	1.77	3.41	--	--	--	--	--
OUTFALL 019	75-09-2	Methylene Chloride (DCM)	3	0	0.0%	µg/l	1	1	0.95	0.95	--	--	--	--	--
OUTFALL 019	99-09-2	m-Nitroaniline	1	0	0.0%	µg/l	19	19	2.84	2.84	--	--	--	--	--
OUTFALL 019	91-20-3	Naphthalene	3	1	33.3%	µg/l	9.48	47.4	2.84	14.2	0.151	0.151	0.151	0.151	Maximum detected value
OUTFALL 019	7440-02-0	Nickel	3	1	33.3%	µg/l	10	10	2	2	2.9	2.9	2.9	2.9	Maximum detected value
OUTFALL 019	7440-02-0 (dissolved)	Nickel (dissolved)	3	2	66.7%	µg/l	10	10	2	2	2.1	2.4	2.25	2.4	Maximum detected value
OUTFALL 019	14797-55-8 (as N)	Nitrate (as N)	18	8	44.4%	mg/l	0.11	0.11	0.06	0.08	0.069	0.17	0.11	0.112	95% KM (t) UCL
OUTFALL 019	NO3NO2 (as N)	Nitrate and Nitrite (as N)	18	0	0.0%	mg/l	0.26	1.3	0.11	0.75	--	--	--	--	--
OUTFALL 019	14797-65-0 (as N)	Nitrite (as N)	18	0	0.0%	mg/l	0.15	0.75	0.09	0.45	--	--	--	--	--
OUTFALL 019	98-95-3	Nitrobenzene	3	0	0.0%	µg/l	0.943	19	0.0943	14.2	--	--	--	--	--
OUTFALL 019	62-75-9	n-Nitrosodimethylamine (NDMA)	18	0	0.0%	µg/l	1.89	94.8	0.094	11.8	--	--	--	--	--
OUTFALL 019	86-30-6	n-Nitrosodiphenylamine	3	0	0.0%	µg/l	0.943	47.4	0.0943	9.48	--	--	--	--	--
OUTFALL 019	621-64-7	n-Nitrosodipropylamine	3	0	0.0%	µg/l	1.89	47.4	0.0943	16.6	--	--	--	--	--
OUTFALL 019	106-44-5	p-Cresol	1	0	0.0%	µg/l	9.48	9.48	2.84	2.84	--	--	--	--	--
OUTFALL 019	87-86-5	Pentachlorophenol	18	0	0.0%	µg/l	1.89	94.8	0.094	16.6	--	--	--	--	--
OUTFALL 019	14797-73-0	Perchlorate	18	1	5.6%	µg/l	1	4	0.9	0.95	0.96	0.96	0.96	0.96	Maximum detected value
OUTFALL 019	85-01-8	Phenanthrene	3	0	0.0%	µg/l	0.472	47.4	0.0943	16.6	--	--	--	--	--
OUTFALL 019	108-95-2	Phenol	3	0	0.0%	µg/l	0.943	47.4	0.283	9.48	--	--	--	--	--
OUTFALL 019	100-01-6	p-Nitroaniline	1	0	0.0%	µg/l	19	19	3.79	3.79	--	--	--	--	--
OUTFALL 019	13966-00-2	Potassium-40	18	0	0.0%	pCi/l	25	185	15.1	185	--	--	--	--	--
OUTFALL 019	129-00-0	Pyrene	3	0	0.0%	µg/l	0.472	47.4	0.0943	19	--	--	--	--	--
OUTFALL 019	13982-63-3	Radium-226	18	1	5.6%	pCi/l	1	1	0.172	0.922	0.566	0.566	0.566	0.566	Maximum detected value
OUTFALL 019	15262-20-1	Radium-228	18	0	0.0%	pCi/l	1	1	0.329	0.739	--	--	--	--	--

Area	CAS	Analyte	Number of Samples	Number of Detects	Percent Detected	Units	Minimum RL	Maximum RL	Minimum DL	Maximum DL	Minimum Detected Value	Maximum Detected Value	Average Detected Value	EPC_Value	EPC_Type
OUTFALL 019	7782-49-2	Selenium	18	5	27.8%	µg/l	2	2	0.5	0.5	0.53	0.96	0.69	0.82	95% KM (t) UCL
OUTFALL 019	7782-49-2 (dissolved)	Selenium (dissolved)	18	4	22.2%	µg/l	2	2	0.5	0.5	0.51	1.1	0.78	1.1	Maximum detected value
OUTFALL 019	7440-22-4	Silver	3	0	0.0%	µg/l	1	10	0.1	6	--	--	--	--	--
OUTFALL 019	7440-22-4 (dissolved)	Silver (dissolved)	3	0	0.0%	µg/l	1	10	0.1	6	--	--	--	--	--
OUTFALL 019	10098-97-2	Strontium-90	18	0	0.0%	pCi/l	2	3	0.347	1.79	--	--	--	--	--
OUTFALL 019	127-18-4	Tetrachloroethene (PCE)	18	0	0.0%	µg/l	0.5	0.5	0.32	0.32	--	--	--	--	--
OUTFALL 019	7440-28-0	Thallium	3	0	0.0%	µg/l	1	1	0.2	0.2	--	--	--	--	--
OUTFALL 019	7440-28-0 (dissolved)	Thallium (dissolved)	3	0	0.0%	µg/l	1	1	0.2	0.2	--	--	--	--	--
OUTFALL 019	108-88-3	Toluene	18	0	0.0%	µg/l	0.5	0.5	0.36	0.36	--	--	--	--	--
OUTFALL 019	8001-35-2	Toxaphene	3	0	0.0%	µg/l	0.47	0.47	0.24	0.24	--	--	--	--	--
OUTFALL 019	156-60-5	trans-1,2-Dichloroethene	3	0	0.0%	µg/l	0.5	0.5	0.3	0.3	--	--	--	--	--
OUTFALL 019	10061-02-6	trans-1,3-Dichloropropene	3	0	0.0%	µg/l	0.5	0.5	0.32	0.32	--	--	--	--	--
OUTFALL 019	79-01-6	Trichloroethene (TCE)	18	0	0.0%	µg/l	0.5	0.5	0.26	0.26	--	--	--	--	--
OUTFALL 019	10028-17-8	Tritium	18	0	0.0%	pCi/l	500	500	133	298	--	--	--	--	--
OUTFALL 019	7440-61-1	Uranium	18	16	88.9%	pCi/l	1	1	0.024	0.155	0.018	1.22	0.23	0.433	Gamma Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)
OUTFALL 019	7440-62-2	Vanadium	3	1	33.3%	µg/l	10	10	3	3	3.3	3.3	3.3	3.3	Maximum detected value
OUTFALL 019	7440-62-2 (dissolved)	Vanadium (dissolved)	3	1	33.3%	µg/l	10	10	3	3	3.2	3.2	3.2	3.2	Maximum detected value
OUTFALL 019	110-75-8	Vinyl 2-Chloroethyl ether	3	0	0.0%	µg/l	2	5	1.8	1.8	--	--	--	--	--
OUTFALL 019	75-01-4	Vinyl Chloride	18	0	0.0%	µg/l	0.5	0.5	0.4	0.4	--	--	--	--	--
OUTFALL 019	1330-20-7	Xylenes, Total	18	0	0.0%	µg/l	1	1.5	0.9	0.9	--	--	--	--	--
OUTFALL 019	7440-66-6	Zinc	18	7	38.9%	µg/l	20	20	6	6	6.6	50.2	24.2	21.56	95% KM (t) UCL
OUTFALL 019	7440-66-6 (dissolved)	Zinc (dissolved)	18	8	44.4%	µg/l	20	42	6	6	6.4	56	17.85	23.13	95% GROS Adjusted Gamma UCL

Notes

--' Not Applicable or Not Available

APPENDIX B

Supporting Information for Exposure Assessment and Modeling

Attachment B-1:
Table of Outfall Flow Data and Exposure Frequency Evaluation

Table B-1
Outfall Flow Data

Month #	Week #	Day	Date (2009/10 WY)	Flow (gal) by Outfall					
				001	002	008	009	011	018
10	1	Thursday	10/1/2009	0	0	0	0	0	0
		Friday	10/2/2009	0	0	0	0	0	0
		Saturday	10/3/2009	0	0	0	0	0	0
		Sunday	10/4/2009	0	0	0	0	0	0
		Monday	10/5/2009	0	0	0	0	0	0
		Tuesday	10/6/2009	0	0	0	0	0	0
		Wednesday	10/7/2009	0	0	0	0	0	0
	2	Thursday	10/8/2009	0	0	0	0	0	0
		Friday	10/9/2009	0	0	0	0	0	0
		Saturday	10/10/2009	0	0	0	0	0	0
		Sunday	10/11/2009	0	0	0	0	0	0
		Monday	10/12/2009	0	0	0	0	0	0
		Tuesday	10/13/2009	0	0	0	130665	0	0
		Wednesday	10/14/2009	45	0	0	523455	0	0
	3	Thursday	10/15/2009	0	0	0	28910	0	0
		Friday	10/16/2009	0	0	20	2540	0	35
		Saturday	10/17/2009	0	0	0	0	0	0
		Sunday	10/18/2009	0	0	0	0	0	0
		Monday	10/19/2009	0	0	0	0	0	0
		Tuesday	10/20/2009	0	0	0	0	0	0
		Wednesday	10/21/2009	0	0	0	0	0	0
	4	Thursday	10/22/2009	0	0	30935	10	0	0
		Friday	10/23/2009	0	0	0	0	0	0
		Saturday	10/24/2009	0	0	0	0	0	0
		Sunday	10/25/2009	0	0	0	0	0	0
		Monday	10/26/2009	0	0	0	0	0	0
		Tuesday	10/27/2009	0	0	0	0	0	0
		Wednesday	10/28/2009	0	0	0	0	0	0
	5	Thursday	10/29/2009	0	0	0	0	0	0
		Friday	10/30/2009	0	0	0	0	0	0
		Saturday	10/31/2009	0	0	0	0	0	0
11		Sunday	11/1/2009	0	0	0	0	0	0
		Monday	11/2/2009	0	0	0	0	0	0
		Tuesday	11/3/2009	0	0	0	0	0	0
		Wednesday	11/4/2009	0	0	0	0	0	0
	6	Thursday	11/5/2009	0	0	0	0	0	0
		Friday	11/6/2009	0	0	0	0	0	0
		Saturday	11/7/2009	0	0	0	0	0	0
		Sunday	11/8/2009	0	0	0	0	0	0
		Monday	11/9/2009	0	0	0	0	0	0
		Tuesday	11/10/2009	0	0	0	0	0	0
		Wednesday	11/11/2009	0	0	0	0	0	0
	7	Thursday	11/12/2009	0	0	0	0	0	0
		Friday	11/13/2009	0	0	0	0	0	0
		Saturday	11/14/2009	0	0	0	0	0	0
		Sunday	11/15/2009	0	0	0	0	0	0
		Monday	11/16/2009	0	0	0	0	0	0
		Tuesday	11/17/2009	0	0	0	0	0	0
		Wednesday	11/18/2009	0	0	0	0	0	0
	8	Thursday	11/19/2009	0	0	0	0	0	0
		Friday	11/20/2009	0	0	0	0	0	0
		Saturday	11/21/2009	0	0	0	0	0	0
		Sunday	11/22/2009	0	0	0	0	0	0
		Monday	11/23/2009	0	0	0	0	0	0
		Tuesday	11/24/2009	0	0	0	0	0	0
		Wednesday	11/25/2009	0	0	0	0	0	0
		Thursday	11/26/2009	0	0	0	0	0	0

Table B-1
Outfall Flow Data

Month #	Week #	Day	Date (2009/10 WY)	Flow (gal) by Outfall					
				001	002	008	009	011	018
	9	Friday	11/27/2009	0	0	0	0	0	0
		Saturday	11/28/2009	0	0	0	0	0	0
		Sunday	11/29/2009	0	0	0	0	0	0
		Monday	11/30/2009	0	0	0	0	0	0
12		Tuesday	12/1/2009	0	0	0	0	0	0
		Wednesday	12/2/2009	0	0	0	0	0	0
	10	Thursday	12/3/2009	0	0	0	0	0	0
		Friday	12/4/2009	0	0	0	0	0	0
		Saturday	12/5/2009	0	0	0	0	0	0
		Sunday	12/6/2009	0	0	0	0	0	0
		Monday	12/7/2009	210	0	0	102605	0	0
		Tuesday	12/8/2009	0	0	0	0	0	0
		Wednesday	12/9/2009	0	0	0	0	0	0
	11	Thursday	12/10/2009	0	0	0	33110	0	0
		Friday	12/11/2009	0	0	0	199865	0	0
		Saturday	12/12/2009	0	0	0	815770	0	2830
		Sunday	12/13/2009	0	0	0	437960	0	0
		Monday	12/14/2009	0	0	0	41350	0	0
		Tuesday	12/15/2009	0	0	0	18290	0	0
		Wednesday	12/16/2009	0	0	0	12710	0	0
	12	Thursday	12/17/2009	0	0	0	3250	0	0
		Friday	12/18/2009	0	0	0	0	0	0
		Saturday	12/19/2009	0	0	0	0	0	0
		Sunday	12/20/2009	0	0	0	0	0	0
		Monday	12/21/2009	0	0	0	0	0	0
		Tuesday	12/22/2009	0	0	0	0	0	15
		Wednesday	12/23/2009	0	0	0	0	0	0
	13	Thursday	12/24/2009	0	0	0	0	0	0
		Friday	12/25/2009	0	0	0	0	0	0
		Saturday	12/26/2009	0	0	0	0	0	0
		Sunday	12/27/2009	0	0	0	0	0	0
		Monday	12/28/2009	0	0	0	0	0	0
		Tuesday	12/29/2009	0	0	0	0	0	0
		Wednesday	12/30/2009	0	0	0	0	0	0
	14	Thursday	12/31/2009	0	0	0	0	0	0
		Friday	1/1/2010	0	0	0	0	0	0
		Saturday	1/2/2010	0	0	0	0	0	0
		Sunday	1/3/2010	0	0	0	0	0	0
		Monday	1/4/2010	0	0	0	0	0	0
		Tuesday	1/5/2010	0	0	0	0	0	0
		Wednesday	1/6/2010	0	0	0	0	0	0
	15	Thursday	1/7/2010	0	0	0	0	0	0
		Friday	1/8/2010	0	0	0	0	0	0
		Saturday	1/9/2010	0	0	0	0	0	0
		Sunday	1/10/2010	0	0	0	0	0	0
		Monday	1/11/2010	0	0	0	0	0	0
		Tuesday	1/12/2010	0	0	0	0	0	0
		Wednesday	1/13/2010	0	0	0	0	0	0
	16	Thursday	1/14/2010	0	0	0	0	0	0
		Friday	1/15/2010	0	0	0	0	0	0
1		Saturday	1/16/2010	0	0	0	0	0	0
		Sunday	1/17/2010	0	0	0	25630	0	0
		Monday	1/18/2010	24545	171720	84470	2418090	0	426625
		Tuesday	1/19/2010	49415	1182665	106395	2077665	0	1019265
		Wednesday	1/20/2010	431165	3318825	292515	5055750	184060	2928295
		Thursday	1/21/2010	1031470	5959800	384170	5139020	299900	5243875

Table B-1
Outfall Flow Data

Month #	Week #	Day	Date (2009/10 WY)	Flow (gal) by Outfall					
				001	002	008	009	011	018
	17	Friday	1/22/2010	1183995	3211120	208460	2097540	174465	2578930
		Saturday	1/23/2010	818040	1662045	70750	473940	0	1387980
		Sunday	1/24/2010	749220	1430965	24600	184325	0	1231025
		Monday	1/25/2010	538225	1323115	5470	116420	0	1149805
		Tuesday	1/26/2010	486080	998600	0	83035	0	656255
		Wednesday	1/27/2010	159145	446545	0	64325	0	221120
	18	Thursday	1/28/2010	221440	487010	0	44170	0	272085
		Friday	1/29/2010	145010	291445	0	31050	0	83830
		Saturday	1/30/2010	1965	247185	0	24455	0	0
		Sunday	1/31/2010	0	200150	0	21315	0	0
2		Monday	2/1/2010	0	397575	0	18715	0	461115
		Tuesday	2/2/2010	0	842815	0	16655	0	383060
		Wednesday	2/3/2010	0	267480	0	15245	0	100
	19	Thursday	2/4/2010	0	217560	0	13440	0	1530
		Friday	2/5/2010	0	298095	84415	1107510	0	5280
		Saturday	2/6/2010	609285	832535	305740	3174080	0	161125
		Sunday	2/7/2010	785240	1174560	91000	511430	115100	315515
		Monday	2/8/2010	173930	1055340	50970	231530	0	312485
		Tuesday	2/9/2010	6105	1072470	45815	221750	0	306025
		Wednesday	2/10/2010	0	937345	31990	150280	0	227840
	20	Thursday	2/11/2010	0	525310	20740	107160	0	103340
		Friday	2/12/2010	0	294130	15140	86385	0	0
		Saturday	2/13/2010	0	244570	9135	67935	0	0
		Sunday	2/14/2010	0	204935	1520	49605	0	0
		Monday	2/15/2010	0	179635	0	34340	0	3205
		Tuesday	2/16/2010	0	310450	0	26205	0	83950
		Wednesday	2/17/2010	0	458650	0	21050	0	107180
	21	Thursday	2/18/2010	0	415945	0	18650	0	77775
		Friday	2/19/2010	0	466360	0	17925	0	96585
		Saturday	2/20/2010	0	277165	0	19205	0	0
		Sunday	2/21/2010	0	219155	0	15160	0	0
		Monday	2/22/2010	0	178540	0	12650	0	0
		Tuesday	2/23/2010	0	149690	0	11585	0	0
		Wednesday	2/24/2010	0	132660	5	10015	0	5
	22	Thursday	2/25/2010	0	112155	0	5810	0	0
		Friday	2/26/2010	0	84225	0	2070	0	0
		Saturday	2/27/2010	0	298460	121440	1528500	0	1735
		Sunday	2/28/2010	0	173930	38975	218435	0	0
		Monday	3/1/2010	0	150705	21260	113250	0	0
		Tuesday	3/2/2010	0	300970	15035	82435	0	377215
		Wednesday	3/3/2010	0	814325	10815	62895	0	697720
	23	Thursday	3/4/2010	0	1036640	7250	53935	0	852405
		Friday	3/5/2010	0	1188130	0	37805	0	412595
		Saturday	3/6/2010	0	958025	6550	82350	0	239150
		Sunday	3/7/2010	0	626115	11850	114965	0	82815
		Monday	3/8/2010	0	275735	5	41345	0	0
		Tuesday	3/9/2010	0	220495	0	30465	0	0
		Wednesday	3/10/2010	0	181075	0	25585	0	0
	24	Thursday	3/11/2010	0	150505	0	21650	0	0
		Friday	3/12/2010	0	134985	0	18775	0	0
		Saturday	3/13/2010	0	135395	0	16765	0	0
		Sunday	3/14/2010	0	120215	0	13855	0	0
		Monday	3/15/2010	0	108065	0	11745	0	0
3		Tuesday	3/16/2010	0	67750	0	11815	0	0
		Wednesday	3/17/2010	0	0	0	8595	0	0
		Thursday	3/18/2010	0	0	0	3770	0	0

Table B-1
Outfall Flow Data

Month #	Week #	Day	Date (2009/10 WY)	Flow (gal) by Outfall					
				001	002	008	009	011	018
	25	Friday	3/19/2010	0	0	0	565	0	0
		Saturday	3/20/2010	0	0	0	15	0	0
		Sunday	3/21/2010	0	0	0	0	0	0
		Monday	3/22/2010	0	0	0	0	0	0
		Tuesday	3/23/2010	0	0	0	0	0	5
		Wednesday	3/24/2010	0	0	12320	0	0	0
	26	Thursday	3/25/2010	0	0	6740	0	0	0
		Friday	3/26/2010	0	0	0	0	0	0
		Saturday	3/27/2010	0	0	0	0	0	0
		Sunday	3/28/2010	0	0	0	0	0	0
		Monday	3/29/2010	0	0	0	0	0	0
		Tuesday	3/30/2010	0	0	0	5	0	0
		Wednesday	3/31/2010	0	0	0	0	0	0
	27	Thursday	4/1/2010	0	0	0	0	0	0
		Friday	4/2/2010	0	0	0	0	0	0
		Saturday	4/3/2010	0	0	0	0	0	0
		Sunday	4/4/2010	0	0	0	0	0	0
		Monday	4/5/2010	0	0	0	110655	0	5
		Tuesday	4/6/2010	0	0	0	4845	0	5
		Wednesday	4/7/2010	0	0	0	735	0	0
	28	Thursday	4/8/2010	0	0	0	860	0	0
		Friday	4/9/2010	0	0	0	320	0	0
		Saturday	4/10/2010	0	0	0	0	0	0
		Sunday	4/11/2010	0	0	0	15405	0	0
		Monday	4/12/2010	0	0	0	166730	0	0
		Tuesday	4/13/2010	0	0	0	17825	0	0
		Wednesday	4/14/2010	0	0	0	12585	0	0
4	29	Thursday	4/15/2010	0	0	0	5360	0	0
		Friday	4/16/2010	0	0	0	15	0	0
		Saturday	4/17/2010	0	0	0	0	0	0
		Sunday	4/18/2010	0	0	0	0	0	0
		Monday	4/19/2010	0	0	0	0	0	0
		Tuesday	4/20/2010	0	0	0	0	0	0
		Wednesday	4/21/2010	0	0	0	0	0	0
	30	Thursday	4/22/2010	0	0	0	0	0	0
		Friday	4/23/2010	0	0	0	0	0	0
		Saturday	4/24/2010	0	0	0	0	0	0
		Sunday	4/25/2010	0	0	0	0	0	0
		Monday	4/26/2010	0	0	0	0	0	0
		Tuesday	4/27/2010	0	0	0	0	0	0
		Wednesday	4/28/2010	0	0	0	0	0	0
	31	Thursday	4/29/2010	0	0	0	0	0	0
		Friday	4/30/2010	0	0	0	0	0	0
		Saturday	5/1/2010	0	0	0	0	0	0
		Sunday	5/2/2010	0	0	0	0	0	0
		Monday	5/3/2010	0	0	0	0	0	0
		Tuesday	5/4/2010	0	0	0	0	0	0
		Wednesday	5/5/2010	0	0	0	0	0	0
	32	Thursday	5/6/2010	0	0	0	0	0	0
		Friday	5/7/2010	0	0	0	0	0	0
		Saturday	5/8/2010	0	0	0	0	0	0
		Sunday	5/9/2010	0	0	0	0	0	0
		Monday	5/10/2010	0	0	0	0	0	0
		Tuesday	5/11/2010	0	0	0	0	0	0
		Wednesday	5/12/2010	0	0	0	0	0	0
		Thursday	5/13/2010	0	0	0	0	0	0

Table B-1
Outfall Flow Data

Month #	Week #	Day	Date (2009/10 WY)	Flow (gal) by Outfall					
				001	002	008	009	011	018
5	33	Friday	5/14/2010	0	0	0	0	0	0
		Saturday	5/15/2010	0	0	0	0	0	0
		Sunday	5/16/2010	0	0	0	0	0	0
		Monday	5/17/2010	0	0	0	0	0	0
		Tuesday	5/18/2010	0	0	0	0	0	0
		Wednesday	5/19/2010	0	0	0	0	0	0
	34	Thursday	5/20/2010	0	0	0	0	0	0
		Friday	5/21/2010	0	0	0	0	0	0
		Saturday	5/22/2010	0	0	0	0	0	0
		Sunday	5/23/2010	0	0	0	0	0	0
		Monday	5/24/2010	0	0	0	0	0	0
		Tuesday	5/25/2010	0	0	0	0	0	0
		Wednesday	5/26/2010	0	0	0	0	0	0
	35	Thursday	5/27/2010	0	0	0	0	0	0
		Friday	5/28/2010	0	0	0	0	0	0
		Saturday	5/29/2010	0	0	0	0	0	0
		Sunday	5/30/2010	0	0	0	0	0	0
		Monday	5/31/2010	0	0	0	0	0	0
6		Tuesday	6/1/2010	0	0	0	0	0	0
		Wednesday	6/2/2010	0	0	0	0	0	0
	36	Thursday	6/3/2010	0	0	0	0	0	0
		Friday	6/4/2010	0	0	0	0	0	0
		Saturday	6/5/2010	0	0	0	0	0	0
		Sunday	6/6/2010	0	0	0	0	0	0
		Monday	6/7/2010	0	0	0	0	0	0
		Tuesday	6/8/2010	0	0	0	0	0	0
		Wednesday	6/9/2010	0	0	0	0	0	0
	37	Thursday	6/10/2010	0	0	0	0	0	0
		Friday	6/11/2010	0	0	0	0	0	0
		Saturday	6/12/2010	0	0	0	0	0	0
		Sunday	6/13/2010	0	0	0	0	0	0
		Monday	6/14/2010	0	0	0	0	0	0
		Tuesday	6/15/2010	0	0	0	0	0	0
		Wednesday	6/16/2010	0	0	0	0	0	0
	38	Thursday	6/17/2010	0	0	0	0	0	0
		Friday	6/18/2010	0	0	0	0	0	0
		Saturday	6/19/2010	0	0	0	0	0	0
		Sunday	6/20/2010	0	0	0	0	0	0
		Monday	6/21/2010	0	0	0	0	0	0
		Tuesday	6/22/2010	0	0	0	0	0	0
		Wednesday	6/23/2010	0	0	0	0	0	0
	39	Thursday	6/24/2010	0	0	0	0	0	0
		Friday	6/25/2010	0	0	0	0	0	0
		Saturday	6/26/2010	0	0	0	0	0	0
		Sunday	6/27/2010	0	0	0	0	0	0
		Monday	6/28/2010	0	0	0	0	0	0
		Tuesday	6/29/2010	0	0	0	0	0	0
		Wednesday	6/30/2010	0	0	0	0	0	0
	40	Thursday	7/1/2010	0	0	0	0	0	0
		Friday	7/2/2010	0	0	0	0	0	0
		Saturday	7/3/2010	0	0	0	0	0	0
		Sunday	7/4/2010	0	0	0	0	0	0
		Monday	7/5/2010	0	0	0	0	0	0
		Tuesday	7/6/2010	0	0	0	0	0	0
		Wednesday	7/7/2010	0	0	0	0	0	0
		Thursday	7/8/2010	0	0	0	0	0	0

Table B-1
Outfall Flow Data

Month #	Week #	Day	Date (2009/10 WY)	Flow (gal) by Outfall					
				001	002	008	009	011	018
7	41	Friday	7/9/2010	0	0	0	0	0	0
		Saturday	7/10/2010	0	0	0	0	0	0
		Sunday	7/11/2010	0	0	0	0	0	0
		Monday	7/12/2010	0	0	0	0	0	0
		Tuesday	7/13/2010	0	0	0	0	0	0
		Wednesday	7/14/2010	0	0	0	0	0	0
	42	Thursday	7/15/2010	0	0	0	0	0	0
		Friday	7/16/2010	0	0	0	0	0	0
		Saturday	7/17/2010	0	0	0	0	0	0
		Sunday	7/18/2010	0	0	0	0	0	0
		Monday	7/19/2010	0	0	0	0	0	0
		Tuesday	7/20/2010	0	0	0	0	0	0
		Wednesday	7/21/2010	0	0	0	0	0	0
	43	Thursday	7/22/2010	0	0	0	0	0	0
		Friday	7/23/2010	0	0	0	0	0	0
		Saturday	7/24/2010	0	0	0	0	0	0
		Sunday	7/25/2010	0	0	0	0	0	0
		Monday	7/26/2010	0	0	0	0	0	0
		Tuesday	7/27/2010	0	0	0	0	0	0
		Wednesday	7/28/2010	0	0	0	0	0	0
	44	Thursday	7/29/2010	0	0	0	0	0	0
		Friday	7/30/2010	0	0	0	0	0	0
		Saturday	7/31/2010	0	0	0	0	0	0
8		Sunday	8/1/2010	0	0	0	0	0	0
		Monday	8/2/2010	0	0	0	0	0	0
		Tuesday	8/3/2010	0	0	0	0	0	0
		Wednesday	8/4/2010	0	0	0	0	0	0
	45	Thursday	8/5/2010	0	0	0	0	0	0
		Friday	8/6/2010	0	0	0	0	0	0
		Saturday	8/7/2010	0	0	0	0	0	0
		Sunday	8/8/2010	0	0	0	0	0	0
		Monday	8/9/2010	0	0	0	0	0	0
		Tuesday	8/10/2010	0	0	0	0	0	0
		Wednesday	8/11/2010	0	0	0	0	0	0
	46	Thursday	8/12/2010	0	0	0	0	0	0
		Friday	8/13/2010	0	0	0	0	0	0
		Saturday	8/14/2010	0	0	0	0	0	0
		Sunday	8/15/2010	0	0	0	0	0	0
		Monday	8/16/2010	0	0	0	0	0	0
		Tuesday	8/17/2010	0	0	0	0	0	0
		Wednesday	8/18/2010	0	0	0	0	0	0
	47	Thursday	8/19/2010	0	0	0	0	0	0
		Friday	8/20/2010	0	0	0	0	0	0
		Saturday	8/21/2010	0	0	0	0	0	0
		Sunday	8/22/2010	0	0	0	0	0	0
		Monday	8/23/2010	0	0	0	0	0	0
		Tuesday	8/24/2010	0	0	0	0	0	0
		Wednesday	8/25/2010	0	0	0	0	0	0
	48	Thursday	8/26/2010	0	0	0	0	0	0
		Friday	8/27/2010	0	0	0	0	0	0
		Saturday	8/28/2010	0	0	0	0	0	0
		Sunday	8/29/2010	0	0	0	0	0	0
		Monday	8/30/2010	0	0	0	0	0	0
		Tuesday	8/31/2010	0	0	0	0	0	0
		Wednesday	9/1/2010	0	0	0	0	0	0
		Thursday	9/2/2010	0	0	0	0	0	0

Table B-1
Outfall Flow Data

Month #	Week #	Day	Date (2009/10 WY)	Flow (gal) by Outfall					
				001	002	008	009	011	018
9	49	Friday	9/3/2010	0	0	0	0	0	0
		Saturday	9/4/2010	0	0	0	0	0	0
		Sunday	9/5/2010	0	0	0	0	0	0
		Monday	9/6/2010	0	0	0	0	0	0
		Tuesday	9/7/2010	0	0	0	0	0	0
		Wednesday	9/8/2010	0	0	0	0	0	0
	50	Thursday	9/9/2010	0	0	0	0	0	0
		Friday	9/10/2010	0	0	0	0	0	0
		Saturday	9/11/2010	0	0	0	0	0	0
		Sunday	9/12/2010	0	0	0	0	0	0
		Monday	9/13/2010	0	0	0	0	0	0
		Tuesday	9/14/2010	0	0	0	0	0	0
		Wednesday	9/15/2010	0	0	0	0	0	0
	51	Thursday	9/16/2010	0	0	0	0	0	0
		Friday	9/17/2010	0	0	0	0	0	0
		Saturday	9/18/2010	0	0	0	0	0	0
		Sunday	9/19/2010	0	0	0	0	0	0
		Monday	9/20/2010	0	0	0	0	0	0
		Tuesday	9/21/2010	0	0	0	0	0	0
		Wednesday	9/22/2010	0	0	0	0	0	0
	52	Thursday	9/23/2010	0	0	0	0	0	0
		Friday	9/24/2010	0	0	0	0	0	0
		Saturday	9/25/2010	0	0	0	0	0	0
		Sunday	9/26/2010	0	0	0	0	0	0
		Monday	9/27/2010	0	0	0	0	0	0
		Tuesday	9/28/2010	0	0	0	0	0	0
		Wednesday	9/29/2010	0	0	0	0	0	0
		Thursday	9/30/2010	0	0	0	0	0	0
			Total	19	58	32	89	4	42

Note:
Gray shaded cells show when flow was measured

Table B-2 - Outfall Flow Data and Exposure Frequency Evaluation

	Outfall - number of days of flow						Outfall - days of exposure					
Week	OF001	OF002	OF008	OF009	OF0011	OF018	OF001_days	OF002_days	OF008_days	OF009_days	OF0011_days	OF018_days
1	0	0	0	0	0	0	0	0	0	0	0	0
2	1	0	0	2	0	0	0.14	0	0	0.29	0	0
3	0	0	1	2	0	1	0	0	0.14	0.29	0	0.14
4	0	0	1	1	0	0	0	0	0.14	0.14	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0
7	0	0	0	0	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	0	0	0	0	0	0
10	1	0	0	1	0	0	0.14	0	0	0.14	0	0
11	0	0	0	7	0	1	0	0	0	1.00	0	0.14
12	0	0	0	1	0	1	0	0	0	0.14	0	0.14
13	0	0	0	0	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0	0	0	0	0	0
16	3	3	3	4	1	3	0.43	0.43	0.43	0.57	0.14	0.43
17	7	7	5	7	2	7	1.00	1.00	0.71	1.00	0.29	1.00
18	3	7	0	7	0	5	0.43	1.00	0	1.00	0	0.71
19	4	7	6	7	1	7	0.57	1.00	0.86	1.00	0.14	1.00
20	0	7	4	7	0	4	0	1.00	0.57	1.00	0	0.57
21	0	7	1	7	0	3	0	1.00	0.14	1.00	0	0.43
22	0	7	5	7	0	3	0	1.00	0.71	1.00	0	0.43
23	0	7	4	7	0	4	0	1.00	0.57	1.00	0	0.57
24	0	6	0	7	0	0	0	0.86	0	1.00	0	0
25	0	0	1	3	0	1	0	0	0.14	0.43	0	0.14
26	0	0	1	1	0	0	0	0	0.14	0.14	0	0
27	0	0	0	3	0	2	0	0	0	0.43	0	0.29
28	0	0	0	6	0	0	0	0	0	0.86	0	0
29	0	0	0	2	0	0	0	0	0	0.29	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0
31	0	0	0	0	0	0	0	0	0	0	0	0
32	0	0	0	0	0	0	0	0	0	0	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0
34	0	0	0	0	0	0	0	0	0	0	0	0
35	0	0	0	0	0	0	0	0	0	0	0	0
36	0	0	0	0	0	0	0	0	0	0	0	0
37	0	0	0	0	0	0	0	0	0	0	0	0
38	0	0	0	0	0	0	0	0	0	0	0	0
39	0	0	0	0	0	0	0	0	0	0	0	0
40	0	0	0	0	0	0	0	0	0	0	0	0
41	0	0	0	0	0	0	0	0	0	0	0	0
42	0	0	0	0	0	0	0	0	0	0	0	0
43	0	0	0	0	0	0	0	0	0	0	0	0

Table B-2 - Outfall Flow Data and Exposure Frequency Evaluation

	Outfall - number of days of flow						Outfall - days of exposure						
Week	**OF001**	**OF002**	**OF008**	**OF009**	**OF0011**	**OF018**	**OF001_days**	**OF002_days**	**OF008_days**	**OF009_days**	**OF0011_days**	**OF018_days**	
44	0	0	0	0	0	0	0	0	0	0	0	0	
45	0	0	0	0	0	0	0	0	0	0	0	0	
46	0	0	0	0	0	0	0	0	0	0	0	0	
47	0	0	0	0	0	0	0	0	0	0	0	0	
48	0	0	0	0	0	0	0	0	0	0	0	0	
49	0	0	0	0	0	0	0	0	0	0	0	0	
50	0	0	0	0	0	0	0	0	0	0	0	0	
Total	**19**	**58**	**32**	**89**	**4**	**42**	**3**	**9**	**5**	**13**	**1**	**6**	<------- One day/wk
							6	**18**	**10**	**26**	**2**	**12**	<------- 2 times value

Attachment B-2:
ProUCL Output

UCL Statistics for Data Sets with Non-Detects

User Selected Options	
Date/Time of Computation	ProUCL 5.19/29/2016 2:26:01 PM
From File	qryHLE_UCL_Calc_Input_030_ProUCL_Ready_20160929.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Result (water, storm;outfall 002;ammonia (as nh3))

General Statistics

Total Number of Observations	20	Number of Distinct Observations	5
Number of Detects	5	Number of Non-Detects	15
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	0.206	Minimum Non-Detect	0.5
Maximum Detect	0.56	Maximum Non-Detect	0.5
Variance Detects	0.02	Percent Non-Detects	75%
Mean Detects	0.313	SD Detects	0.142
Median Detects	0.28	CV Detects	0.452
Skewness Detects	1.965	Kurtosis Detects	4.108
Mean of Logged Detects	-1.227	SD of Logged Detects	0.384

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	0.392	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.343	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

KM Mean	0.267	KM Standard Error of Mean	0.0235
KM SD	0.0738	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.307	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.305	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.337	95% KM Chebyshev UCL	0.369
97.5% KM Chebyshev UCL	0.414	99% KM Chebyshev UCL	0.501

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.61	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.68	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.373	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.358	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)	7.758	k star (bias corrected MLE)	3.237
Theta hat (MLE)	0.0403	Theta star (bias corrected MLE)	0.0967
nu hat (MLE)	77.58	nu star (bias corrected)	32.37
Mean (detects)	0.313		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.124	Mean	0.274

Maximum	0.56	Median	0.264
SD	0.1	CV	0.367
k hat (MLE)	8.535	k star (bias corrected MLE)	7.288
Theta hat (MLE)	0.0321	Theta star (bias corrected MLE)	0.0376
nu hat (MLE)	341.4	nu star (bias corrected)	291.5
Adjusted Level of Significance (β)	0.038		
Approximate Chi Square Value (291.52, α)	253	Adjusted Chi Square Value (291.52, β)	250.1
95% Gamma Approximate UCL (use when n>=50)	0.316	95% Gamma Adjusted UCL (use when n<50)	0.319

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.267	SD (KM)	0.0738
Variance (KM)	0.00544	SE of Mean (KM)	0.0235
k hat (KM)	13.07	k star (KM)	11.14
nu hat (KM)	522.7	nu star (KM)	445.6
theta hat (KM)	0.0204	theta star (KM)	0.0239
80% gamma percentile (KM)	0.331	90% gamma percentile (KM)	0.373
95% gamma percentile (KM)	0.41	99% gamma percentile (KM)	0.487

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (445.64, α)	397.7	Adjusted Chi Square Value (445.64, β)	394.1
95% Gamma Approximate KM-UCL (use when n>=50)	0.299	95% Gamma Adjusted KM-UCL (use when n<50)	0.302

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.838	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.347	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	Detected Data Not Lognormal at 5% Significance Level	

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.275	Mean in Log Scale	-1.335
SD in Original Scale	0.0918	SD in Log Scale	0.301
95% t UCL (assumes normality of ROS data)	0.311	95% Percentile Bootstrap UCL	0.31
95% BCA Bootstrap UCL	0.315	95% Bootstrap t UCL	0.321
95% H-UCL (Log ROS)	0.313		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.349	KM Geo Mean	0.26
KM SD (logged)	0.216	95% Critical H Value (KM-Log)	1.796
KM Standard Error of Mean (logged)	0.0809	95% H-UCL (KM -Log)	0.29
KM SD (logged)	0.216	95% Critical H Value (KM-Log)	1.796
KM Standard Error of Mean (logged)	0.0809		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.266	Mean in Log Scale	-1.347
SD in Original Scale	0.0707	SD in Log Scale	0.19
95% t UCL (Assumes normality)	0.293	95% H-Stat UCL	0.286

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 Adjusted Gamma UCL	0.302	95% GROS Adjusted Gamma UCL	0.319

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

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.

Result (water, storm;outfall 002;barium)

General Statistics

Total Number of Observations	10	Number of Distinct Observations	10
		Number of Missing Observations	0
Minimum	0.013	Mean	0.0497
Maximum	0.13	Median	0.039
SD	0.0323	Std. Error of Mean	0.0102
Coefficient of Variation	0.651	Skewness	1.886

Normal GOF Test

Shapiro Wilk Test Statistic	0.818	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.842	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.223	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.262	Data appear 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	0.0685	95% Adjusted-CLT UCL (Chen-1995)	0.073
		95% Modified-t UCL (Johnson-1978)	0.0695

Gamma GOF Test

A-D Test Statistic	0.36	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.732	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.157	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.268	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	3.217	k star (bias corrected MLE)	2.318
Theta hat (MLE)	0.0155	Theta star (bias corrected MLE)	0.0214
nu hat (MLE)	64.33	nu star (bias corrected)	46.37
MLE Mean (bias corrected)	0.0497	MLE Sd (bias corrected)	0.0326
		Approximate Chi Square Value (0.05)	31.74
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	29.65

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	0.0726	95% Adjusted Gamma UCL (use when n<50)	0.0777

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.959	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.842	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.167	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.262	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-4.343	Mean of logged Data	-3.165
Maximum of Logged Data	-2.04	SD of logged Data	0.604

Assuming Lognormal Distribution

95% H-UCL	0.0816	90% Chebyshev (MVUE) UCL	0.0787
95% Chebyshev (MVUE) UCL	0.0919	97.5% Chebyshev (MVUE) UCL	0.11
99% Chebyshev (MVUE) UCL	0.146		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	0.0665	95% Jackknife UCL	0.0685
95% Standard Bootstrap UCL	0.0658	95% Bootstrap-t UCL	0.0852
95% Hall's Bootstrap UCL	0.152	95% Percentile Bootstrap UCL	0.0675
95% BCA Bootstrap UCL	0.071		
90% Chebyshev(Mean, Sd) UCL	0.0804	95% Chebyshev(Mean, Sd) UCL	0.0943
97.5% Chebyshev(Mean, Sd) UCL	0.114	99% Chebyshev(Mean, Sd) UCL	0.151

Suggested UCL to Use

95% Student's-t UCL	0.0685

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

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.

Result (water, storm;outfall 002;barium (dissolved))

General Statistics

Total Number of Observations	10	Number of Distinct Observations	8
		Number of Missing Observations	0
Minimum	0.012	Mean	0.0317
Maximum	0.048	Median	0.033
SD	0.00999	Std. Error of Mean	0.00316
Coefficient of Variation	0.315	Skewness	-0.605

Normal GOF Test

Shapiro Wilk Test Statistic	0.942	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.232	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	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	0.0375	95% Adjusted-CLT UCL (Chen-1995)	0.0363
		95% Modified-t UCL (Johnson-1978)	0.0374

Gamma GOF Test

A-D Test Statistic	0.608	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.726	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.281	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.267	Data Not Gamma Distributed at 5% Significance Level	

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	8.652	k star (bias corrected MLE)	6.123
Theta hat (MLE)	0.00366	Theta star (bias corrected MLE)	0.00518

nu hat (MLE)	173	nu star (bias corrected)	122.5
MLE Mean (bias corrected)	0.0317	MLE Sd (bias corrected)	0.0128
		Approximate Chi Square Value (0.05)	97.91
Adjusted Level of Significance	0.0267	Adjusted Chi Square Value	94.1

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	0.0397	95% Adjusted Gamma UCL (use when n<50)	0.0413

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.845	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.304	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.262	Data Not Lognormal at 5% Significance Level	

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-4.423	Mean of logged Data	-3.51
Maximum of Logged Data	-3.037	SD of logged Data	0.392

Assuming Lognormal Distribution

95% H-UCL	0.0424	90% Chebyshev (MVUE) UCL	0.0441
95% Chebyshev (MVUE) UCL	0.0495	97.5% Chebyshev (MVUE) UCL	0.0571
99% Chebyshev (MVUE) UCL	0.072		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	0.0369	95% Jackknife UCL	0.0375
95% Standard Bootstrap UCL	0.0366	95% Bootstrap-t UCL	0.0367
95% Hall's Bootstrap UCL	0.0366	95% Percentile Bootstrap UCL	0.0366
95% BCA Bootstrap UCL	0.0361		
90% Chebyshev(Mean, Sd) UCL	0.0412	95% Chebyshev(Mean, Sd) UCL	0.0455
97.5% Chebyshev(Mean, Sd) UCL	0.0514	99% Chebyshev(Mean, Sd) UCL	0.0631

Suggested UCL to Use

95% Student's-t UCL	0.0375

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.

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.

Result (water, storm;outfall 002;copper)

General Statistics

Total Number of Observations	21	Number of Distinct Observations	19
Number of Detects	20	Number of Non-Detects	1
Number of Distinct Detects	18	Number of Distinct Non-Detects	1
Minimum Detect	0.968	Minimum Non-Detect	3.4
Maximum Detect	10	Maximum Non-Detect	3.4
Variance Detects	5.115	Percent Non-Detects	4.762%
Mean Detects	3.211	SD Detects	2.262
Median Detects	2.3	CV Detects	0.704
Skewness Detects	1.75	Kurtosis Detects	3.177

Mean of Logged Detects	0.978	SD of Logged Detects	0.607

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.805	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.272	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.192	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

KM Mean	3.153	KM Standard Error of Mean	0.487
KM SD	2.17	95% KM (BCA) UCL	4.004
95% KM (t) UCL	3.993	95% KM (Percentile Bootstrap) UCL	3.991
95% KM (z) UCL	3.954	95% KM Bootstrap t UCL	4.451
90% KM Chebyshev UCL	4.614	95% KM Chebyshev UCL	5.275
97.5% KM Chebyshev UCL	6.193	99% KM Chebyshev UCL	7.996

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.701	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.748	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.226	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.195	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)	2.808	k star (bias corrected MLE)	2.42
Theta hat (MLE)	1.144	Theta star (bias corrected MLE)	1.327
nu hat (MLE)	112.3	nu star (bias corrected)	96.79
Mean (detects)	3.211		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.968	Mean	3.155
Maximum	10	Median	2.3
SD	2.22	CV	0.704
k hat (MLE)	2.876	k star (bias corrected MLE)	2.497
Theta hat (MLE)	1.097	Theta star (bias corrected MLE)	1.263
nu hat (MLE)	120.8	nu star (bias corrected)	104.9
Adjusted Level of Significance (β)	0.0383		
Approximate Chi Square Value (104.87, α)	82.24	Adjusted Chi Square Value (104.87, β)	80.7
95% Gamma Approximate UCL (use when n>=50)	4.023	95% Gamma Adjusted UCL (use when n<50)	4.1

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	3.153	SD (KM)	2.17
Variance (KM)	4.71	SE of Mean (KM)	0.487
k hat (KM)	2.111	k star (KM)	1.841
nu hat (KM)	88.66	nu star (KM)	77.33
theta hat (KM)	1.494	theta star (KM)	1.713
80% gamma percentile (KM)	4.767	90% gamma percentile (KM)	6.254
95% gamma percentile (KM)	7.68	99% gamma percentile (KM)	10.86

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (77.33, α)	58.07	Adjusted Chi Square Value (77.33, β)	56.79
95% Gamma Approximate KM-UCL (use when n>=50)	4.199	95% Gamma Adjusted KM-UCL (use when n<50)	4.294

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.958	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.905	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.188	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.192	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	3.157	Mean in Log Scale	0.966
SD in Original Scale	2.219	SD in Log Scale	0.594
95% t UCL (assumes normality of ROS data)	3.992	95% Percentile Bootstrap UCL	4.003
95% BCA Bootstrap UCL	4.109	95% Bootstrap t UCL	4.363
95% H-UCL (Log ROS)	4.131		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.962	KM Geo Mean	2.618
KM SD (logged)	0.585	95% Critical H Value (KM-Log)	2.07
KM Standard Error of Mean (logged)	0.132	95% H-UCL (KM -Log)	4.073
KM SD (logged)	0.585	95% Critical H Value (KM-Log)	2.07
KM Standard Error of Mean (logged)	0.132		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	3.139	Mean in Log Scale	0.957
SD in Original Scale	2.229	SD in Log Scale	0.599
95% t UCL (Assumes normality)	3.978	95% H-Stat UCL	4.12

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 Adjusted Gamma UCL	4.294	95% GROS Adjusted Gamma UCL	4.1

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

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.

Result (water, storm;outfall 002;copper (dissolved))

General Statistics

Total Number of Observations	21	Number of Distinct Observations	17
Number of Detects	18	Number of Non-Detects	3
Number of Distinct Detects	16	Number of Distinct Non-Detects	2
Minimum Detect	0.77	Minimum Non-Detect	1.8
Maximum Detect	3.6	Maximum Non-Detect	2
Variance Detects	0.543	Percent Non-Detects	14.29%
Mean Detects	1.994	SD Detects	0.737
Median Detects	1.865	CV Detects	0.37
Skewness Detects	0.345	Kurtosis Detects	0.0359
Mean of Logged Detects	0.618	SD of Logged Detects	0.408

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.969	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.897	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.162	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.202	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

KM Mean	1.916	KM Standard Error of Mean	0.163
KM SD	0.706	95% KM (BCA) UCL	2.171
95% KM (t) UCL	2.197	95% KM (Percentile Bootstrap) UCL	2.189
95% KM (z) UCL	2.184	95% KM Bootstrap t UCL	2.216
90% KM Chebyshev UCL	2.404	95% KM Chebyshev UCL	2.625
97.5% KM Chebyshev UCL	2.932	99% KM Chebyshev UCL	3.535

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.298	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.741	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.112	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.204	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)	7.105	k star (bias corrected MLE)	5.958
Theta hat (MLE)	0.281	Theta star (bias corrected MLE)	0.335
nu hat (MLE)	255.8	nu star (bias corrected)	214.5
Mean (detects)	1.994		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.77	Mean	1.915
Maximum	3.6	Median	1.8
SD	0.711	CV	0.371
k hat (MLE)	7.428	k star (bias corrected MLE)	6.399
Theta hat (MLE)	0.258	Theta star (bias corrected MLE)	0.299
nu hat (MLE)	312	nu star (bias corrected)	268.8
Adjusted Level of Significance (β)	0.0383		
Approximate Chi Square Value (268.76, α)	231.8	Adjusted Chi Square Value (268.76, β)	229.2
95% Gamma Approximate UCL (use when n>=50)	2.221	95% Gamma Adjusted UCL (use when n<50)	2.246

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.916	SD (KM)	0.706
Variance (KM)	0.498	SE of Mean (KM)	0.163
k hat (KM)	7.374	k star (KM)	6.352
nu hat (KM)	309.7	nu star (KM)	266.8
theta hat (KM)	0.26	theta star (KM)	0.302
80% gamma percentile (KM)	2.509	90% gamma percentile (KM)	2.932
95% gamma percentile (KM)	3.313	99% gamma percentile (KM)	4.111

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (266.80, α)	230	Adjusted Chi Square Value (266.80, β)	227.4
95% Gamma Approximate KM-UCL (use when n>=50)	2.223	95% Gamma Adjusted KM-UCL (use when n<50)	2.249

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.942	**Shapiro Wilk GOF Test**	

5% Shapiro Wilk Critical Value	0.897	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.137	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.202	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	1.91	Mean in Log Scale	0.577
SD in Original Scale	0.715	SD in Log Scale	0.392
95% t UCL (assumes normality of ROS data)	2.179	95% Percentile Bootstrap UCL	2.18
95% BCA Bootstrap UCL	2.187	95% Bootstrap t UCL	2.2
95% H-UCL (Log ROS)	2.273		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.576	KM Geo Mean	1.779
KM SD (logged)	0.399	95% Critical H Value (KM-Log)	1.904
KM Standard Error of Mean (logged)	0.0946	95% H-UCL (KM -Log)	2.284
KM SD (logged)	0.399	95% Critical H Value (KM-Log)	1.904
KM Standard Error of Mean (logged)	0.0946		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.847	Mean in Log Scale	0.525
SD in Original Scale	0.773	SD in Log Scale	0.443
95% t UCL (Assumes normality)	2.138	95% H-Stat UCL	2.259

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	2.197

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.

Result (water, storm;outfall 002;dioxin teq, human/mammal (epa, nds excluded))

General Statistics

Total Number of Observations	11	Number of Distinct Observations	11
		Number of Missing Observations	0
Minimum	2.6400E-9	Mean	5.1515E-7
Maximum	1.9920E-6	Median	1.8500E-7
SD	6.2825E-7	Std. Error of Mean	1.8942E-7
Coefficient of Variation	N/A	Skewness	1.474

Normal GOF Test

Shapiro Wilk Test Statistic	0.801	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.85	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.26	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.251	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	8.5847E-7	95% Adjusted-CLT UCL (Chen-1995)	9.1669E-7
		95% Modified-t UCL (Johnson-1978)	8.7250E-7

Gamma GOF Test

A-D Test Statistic	0.228	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.775	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.145	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.268	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.58	k star (bias corrected MLE)	0.483
Theta hat (MLE)	8.8788E-7	Theta star (bias corrected MLE)	1.0675E-6
nu hat (MLE)	12.76	nu star (bias corrected)	10.62
MLE Mean (bias corrected)	5.1515E-7	MLE Sd (bias corrected)	7.4157E-7
		Approximate Chi Square Value (0.05)	4.331
Adjusted Level of Significance	0.0278	Adjusted Chi Square Value	3.699

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	1.2629E-6	95% Adjusted Gamma UCL (use when n<50)	1.4785E-6

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.933	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.85	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.143	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.251	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-19.75	Mean of logged Data	-15.55
Maximum of Logged Data	-13.13	SD of logged Data	1.939

Assuming Lognormal Distribution

95% H-UCL	2.5047E-5	90% Chebyshev (MVUE) UCL	2.3156E-6
95% Chebyshev (MVUE) UCL	2.9979E-6	97.5% Chebyshev (MVUE) UCL	3.9448E-6
99% Chebyshev (MVUE) UCL	5.8049E-6		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	8.2672E-7	95% Jackknife UCL	8.5847E-7
95% Standard Bootstrap UCL	8.1231E-7	95% Bootstrap-t UCL	1.0603E-6
95% Hall's Bootstrap UCL	9.0484E-7	95% Percentile Bootstrap UCL	8.2309E-7
95% BCA Bootstrap UCL	9.3709E-7		
90% Chebyshev(Mean, Sd) UCL	1.0834E-6	95% Chebyshev(Mean, Sd) UCL	1.3408E-6
97.5% Chebyshev(Mean, Sd) UCL	1.6981E-6	99% Chebyshev(Mean, Sd) UCL	2.3999E-6

Suggested UCL to Use

95% Adjusted Gamma UCL	1.4785E-6

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.

Result (water, storm;outfall 002;gross alpha)

General Statistics

Total Number of Observations	21	Number of Distinct Observations	12

Number of Detects	11	Number of Non-Detects	10
Number of Distinct Detects	10	Number of Distinct Non-Detects	2
Minimum Detect	0.905	Minimum Non-Detect	2.1
Maximum Detect	6.8	Maximum Non-Detect	3
Variance Detects	4.936	Percent Non-Detects	47.62%
Mean Detects	2.93	SD Detects	2.222
Median Detects	1.72	CV Detects	0.758
Skewness Detects	0.978	Kurtosis Detects	-0.528
Mean of Logged Detects	0.821	SD of Logged Detects	0.74

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.813	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.85	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.252	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.251	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

KM Mean	2.217	KM Standard Error of Mean	0.414
KM SD	1.738	95% KM (BCA) UCL	2.919
95% KM (t) UCL	2.931	95% KM (Percentile Bootstrap) UCL	2.893
95% KM (z) UCL	2.898	95% KM Bootstrap t UCL	3.217
90% KM Chebyshev UCL	3.458	95% KM Chebyshev UCL	4.021
97.5% KM Chebyshev UCL	4.801	99% KM Chebyshev UCL	6.334

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.666	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.738	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.233	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.258	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)	2.121	k star (bias corrected MLE)	1.603
Theta hat (MLE)	1.381	Theta star (bias corrected MLE)	1.828
nu hat (MLE)	46.66	nu star (bias corrected)	35.27
Mean (detects)	2.93		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.113	Mean	2.249
Maximum	6.8	Median	1.456
SD	1.848	CV	0.821
k hat (MLE)	1.666	k star (bias corrected MLE)	1.46
Theta hat (MLE)	1.35	Theta star (bias corrected MLE)	1.541
nu hat (MLE)	69.98	nu star (bias corrected)	61.32
Adjusted Level of Significance (β)	0.0383		
Approximate Chi Square Value (61.32, α)	44.31	Adjusted Chi Square Value (61.32, β)	43.2
95% Gamma Approximate UCL (use when n>=50)	3.113	95% Gamma Adjusted UCL (use when n<50)	3.193

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.217	SD (KM)	1.738
Variance (KM)	3.021	SE of Mean (KM)	0.414
k hat (KM)	1.627	k star (KM)	1.426

nu hat (KM)	68.34	nu star (KM)	59.91
theta hat (KM)	1.363	theta star (KM)	1.554
80% gamma percentile (KM)	3.449	90% gamma percentile (KM)	4.677
95% gamma percentile (KM)	5.874	99% gamma percentile (KM)	8.585

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (59.91, α)	43.11	Adjusted Chi Square Value (59.91, β)	42.02
95% Gamma Approximate KM-UCL (use when n>=50)	3.081	95% Gamma Adjusted KM-UCL (use when n<50)	3.162

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.888	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.217	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.251	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	2.283	Mean in Log Scale	0.604
SD in Original Scale	1.776	SD in Log Scale	0.647
95% t UCL (assumes normality of ROS data)	2.952	95% Percentile Bootstrap UCL	2.967
95% BCA Bootstrap UCL	3.101	95% Bootstrap t UCL	3.245
95% H-UCL (Log ROS)	3.071		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.579	KM Geo Mean	1.784
KM SD (logged)	0.606	95% Critical H Value (KM-Log)	2.091
KM Standard Error of Mean (logged)	0.155	95% H-UCL (KM -Log)	2.845
KM SD (logged)	0.606	95% Critical H Value (KM-Log)	2.091
KM Standard Error of Mean (logged)	0.155		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	2.227	Mean in Log Scale	0.606
SD in Original Scale	1.745	SD in Log Scale	0.577
95% t UCL (Assumes normality)	2.884	95% H-Stat UCL	2.824

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	3.162	95% GROS Adjusted Gamma UCL	3.193

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.

Result (water, storm;outfall 002;gross beta)

General Statistics

Total Number of Observations	21	Number of Distinct Observations	21
		Number of Missing Observations	0
Minimum	1.94	Mean	4.062
Maximum	9.5	Median	3.86
SD	1.726	Std. Error of Mean	0.377
Coefficient of Variation	0.425	Skewness	1.913

Normal GOF Test

Shapiro Wilk Test Statistic	0.819	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.209	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.188	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	4.712	95% Adjusted-CLT UCL (Chen-1995)	4.85
		95% Modified-t UCL (Johnson-1978)	4.738

Gamma GOF Test

A-D Test Statistic	0.573	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.744	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.155	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.19	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	7.458	k star (bias corrected MLE)	6.424
Theta hat (MLE)	0.545	Theta star (bias corrected MLE)	0.632
nu hat (MLE)	313.2	nu star (bias corrected)	269.8
MLE Mean (bias corrected)	4.062	MLE Sd (bias corrected)	1.603
		Approximate Chi Square Value (0.05)	232.8
Adjusted Level of Significance	0.0383	Adjusted Chi Square Value	230.1

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	4.709	95% Adjusted Gamma UCL (use when n<50)	4.763

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.955	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.908	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.13	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.188	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.663	Mean of logged Data	1.333
Maximum of Logged Data	2.251	SD of logged Data	0.364

Assuming Lognormal Distribution

95% H-UCL	4.722	90% Chebyshev (MVUE) UCL	5.021
95% Chebyshev (MVUE) UCL	5.466	97.5% Chebyshev (MVUE) UCL	6.084
99% Chebyshev (MVUE) UCL	7.296		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	4.682	95% Jackknife UCL	4.712
95% Standard Bootstrap UCL	4.669	95% Bootstrap-t UCL	5.144
95% Hall's Bootstrap UCL	8.024	95% Percentile Bootstrap UCL	4.735
95% BCA Bootstrap UCL	4.818		
90% Chebyshev(Mean, Sd) UCL	5.193	95% Chebyshev(Mean, Sd) UCL	5.705
97.5% Chebyshev(Mean, Sd) UCL	6.415	99% Chebyshev(Mean, Sd) UCL	7.811

Suggested UCL to Use

95% Adjusted Gamma UCL	4.763

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.

Result (water, storm;outfall 002;lead)

General Statistics

Total Number of Observations	21	Number of Distinct Observations	12
Number of Detects	10	Number of Non-Detects	11
Number of Distinct Detects	10	Number of Distinct Non-Detects	2
Minimum Detect	0.24	Minimum Non-Detect	0.5
Maximum Detect	11	Maximum Non-Detect	1
Variance Detects	10.51	Percent Non-Detects	52.38%
Mean Detects	2.336	SD Detects	3.242
Median Detects	1.285	CV Detects	1.388
Skewness Detects	2.518	Kurtosis Detects	6.93
Mean of Logged Detects	0.166	SD of Logged Detects	1.223

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.664	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.283	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	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

KM Mean	1.34	KM Standard Error of Mean	0.539
KM SD	2.33	95% KM (BCA) UCL	2.337
95% KM (t) UCL	2.269	95% KM (Percentile Bootstrap) UCL	2.282
95% KM (z) UCL	2.226	95% KM Bootstrap t UCL	3.691
90% KM Chebyshev UCL	2.956	95% KM Chebyshev UCL	3.689
97.5% KM Chebyshev UCL	4.705	99% KM Chebyshev UCL	6.701

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.415	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.753	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.164	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.275	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)	0.861	k star (bias corrected MLE)	0.669
Theta hat (MLE)	2.713	Theta star (bias corrected MLE)	3.49
nu hat (MLE)	17.22	nu star (bias corrected)	13.39
Mean (detects)	2.336		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	1.283
Maximum	11	Median	0.4
SD	2.436	CV	1.898

k hat (MLE)	0.375	k star (bias corrected MLE)	0.353
Theta hat (MLE)	3.42	Theta star (bias corrected MLE)	3.631
nu hat (MLE)	15.76	nu star (bias corrected)	14.84
Adjusted Level of Significance (β)	0.0383		
Approximate Chi Square Value (14.84, α)	7.153	Adjusted Chi Square Value (14.84, β)	6.745
95% Gamma Approximate UCL (use when n>=50)	2.663	95% Gamma Adjusted UCL (use when n<50)	2.824

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.34	SD (KM)	2.33
Variance (KM)	5.427	SE of Mean (KM)	0.539
k hat (KM)	0.331	k star (KM)	0.315
nu hat (KM)	13.9	nu star (KM)	13.25
theta hat (KM)	4.049	theta star (KM)	4.248
80% gamma percentile (KM)	2.08	90% gamma percentile (KM)	3.928
95% gamma percentile (KM)	6.032	99% gamma percentile (KM)	11.47

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (13.25, α)	6.062	Adjusted Chi Square Value (13.25, β)	5.691
95% Gamma Approximate KM-UCL (use when n>=50)	2.93	95% Gamma Adjusted KM-UCL (use when n<50)	3.121

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.954	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.144	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	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	1.377	Mean in Log Scale	-0.405
SD in Original Scale	2.381	SD in Log Scale	1.128
95% t UCL (assumes normality of ROS data)	2.273	95% Percentile Bootstrap UCL	2.304
95% BCA Bootstrap UCL	2.849	95% Bootstrap t UCL	3.893
95% H-UCL (Log ROS)	2.518		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.406	KM Geo Mean	0.666
KM SD (logged)	1.015	95% Critical H Value (KM-Log)	2.585
KM Standard Error of Mean (logged)	0.26	95% H-UCL (KM -Log)	2.005
KM SD (logged)	1.015	95% Critical H Value (KM-Log)	2.585
KM Standard Error of Mean (logged)	0.26		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.362	Mean in Log Scale	-0.317
SD in Original Scale	2.374	SD in Log Scale	0.958
95% t UCL (Assumes normality)	2.256	95% H-Stat UCL	1.972

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

3 Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	3.121

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.

Result (water, storm;outfall 002;manganese)

General Statistics

Total Number of Observations	14	Number of Distinct Observations	11
Number of Detects	10	Number of Non-Detects	4
Number of Distinct Detects	10	Number of Distinct Non-Detects	1
Minimum Detect	6.2	Minimum Non-Detect	20
Maximum Detect	240	Maximum Non-Detect	20
Variance Detects	5690	Percent Non-Detects	28.57%
Mean Detects	58.5	SD Detects	75.43
Median Detects	25	CV Detects	1.289
Skewness Detects	1.873	Kurtosis Detects	3.341
Mean of Logged Detects	3.359	SD of Logged Detects	1.259

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.742	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.842	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.281	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.262	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

KM Mean	44.87	KM Standard Error of Mean	18.12
KM SD	64.24	95% KM (BCA) UCL	77.32
95% KM (t) UCL	76.96	95% KM (Percentile Bootstrap) UCL	75.85
95% KM (z) UCL	74.67	95% KM Bootstrap t UCL	124.5
90% KM Chebyshev UCL	99.22	95% KM Chebyshev UCL	123.8
97.5% KM Chebyshev UCL	158	99% KM Chebyshev UCL	225.1

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.469	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.754	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.194	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.275	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)	0.832	k star (bias corrected MLE)	0.649
Theta hat (MLE)	70.31	Theta star (bias corrected MLE)	90.13
nu hat (MLE)	16.64	nu star (bias corrected)	12.98
Mean (detects)	58.5		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	43.91
Maximum	240	Median	15
SD	67.39	CV	1.535
k hat (MLE)	0.392	k star (bias corrected MLE)	0.355
Theta hat (MLE)	112.1	Theta star (bias corrected MLE)	123.6
nu hat (MLE)	10.96	nu star (bias corrected)	9.947
Adjusted Level of Significance (β)	0.0312		
Approximate Chi Square Value (9.95, α)	3.909	Adjusted Chi Square Value (9.95, β)	3.421
95% Gamma Approximate UCL (use when n>=50)	111.7	95% Gamma Adjusted UCL (use when n<50)	127.7

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	44.87	SD (KM)	64.24
Variance (KM)	4127	SE of Mean (KM)	18.12
k hat (KM)	0.488	k star (KM)	0.431
nu hat (KM)	13.66	nu star (KM)	12.07
theta hat (KM)	91.98	theta star (KM)	104.1
80% gamma percentile (KM)	72.98	90% gamma percentile (KM)	125
95% gamma percentile (KM)	181.7	99% gamma percentile (KM)	323

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (12.07, α)	5.271	Adjusted Chi Square Value (12.07, β)	4.688
95% Gamma Approximate KM-UCL (use when n>=50)	102.7	95% Gamma Adjusted KM-UCL (use when n<50)	115.5

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.937	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.156	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	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	45.32	Mean in Log Scale	3.072
SD in Original Scale	66.49	SD in Log Scale	1.195
95% t UCL (assumes normality of ROS data)	76.79	95% Percentile Bootstrap UCL	76
95% BCA Bootstrap UCL	84.04	95% Bootstrap t UCL	126.6
95% H-UCL (Log ROS)	124.1		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	3.06	KM Geo Mean	21.33
KM SD (logged)	1.132	95% Critical H Value (KM-Log)	3.015
KM Standard Error of Mean (logged)	0.327	95% H-UCL (KM -Log)	104.2
KM SD (logged)	1.132	95% Critical H Value (KM-Log)	3.015
KM Standard Error of Mean (logged)	0.327		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	44.64	Mean in Log Scale	3.057
SD in Original Scale	66.76	SD in Log Scale	1.159
95% t UCL (Assumes normality)	76.24	95% H-Stat UCL	111.5

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Bootstrap t UCL	124.5	ə Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	115.5

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.

Result (water, storm;outfall 002;manganese (dissolved))

General Statistics

Total Number of Observations	14	Number of Distinct Observations	8
Number of Detects	8	Number of Non-Detects	6

Number of Distinct Detects	8	Number of Distinct Non-Detects	1
Minimum Detect	4.8	Minimum Non-Detect	20
Maximum Detect	42	Maximum Non-Detect	20
Variance Detects	148.1	Percent Non-Detects	42.86%
Mean Detects	14.53	SD Detects	12.17
Median Detects	10.2	CV Detects	0.838
Skewness Detects	1.996	Kurtosis Detects	4.282
Mean of Logged Detects	2.439	SD of Logged Detects	0.698

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.769	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.234	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.283	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

KM Mean	12.17	KM Standard Error of Mean	2.809
KM SD	9.301	95% KM (BCA) UCL	17.21
95% KM (t) UCL	17.15	95% KM (Percentile Bootstrap) UCL	16.94
95% KM (z) UCL	16.79	95% KM Bootstrap t UCL	21.06
90% KM Chebyshev UCL	20.6	95% KM Chebyshev UCL	24.42
97.5% KM Chebyshev UCL	29.71	99% KM Chebyshev UCL	40.12

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.401	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.723	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.2	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.297	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)	2.267	k star (bias corrected MLE)	1.5
Theta hat (MLE)	6.408	Theta star (bias corrected MLE)	9.683
nu hat (MLE)	36.27	nu star (bias corrected)	24
Mean (detects)	14.53		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	1.823	Mean	12.21
Maximum	42	Median	9.251
SD	10.01	CV	0.82
k hat (MLE)	2.08	k star (bias corrected MLE)	1.682
Theta hat (MLE)	5.867	Theta star (bias corrected MLE)	7.256
nu hat (MLE)	58.25	nu star (bias corrected)	47.1
Adjusted Level of Significance (β)	0.0312		
Approximate Chi Square Value (47.10, α)	32.35	Adjusted Chi Square Value (47.10, β)	30.73
95% Gamma Approximate UCL (use when n>=50)	17.77	95% Gamma Adjusted UCL (use when n<50)	18.7

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	12.17	SD (KM)	9.301
Variance (KM)	86.52	SE of Mean (KM)	2.809
k hat (KM)	1.712	k star (KM)	1.393
nu hat (KM)	47.94	nu star (KM)	39

theta hat (KM)	7.108	theta star (KM)	8.737
80% gamma percentile (KM)	18.98	90% gamma percentile (KM)	25.83
95% gamma percentile (KM)	32.51	99% gamma percentile (KM)	47.66

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (39.00, α)	25.7	Adjusted Chi Square Value (39.00, β)	24.27
95% Gamma Approximate KM-UCL (use when n>=50)	18.47	95% Gamma Adjusted KM-UCL (use when n<50)	19.56

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.949	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.172	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.283	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	12.26	Mean in Log Scale	2.311
SD in Original Scale	9.663	SD in Log Scale	0.606
95% t UCL (assumes normality of ROS data)	16.84	95% Percentile Bootstrap UCL	16.7
95% BCA Bootstrap UCL	18.43	95% Bootstrap t UCL	21.48
95% H-UCL (Log ROS)	17.58		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.307	KM Geo Mean	10.04
KM SD (logged)	0.572	95% Critical H Value (KM-Log)	2.133
KM Standard Error of Mean (logged)	0.191	95% H-UCL (KM -Log)	16.6
KM SD (logged)	0.572	95% Critical H Value (KM-Log)	2.133
KM Standard Error of Mean (logged)	0.191		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	12.59	Mean in Log Scale	2.381
SD in Original Scale	9.228	SD in Log Scale	0.517
95% t UCL (Assumes normality)	16.95	95% H-Stat UCL	16.54

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	17.15

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

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.

Result (water, storm;outfall 002;nitrate (as n))

General Statistics

Total Number of Observations	21	Number of Distinct Observations	18
Number of Detects	18	Number of Non-Detects	3
Number of Distinct Detects	18	Number of Distinct Non-Detects	1
Minimum Detect	0.088	Minimum Non-Detect	0.11
Maximum Detect	3.5	Maximum Non-Detect	0.11

Variance Detects	0.979	Percent Non-Detects	14.29%
Mean Detects	0.684	SD Detects	0.99
Median Detects	0.27	CV Detects	1.448
Skewness Detects	2.081	Kurtosis Detects	3.544
Mean of Logged Detects	-1.099	SD of Logged Detects	1.136

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.634	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.897	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.387	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.202	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

KM Mean	0.599	KM Standard Error of Mean	0.205
KM SD	0.914	95% KM (BCA) UCL	0.943
95% KM (t) UCL	0.953	95% KM (Percentile Bootstrap) UCL	0.95
95% KM (z) UCL	0.937	95% KM Bootstrap t UCL	1.359
90% KM Chebyshev UCL	1.215	95% KM Chebyshev UCL	1.494
97.5% KM Chebyshev UCL	1.881	99% KM Chebyshev UCL	2.642

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.537	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.775	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.295	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.211	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)	0.822	k star (bias corrected MLE)	0.722
Theta hat (MLE)	0.831	Theta star (bias corrected MLE)	0.946
nu hat (MLE)	29.61	nu star (bias corrected)	26.01
Mean (detects)	0.684		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.587
Maximum	3.5	Median	0.23
SD	0.944	CV	1.607
k hat (MLE)	0.581	k star (bias corrected MLE)	0.53
Theta hat (MLE)	1.011	Theta star (bias corrected MLE)	1.108
nu hat (MLE)	24.41	nu star (bias corrected)	22.26
Adjusted Level of Significance (β)	0.0383		
Approximate Chi Square Value (22.26, α)	12.53	Adjusted Chi Square Value (22.26, β)	11.97
95% Gamma Approximate UCL (use when n>=50)	1.043	95% Gamma Adjusted UCL (use when n<50)	1.092

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.599	SD (KM)	0.914
Variance (KM)	0.836	SE of Mean (KM)	0.205
k hat (KM)	0.429	k star (KM)	0.4
nu hat (KM)	18.03	nu star (KM)	16.79
theta hat (KM)	1.395	theta star (KM)	1.498
80% gamma percentile (KM)	0.967	90% gamma percentile (KM)	1.692
95% gamma percentile (KM)	2.489	99% gamma percentile (KM)	4.494

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (16.79, α)	8.523	Adjusted Chi Square Value (16.79, β)	8.072
95% Gamma Approximate KM-UCL (use when n>=50)	1.18	95% Gamma Adjusted KM-UCL (use when n<50)	1.246

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.884	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.897	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.205	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.202	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	0.594	Mean in Log Scale	-1.368
SD in Original Scale	0.94	SD in Log Scale	1.253
95% t UCL (assumes normality of ROS data)	0.947	95% Percentile Bootstrap UCL	0.951
95% BCA Bootstrap UCL	1.022	95% Bootstrap t UCL	1.276
95% H-UCL (Log ROS)	1.267		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.283	KM Geo Mean	0.277
KM SD (logged)	1.117	95% Critical H Value (KM-Log)	2.727
KM Standard Error of Mean (logged)	0.251	95% H-UCL (KM -Log)	1.022
KM SD (logged)	1.117	95% Critical H Value (KM-Log)	2.727
KM Standard Error of Mean (logged)	0.251		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.594	Mean in Log Scale	-1.357
SD in Original Scale	0.94	SD in Log Scale	1.231
95% t UCL (Assumes normality)	0.947	95% H-Stat UCL	1.217

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	1.494

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.

Result (water, storm;outfall 002;nitrate and nitrite (as n))

General Statistics

Total Number of Observations	21	Number of Distinct Observations	14
Number of Detects	13	Number of Non-Detects	8
Number of Distinct Detects	13	Number of Distinct Non-Detects	1
Minimum Detect	0.15	Minimum Non-Detect	0.26
Maximum Detect	3.5	Maximum Non-Detect	0.26
Variance Detects	1.19	Percent Non-Detects	38.1%
Mean Detects	0.912	SD Detects	1.091
Median Detects	0.34	CV Detects	1.197
Skewness Detects	1.633	Kurtosis Detects	1.647
Mean of Logged Detects	-0.652	SD of Logged Detects	1.045

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.713	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.353	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.234	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

KM Mean	0.642	KM Standard Error of Mean	0.203
KM SD	0.893	95% KM (BCA) UCL	1.005
95% KM (t) UCL	0.993	95% KM (Percentile Bootstrap) UCL	0.97
95% KM (z) UCL	0.976	95% KM Bootstrap t UCL	1.369
90% KM Chebyshev UCL	1.252	95% KM Chebyshev UCL	1.528
97.5% KM Chebyshev UCL	1.911	99% KM Chebyshev UCL	2.663

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.096	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.757	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.301	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.243	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)	1.028	k star (bias corrected MLE)	0.842
Theta hat (MLE)	0.886	Theta star (bias corrected MLE)	1.082
nu hat (MLE)	26.74	nu star (bias corrected)	21.9
Mean (detects)	0.912		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.584
Maximum	3.5	Median	0.24
SD	0.948	CV	1.623
k hat (MLE)	0.474	k star (bias corrected MLE)	0.438
Theta hat (MLE)	1.234	Theta star (bias corrected MLE)	1.335
nu hat (MLE)	19.89	nu star (bias corrected)	18.39
Adjusted Level of Significance (β)	0.0383		
Approximate Chi Square Value (18.39, α)	9.67	Adjusted Chi Square Value (18.39, β)	9.186
95% Gamma Approximate UCL (use when n>=50)	1.111	95% Gamma Adjusted UCL (use when n<50)	1.17

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.642	SD (KM)	0.893
Variance (KM)	0.798	SE of Mean (KM)	0.203
k hat (KM)	0.517	k star (KM)	0.475
nu hat (KM)	21.71	nu star (KM)	19.95
theta hat (KM)	1.242	theta star (KM)	1.353
80% gamma percentile (KM)	1.052	90% gamma percentile (KM)	1.756
95% gamma percentile (KM)	2.513	99% gamma percentile (KM)	4.384

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (19.95, α)	10.81	Adjusted Chi Square Value (19.95, β)	10.3
95% Gamma Approximate KM-UCL (use when n>=50)	1.185	95% Gamma Adjusted KM-UCL (use when n<50)	1.244

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.874	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.24	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.234	Detected Data Not Lognormal at 5% Significance Level	

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.635	Mean in Log Scale	-1.098
SD in Original Scale	0.921	SD in Log Scale	1.055
95% t UCL (assumes normality of ROS data)	0.981	95% Percentile Bootstrap UCL	0.997
95% BCA Bootstrap UCL	1.061	95% Bootstrap t UCL	1.438
95% H-UCL (Log ROS)	1.085		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.014	KM Geo Mean	0.363
KM SD (logged)	0.921	95% Critical H Value (KM-Log)	2.46
KM Standard Error of Mean (logged)	0.214	95% H-UCL (KM -Log)	0.921
KM SD (logged)	0.921	95% Critical H Value (KM-Log)	2.46
KM Standard Error of Mean (logged)	0.214		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.614	Mean in Log Scale	-1.181
SD in Original Scale	0.93	SD in Log Scale	1.064
95% t UCL (Assumes normality)	0.964	95% H-Stat UCL	1.016

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

95% KM (Chebyshev) UCL	1.528

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.

Result (water, storm;outfall 002;radium-226)

General Statistics

Total Number of Observations	21	Number of Distinct Observations	7
Number of Detects	5	Number of Non-Detects	16
Number of Distinct Detects	5	Number of Distinct Non-Detects	2
Minimum Detect	0.123	Minimum Non-Detect	0.0599
Maximum Detect	0.667	Maximum Non-Detect	1
Variance Detects	0.0501	Percent Non-Detects	76.19%
Mean Detects	0.337	SD Detects	0.224
Median Detects	0.37	CV Detects	0.665
Skewness Detects	0.672	Kurtosis Detects	-0.153
Mean of Logged Detects	-1.291	SD of Logged Detects	0.737

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.896	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.219	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	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

KM Mean	0.29	KM Standard Error of Mean	0.0957
KM SD	0.21	95% KM (BCA) UCL	0.472
95% KM (t) UCL	0.456	95% KM (Percentile Bootstrap) UCL	0.454
95% KM (z) UCL	0.448	95% KM Bootstrap t UCL	0.518
90% KM Chebyshev UCL	0.578	95% KM Chebyshev UCL	0.708
97.5% KM Chebyshev UCL	0.888	99% KM Chebyshev UCL	1.243

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.401	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.683	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.261	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.36	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)	2.631	k star (bias corrected MLE)	1.186
Theta hat (MLE)	0.128	Theta star (bias corrected MLE)	0.284
nu hat (MLE)	26.31	nu star (bias corrected)	11.86
Mean (detects)	0.337		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.289
Maximum	0.875	Median	0.235
SD	0.251	CV	0.87
k hat (MLE)	0.892	k star (bias corrected MLE)	0.797
Theta hat (MLE)	0.324	Theta star (bias corrected MLE)	0.363
nu hat (MLE)	37.48	nu star (bias corrected)	33.46
Adjusted Level of Significance (β)	0.0383		
Approximate Chi Square Value (33.46, α)	21.23	Adjusted Chi Square Value (33.46, β)	20.48
95% Gamma Approximate UCL (use when n>=50)	0.456	95% Gamma Adjusted UCL (use when n<50)	0.472

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.29	SD (KM)	0.21
Variance (KM)	0.044	SE of Mean (KM)	0.0957
k hat (KM)	1.918	k star (KM)	1.675
nu hat (KM)	80.54	nu star (KM)	70.37
theta hat (KM)	0.151	theta star (KM)	0.173
80% gamma percentile (KM)	0.444	90% gamma percentile (KM)	0.589
95% gamma percentile (KM)	0.729	99% gamma percentile (KM)	1.044

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (70.37, α)	52.06	Adjusted Chi Square Value (70.37, β)	50.85
95% Gamma Approximate KM-UCL (use when n>=50)	0.393	95% Gamma Adjusted KM-UCL (use when n<50)	0.402

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.882	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.256	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.343	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	0.309	Mean in Log Scale	-1.578
SD in Original Scale	0.287	SD in Log Scale	0.961
95% t UCL (assumes normality of ROS data)	0.418	95% Percentile Bootstrap UCL	0.415
95% BCA Bootstrap UCL	0.424	95% Bootstrap t UCL	0.461
95% H-UCL (Log ROS)	0.562		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.545	KM Geo Mean	0.213
KM SD (logged)	0.827	95% Critical H Value (KM-Log)	2.34
KM Standard Error of Mean (logged)	0.378	95% H-UCL (KM -Log)	0.463
KM SD (logged)	0.827	95% Critical H Value (KM-Log)	2.34
KM Standard Error of Mean (logged)	0.378		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.439	Mean in Log Scale	-0.969
SD in Original Scale	0.154	SD in Log Scale	0.717
95% t UCL (Assumes normality)	0.497	95% H-Stat UCL	0.699

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	0.456

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.

Result (water, storm;outfall 002;trichloroethene (tce))

General Statistics

Total Number of Observations	21	Number of Distinct Observations	7
Number of Detects	5	Number of Non-Detects	16
Number of Distinct Detects	5	Number of Distinct Non-Detects	2
Minimum Detect	0.43	Minimum Non-Detect	0.5
Maximum Detect	1.8	Maximum Non-Detect	2
Variance Detects	0.303	Percent Non-Detects	76.19%
Mean Detects	0.908	SD Detects	0.551
Median Detects	0.86	CV Detects	0.607
Skewness Detects	1.302	Kurtosis Detects	1.764
Mean of Logged Detects	-0.234	SD of Logged Detects	0.58

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.872	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.255	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	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

KM Mean	0.581	KM Standard Error of Mean	0.0884
KM SD	0.33	95% KM (BCA) UCL	0.758
95% KM (t) UCL	0.733	95% KM (Percentile Bootstrap) UCL	0.743
95% KM (z) UCL	0.726	95% KM Bootstrap t UCL	0.834

90% KM Chebyshev UCL	0.846	95% KM Chebyshev UCL	0.966
97.5% KM Chebyshev UCL	1.133	99% KM Chebyshev UCL	1.46

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.315	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.682	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.227	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.359	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)	3.788	k star (bias corrected MLE)	1.648
Theta hat (MLE)	0.24	Theta star (bias corrected MLE)	0.551
nu hat (MLE)	37.88	nu star (bias corrected)	16.48
Mean (detects)	0.908		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.543
Maximum	1.8	Median	0.48
SD	0.391	CV	0.72
k hat (MLE)	1.624	k star (bias corrected MLE)	1.424
Theta hat (MLE)	0.335	Theta star (bias corrected MLE)	0.382
nu hat (MLE)	68.2	nu star (bias corrected)	59.79
Adjusted Level of Significance (β)	0.0383		
Approximate Chi Square Value (59.79, α)	43.01	Adjusted Chi Square Value (59.79, β)	41.91
95% Gamma Approximate UCL (use when n>=50)	0.755	95% Gamma Adjusted UCL (use when n<50)	0.775

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.581	SD (KM)	0.33
Variance (KM)	0.109	SE of Mean (KM)	0.0884
k hat (KM)	3.094	k star (KM)	2.684
nu hat (KM)	130	nu star (KM)	112.7
theta hat (KM)	0.188	theta star (KM)	0.216
80% gamma percentile (KM)	0.84	90% gamma percentile (KM)	1.056
95% gamma percentile (KM)	1.259	99% gamma percentile (KM)	1.702

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (112.72, α)	89.21	Adjusted Chi Square Value (112.72, β)	87.61
95% Gamma Approximate KM-UCL (use when n>=50)	0.734	95% Gamma Adjusted KM-UCL (use when n<50)	0.747

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.934	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.206	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.343	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	0.585	Mean in Log Scale	-0.658
SD in Original Scale	0.343	SD in Log Scale	0.487
95% t UCL (assumes normality of ROS data)	0.715	95% Percentile Bootstrap UCL	0.713
95% BCA Bootstrap UCL	0.768	95% Bootstrap t UCL	0.793
95% H-UCL (Log ROS)	0.723		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.635	KM Geo Mean	0.53
KM SD (logged)	0.372	95% Critical H Value (KM-Log)	1.884
KM Standard Error of Mean (logged)	0.104	95% H-UCL (KM -Log)	0.665
KM SD (logged)	0.372	95% Critical H Value (KM-Log)	1.884
KM Standard Error of Mean (logged)	0.104		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.514	Mean in Log Scale	-0.914
SD in Original Scale	0.425	SD in Log Scale	0.673
95% t UCL (Assumes normality)	0.674	95% H-Stat UCL	0.696

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	0.733

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.

Result (water, storm;outfall 002;uranium)

General Statistics

Total Number of Observations	20	Number of Distinct Observations	18
Number of Detects	15	Number of Non-Detects	5
Number of Distinct Detects	15	Number of Distinct Non-Detects	4
Minimum Detect	0.147	Minimum Non-Detect	0.244
Maximum Detect	1.68	Maximum Non-Detect	1.48
Variance Detects	0.281	Percent Non-Detects	25%
Mean Detects	0.77	SD Detects	0.53
Median Detects	0.634	CV Detects	0.688
Skewness Detects	0.52	Kurtosis Detects	-1.158
Mean of Logged Detects	-0.533	SD of Logged Detects	0.817

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.896	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.881	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.17	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.22	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

KM Mean	0.679	KM Standard Error of Mean	0.119
KM SD	0.494	95% KM (BCA) UCL	0.887
95% KM (t) UCL	0.885	95% KM (Percentile Bootstrap) UCL	0.87
95% KM (z) UCL	0.875	95% KM Bootstrap t UCL	0.922
90% KM Chebyshev UCL	1.036	95% KM Chebyshev UCL	1.198
97.5% KM Chebyshev UCL	1.423	99% KM Chebyshev UCL	1.864

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.346	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.747	Detected data appear Gamma Distributed at 5% Significance Level	

K-S Test Statistic	0.158	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.224	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)	1.987	k star (bias corrected MLE)	1.634
Theta hat (MLE)	0.388	Theta star (bias corrected MLE)	0.472
nu hat (MLE)	59.6	nu star (bias corrected)	49.01
Mean (detects)	0.77		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.147	Mean	0.678
Maximum	1.68	Median	0.555
SD	0.489	CV	0.721
k hat (MLE)	2.085	k star (bias corrected MLE)	1.806
Theta hat (MLE)	0.325	Theta star (bias corrected MLE)	0.376
nu hat (MLE)	83.42	nu star (bias corrected)	72.24
Adjusted Level of Significance (β)	0.038		
Approximate Chi Square Value (72.24, α)	53.67	Adjusted Chi Square Value (72.24, β)	52.4
95% Gamma Approximate UCL (use when n>=50)	0.913	95% Gamma Adjusted UCL (use when n<50)	0.935

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.679	SD (KM)	0.494
Variance (KM)	0.244	SE of Mean (KM)	0.119
k hat (KM)	1.89	k star (KM)	1.64
nu hat (KM)	75.61	nu star (KM)	65.6
theta hat (KM)	0.359	theta star (KM)	0.414
80% gamma percentile (KM)	1.04	90% gamma percentile (KM)	1.384
95% gamma percentile (KM)	1.716	99% gamma percentile (KM)	2.463

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (65.60, α)	47.96	Adjusted Chi Square Value (65.60, β)	46.77
95% Gamma Approximate KM-UCL (use when n>=50)	0.928	95% Gamma Adjusted KM-UCL (use when n<50)	0.952

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.93	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.881	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.135	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.22	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	0.668	Mean in Log Scale	-0.669
SD in Original Scale	0.494	SD in Log Scale	0.762
95% t UCL (assumes normality of ROS data)	0.859	95% Percentile Bootstrap UCL	0.847
95% BCA Bootstrap UCL	0.849	95% Bootstrap t UCL	0.881
95% H-UCL (Log ROS)	1.026		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.685	KM Geo Mean	0.504
KM SD (logged)	0.804	95% Critical H Value (KM-Log)	2.365
KM Standard Error of Mean (logged)	0.201	95% H-UCL (KM -Log)	1.078
KM SD (logged)	0.804	95% Critical H Value (KM-Log)	2.365

KM Standard Error of Mean (logged)	0.201

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.688	Mean in Log Scale	-0.642
SD in Original Scale	0.489	SD in Log Scale	0.793
95% t UCL (Assumes normality)	0.877	95% H-Stat UCL	1.105

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	0.885

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.

Result (water, storm;outfall 002;zinc)

General Statistics

Total Number of Observations	21	Number of Distinct Observations	11
Number of Detects	10	Number of Non-Detects	11
Number of Distinct Detects	10	Number of Distinct Non-Detects	1
Minimum Detect	5.8	Minimum Non-Detect	20
Maximum Detect	56	Maximum Non-Detect	20
Variance Detects	247.3	Percent Non-Detects	52.38%
Mean Detects	18.18	SD Detects	15.72
Median Detects	11.4	CV Detects	0.865
Skewness Detects	1.813	Kurtosis Detects	3.286
Mean of Logged Detects	2.633	SD of Logged Detects	0.733

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.767	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.273	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	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

KM Mean	13.78	KM Standard Error of Mean	2.752
KM SD	11.36	95% KM (BCA) UCL	19.18
95% KM (t) UCL	18.52	95% KM (Percentile Bootstrap) UCL	18.83
95% KM (z) UCL	18.31	95% KM Bootstrap t UCL	21.89
90% KM Chebyshev UCL	22.03	95% KM Chebyshev UCL	25.77
97.5% KM Chebyshev UCL	30.97	99% KM Chebyshev UCL	41.16

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.616	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.735	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.25	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.27	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)	2.024	k star (bias corrected MLE)	1.483

Theta hat (MLE)	8.984	Theta star (bias corrected MLE)	12.26
nu hat (MLE)	40.48	nu star (bias corrected)	29.67
Mean (detects)	18.18		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	13.97
Maximum	56	Median	9.372
SD	12.46	CV	0.892
k hat (MLE)	1.023	k star (bias corrected MLE)	0.909
Theta hat (MLE)	13.66	Theta star (bias corrected MLE)	15.38
nu hat (MLE)	42.97	nu star (bias corrected)	38.16
Adjusted Level of Significance (β)	0.0383		
Approximate Chi Square Value (38.16, α)	25.01	Adjusted Chi Square Value (38.16, β)	24.2
95% Gamma Approximate UCL (use when n>=50)	21.31	95% Gamma Adjusted UCL (use when n<50)	22.03

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	13.78	SD (KM)	11.36
Variance (KM)	129.1	SE of Mean (KM)	2.752
k hat (KM)	1.471	k star (KM)	1.292
nu hat (KM)	61.77	nu star (KM)	54.28
theta hat (KM)	9.368	theta star (KM)	10.66
80% gamma percentile (KM)	21.66	90% gamma percentile (KM)	29.78
95% gamma percentile (KM)	37.75	99% gamma percentile (KM)	55.92

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (54.28, α)	38.35	Adjusted Chi Square Value (54.28, β)	37.32
95% Gamma Approximate KM-UCL (use when n>=50)	19.5	95% Gamma Adjusted KM-UCL (use when n<50)	20.04

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.91	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.234	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	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	14.25	Mean in Log Scale	2.439
SD in Original Scale	11.76	SD in Log Scale	0.632
95% t UCL (assumes normality of ROS data)	18.68	95% Percentile Bootstrap UCL	18.68
95% BCA Bootstrap UCL	20.14	95% Bootstrap t UCL	22.38
95% H-UCL (Log ROS)	18.89		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.421	KM Geo Mean	11.26
KM SD (logged)	0.569	95% Critical H Value (KM-Log)	2.054
KM Standard Error of Mean (logged)	0.156	95% H-UCL (KM -Log)	17.18
KM SD (logged)	0.569	95% Critical H Value (KM-Log)	2.054
KM Standard Error of Mean (logged)	0.156		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	13.9	Mean in Log Scale	2.46
SD in Original Scale	11.35	SD in Log Scale	0.52

95% t UCL (Assumes normality)	18.17	95% H-Stat UCL	16.92

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	20.04	95% GROS Adjusted Gamma UCL	22.03

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.

Result (water, storm;outfall 002;zinc (dissolved))

General Statistics

Total Number of Observations	21	Number of Distinct Observations	7
Number of Detects	6	Number of Non-Detects	15
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	3.7	Minimum Non-Detect	20
Maximum Detect	17.6	Maximum Non-Detect	20
Variance Detects	24.35	Percent Non-Detects	71.43%
Mean Detects	9.032	SD Detects	4.935
Median Detects	7.495	CV Detects	0.546
Skewness Detects	1.164	Kurtosis Detects	1.215
Mean of Logged Detects	2.081	SD of Logged Detects	0.536

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.908	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.275	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	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

KM Mean	9.032	KM Standard Error of Mean	2.015
KM SD	4.505	95% KM (BCA) UCL	12.65
95% KM (t) UCL	12.51	95% KM (Percentile Bootstrap) UCL	12.28
95% KM (z) UCL	12.35	95% KM Bootstrap t UCL	17.41
90% KM Chebyshev UCL	15.08	95% KM Chebyshev UCL	17.81
97.5% KM Chebyshev UCL	21.61	99% KM Chebyshev UCL	29.08

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.244	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.699	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.233	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.333	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)	4.349	k star (bias corrected MLE)	2.285
Theta hat (MLE)	2.077	Theta star (bias corrected MLE)	3.952
nu hat (MLE)	52.18	nu star (bias corrected)	27.42
Mean (detects)	9.032		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	1.361	Mean	9.181
Maximum	20.45	Median	7.68
SD	5.175	CV	0.564
k hat (MLE)	2.92	k star (bias corrected MLE)	2.535
Theta hat (MLE)	3.144	Theta star (bias corrected MLE)	3.622
nu hat (MLE)	122.7	nu star (bias corrected)	106.5
Adjusted Level of Significance (β)	0.0383		
Approximate Chi Square Value (106.47, α)	83.66	Adjusted Chi Square Value (106.47, β)	82.1
95% Gamma Approximate UCL (use when n>=50)	11.68	95% Gamma Adjusted UCL (use when n<50)	11.91

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	9.032	SD (KM)	4.505
Variance (KM)	20.3	SE of Mean (KM)	2.015
k hat (KM)	4.019	k star (KM)	3.477
nu hat (KM)	168.8	nu star (KM)	146
theta hat (KM)	2.247	theta star (KM)	2.598
80% gamma percentile (KM)	12.66	90% gamma percentile (KM)	15.53
95% gamma percentile (KM)	18.18	99% gamma percentile (KM)	23.9

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (146.02, α)	119.1	Adjusted Chi Square Value (146.02, β)	117.2
95% Gamma Approximate KM-UCL (use when n>=50)	11.07	95% Gamma Adjusted KM-UCL (use when n<50)	11.25

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.979	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.198	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.325	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	9.299	Mean in Log Scale	2.081
SD in Original Scale	5.289	SD in Log Scale	0.563
95% t UCL (assumes normality of ROS data)	11.29	95% Percentile Bootstrap UCL	11.17
95% BCA Bootstrap UCL	11.38	95% Bootstrap t UCL	11.81
95% H-UCL (Log ROS)	12.15		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.081	KM Geo Mean	8.015
KM SD (logged)	0.489	95% Critical H Value (KM-Log)	1.979
KM Standard Error of Mean (logged)	0.219	95% H-UCL (KM -Log)	11.22
KM SD (logged)	0.489	95% Critical H Value (KM-Log)	1.979
KM Standard Error of Mean (logged)	0.219		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	9.723	Mean in Log Scale	2.239
SD in Original Scale	2.508	SD in Log Scale	0.287
95% t UCL (Assumes normality)	10.67	95% H-Stat UCL	11

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	12.51

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.

Result (water, storm;outfall 008;antimony)

General Statistics

Total Number of Observations	14	Number of Distinct Observations	7
Number of Detects	6	Number of Non-Detects	8
Number of Distinct Detects	5	Number of Distinct Non-Detects	2
Minimum Detect	0.35	Minimum Non-Detect	2
Maximum Detect	0.48	Maximum Non-Detect	10
Variance Detects	0.00267	Percent Non-Detects	57.14%
Mean Detects	0.405	SD Detects	0.0517
Median Detects	0.405	CV Detects	0.128
Skewness Detects	0.287	Kurtosis Detects	-1.189
Mean of Logged Detects	-0.911	SD of Logged Detects	0.127

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.931	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.19	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	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

KM Mean	0.405	KM Standard Error of Mean	0.0211
KM SD	0.0472	95% KM (BCA) UCL	0.439
95% KM (t) UCL	0.442	95% KM (Percentile Bootstrap) UCL	0.438
95% KM (z) UCL	0.44	95% KM Bootstrap t UCL	0.454
90% KM Chebyshev UCL	0.468	95% KM Chebyshev UCL	0.497
97.5% KM Chebyshev UCL	0.537	99% KM Chebyshev UCL	0.615

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.288	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.697	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.216	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.332	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)	74.25	k star (bias corrected MLE)	37.24
Theta hat (MLE)	0.00545	Theta star (bias corrected MLE)	0.0109
nu hat (MLE)	891	nu star (bias corrected)	446.8
Mean (detects)	0.405		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.332	Mean	0.405
Maximum	0.483	Median	0.404

SD	0.0476	CV	0.118
k hat (MLE)	77.85	k star (bias corrected MLE)	61.22
Theta hat (MLE)	0.0052	Theta star (bias corrected MLE)	0.00662
nu hat (MLE)	2180	nu star (bias corrected)	1714
Adjusted Level of Significance (β)	0.0312		
Approximate Chi Square Value (N/A, α)	1619	Adjusted Chi Square Value (N/A, β)	1607
95% Gamma Approximate UCL (use when n>=50)	0.429	95% Gamma Adjusted UCL (use when n<50)	0.432

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.405	SD (KM)	0.0472
Variance (KM)	0.00223	SE of Mean (KM)	0.0211
k hat (KM)	73.72	k star (KM)	57.97
nu hat (KM)	2064	nu star (KM)	1623
theta hat (KM)	0.00549	theta star (KM)	0.00699
80% gamma percentile (KM)	0.449	90% gamma percentile (KM)	0.474
95% gamma percentile (KM)	0.496	99% gamma percentile (KM)	0.539

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (N/A, α)	1531	Adjusted Chi Square Value (N/A, β)	1519
95% Gamma Approximate KM-UCL (use when n>=50)	0.429	95% Gamma Adjusted KM-UCL (use when n<50)	0.433

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.928	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.197	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.325	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	0.405	Mean in Log Scale	-0.911
SD in Original Scale	0.0475	SD in Log Scale	0.117
95% t UCL (assumes normality of ROS data)	0.427	95% Percentile Bootstrap UCL	0.424
95% BCA Bootstrap UCL	0.426	95% Bootstrap t UCL	0.428
95% H-UCL (Log ROS)	0.429		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.911	KM Geo Mean	0.402
KM SD (logged)	0.116	95% Critical H Value (KM-Log)	1.765
KM Standard Error of Mean (logged)	0.0519	95% H-UCL (KM -Log)	0.429
KM SD (logged)	0.116	95% Critical H Value (KM-Log)	1.765
KM Standard Error of Mean (logged)	0.0519		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.031	Mean in Log Scale	-0.275
SD in Original Scale	1.181	SD in Log Scale	0.712
95% t UCL (Assumes normality)	1.59	95% H-Stat UCL	1.556

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	0.442

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.

Result (water, storm;outfall 008;copper)

General Statistics

Total Number of Observations	14	Number of Distinct Observations	14
		Number of Missing Observations	0
Minimum	1.3	Mean	6.869
Maximum	18	Median	5.6
SD	4.678	Std. Error of Mean	1.25
Coefficient of Variation	0.681	Skewness	1.187

Normal GOF Test

Shapiro Wilk Test Statistic	0.9	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.874	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.157	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.226	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	9.084	95% Adjusted-CLT UCL (Chen-1995)	9.35
		95% Modified-t UCL (Johnson-1978)	9.15

Gamma GOF Test

A-D Test Statistic	0.148	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.745	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.104	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.231	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.416	k star (bias corrected MLE)	1.946
Theta hat (MLE)	2.844	Theta star (bias corrected MLE)	3.531
nu hat (MLE)	67.64	nu star (bias corrected)	54.48
MLE Mean (bias corrected)	6.869	MLE Sd (bias corrected)	4.925
		Approximate Chi Square Value (0.05)	38.52
Adjusted Level of Significance	0.0312	Adjusted Chi Square Value	36.74

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	9.716	95% Adjusted Gamma UCL (use when n<50)	10.18

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.985	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.874	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.114	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.226	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.262	Mean of logged Data	1.706
Maximum of Logged Data	2.89	SD of logged Data	0.717

Assuming Lognormal Distribution

95% H-UCL	11.39	90% Chebyshev (MVUE) UCL	11.18
95% Chebyshev (MVUE) UCL	13.09	97.5% Chebyshev (MVUE) UCL	15.74
99% Chebyshev (MVUE) UCL	20.95		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	8.926	95% Jackknife UCL	9.084
95% Standard Bootstrap UCL	8.846	95% Bootstrap-t UCL	9.817
95% Hall's Bootstrap UCL	10.53	95% Percentile Bootstrap UCL	8.928
95% BCA Bootstrap UCL	9.499		
90% Chebyshev(Mean, Sd) UCL	10.62	95% Chebyshev(Mean, Sd) UCL	12.32
97.5% Chebyshev(Mean, Sd) UCL	14.68	99% Chebyshev(Mean, Sd) UCL	19.31

Suggested UCL to Use

95% Student's-t UCL	9.084

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.

Result (water, storm;outfall 008;copper (dissolved))

General Statistics

Total Number of Observations	14	Number of Distinct Observations	14
		Number of Missing Observations	0
Minimum	1.1	Mean	2.411
Maximum	4.6	Median	2.035
SD	1.025	Std. Error of Mean	0.274
Coefficient of Variation	0.425	Skewness	0.704

Normal GOF Test

Shapiro Wilk Test Statistic	0.939	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.213	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.226	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	2.897	95% Adjusted-CLT UCL (Chen-1995)	2.917
		95% Modified-t UCL (Johnson-1978)	2.905

Gamma GOF Test

A-D Test Statistic	0.239	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.737	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.176	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.229	Detected data appear Gamma Distributed at 5% Significance Level	

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	6.127	k star (bias corrected MLE)	4.862
Theta hat (MLE)	0.394	Theta star (bias corrected MLE)	0.496
nu hat (MLE)	171.6	nu star (bias corrected)	136.1
MLE Mean (bias corrected)	2.411	MLE Sd (bias corrected)	1.094
		Approximate Chi Square Value (0.05)	110.2
Adjusted Level of Significance	0.0312	Adjusted Chi Square Value	107.1

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	2.98	95% Adjusted Gamma UCL (use when n<50)	3.066

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.971	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.149	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.226	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.0953	Mean of logged Data	0.796
Maximum of Logged Data	1.526	SD of logged Data	0.428

Assuming Lognormal Distribution

95% H-UCL	3.08	90% Chebyshev (MVUE) UCL	3.258
95% Chebyshev (MVUE) UCL	3.641	97.5% Chebyshev (MVUE) UCL	4.173
99% Chebyshev (MVUE) UCL	5.217		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	2.862	95% Jackknife UCL	2.897
95% Standard Bootstrap UCL	2.856	95% Bootstrap-t UCL	2.997
95% Hall's Bootstrap UCL	2.933	95% Percentile Bootstrap UCL	2.835
95% BCA Bootstrap UCL	2.876		
90% Chebyshev(Mean, Sd) UCL	3.233	95% Chebyshev(Mean, Sd) UCL	3.606
97.5% Chebyshev(Mean, Sd) UCL	4.123	99% Chebyshev(Mean, Sd) UCL	5.138

Suggested UCL to Use

95% Student's-t UCL	2.897

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.

Result (water, storm;outfall 008;dioxin teq, human/mammal (epa, nds excluded))

General Statistics

Total Number of Observations	11	Number of Distinct Observations	11
		Number of Missing Observations	0
Minimum	1.4700E-9	Mean	7.4669E-7
Maximum	2.8020E-6	Median	2.2760E-7
SD	1.0817E-6	Std. Error of Mean	3.2613E-7
Coefficient of Variation	N/A	Skewness	1.406

Normal GOF Test

Shapiro Wilk Test Statistic	0.698	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.365	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.251	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	1.3378E-6	95% Adjusted-CLT UCL (Chen-1995)	1.4308E-6
		95% Modified-t UCL (Johnson-1978)	1.3608E-6

Gamma GOF Test

A-D Test Statistic	0.368	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.796	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.181	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.272	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.423	k star (bias corrected MLE)	0.368
Theta hat (MLE)	1.7649E-6	Theta star (bias corrected MLE)	2.0274E-6
nu hat (MLE)	9.307	nu star (bias corrected)	8.102
MLE Mean (bias corrected)	7.4669E-7	MLE Sd (bias corrected)	1.2304E-6
		Approximate Chi Square Value (0.05)	2.794
Adjusted Level of Significance	0.0278	Adjusted Chi Square Value	2.312

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	2.1650E-6	95% Adjusted Gamma UCL (use when n<50)	2.6168E-6

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.938	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.85	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.132	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.251	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-20.34	Mean of logged Data	-15.65
Maximum of Logged Data	-12.79	SD of logged Data	2.314

Assuming Lognormal Distribution

95% H-UCL	1.7162E-4	90% Chebyshev (MVUE) UCL	4.0583E-6
95% Chebyshev (MVUE) UCL	5.3130E-6	97.5% Chebyshev (MVUE) UCL	7.0544E-6
99% Chebyshev (MVUE) UCL	1.0475E-5		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	1.2831E-6	95% Jackknife UCL	1.3378E-6
95% Standard Bootstrap UCL	1.2553E-6	95% Bootstrap-t UCL	1.8790E-6
95% Hall's Bootstrap UCL	1.3055E-6	95% Percentile Bootstrap UCL	1.2905E-6
95% BCA Bootstrap UCL	1.3773E-6		
90% Chebyshev(Mean, Sd) UCL	1.7251E-6	95% Chebyshev(Mean, Sd) UCL	2.1683E-6
97.5% Chebyshev(Mean, Sd) UCL	2.7834E-6	99% Chebyshev(Mean, Sd) UCL	3.9917E-6

Suggested UCL to Use

95% Adjusted Gamma UCL	2.6168E-6

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.

Result (water, storm;outfall 008;gross alpha)

General Statistics

Total Number of Observations	14	Number of Distinct Observations	12
Number of Detects	11	Number of Non-Detects	3

Number of Distinct Detects	11	Number of Distinct Non-Detects	1
Minimum Detect	0.928	Minimum Non-Detect	3
Maximum Detect	25.8	Maximum Non-Detect	3
Variance Detects	71.54	Percent Non-Detects	21.43%
Mean Detects	7.263	SD Detects	8.458
Median Detects	3.04	CV Detects	1.164
Skewness Detects	1.558	Kurtosis Detects	1.364
Mean of Logged Detects	1.406	SD of Logged Detects	1.115

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.75	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.85	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.307	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.251	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

KM Mean	6.081	KM Standard Error of Mean	2.107
KM SD	7.505	95% KM (BCA) UCL	9.783
95% KM (t) UCL	9.812	95% KM (Percentile Bootstrap) UCL	9.554
95% KM (z) UCL	9.547	95% KM Bootstrap t UCL	14.08
90% KM Chebyshev UCL	12.4	95% KM Chebyshev UCL	15.26
97.5% KM Chebyshev UCL	19.24	99% KM Chebyshev UCL	27.04

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.587	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.752	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.252	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.262	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)	1.001	k star (bias corrected MLE)	0.788
Theta hat (MLE)	7.259	Theta star (bias corrected MLE)	9.214
nu hat (MLE)	22.01	nu star (bias corrected)	17.34
Mean (detects)	7.263		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	5.895
Maximum	25.8	Median	2.665
SD	7.917	CV	1.343
k hat (MLE)	0.599	k star (bias corrected MLE)	0.519
Theta hat (MLE)	9.834	Theta star (bias corrected MLE)	11.37
nu hat (MLE)	16.78	nu star (bias corrected)	14.52
Adjusted Level of Significance (β)	0.0312		
Approximate Chi Square Value (14.52, α)	6.93	Adjusted Chi Square Value (14.52, β)	6.246
95% Gamma Approximate UCL (use when n>=50)	12.35	95% Gamma Adjusted UCL (use when n<50)	13.71

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	6.081	SD (KM)	7.505
Variance (KM)	56.33	SE of Mean (KM)	2.107
k hat (KM)	0.657	k star (KM)	0.564
nu hat (KM)	18.39	nu star (KM)	15.78

theta hat (KM)	9.262	theta star (KM)	10.79
80% gamma percentile (KM)	10.02	90% gamma percentile (KM)	16.04
95% gamma percentile (KM)	22.38	99% gamma percentile (KM)	37.81

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (15.78, α)	7.806	Adjusted Chi Square Value (15.78, β)	7.074
95% Gamma Approximate KM-UCL (use when n>=50)	12.29	95% Gamma Adjusted KM-UCL (use when n<50)	13.57

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.933	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.189	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.251	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	6.077	Mean in Log Scale	1.202
SD in Original Scale	7.791	SD in Log Scale	1.079
95% t UCL (assumes normality of ROS data)	9.765	95% Percentile Bootstrap UCL	9.783
95% BCA Bootstrap UCL	10.74	95% Bootstrap t UCL	13.79
95% H-UCL (Log ROS)	14.29		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.208	KM Geo Mean	3.348
KM SD (logged)	1.031	95% Critical H Value (KM-Log)	2.843
KM Standard Error of Mean (logged)	0.296	95% H-UCL (KM -Log)	12.84
KM SD (logged)	1.031	95% Critical H Value (KM-Log)	2.843
KM Standard Error of Mean (logged)	0.296		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	6.028	Mean in Log Scale	1.192
SD in Original Scale	7.814	SD in Log Scale	1.067
95% t UCL (Assumes normality)	9.727	95% H-Stat UCL	13.72

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Bootstrap t UCL	14.08	ȝ Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	13.57

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.

Result (water, storm;outfall 008;gross beta)

General Statistics

Total Number of Observations	14	Number of Distinct Observations	14
		Number of Missing Observations	0
Minimum	2.2	Mean	7.131
Maximum	25.4	Median	5.295
SD	6.026	Std. Error of Mean	1.611
Coefficient of Variation	0.845	Skewness	2.449

Normal GOF Test

Shapiro Wilk Test Statistic	0.709	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.314	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.226	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	9.983	95% Adjusted-CLT UCL (Chen-1995)	10.91
		95% Modified-t UCL (Johnson-1978)	10.16

Gamma GOF Test

A-D Test Statistic	0.629	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.745	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.236	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.231	Data Not Gamma Distributed at 5% Significance Level	

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.379	k star (bias corrected MLE)	1.916
Theta hat (MLE)	2.998	Theta star (bias corrected MLE)	3.721
nu hat (MLE)	66.6	nu star (bias corrected)	53.66
MLE Mean (bias corrected)	7.131	MLE Sd (bias corrected)	5.151
		Approximate Chi Square Value (0.05)	37.83
Adjusted Level of Significance	0.0312	Adjusted Chi Square Value	36.07

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	10.11	95% Adjusted Gamma UCL (use when n<50)	10.61

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.948	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.187	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.226	Data appear Lognormal at 5% Significance Level	

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.788	Mean of logged Data	1.74
Maximum of Logged Data	3.235	SD of logged Data	0.65

Assuming Lognormal Distribution

95% H-UCL	10.61	90% Chebyshev (MVUE) UCL	10.68
95% Chebyshev (MVUE) UCL	12.38	97.5% Chebyshev (MVUE) UCL	14.75
99% Chebyshev (MVUE) UCL	19.4		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	9.78	95% Jackknife UCL	9.983
95% Standard Bootstrap UCL	9.666	95% Bootstrap-t UCL	13.26
95% Hall's Bootstrap UCL	20.69	95% Percentile Bootstrap UCL	9.715
95% BCA Bootstrap UCL	11.16		
90% Chebyshev(Mean, Sd) UCL	11.96	95% Chebyshev(Mean, Sd) UCL	14.15
97.5% Chebyshev(Mean, Sd) UCL	17.19	99% Chebyshev(Mean, Sd) UCL	23.16

Suggested UCL to Use

95% Adjusted Gamma UCL	10.61

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

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.

Result (water, storm;outfall 008;lead)

General Statistics

Total Number of Observations	14	Number of Distinct Observations	13
		Number of Missing Observations	0
Minimum	0.38	Mean	4.07
Maximum	10	Median	2.5
SD	3.51	Std. Error of Mean	0.938
Coefficient of Variation	0.862	Skewness	0.699

Normal GOF Test

Shapiro Wilk Test Statistic	0.852	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.874	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.234	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.226	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	5.731	95% Adjusted-CLT UCL (Chen-1995)	5.8
		95% Modified-t UCL (Johnson-1978)	5.761

Gamma GOF Test

A-D Test Statistic	0.426	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.755	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.173	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.234	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.277	k star (bias corrected MLE)	1.051
Theta hat (MLE)	3.186	Theta star (bias corrected MLE)	3.871
nu hat (MLE)	35.77	nu star (bias corrected)	29.44
MLE Mean (bias corrected)	4.07	MLE Sd (bias corrected)	3.969
		Approximate Chi Square Value (0.05)	18.05
Adjusted Level of Significance	0.0312	Adjusted Chi Square Value	16.87

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	6.637	95% Adjusted Gamma UCL (use when n<50)	7.1

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.937	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.874	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.171	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.226	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-0.968	Mean of logged Data	0.964

Maximum of Logged Data	2.303	SD of logged Data	1.052

Assuming Lognormal Distribution

95% H-UCL	10.55	90% Chebyshev (MVUE) UCL	8.275
95% Chebyshev (MVUE) UCL	10.07	97.5% Chebyshev (MVUE) UCL	12.56
99% Chebyshev (MVUE) UCL	17.46		

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	5.613	95% Jackknife UCL	5.731
95% Standard Bootstrap UCL	5.566	95% Bootstrap-t UCL	6.018
95% Hall's Bootstrap UCL	5.638	95% Percentile Bootstrap UCL	5.586
95% BCA Bootstrap UCL	5.729		
90% Chebyshev(Mean, Sd) UCL	6.885	95% Chebyshev(Mean, Sd) UCL	8.159
97.5% Chebyshev(Mean, Sd) UCL	9.929	99% Chebyshev(Mean, Sd) UCL	13.4

Suggested UCL to Use

95% Adjusted Gamma UCL	7.1

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.

Result (water, storm;outfall 008;nitrate (as n))

General Statistics

Total Number of Observations	14	Number of Distinct Observations	13
		Number of Missing Observations	0
Minimum	0.34	Mean	0.983
Maximum	4.3	Median	0.655
SD	1.023	Std. Error of Mean	0.273
Coefficient of Variation	1.041	Skewness	3.06

Normal GOF Test

Shapiro Wilk Test Statistic	0.543	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.378	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.226	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	1.467	95% Adjusted-CLT UCL (Chen-1995)	1.671
		95% Modified-t UCL (Johnson-1978)	1.504

Gamma GOF Test

A-D Test Statistic	1.733	**Anderson-Darling Gamma GOF Test**	
5% A-D Critical Value	0.746	Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.315	**Kolmogorov-Smirnov Gamma GOF Test**	
5% K-S Critical Value	0.232	Data Not Gamma Distributed at 5% Significance Level	

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.121	k star (bias corrected MLE)	1.714
Theta hat (MLE)	0.463	Theta star (bias corrected MLE)	0.573

nu hat (MLE)	59.4	nu star (bias corrected)	48
MLE Mean (bias corrected)	0.983	MLE Sd (bias corrected)	0.751
		Approximate Chi Square Value (0.05)	33.1
Adjusted Level of Significance	0.0312	Adjusted Chi Square Value	31.46

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1.425	95% Adjusted Gamma UCL (use when n<50)	1.499

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.802	**Shapiro Wilk Lognormal GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.263	**Lilliefors Lognormal GOF Test**	
5% Lilliefors Critical Value	0.226	Data Not Lognormal at 5% Significance Level	

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.079	Mean of logged Data	-0.271
Maximum of Logged Data	1.459	SD of logged Data	0.629

Assuming Lognormal Distribution

95% H-UCL	1.377	90% Chebyshev (MVUE) UCL	1.395
95% Chebyshev (MVUE) UCL	1.613	97.5% Chebyshev (MVUE) UCL	1.916
99% Chebyshev (MVUE) UCL	2.51		

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	1.432	95% Jackknife UCL	1.467
95% Standard Bootstrap UCL	1.417	95% Bootstrap-t UCL	3.529
95% Hall's Bootstrap UCL	3.76	95% Percentile Bootstrap UCL	1.431
95% BCA Bootstrap UCL	1.719		
90% Chebyshev(Mean, Sd) UCL	1.803	95% Chebyshev(Mean, Sd) UCL	2.174
97.5% Chebyshev(Mean, Sd) UCL	2.69	99% Chebyshev(Mean, Sd) UCL	3.703

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	2.174

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.

Result (water, storm;outfall 008;nitrate and nitrite (as n))

General Statistics

Total Number of Observations	14	Number of Distinct Observations	12
		Number of Missing Observations	0
Minimum	0.34	Mean	0.988
Maximum	4.3	Median	0.655
SD	1.021	Std. Error of Mean	0.273
Coefficient of Variation	1.033	Skewness	3.063

Normal GOF Test

Shapiro Wilk Test Statistic	0.542	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.874	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.38	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.226	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	1.471	95% Adjusted-CLT UCL (Chen-1995)	1.675
		95% Modified-t UCL (Johnson-1978)	1.508

Gamma GOF Test

A-D Test Statistic	1.751	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.745	Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.319	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.231	Data Not Gamma Distributed at 5% Significance Level

Data Not Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	2.147	k star (bias corrected MLE)	1.734
Theta hat (MLE)	0.46	Theta star (bias corrected MLE)	0.57
nu hat (MLE)	60.11	nu star (bias corrected)	48.56
MLE Mean (bias corrected)	0.988	MLE Sd (bias corrected)	0.75
		Approximate Chi Square Value (0.05)	33.56
Adjusted Level of Significance	0.0312	Adjusted Chi Square Value	31.92

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1.429	95% Adjusted Gamma UCL (use when n<50)	1.503

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.801	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.874	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.268	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.226	Data Not Lognormal at 5% Significance Level

Data Not Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-1.079	Mean of logged Data	-0.263
Maximum of Logged Data	1.459	SD of logged Data	0.626

Assuming Lognormal Distribution

95% H-UCL	1.381	90% Chebyshev (MVUE) UCL	1.402
95% Chebyshev (MVUE) UCL	1.62	97.5% Chebyshev (MVUE) UCL	1.922
99% Chebyshev (MVUE) UCL	2.516		

Nonparametric Distribution Free UCL Statistics
Data do not follow a Discernible Distribution (0.05)

Nonparametric Distribution Free UCLs

95% CLT UCL	1.437	95% Jackknife UCL	1.471
95% Standard Bootstrap UCL	1.42	95% Bootstrap-t UCL	3.729
95% Hall's Bootstrap UCL	3.796	95% Percentile Bootstrap UCL	1.489
95% BCA Bootstrap UCL	1.739		
90% Chebyshev(Mean, Sd) UCL	1.806	95% Chebyshev(Mean, Sd) UCL	2.177
97.5% Chebyshev(Mean, Sd) UCL	2.692	99% Chebyshev(Mean, Sd) UCL	3.702

Suggested UCL to Use

95% Chebyshev (Mean, Sd) UCL	2.177

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.

Result (water, storm;outfall 008;perchlorate)

General Statistics

Total Number of Observations	14	Number of Distinct Observations	6
Number of Detects	6	Number of Non-Detects	8
Number of Distinct Detects	5	Number of Distinct Non-Detects	1
Minimum Detect	0.9	Minimum Non-Detect	4
Maximum Detect	2.5	Maximum Non-Detect	4
Variance Detects	0.407	Percent Non-Detects	57.14%
Mean Detects	1.967	SD Detects	0.638
Median Detects	2.15	CV Detects	0.324
Skewness Detects	-1.016	Kurtosis Detects	0.14
Mean of Logged Detects	0.619	SD of Logged Detects	0.397

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.864	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.252	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.325	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

KM Mean	1.967	KM Standard Error of Mean	0.26
KM SD	0.582	95% KM (BCA) UCL	2.325
95% KM (t) UCL	2.428	95% KM (Percentile Bootstrap) UCL	2.367
95% KM (z) UCL	2.395	95% KM Bootstrap t UCL	2.387
90% KM Chebyshev UCL	2.748	95% KM Chebyshev UCL	3.101
97.5% KM Chebyshev UCL	3.592	99% KM Chebyshev UCL	4.557

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.526	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.698	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.266	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.333	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)	8.897	k star (bias corrected MLE)	4.56
Theta hat (MLE)	0.221	Theta star (bias corrected MLE)	0.431
nu hat (MLE)	106.8	nu star (bias corrected)	54.72
Mean (detects)	1.967		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.9	Mean	1.97
Maximum	2.966	Median	1.965
SD	0.595	CV	0.302
k hat (MLE)	10.37	k star (bias corrected MLE)	8.193
Theta hat (MLE)	0.19	Theta star (bias corrected MLE)	0.24
nu hat (MLE)	290.3	nu star (bias corrected)	229.4
Adjusted Level of Significance (β)	0.0312		
Approximate Chi Square Value (229.41, α)	195.3	Adjusted Chi Square Value (229.41, β)	191.2

95% Gamma Approximate UCL (use when n>=50)	2.314	95% Gamma Adjusted UCL (use when n<50)	2.364

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.967	SD (KM)	0.582
Variance (KM)	0.339	SE of Mean (KM)	0.26
k hat (KM)	11.41	k star (KM)	9.015
nu hat (KM)	319.6	nu star (KM)	252.4
theta hat (KM)	0.172	theta star (KM)	0.218
80% gamma percentile (KM)	2.486	90% gamma percentile (KM)	2.839
95% gamma percentile (KM)	3.153	99% gamma percentile (KM)	3.801

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (252.42, α)	216.6	Adjusted Chi Square Value (252.42, β)	212.2
95% Gamma Approximate KM-UCL (use when n>=50)	2.292	95% Gamma Adjusted KM-UCL (use when n<50)	2.339

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.816	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.241	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.325	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	1.971	Mean in Log Scale	0.619
SD in Original Scale	0.669	SD in Log Scale	0.369
95% t UCL (assumes normality of ROS data)	2.287	95% Percentile Bootstrap UCL	2.244
95% BCA Bootstrap UCL	2.254	95% Bootstrap t UCL	2.294
95% H-UCL (Log ROS)	2.429		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.619	KM Geo Mean	1.857
KM SD (logged)	0.363	95% Critical H Value (KM-Log)	1.949
KM Standard Error of Mean (logged)	0.162	95% H-UCL (KM -Log)	2.413
KM SD (logged)	0.363	95% Critical H Value (KM-Log)	1.949
KM Standard Error of Mean (logged)	0.162		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.986	Mean in Log Scale	0.661
SD in Original Scale	0.396	SD in Log Scale	0.249
95% t UCL (Assumes normality)	2.173	95% H-Stat UCL	2.272

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	2.428

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.

Result (water, storm;outfall 008;radium-226)

General Statistics

Total Number of Observations	14	Number of Distinct Observations	9

Number of Detects	7	Number of Non-Detects	7
Number of Distinct Detects	7	Number of Distinct Non-Detects	2
Minimum Detect	0.104	Minimum Non-Detect	0.218
Maximum Detect	1.41	Maximum Non-Detect	1
Variance Detects	0.202	Percent Non-Detects	50%
Mean Detects	0.514	SD Detects	0.45
Median Detects	0.34	CV Detects	0.874
Skewness Detects	1.534	Kurtosis Detects	2.461
Mean of Logged Detects	-0.984	SD of Logged Detects	0.877

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.84	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.233	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.304	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

KM Mean	0.411	KM Standard Error of Mean	0.114
KM SD	0.345	95% KM (BCA) UCL	0.587
95% KM (t) UCL	0.613	95% KM (Percentile Bootstrap) UCL	0.601
95% KM (z) UCL	0.599	95% KM Bootstrap t UCL	0.681
90% KM Chebyshev UCL	0.754	95% KM Chebyshev UCL	0.908
97.5% KM Chebyshev UCL	1.124	99% KM Chebyshev UCL	1.546

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.257	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.719	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.167	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.316	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)	1.715	k star (bias corrected MLE)	1.075
Theta hat (MLE)	0.3	Theta star (bias corrected MLE)	0.478
nu hat (MLE)	24.02	nu star (bias corrected)	15.06
Mean (detects)	0.514		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0356	Mean	0.403
Maximum	1.41	Median	0.29
SD	0.365	CV	0.906
k hat (MLE)	1.418	k star (bias corrected MLE)	1.162
Theta hat (MLE)	0.284	Theta star (bias corrected MLE)	0.347
nu hat (MLE)	39.71	nu star (bias corrected)	32.54
Adjusted Level of Significance (β)	0.0312		
Approximate Chi Square Value (32.54, α)	20.5	Adjusted Chi Square Value (32.54, β)	19.24
95% Gamma Approximate UCL (use when n>=50)	0.64	95% Gamma Adjusted UCL (use when n<50)	0.682

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.411	SD (KM)	0.345
Variance (KM)	0.119	SE of Mean (KM)	0.114
k hat (KM)	1.422	k star (KM)	1.165

nu hat (KM)	39.83	nu star (KM)	32.63
theta hat (KM)	0.289	theta star (KM)	0.353
80% gamma percentile (KM)	0.653	90% gamma percentile (KM)	0.912
95% gamma percentile (KM)	1.168	99% gamma percentile (KM)	1.756

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (32.63, α)	20.57	Adjusted Chi Square Value (32.63, β)	19.31
95% Gamma Approximate KM-UCL (use when n>=50)	0.653	95% Gamma Adjusted KM-UCL (use when n<50)	0.695

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.977	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.164	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.304	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	0.401	Mean in Log Scale	-1.197
SD in Original Scale	0.35	SD in Log Scale	0.763
95% t UCL (assumes normality of ROS data)	0.567	95% Percentile Bootstrap UCL	0.561
95% BCA Bootstrap UCL	0.593	95% Bootstrap t UCL	0.671
95% H-UCL (Log ROS)	0.676		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.192	KM Geo Mean	0.304
KM SD (logged)	0.772	95% Critical H Value (KM-Log)	2.438
KM Standard Error of Mean (logged)	0.287	95% H-UCL (KM -Log)	0.69
KM SD (logged)	0.772	95% Critical H Value (KM-Log)	2.438
KM Standard Error of Mean (logged)	0.287		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.479	Mean in Log Scale	-0.947
SD in Original Scale	0.324	SD in Log Scale	0.714
95% t UCL (Assumes normality)	0.632	95% H-Stat UCL	0.798

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	0.613

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.

Result (water, storm;outfall 008;selenium)

General Statistics

Total Number of Observations	14	Number of Distinct Observations	7
Number of Detects	5	Number of Non-Detects	9
Number of Distinct Detects	5	Number of Distinct Non-Detects	2
Minimum Detect	0.51	Minimum Non-Detect	2
Maximum Detect	1.3	Maximum Non-Detect	10
Variance Detects	0.107	Percent Non-Detects	64.29%
Mean Detects	0.72	SD Detects	0.327

Median Detects	0.59	CV Detects	0.454
Skewness Detects	2.149	Kurtosis Detects	4.711
Mean of Logged Detects	-0.392	SD of Logged Detects	0.373

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.67	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.42	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.343	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

KM Mean	0.72	KM Standard Error of Mean	0.146
KM SD	0.292	95% KM (BCA) UCL	0.953
95% KM (t) UCL	0.979	95% KM (Percentile Bootstrap) UCL	0.96
95% KM (z) UCL	0.96	95% KM Bootstrap t UCL	2.688
90% KM Chebyshev UCL	1.158	95% KM Chebyshev UCL	1.357
97.5% KM Chebyshev UCL	1.632	99% KM Chebyshev UCL	2.174

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.877	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.68	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.415	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.358	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)	8.004	k star (bias corrected MLE)	3.335
Theta hat (MLE)	0.09	Theta star (bias corrected MLE)	0.216
nu hat (MLE)	80.04	nu star (bias corrected)	33.35
Mean (detects)	0.72		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.321	Mean	0.722
Maximum	1.3	Median	0.635
SD	0.282	CV	0.391
k hat (MLE)	7.556	k star (bias corrected MLE)	5.985
Theta hat (MLE)	0.0955	Theta star (bias corrected MLE)	0.121
nu hat (MLE)	211.6	nu star (bias corrected)	167.6
Adjusted Level of Significance (β)	0.0312		
Approximate Chi Square Value (167.57, α)	138.6	Adjusted Chi Square Value (167.57, β)	135.1
95% Gamma Approximate UCL (use when n>=50)	0.872	95% Gamma Adjusted UCL (use when n<50)	0.895

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.72	SD (KM)	0.292
Variance (KM)	0.0854	SE of Mean (KM)	0.146
k hat (KM)	6.07	k star (KM)	4.817
nu hat (KM)	170	nu star (KM)	134.9
theta hat (KM)	0.119	theta star (KM)	0.149
80% gamma percentile (KM)	0.972	90% gamma percentile (KM)	1.159
95% gamma percentile (KM)	1.33	99% gamma percentile (KM)	1.693

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (134.88, α)	109	Adjusted Chi Square Value (134.88, β)	106
95% Gamma Approximate KM-UCL (use when n>=50)	0.891	95% Gamma Adjusted KM-UCL (use when n<50)	0.916

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.731	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.391	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	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	0.711	Mean in Log Scale	-0.392
SD in Original Scale	0.252	SD in Log Scale	0.322
95% t UCL (assumes normality of ROS data)	0.83	95% Percentile Bootstrap UCL	0.827
95% BCA Bootstrap UCL	0.848	95% Bootstrap t UCL	0.879
95% H-UCL (Log ROS)	0.844		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.392	KM Geo Mean	0.676
KM SD (logged)	0.334	95% Critical H Value (KM-Log)	1.923
KM Standard Error of Mean (logged)	0.167	95% H-UCL (KM -Log)	0.853
KM SD (logged)	0.334	95% Critical H Value (KM-Log)	1.923
KM Standard Error of Mean (logged)	0.167		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.186	Mean in Log Scale	-0.0251
SD in Original Scale	1.121	SD in Log Scale	0.548
95% t UCL (Assumes normality)	1.716	95% H-Stat UCL	1.555

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	0.979	KM H-UCL	0.853
95% KM (BCA) UCL	0.953		

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.

Result (water, storm;outfall 008;uranium)

General Statistics

Total Number of Observations	14	Number of Distinct Observations	14
Number of Detects	11	Number of Non-Detects	3
Number of Distinct Detects	11	Number of Distinct Non-Detects	3
Minimum Detect	0.439	Minimum Non-Detect	0.693
Maximum Detect	1.61	Maximum Non-Detect	1.38
Variance Detects	0.115	Percent Non-Detects	21.43%
Mean Detects	0.8	SD Detects	0.339
Median Detects	0.677	CV Detects	0.424
Skewness Detects	1.674	Kurtosis Detects	2.629
Mean of Logged Detects	-0.29	SD of Logged Detects	0.367

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.819	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.274	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.251	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

KM Mean	0.768	KM Standard Error of Mean	0.0868
KM SD	0.301	95% KM (BCA) UCL	0.933
95% KM (t) UCL	0.921	95% KM (Percentile Bootstrap) UCL	0.916
95% KM (z) UCL	0.91	95% KM Bootstrap t UCL	1.058
90% KM Chebyshev UCL	1.028	95% KM Chebyshev UCL	1.146
97.5% KM Chebyshev UCL	1.31	99% KM Chebyshev UCL	1.631

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.563	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.73	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.219	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.256	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)	7.634	k star (bias corrected MLE)	5.612
Theta hat (MLE)	0.105	Theta star (bias corrected MLE)	0.143
nu hat (MLE)	167.9	nu star (bias corrected)	123.5
Mean (detects)	0.8		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.439	Mean	0.767
Maximum	1.61	Median	0.674
SD	0.306	CV	0.398
k hat (MLE)	8.944	k star (bias corrected MLE)	7.075
Theta hat (MLE)	0.0858	Theta star (bias corrected MLE)	0.108
nu hat (MLE)	250.4	nu star (bias corrected)	198.1
Adjusted Level of Significance (β)	0.0312		
Approximate Chi Square Value (198.09, α)	166.5	Adjusted Chi Square Value (198.09, β)	162.7
95% Gamma Approximate UCL (use when n>=50)	0.913	95% Gamma Adjusted UCL (use when n<50)	0.934

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.768	SD (KM)	0.301
Variance (KM)	0.0908	SE of Mean (KM)	0.0868
k hat (KM)	6.49	k star (KM)	5.147
nu hat (KM)	181.7	nu star (KM)	144.1
theta hat (KM)	0.118	theta star (KM)	0.149
80% gamma percentile (KM)	1.029	90% gamma percentile (KM)	1.221
95% gamma percentile (KM)	1.395	99% gamma percentile (KM)	1.764

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (144.12, α)	117.4	Adjusted Chi Square Value (144.12, β)	114.2
95% Gamma Approximate KM-UCL (use when n>=50)	0.943	95% Gamma Adjusted KM-UCL (use when n<50)	0.969

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.929	**Shapiro Wilk GOF Test**	

5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.197	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.251	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	0.768	Mean in Log Scale	-0.321
SD in Original Scale	0.305	SD in Log Scale	0.33
95% t UCL (assumes normality of ROS data)	0.912	95% Percentile Bootstrap UCL	0.901
95% BCA Bootstrap UCL	0.959	95% Bootstrap t UCL	1.116
95% H-UCL (Log ROS)	0.913		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.325	KM Geo Mean	0.722
KM SD (logged)	0.332	95% Critical H Value (KM-Log)	1.922
KM Standard Error of Mean (logged)	0.0977	95% H-UCL (KM -Log)	0.911
KM SD (logged)	0.332	95% Critical H Value (KM-Log)	1.922
KM Standard Error of Mean (logged)	0.0977		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.733	Mean in Log Scale	-0.392
SD in Original Scale	0.334	SD in Log Scale	0.405
95% t UCL (Assumes normality)	0.891	95% H-Stat UCL	0.917

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	0.969	95% GROS Adjusted Gamma UCL	0.934

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.

Result (water, storm;outfall 008;zinc)

General Statistics

Total Number of Observations	14	Number of Distinct Observations	14
Number of Detects	13	Number of Non-Detects	1
Number of Distinct Detects	13	Number of Distinct Non-Detects	1
Minimum Detect	11.8	Minimum Non-Detect	20
Maximum Detect	64	Maximum Non-Detect	20
Variance Detects	272.4	Percent Non-Detects	7.143%
Mean Detects	30.07	SD Detects	16.5
Median Detects	28.4	CV Detects	0.549
Skewness Detects	0.729	Kurtosis Detects	-0.426
Mean of Logged Detects	3.262	SD of Logged Detects	0.559

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.908	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.866	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.17	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.234	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

KM Mean	28.96	KM Standard Error of Mean	4.398
KM SD	15.8	95% KM (BCA) UCL	36.04
95% KM (t) UCL	36.75	95% KM (Percentile Bootstrap) UCL	36.14
95% KM (z) UCL	36.19	95% KM Bootstrap t UCL	38.66
90% KM Chebyshev UCL	42.15	95% KM Chebyshev UCL	48.13
97.5% KM Chebyshev UCL	56.42	99% KM Chebyshev UCL	72.72

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.385	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.738	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.178	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.238	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)	3.69	k star (bias corrected MLE)	2.89
Theta hat (MLE)	8.149	Theta star (bias corrected MLE)	10.41
nu hat (MLE)	95.93	nu star (bias corrected)	75.13
Mean (detects)	30.07		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	11.8	Mean	28.96
Maximum	64	Median	25.3
SD	16.39	CV	0.566
k hat (MLE)	3.585	k star (bias corrected MLE)	2.865
Theta hat (MLE)	8.076	Theta star (bias corrected MLE)	10.11
nu hat (MLE)	100.4	nu star (bias corrected)	80.21
Adjusted Level of Significance (β)	0.0312		
Approximate Chi Square Value (80.21, α)	60.58	Adjusted Chi Square Value (80.21, β)	58.32
95% Gamma Approximate UCL (use when n>=50)	38.34	95% Gamma Adjusted UCL (use when n<50)	39.83

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	28.96	SD (KM)	15.8
Variance (KM)	249.7	SE of Mean (KM)	4.398
k hat (KM)	3.36	k star (KM)	2.687
nu hat (KM)	94.07	nu star (KM)	75.25
theta hat (KM)	8.62	theta star (KM)	10.78
80% gamma percentile (KM)	41.86	90% gamma percentile (KM)	52.64
95% gamma percentile (KM)	62.76	99% gamma percentile (KM)	84.82

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (75.25, α)	56.27	Adjusted Chi Square Value (75.25, β)	54.09
95% Gamma Approximate KM-UCL (use when n>=50)	38.73	95% Gamma Adjusted KM-UCL (use when n<50)	40.29

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.937	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.163	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.234	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	29.02	Mean in Log Scale	3.224
SD in Original Scale	16.34	SD in Log Scale	0.555
95% t UCL (assumes normality of ROS data)	36.75	95% Percentile Bootstrap UCL	36.28
95% BCA Bootstrap UCL	37.14	95% Bootstrap t UCL	39.19
95% H-UCL (Log ROS)	40.49		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	3.22	KM Geo Mean	25.02
KM SD (logged)	0.54	95% Critical H Value (KM-Log)	2.067
KM Standard Error of Mean (logged)	0.151	95% H-UCL (KM -Log)	39.47
KM SD (logged)	0.54	95% Critical H Value (KM-Log)	2.067
KM Standard Error of Mean (logged)	0.151		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	28.64	Mean in Log Scale	3.193
SD in Original Scale	16.74	SD in Log Scale	0.595
95% t UCL (Assumes normality)	36.56	95% H-Stat UCL	41.77

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	36.75

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.

Result (water, storm;outfall 008;zinc (dissolved))

General Statistics

Total Number of Observations	14	Number of Distinct Observations	7
Number of Detects	6	Number of Non-Detects	8
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	7.03	Minimum Non-Detect	20
Maximum Detect	49	Maximum Non-Detect	20
Variance Detects	266.3	Percent Non-Detects	57.14%
Mean Detects	21.97	SD Detects	16.32
Median Detects	18.95	CV Detects	0.743
Skewness Detects	0.912	Kurtosis Detects	0.0401
Mean of Logged Detects	2.841	SD of Logged Detects	0.789

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.889	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.229	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	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

KM Mean	14.54	KM Standard Error of Mean	3.574
KM SD	11.8	95% KM (BCA) UCL	22.27
95% KM (t) UCL	20.87	95% KM (Percentile Bootstrap) UCL	21.55
95% KM (z) UCL	20.42	95% KM Bootstrap t UCL	24.08
90% KM Chebyshev UCL	25.26	95% KM Chebyshev UCL	30.12

97.5% KM Chebyshev UCL	36.86	99% KM Chebyshev UCL	50.11

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.335	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.704	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.216	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.336	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)	2.164	k star (bias corrected MLE)	1.193
Theta hat (MLE)	10.15	Theta star (bias corrected MLE)	18.41
nu hat (MLE)	25.97	nu star (bias corrected)	14.32
Mean (detects)	21.97		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	14.53
Maximum	49	Median	10.88
SD	13.14	CV	0.904
k hat (MLE)	0.803	k star (bias corrected MLE)	0.678
Theta hat (MLE)	18.1	Theta star (bias corrected MLE)	21.42
nu hat (MLE)	22.48	nu star (bias corrected)	19
Adjusted Level of Significance (β)	0.0312		
Approximate Chi Square Value (19.00, α)	10.12	Adjusted Chi Square Value (19.00, β)	9.265
95% Gamma Approximate UCL (use when n>=50)	27.3	95% Gamma Adjusted UCL (use when n<50)	29.8

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	14.54	SD (KM)	11.8
Variance (KM)	139.2	SE of Mean (KM)	3.574
k hat (KM)	1.519	k star (KM)	1.241
nu hat (KM)	42.53	nu star (KM)	34.75
theta hat (KM)	9.572	theta star (KM)	11.72
80% gamma percentile (KM)	22.95	90% gamma percentile (KM)	31.74
95% gamma percentile (KM)	40.39	99% gamma percentile (KM)	60.18

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (34.75, α)	22.27	Adjusted Chi Square Value (34.75, β)	20.95
95% Gamma Approximate KM-UCL (use when n>=50)	22.69	95% Gamma Adjusted KM-UCL (use when n<50)	24.12

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.919	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.2	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.325	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	15.03	Mean in Log Scale	2.461
SD in Original Scale	12.38	SD in Log Scale	0.706
95% t UCL (assumes normality of ROS data)	20.88	95% Percentile Bootstrap UCL	20.6
95% BCA Bootstrap UCL	22.57	95% Bootstrap t UCL	24.95
95% H-UCL (Log ROS)	23.8		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.456	KM Geo Mean	11.65
KM SD (logged)	0.603	95% Critical H Value (KM-Log)	2.211
KM Standard Error of Mean (logged)	0.202	95% H-UCL (KM -Log)	20.24
KM SD (logged)	0.603	95% Critical H Value (KM-Log)	2.211
KM Standard Error of Mean (logged)	0.202		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	15.13	Mean in Log Scale	2.533
SD in Original Scale	11.84	SD in Log Scale	0.562
95% t UCL (Assumes normality)	20.73	95% H-Stat UCL	20.5

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	20.87

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.

Result (water, storm;outfall 009;antimony)

General Statistics

Total Number of Observations	43	Number of Distinct Observations	35
Number of Detects	38	Number of Non-Detects	5
Number of Distinct Detects	33	Number of Distinct Non-Detects	2
Minimum Detect	0.3	Minimum Non-Detect	0.71
Maximum Detect	1.9	Maximum Non-Detect	2
Variance Detects	0.133	Percent Non-Detects	11.63%
Mean Detects	0.711	SD Detects	0.365
Median Detects	0.615	CV Detects	0.514
Skewness Detects	1.893	Kurtosis Detects	3.601
Mean of Logged Detects	-0.441	SD of Logged Detects	0.431

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.794	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.938	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.205	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.142	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

KM Mean	0.706	KM Standard Error of Mean	0.0581
KM SD	0.357	95% KM (BCA) UCL	0.798
95% KM (t) UCL	0.803	95% KM (Percentile Bootstrap) UCL	0.8
95% KM (z) UCL	0.801	95% KM Bootstrap t UCL	0.844
90% KM Chebyshev UCL	0.88	95% KM Chebyshev UCL	0.959
97.5% KM Chebyshev UCL	1.068	99% KM Chebyshev UCL	1.283

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.045	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.751	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.142	**Kolmogorov-Smirnov GOF**	

5% K-S Critical Value	0.144	Detected data appear 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)	5.201	k star (bias corrected MLE)	4.808
Theta hat (MLE)	0.137	Theta star (bias corrected MLE)	0.148
nu hat (MLE)	395.3	nu star (bias corrected)	365.4
Mean (detects)	0.711		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.3	Mean	0.703
Maximum	1.9	Median	0.6
SD	0.351	CV	0.499
k hat (MLE)	5.474	k star (bias corrected MLE)	5.108
Theta hat (MLE)	0.128	Theta star (bias corrected MLE)	0.138
nu hat (MLE)	470.8	nu star (bias corrected)	439.3
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (439.28, α)	391.7	Adjusted Chi Square Value (439.28, β)	390.1
95% Gamma Approximate UCL (use when n>=50)	0.788	95% Gamma Adjusted UCL (use when n<50)	0.791

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.706	SD (KM)	0.357
Variance (KM)	0.128	SE of Mean (KM)	0.0581
k hat (KM)	3.897	k star (KM)	3.641
nu hat (KM)	335.1	nu star (KM)	313.1
theta hat (KM)	0.181	theta star (KM)	0.194
80% gamma percentile (KM)	0.984	90% gamma percentile (KM)	1.201
95% gamma percentile (KM)	1.403	99% gamma percentile (KM)	1.835

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (313.09, α)	273.1	Adjusted Chi Square Value (313.09, β)	271.8
95% Gamma Approximate KM-UCL (use when n>=50)	0.809	95% Gamma Adjusted KM-UCL (use when n<50)	0.813

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.95	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.938	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.111	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.142	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	0.702	Mean in Log Scale	-0.447
SD in Original Scale	0.349	SD in Log Scale	0.415
95% t UCL (assumes normality of ROS data)	0.791	95% Percentile Bootstrap UCL	0.792
95% BCA Bootstrap UCL	0.803	95% Bootstrap t UCL	0.819
95% H-UCL (Log ROS)	0.785		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.447	KM Geo Mean	0.639
KM SD (logged)	0.424	95% Critical H Value (KM-Log)	1.849
KM Standard Error of Mean (logged)	0.069	95% H-UCL (KM -Log)	0.789
KM SD (logged)	0.424	95% Critical H Value (KM-Log)	1.849
KM Standard Error of Mean (logged)	0.069		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.729	Mean in Log Scale	-0.413
SD in Original Scale	0.358	SD in Log Scale	0.436
95% t UCL (Assumes normality)	0.821	95% H-Stat UCL	0.824

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 Adjusted Gamma UCL	0.813	95% GROS Adjusted Gamma UCL	0.791

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

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.

Result (water, storm;outfall 009;antimony (dissolved))

General Statistics

Total Number of Observations	43	Number of Distinct Observations	30
Number of Detects	31	Number of Non-Detects	12
Number of Distinct Detects	28	Number of Distinct Non-Detects	2
Minimum Detect	0.3	Minimum Non-Detect	0.76
Maximum Detect	1.7	Maximum Non-Detect	2
Variance Detects	0.129	Percent Non-Detects	27.91%
Mean Detects	0.696	SD Detects	0.359
Median Detects	0.59	CV Detects	0.516
Skewness Detects	1.723	Kurtosis Detects	2.385
Mean of Logged Detects	-0.463	SD of Logged Detects	0.434

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.785	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.929	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.224	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.156	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

KM Mean	0.69	KM Standard Error of Mean	0.0629
KM SD	0.349	95% KM (BCA) UCL	0.806
95% KM (t) UCL	0.796	95% KM (Percentile Bootstrap) UCL	0.795
95% KM (z) UCL	0.794	95% KM Bootstrap t UCL	0.832
90% KM Chebyshev UCL	0.879	95% KM Chebyshev UCL	0.964
97.5% KM Chebyshev UCL	1.083	99% KM Chebyshev UCL	1.316

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.204	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.747	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.158	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.158	Detected data appear 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)	5.141	k star (bias corrected MLE)	4.665
Theta hat (MLE)	0.135	Theta star (bias corrected MLE)	0.149
nu hat (MLE)	318.7	nu star (bias corrected)	289.2
Mean (detects)	0.696		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.263	Mean	0.687
Maximum	1.7	Median	0.59
SD	0.336	CV	0.489
k hat (MLE)	5.325	k star (bias corrected MLE)	4.969
Theta hat (MLE)	0.129	Theta star (bias corrected MLE)	0.138
nu hat (MLE)	458	nu star (bias corrected)	427.4
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (427.36, α)	380.4	Adjusted Chi Square Value (427.36, β)	378.9
95% Gamma Approximate UCL (use when n>=50)	0.772	95% Gamma Adjusted UCL (use when n<50)	0.775

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.69	SD (KM)	0.349
Variance (KM)	0.122	SE of Mean (KM)	0.0629
k hat (KM)	3.907	k star (KM)	3.65
nu hat (KM)	336	nu star (KM)	313.9
theta hat (KM)	0.177	theta star (KM)	0.189
80% gamma percentile (KM)	0.962	90% gamma percentile (KM)	1.175
95% gamma percentile (KM)	1.371	99% gamma percentile (KM)	1.793

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (313.88, α)	273.8	Adjusted Chi Square Value (313.88, β)	272.5
95% Gamma Approximate KM-UCL (use when n>=50)	0.791	95% Gamma Adjusted KM-UCL (use when n<50)	0.795

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.932	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.929	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.129	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.156	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	0.684	Mean in Log Scale	-0.469
SD in Original Scale	0.328	SD in Log Scale	0.41
95% t UCL (assumes normality of ROS data)	0.768	95% Percentile Bootstrap UCL	0.77
95% BCA Bootstrap UCL	0.779	95% Bootstrap t UCL	0.789
95% H-UCL (Log ROS)	0.765		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.47	KM Geo Mean	0.625
KM SD (logged)	0.424	95% Critical H Value (KM-Log)	1.849
KM Standard Error of Mean (logged)	0.0765	95% H-UCL (KM -Log)	0.772
KM SD (logged)	0.424	95% Critical H Value (KM-Log)	1.849
KM Standard Error of Mean (logged)	0.0765		

DL/2 Statistics

DL/2 Normal **DL/2 Log-Transformed**

Mean in Original Scale	0.766	Mean in Log Scale	-0.356
SD in Original Scale	0.337	SD in Log Scale	0.43
95% t UCL (Assumes normality)	0.853	95% H-Stat UCL	0.869

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 Adjusted Gamma UCL	0.795	95% GROS Adjusted Gamma UCL	0.775

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

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.

Result (water, storm;outfall 009;cadmium)

General Statistics

Total Number of Observations	43	Number of Distinct Observations	9
Number of Detects	9	Number of Non-Detects	34
Number of Distinct Detects	8	Number of Distinct Non-Detects	1
Minimum Detect	0.11	Minimum Non-Detect	1
Maximum Detect	0.43	Maximum Non-Detect	1
Variance Detects	0.0118	Percent Non-Detects	79.07%
Mean Detects	0.19	SD Detects	0.109
Median Detects	0.15	CV Detects	0.572
Skewness Detects	1.761	Kurtosis Detects	2.412
Mean of Logged Detects	-1.772	SD of Logged Detects	0.468

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.743	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.829	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.314	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.274	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

KM Mean	0.19	KM Standard Error of Mean	0.0362
KM SD	0.102	95% KM (BCA) UCL	0.25
95% KM (t) UCL	0.251	95% KM (Percentile Bootstrap) UCL	0.253
95% KM (z) UCL	0.25	95% KM Bootstrap t UCL	0.437
90% KM Chebyshev UCL	0.299	95% KM Chebyshev UCL	0.348
97.5% KM Chebyshev UCL	0.416	99% KM Chebyshev UCL	0.55

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.83	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.724	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.262	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.28	Detected data appear 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)	4.655	k star (bias corrected MLE)	3.178
Theta hat (MLE)	0.0408	Theta star (bias corrected MLE)	0.0598

nu hat (MLE)	83.8	nu star (bias corrected)	57.2
Mean (detects)	0.19		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0161	Mean	0.193
Maximum	0.477	Median	0.166
SD	0.11	CV	0.571
k hat (MLE)	2.812	k star (bias corrected MLE)	2.632
Theta hat (MLE)	0.0688	Theta star (bias corrected MLE)	0.0735
nu hat (MLE)	241.9	nu star (bias corrected)	226.3
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (226.31, α)	192.5	Adjusted Chi Square Value (226.31, β)	191.4
95% Gamma Approximate UCL (use when n>=50)	0.227	95% Gamma Adjusted UCL (use when n<50)	0.229

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.19	SD (KM)	0.102
Variance (KM)	0.0105	SE of Mean (KM)	0.0362
k hat (KM)	3.442	k star (KM)	3.217
nu hat (KM)	296	nu star (KM)	276.7
theta hat (KM)	0.0552	theta star (KM)	0.0591
80% gamma percentile (KM)	0.269	90% gamma percentile (KM)	0.332
95% gamma percentile (KM)	0.391	99% gamma percentile (KM)	0.518

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (276.67, α)	239.1	Adjusted Chi Square Value (276.67, β)	237.9
95% Gamma Approximate KM-UCL (use when n>=50)	0.22	95% Gamma Adjusted KM-UCL (use when n<50)	0.221

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.838	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.829	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.229	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.274	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	0.19	Mean in Log Scale	-1.772
SD in Original Scale	0.0954	SD in Log Scale	0.474
95% t UCL (assumes normality of ROS data)	0.215	95% Percentile Bootstrap UCL	0.215
95% BCA Bootstrap UCL	0.216	95% Bootstrap t UCL	0.218
95% H-UCL (Log ROS)	0.218		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.772	KM Geo Mean	0.17
KM SD (logged)	0.441	95% Critical H Value (KM-Log)	1.86
KM Standard Error of Mean (logged)	0.156	95% H-UCL (KM -Log)	0.213
KM SD (logged)	0.441	95% Critical H Value (KM-Log)	1.86
KM Standard Error of Mean (logged)	0.156		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.435	Mean in Log Scale	-0.919
SD in Original Scale	0.136	SD in Log Scale	0.489
95% t UCL (Assumes normality)	0.47	95% H-Stat UCL	0.519

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 Adjusted Gamma UCL	0.221	95% GROS Adjusted Gamma UCL	0.229

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

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.

Result (water, storm;outfall 009;copper)

General Statistics

Total Number of Observations	43	Number of Distinct Observations	35
Number of Detects	42	Number of Non-Detects	1
Number of Distinct Detects	35	Number of Distinct Non-Detects	1
Minimum Detect	1.6	Minimum Non-Detect	5.3
Maximum Detect	9.6	Maximum Non-Detect	5.3
Variance Detects	4.453	Percent Non-Detects	2.326%
Mean Detects	4.825	SD Detects	2.11
Median Detects	4.18	CV Detects	0.437
Skewness Detects	0.789	Kurtosis Detects	-0.287
Mean of Logged Detects	1.482	SD of Logged Detects	0.437

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.87	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.942	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.14	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.135	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

KM Mean	4.796	KM Standard Error of Mean	0.321
KM SD	2.074	95% KM (BCA) UCL	5.346
95% KM (t) UCL	5.335	95% KM (Percentile Bootstrap) UCL	5.313
95% KM (z) UCL	5.323	95% KM Bootstrap t UCL	5.391
90% KM Chebyshev UCL	5.758	95% KM Chebyshev UCL	6.194
97.5% KM Chebyshev UCL	6.799	99% KM Chebyshev UCL	7.988

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.587	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.752	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.099	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.137	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)	5.613	k star (bias corrected MLE)	5.228
Theta hat (MLE)	0.86	Theta star (bias corrected MLE)	0.923
nu hat (MLE)	471.5	nu star (bias corrected)	439.1
Mean (detects)	4.825		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	1.6	Mean	4.798
Maximum	9.6	Median	4.16
SD	2.092	CV	0.436
k hat (MLE)	5.696	k star (bias corrected MLE)	5.314
Theta hat (MLE)	0.842	Theta star (bias corrected MLE)	0.903
nu hat (MLE)	489.8	nu star (bias corrected)	457
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (456.98, α)	408.4	Adjusted Chi Square Value (456.98, β)	406.8
95% Gamma Approximate UCL (use when n>=50)	5.369	95% Gamma Adjusted UCL (use when n<50)	5.389

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	4.796	SD (KM)	2.074
Variance (KM)	4.3	SE of Mean (KM)	0.321
k hat (KM)	5.348	k star (KM)	4.991
nu hat (KM)	459.9	nu star (KM)	429.2
theta hat (KM)	0.897	theta star (KM)	0.961
80% gamma percentile (KM)	6.448	90% gamma percentile (KM)	7.67
95% gamma percentile (KM)	8.784	99% gamma percentile (KM)	11.14

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (429.18, α)	382.2	Adjusted Chi Square Value (429.18, β)	380.6
95% Gamma Approximate KM-UCL (use when n>=50)	5.386	95% Gamma Adjusted KM-UCL (use when n<50)	5.408

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.92	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.942	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.0809	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.135	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	4.796	Mean in Log Scale	1.477
SD in Original Scale	2.093	SD in Log Scale	0.433
95% t UCL (assumes normality of ROS data)	5.333	95% Percentile Bootstrap UCL	5.318
95% BCA Bootstrap UCL	5.356	95% Bootstrap t UCL	5.364
95% H-UCL (Log ROS)	5.447		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.476	KM Geo Mean	4.377
KM SD (logged)	0.431	95% Critical H Value (KM-Log)	1.853
KM Standard Error of Mean (logged)	0.0668	95% H-UCL (KM -Log)	5.432
KM SD (logged)	0.431	95% Critical H Value (KM-Log)	1.853
KM Standard Error of Mean (logged)	0.0668		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	4.774	Mean in Log Scale	1.47
SD in Original Scale	2.111	SD in Log Scale	0.439
95% t UCL (Assumes normality)	5.315	95% H-Stat UCL	5.433

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	5.408	95% GROS Adjusted Gamma UCL	5.389

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.

Result (water, storm;outfall 009;copper (dissolved))

General Statistics

Total Number of Observations	43	Number of Distinct Observations	33
Number of Detects	42	Number of Non-Detects	1
Number of Distinct Detects	32	Number of Distinct Non-Detects	1
Minimum Detect	1.3	Minimum Non-Detect	2.7
Maximum Detect	7.1	Maximum Non-Detect	2.7
Variance Detects	1.725	Percent Non-Detects	2.326%
Mean Detects	3.259	SD Detects	1.313
Median Detects	3.01	CV Detects	0.403
Skewness Detects	1.061	Kurtosis Detects	1.063
Mean of Logged Detects	1.107	SD of Logged Detects	0.39

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.886	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.942	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.154	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.135	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

KM Mean	3.23	KM Standard Error of Mean	0.2
KM SD	1.297	95% KM (BCA) UCL	3.549
95% KM (t) UCL	3.568	95% KM (Percentile Bootstrap) UCL	3.564
95% KM (z) UCL	3.56	95% KM Bootstrap t UCL	3.617
90% KM Chebyshev UCL	3.832	95% KM Chebyshev UCL	4.104
97.5% KM Chebyshev UCL	4.482	99% KM Chebyshev UCL	5.225

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.406	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.751	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.106	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.137	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)	6.879	k star (bias corrected MLE)	6.404
Theta hat (MLE)	0.474	Theta star (bias corrected MLE)	0.509
nu hat (MLE)	577.8	nu star (bias corrected)	537.9
Mean (detects)	3.259		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	1.3	Mean	3.229
Maximum	7.1	Median	3
SD	1.312	CV	0.406
k hat (MLE)	6.813	k star (bias corrected MLE)	6.353
Theta hat (MLE)	0.474	Theta star (bias corrected MLE)	0.508
nu hat (MLE)	585.9	nu star (bias corrected)	546.4
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (546.36, α)	493.2	Adjusted Chi Square Value (546.36, β)	491.4
95% Gamma Approximate UCL (use when n>=50)	3.577	95% Gamma Adjusted UCL (use when n<50)	3.59

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	3.23	SD (KM)	1.297
Variance (KM)	1.683	SE of Mean (KM)	0.2
k hat (KM)	6.203	k star (KM)	5.785
nu hat (KM)	533.4	nu star (KM)	497.5
theta hat (KM)	0.521	theta star (KM)	0.558
80% gamma percentile (KM)	4.273	90% gamma percentile (KM)	5.027
95% gamma percentile (KM)	5.709	99% gamma percentile (KM)	7.142

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (497.54, α)	446.8	Adjusted Chi Square Value (497.54, β)	445.1
95% Gamma Approximate KM-UCL (use when n>=50)	3.597	95% Gamma Adjusted KM-UCL (use when n<50)	3.611

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.942	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.942	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.107	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.135	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	3.231	Mean in Log Scale	1.098
SD in Original Scale	1.311	SD in Log Scale	0.39
95% t UCL (assumes normality of ROS data)	3.567	95% Percentile Bootstrap UCL	3.563
95% BCA Bootstrap UCL	3.58	95% Bootstrap t UCL	3.595
95% H-UCL (Log ROS)	3.611		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.097	KM Geo Mean	2.996
KM SD (logged)	0.387	95% Critical H Value (KM-Log)	1.827
KM Standard Error of Mean (logged)	0.06	95% H-UCL (KM -Log)	3.602
KM SD (logged)	0.387	95% Critical H Value (KM-Log)	1.827
KM Standard Error of Mean (logged)	0.06		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	3.215	Mean in Log Scale	1.088
SD in Original Scale	1.33	SD in Log Scale	0.405
95% t UCL (Assumes normality)	3.556	95% H-Stat UCL	3.613

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	3.611	95% GROS Adjusted Gamma UCL	3.59

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.

Result (water, storm;outfall 009;dioxin teq, human/mammal (epa, nds excluded))

General Statistics

Total Number of Observations	38	Number of Distinct Observations	37
		Number of Missing Observations	0
Minimum	1.6800E-9	Mean	1.7951E-6
Maximum	8.0530E-6	Median	9.4900E-7
SD	2.1479E-6	Std. Error of Mean	3.4844E-7
Coefficient of Variation	N/A	Skewness	1.288

Normal GOF Test

Shapiro Wilk Test Statistic	0.799	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.938	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.226	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.142	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	2.3829E-6	95% Adjusted-CLT UCL (Chen-1995)	2.4460E-6
		95% Modified-t UCL (Johnson-1978)	2.3951E-6

Gamma GOF Test

A-D Test Statistic	0.691	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.807	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.172	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.151	Data Not Gamma Distributed at 5% Significance Level

Detected data follow Appr. Gamma Distribution at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.564	k star (bias corrected MLE)	0.537
Theta hat (MLE)	3.1812E-6	Theta star (bias corrected MLE)	3.3411E-6
nu hat (MLE)	42.89	nu star (bias corrected)	40.83
MLE Mean (bias corrected)	1.7951E-6	MLE Sd (bias corrected)	2.4490E-6
		Approximate Chi Square Value (0.05)	27.19
Adjusted Level of Significance	0.0434	Adjusted Chi Square Value	26.73

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	2.6959E-6	95% Adjusted Gamma UCL (use when n<50)	2.7425E-6

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.928	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.938	Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.114	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.142	Data appear Lognormal at 5% Significance Level

Data appear Approximate Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-20.2	Mean of logged Data	-14.34
Maximum of Logged Data	-11.73	SD of logged Data	1.878

Assuming Lognormal Distribution

95% H-UCL	1.0428E-5	90% Chebyshev (MVUE) UCL	6.9897E-6
95% Chebyshev (MVUE) UCL	8.7550E-6	97.5% Chebyshev (MVUE) UCL	1.1205E-5

99% Chebyshev (MVUE) UCL 1.6018E-5

Nonparametric Distribution Free UCL Statistics
Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL 2.3682E-6	95% Jackknife UCL 2.3829E-6
95% Standard Bootstrap UCL 2.3630E-6	95% Bootstrap-t UCL 2.5321E-6
95% Hall's Bootstrap UCL 2.4534E-6	95% Percentile Bootstrap UCL 2.3615E-6
95% BCA Bootstrap UCL 2.4389E-6	
90% Chebyshev(Mean, Sd) UCL 2.8404E-6	95% Chebyshev(Mean, Sd) UCL 3.3139E-6
97.5% Chebyshev(Mean, Sd) UCL 3.9711E-6	99% Chebyshev(Mean, Sd) UCL 5.2620E-6

Suggested UCL to Use

95% Adjusted Gamma UCL 2.7425E-6

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

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.

Result (water, storm;outfall 009;gross alpha)

General Statistics

Total Number of Observations	43	Number of Distinct Observations	34
Number of Detects	30	Number of Non-Detects	13
Number of Distinct Detects	29	Number of Distinct Non-Detects	5
Minimum Detect	0.142	Minimum Non-Detect	0.978
Maximum Detect	5.82	Maximum Non-Detect	35.8
Variance Detects	1.522	Percent Non-Detects	30.23%
Mean Detects	1.499	SD Detects	1.234
Median Detects	1.1	CV Detects	0.823
Skewness Detects	2.025	Kurtosis Detects	4.872
Mean of Logged Detects	0.128	SD of Logged Detects	0.773

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.796	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.927	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.186	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.159	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

KM Mean	1.381	KM Standard Error of Mean	0.183
KM SD	1.101	95% KM (BCA) UCL	1.684
95% KM (t) UCL	1.689	95% KM (Percentile Bootstrap) UCL	1.685
95% KM (z) UCL	1.682	95% KM Bootstrap t UCL	1.793
90% KM Chebyshev UCL	1.93	95% KM Chebyshev UCL	2.179
97.5% KM Chebyshev UCL	2.525	99% KM Chebyshev UCL	3.204

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.447	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.759	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.11	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.162	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)	1.955	k star (bias corrected MLE)	1.782
Theta hat (MLE)	0.767	Theta star (bias corrected MLE)	0.842
nu hat (MLE)	117.3	nu star (bias corrected)	106.9
Mean (detects)	1.499		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.142	Mean	1.367
Maximum	5.82	Median	1.01
SD	1.107	CV	0.81
k hat (MLE)	2.011	k star (bias corrected MLE)	1.886
Theta hat (MLE)	0.68	Theta star (bias corrected MLE)	0.725
nu hat (MLE)	172.9	nu star (bias corrected)	162.2
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (162.21, α)	133.8	Adjusted Chi Square Value (162.21, β)	132.9
95% Gamma Approximate UCL (use when n>=50)	1.658	95% Gamma Adjusted UCL (use when n<50)	1.669

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.381	SD (KM)	1.101
Variance (KM)	1.211	SE of Mean (KM)	0.183
k hat (KM)	1.573	k star (KM)	1.479
nu hat (KM)	135.3	nu star (KM)	127.2
theta hat (KM)	0.877	theta star (KM)	0.933
80% gamma percentile (KM)	2.139	90% gamma percentile (KM)	2.887
95% gamma percentile (KM)	3.613	99% gamma percentile (KM)	5.255

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (127.21, α)	102.2	Adjusted Chi Square Value (127.21, β)	101.4
95% Gamma Approximate KM-UCL (use when n>=50)	1.719	95% Gamma Adjusted KM-UCL (use when n<50)	1.732

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.979	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.927	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0866	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.159	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	1.36	Mean in Log Scale	0.064
SD in Original Scale	1.09	SD in Log Scale	0.704
95% t UCL (assumes normality of ROS data)	1.64	95% Percentile Bootstrap UCL	1.651
95% BCA Bootstrap UCL	1.717	95% Bootstrap t UCL	1.762
95% H-UCL (Log ROS)	1.71		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.0591	KM Geo Mean	1.061
KM SD (logged)	0.74	95% Critical H Value (KM-Log)	2.099
KM Standard Error of Mean (logged)	0.132	95% H-UCL (KM -Log)	1.772
KM SD (logged)	0.74	95% Critical H Value (KM-Log)	2.099
KM Standard Error of Mean (logged)	0.132		

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	1.825	Mean in Log Scale	0.211
SD in Original Scale	2.72	SD in Log Scale	0.796
95% t UCL (Assumes normality)	2.522	95% H-Stat UCL	2.209

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	1.732	95% GROS Adjusted Gamma UCL	1.669

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.

Result (water, storm;outfall 009;gross beta)

General Statistics

Total Number of Observations	43	Number of Distinct Observations	39
Number of Detects	38	Number of Non-Detects	5
Number of Distinct Detects	36	Number of Distinct Non-Detects	3
Minimum Detect	1.13	Minimum Non-Detect	1.97
Maximum Detect	9.9	Maximum Non-Detect	25.4
Variance Detects	4.153	Percent Non-Detects	11.63%
Mean Detects	2.728	SD Detects	2.038
Median Detects	2.155	CV Detects	0.747
Skewness Detects	2.338	Kurtosis Detects	5.044
Mean of Logged Detects	0.831	SD of Logged Detects	0.54

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.668	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.938	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.279	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.142	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

KM Mean	2.652	KM Standard Error of Mean	0.305
KM SD	1.938	95% KM (BCA) UCL	3.179
95% KM (t) UCL	3.164	95% KM (Percentile Bootstrap) UCL	3.186
95% KM (z) UCL	3.153	95% KM Bootstrap t UCL	3.382
90% KM Chebyshev UCL	3.566	95% KM Chebyshev UCL	3.979
97.5% KM Chebyshev UCL	4.554	99% KM Chebyshev UCL	5.682

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	2.472	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.754	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.187	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.144	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)	3.05	k star (bias corrected MLE)	2.827
Theta hat (MLE)	0.894	Theta star (bias corrected MLE)	0.965
nu hat (MLE)	231.8	nu star (bias corrected)	214.8

Mean (detects)	2.728

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	1.13	Mean	2.646
Maximum	9.9	Median	2.117
SD	1.944	CV	0.735
k hat (MLE)	3.18	k star (bias corrected MLE)	2.974
Theta hat (MLE)	0.832	Theta star (bias corrected MLE)	0.89
nu hat (MLE)	273.5	nu star (bias corrected)	255.8
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (255.75, α)	219.7	Adjusted Chi Square Value (255.75, β)	218.6
95% Gamma Approximate UCL (use when n>=50)	3.08	95% Gamma Adjusted UCL (use when n<50)	3.096

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.652	SD (KM)	1.938
Variance (KM)	3.754	SE of Mean (KM)	0.305
k hat (KM)	1.873	k star (KM)	1.758
nu hat (KM)	161.1	nu star (KM)	151.2
theta hat (KM)	1.416	theta star (KM)	1.508
80% gamma percentile (KM)	4.031	90% gamma percentile (KM)	5.318
95% gamma percentile (KM)	6.556	99% gamma percentile (KM)	9.323

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (151.20, α)	123.8	Adjusted Chi Square Value (151.20, β)	122.9
95% Gamma Approximate KM-UCL (use when n>=50)	3.24	95% Gamma Adjusted KM-UCL (use when n<50)	3.262

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.869	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.938	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.158	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.142	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	2.65	Mean in Log Scale	0.815
SD in Original Scale	1.933	SD in Log Scale	0.515
95% t UCL (assumes normality of ROS data)	3.146	95% Percentile Bootstrap UCL	3.171
95% BCA Bootstrap UCL	3.265	95% Bootstrap t UCL	3.356
95% H-UCL (Log ROS)	3.003		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.809	KM Geo Mean	2.247
KM SD (logged)	0.52	95% Critical H Value (KM-Log)	1.915
KM Standard Error of Mean (logged)	0.0826	95% H-UCL (KM -Log)	2.999
KM SD (logged)	0.52	95% Critical H Value (KM-Log)	1.915
KM Standard Error of Mean (logged)	0.0826		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	2.868	Mean in Log Scale	0.841
SD in Original Scale	2.473	SD in Log Scale	0.587
95% t UCL (Assumes normality)	3.503	95% H-Stat UCL	3.293

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	3.979

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.

Result (water, storm;outfall 009;lead)

General Statistics

Total Number of Observations	43	Number of Distinct Observations	35
Number of Detects	41	Number of Non-Detects	2
Number of Distinct Detects	34	Number of Distinct Non-Detects	1
Minimum Detect	0.42	Minimum Non-Detect	1
Maximum Detect	13	Maximum Non-Detect	1
Variance Detects	10.37	Percent Non-Detects	4.651%
Mean Detects	3.621	SD Detects	3.22
Median Detects	2.3	CV Detects	0.889
Skewness Detects	1.339	Kurtosis Detects	0.953
Mean of Logged Detects	0.914	SD of Logged Detects	0.894

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.824	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.941	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.21	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.137	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

KM Mean	3.484	KM Standard Error of Mean	0.489
KM SD	3.167	95% KM (BCA) UCL	4.379
95% KM (t) UCL	4.307	95% KM (Percentile Bootstrap) UCL	4.361
95% KM (z) UCL	4.289	95% KM Bootstrap t UCL	4.405
90% KM Chebyshev UCL	4.951	95% KM Chebyshev UCL	5.616
97.5% KM Chebyshev UCL	6.538	99% KM Chebyshev UCL	8.35

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.7	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.767	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.134	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.141	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)	1.485	k star (bias corrected MLE)	1.392
Theta hat (MLE)	2.439	Theta star (bias corrected MLE)	2.6
nu hat (MLE)	121.8	nu star (bias corrected)	114.2
Mean (detects)	3.621		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	3.458
Maximum	13	Median	2.3
SD	3.23	CV	0.934
k hat (MLE)	1.117	k star (bias corrected MLE)	1.055
Theta hat (MLE)	3.095	Theta star (bias corrected MLE)	3.278
nu hat (MLE)	96.09	nu star (bias corrected)	90.72
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (90.72, α)	69.76	Adjusted Chi Square Value (90.72, β)	69.12
95% Gamma Approximate UCL (use when n>=50)	4.498	95% Gamma Adjusted UCL (use when n<50)	4.539

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	3.484	SD (KM)	3.167
Variance (KM)	10.03	SE of Mean (KM)	0.489
k hat (KM)	1.21	k star (KM)	1.141
nu hat (KM)	104.1	nu star (KM)	98.16
theta hat (KM)	2.879	theta star (KM)	3.053
80% gamma percentile (KM)	5.543	90% gamma percentile (KM)	7.765
95% gamma percentile (KM)	9.965	99% gamma percentile (KM)	15.02

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (98.16, α)	76.3	Adjusted Chi Square Value (98.16, β)	75.63
95% Gamma Approximate KM-UCL (use when n>=50)	4.482	95% Gamma Adjusted KM-UCL (use when n<50)	4.522

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.969	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.941	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.078	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.137	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	3.482	Mean in Log Scale	0.85
SD in Original Scale	3.206	SD in Log Scale	0.921
95% t UCL (assumes normality of ROS data)	4.305	95% Percentile Bootstrap UCL	4.277
95% BCA Bootstrap UCL	4.418	95% Bootstrap t UCL	4.453
95% H-UCL (Log ROS)	4.942		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.851	KM Geo Mean	2.342
KM SD (logged)	0.91	95% Critical H Value (KM-Log)	2.266
KM Standard Error of Mean (logged)	0.141	95% H-UCL (KM -Log)	4.873
KM SD (logged)	0.91	95% Critical H Value (KM-Log)	2.266
KM Standard Error of Mean (logged)	0.141		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	3.476	Mean in Log Scale	0.839
SD in Original Scale	3.212	SD in Log Scale	0.937
95% t UCL (Assumes normality)	4.3	95% H-Stat UCL	5.004

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	4.522	95% GROS Adjusted Gamma UCL	4.539

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.

Result (water, storm;outfall 009;lead (dissolved))

General Statistics

Total Number of Observations	43	Number of Distinct Observations	30
Number of Detects	33	Number of Non-Detects	10
Number of Distinct Detects	29	Number of Distinct Non-Detects	1
Minimum Detect	0.21	Minimum Non-Detect	1
Maximum Detect	7.1	Maximum Non-Detect	1
Variance Detects	1.394	Percent Non-Detects	23.26%
Mean Detects	0.763	SD Detects	1.181
Median Detects	0.51	CV Detects	1.548
Skewness Detects	5.123	Kurtosis Detects	28.03
Mean of Logged Detects	-0.637	SD of Logged Detects	0.714

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.397	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.32	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.152	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

KM Mean	0.7	KM Standard Error of Mean	0.161
KM SD	1.031	95% KM (BCA) UCL	1.034
95% KM (t) UCL	0.97	95% KM (Percentile Bootstrap) UCL	1.006
95% KM (z) UCL	0.964	95% KM Bootstrap t UCL	1.427
90% KM Chebyshev UCL	1.182	95% KM Chebyshev UCL	1.401
97.5% KM Chebyshev UCL	1.704	99% KM Chebyshev UCL	2.3

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.999	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.765	Detected Data Not Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.175	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.156	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)	1.509	k star (bias corrected MLE)	1.392
Theta hat (MLE)	0.505	Theta star (bias corrected MLE)	0.548
nu hat (MLE)	99.58	nu star (bias corrected)	91.87
Mean (detects)	0.763		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.706
Maximum	7.1	Median	0.498
SD	1.059	CV	1.499
k hat (MLE)	1.165	k star (bias corrected MLE)	1.099

Theta hat (MLE)	0.606	Theta star (bias corrected MLE)	0.642
nu hat (MLE)	100.2	nu star (bias corrected)	94.55
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (94.55, α)	73.13	Adjusted Chi Square Value (94.55, β)	72.47
95% Gamma Approximate UCL (use when n>=50)	0.913	95% Gamma Adjusted UCL (use when n<50)	0.921

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.7	SD (KM)	1.031
Variance (KM)	1.062	SE of Mean (KM)	0.161
k hat (KM)	0.461	k star (KM)	0.444
nu hat (KM)	39.65	nu star (KM)	38.22
theta hat (KM)	1.518	theta star (KM)	1.575
80% gamma percentile (KM)	1.141	90% gamma percentile (KM)	1.939
95% gamma percentile (KM)	2.803	99% gamma percentile (KM)	4.953

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (38.22, α)	25.06	Adjusted Chi Square Value (38.22, β)	24.69
95% Gamma Approximate KM-UCL (use when n>=50)	1.067	95% Gamma Adjusted KM-UCL (use when n<50)	1.083

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.897	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.931	Detected Data Not Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.106	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.152	Detected Data appear Lognormal at 5% Significance Level	

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.704	Mean in Log Scale	-0.672
SD in Original Scale	1.042	SD in Log Scale	0.669
95% t UCL (assumes normality of ROS data)	0.971	95% Percentile Bootstrap UCL	0.978
95% BCA Bootstrap UCL	1.185	95% Bootstrap t UCL	1.522
95% H-UCL (Log ROS)	0.788		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.679	KM Geo Mean	0.507
KM SD (logged)	0.661	95% Critical H Value (KM-Log)	2.028
KM Standard Error of Mean (logged)	0.11	95% H-UCL (KM -Log)	0.776
KM SD (logged)	0.661	95% Critical H Value (KM-Log)	2.028
KM Standard Error of Mean (logged)	0.11		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.702	Mean in Log Scale	-0.65
SD in Original Scale	1.037	SD in Log Scale	0.624
95% t UCL (Assumes normality)	0.967	95% H-Stat UCL	0.768

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

KM H-UCL	0.776

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.

Result (water, storm;outfall 009;nickel)

General Statistics

Total Number of Observations	9	Number of Distinct Observations	6
Number of Detects	5	Number of Non-Detects	4
Number of Distinct Detects	5	Number of Distinct Non-Detects	1
Minimum Detect	2.2	Minimum Non-Detect	10
Maximum Detect	7.3	Maximum Non-Detect	10
Variance Detects	5.727	Percent Non-Detects	44.44%
Mean Detects	4.18	SD Detects	2.393
Median Detects	2.9	CV Detects	0.573
Skewness Detects	0.672	Kurtosis Detects	-2.59
Mean of Logged Detects	1.3	SD of Logged Detects	0.566

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 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.819	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.304	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.343	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

KM Mean	4.18	KM Standard Error of Mean	1.07
KM SD	2.14	95% KM (BCA) UCL	5.833
95% KM (t) UCL	6.17	95% KM (Percentile Bootstrap) UCL	5.86
95% KM (z) UCL	5.94	95% KM Bootstrap t UCL	15.22
90% KM Chebyshev UCL	7.391	95% KM Chebyshev UCL	8.845
97.5% KM Chebyshev UCL	10.86	99% KM Chebyshev UCL	14.83

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.545	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.681	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.297	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.358	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)	3.987	k star (bias corrected MLE)	1.728
Theta hat (MLE)	1.048	Theta star (bias corrected MLE)	2.419
nu hat (MLE)	39.87	nu star (bias corrected)	17.28
Mean (detects)	4.18		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	1.793	Mean	4.166
Maximum	7.3	Median	3.226
SD	2.147	CV	0.515
k hat (MLE)	4.21	k star (bias corrected MLE)	2.881
Theta hat (MLE)	0.99	Theta star (bias corrected MLE)	1.446

nu hat (MLE)	75.78	nu star (bias corrected)	51.85
Adjusted Level of Significance (β)	0.0231		
Approximate Chi Square Value (51.85, α)	36.31	Adjusted Chi Square Value (51.85, β)	33.59
95% Gamma Approximate UCL (use when n>=50)	5.948	95% Gamma Adjusted UCL (use when n<50)	6.43

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	4.18	SD (KM)	2.14
Variance (KM)	4.582	SE of Mean (KM)	1.07
k hat (KM)	3.814	k star (KM)	2.616
nu hat (KM)	68.64	nu star (KM)	47.1
theta hat (KM)	1.096	theta star (KM)	1.598
80% gamma percentile (KM)	6.061	90% gamma percentile (KM)	7.643
95% gamma percentile (KM)	9.13	99% gamma percentile (KM)	12.38

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (47.10, α)	32.35	Adjusted Chi Square Value (47.10, β)	29.79
95% Gamma Approximate KM-UCL (use when n>=50)	6.086	95% Gamma Adjusted KM-UCL (use when n<50)	6.608

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.837	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.261	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	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	4.115	Mean in Log Scale	1.3
SD in Original Scale	2.09	SD in Log Scale	0.507
95% t UCL (assumes normality of ROS data)	5.41	95% Percentile Bootstrap UCL	5.273
95% BCA Bootstrap UCL	5.392	95% Bootstrap t UCL	5.661
95% H-UCL (Log ROS)	6.231		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.3	KM Geo Mean	3.668
KM SD (logged)	0.507	95% Critical H Value (KM-Log)	2.237
KM Standard Error of Mean (logged)	0.253	95% H-UCL (KM -Log)	6.227
KM SD (logged)	0.507	95% Critical H Value (KM-Log)	2.237
KM Standard Error of Mean (logged)	0.253		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	4.544	Mean in Log Scale	1.437
SD in Original Scale	1.747	SD in Log Scale	0.433
95% t UCL (Assumes normality)	5.627	95% H-Stat UCL	6.439

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	6.17

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.

Result (water, storm;outfall 009;nitrate and nitrite (as n))

General Statistics

Total Number of Observations	43	Number of Distinct Observations	33
Number of Detects	42	Number of Non-Detects	1
Number of Distinct Detects	33	Number of Distinct Non-Detects	1
Minimum Detect	0.26	Minimum Non-Detect	0.26
Maximum Detect	3	Maximum Non-Detect	0.26
Variance Detects	0.276	Percent Non-Detects	2.326%
Mean Detects	0.685	SD Detects	0.525
Median Detects	0.55	CV Detects	0.766
Skewness Detects	2.835	Kurtosis Detects	9.459
Mean of Logged Detects	-0.555	SD of Logged Detects	0.552

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.668	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.942	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.251	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.135	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

KM Mean	0.676	KM Standard Error of Mean	0.0798
KM SD	0.517	95% KM (BCA) UCL	0.813
95% KM (t) UCL	0.81	95% KM (Percentile Bootstrap) UCL	0.812
95% KM (z) UCL	0.807	95% KM Bootstrap t UCL	0.906
90% KM Chebyshev UCL	0.915	95% KM Chebyshev UCL	1.023
97.5% KM Chebyshev UCL	1.174	99% KM Chebyshev UCL	1.469

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.564	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.755	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.176	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.137	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)	2.979	k star (bias corrected MLE)	2.782
Theta hat (MLE)	0.23	Theta star (bias corrected MLE)	0.246
nu hat (MLE)	250.2	nu star (bias corrected)	233.7
Mean (detects)	0.685		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.67
Maximum	3	Median	0.55
SD	0.529	CV	0.79
k hat (MLE)	2.167	k star (bias corrected MLE)	2.031
Theta hat (MLE)	0.309	Theta star (bias corrected MLE)	0.33
nu hat (MLE)	186.3	nu star (bias corrected)	174.7
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (174.67, α)	145.1	Adjusted Chi Square Value (174.67, β)	144.2
95% Gamma Approximate UCL (use when n>=50)	0.806	95% Gamma Adjusted UCL (use when n<50)	0.811

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.676	SD (KM)	0.517
Variance (KM)	0.267	SE of Mean (KM)	0.0798
k hat (KM)	1.709	k star (KM)	1.605
nu hat (KM)	146.9	nu star (KM)	138
theta hat (KM)	0.395	theta star (KM)	0.421
80% gamma percentile (KM)	1.037	90% gamma percentile (KM)	1.385
95% gamma percentile (KM)	1.721	99% gamma percentile (KM)	2.476

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (138.02, α)	111.9	Adjusted Chi Square Value (138.02, β)	111.1
95% Gamma Approximate KM-UCL (use when n>=50)	0.833	95% Gamma Adjusted KM-UCL (use when n<50)	0.84

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.894	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.942	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.128	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.135	Detected Data appear Lognormal at 5% Significance Level

Detected Data appear Approximate Lognormal at 5% Significance Level

Lognormal ROS Statistics Using Imputed Non-Detects

Mean in Original Scale	0.673	Mean in Log Scale	-0.587
SD in Original Scale	0.525	SD in Log Scale	0.585
95% t UCL (assumes normality of ROS data)	0.808	95% Percentile Bootstrap UCL	0.81
95% BCA Bootstrap UCL	0.843	95% Bootstrap t UCL	0.896
95% H-UCL (Log ROS)	0.788		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.573	KM Geo Mean	0.564
KM SD (logged)	0.552	95% Critical H Value (KM-Log)	1.939
KM Standard Error of Mean (logged)	0.0852	95% H-UCL (KM -Log)	0.775
KM SD (logged)	0.552	95% Critical H Value (KM-Log)	1.939
KM Standard Error of Mean (logged)	0.0852		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.673	Mean in Log Scale	-0.589
SD in Original Scale	0.526	SD in Log Scale	0.591
95% t UCL (Assumes normality)	0.807	95% H-Stat UCL	0.79

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Approximate Lognormal Distributed at 5% Significance Level

Suggested UCL to Use

KM H-UCL	0.775

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.

Result (water, storm;outfall 009;radium-226)

General Statistics

Total Number of Observations	43	Number of Distinct Observations	13
Number of Detects	8	Number of Non-Detects	35
Number of Distinct Detects	8	Number of Distinct Non-Detects	5
Minimum Detect	0.064	Minimum Non-Detect	0.0449

Maximum Detect	0.78	Maximum Non-Detect	1
Variance Detects	0.0619	Percent Non-Detects	81.4%
Mean Detects	0.307	SD Detects	0.249
Median Detects	0.232	CV Detects	0.811
Skewness Detects	1.237	Kurtosis Detects	0.583
Mean of Logged Detects	-1.467	SD of Logged Detects	0.824

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.856	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.277	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.283	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

KM Mean	0.252	KM Standard Error of Mean	0.0722
KM SD	0.221	95% KM (BCA) UCL	0.378
95% KM (t) UCL	0.373	95% KM (Percentile Bootstrap) UCL	0.378
95% KM (z) UCL	0.371	95% KM Bootstrap t UCL	0.481
90% KM Chebyshev UCL	0.469	95% KM Chebyshev UCL	0.567
97.5% KM Chebyshev UCL	0.703	99% KM Chebyshev UCL	0.971

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.261	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.725	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.183	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.298	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)	1.897	k star (bias corrected MLE)	1.269
Theta hat (MLE)	0.162	Theta star (bias corrected MLE)	0.242
nu hat (MLE)	30.35	nu star (bias corrected)	20.3
Mean (detects)	0.307		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.244
Maximum	0.89	Median	0.18
SD	0.228	CV	0.932
k hat (MLE)	0.947	k star (bias corrected MLE)	0.897
Theta hat (MLE)	0.258	Theta star (bias corrected MLE)	0.272
nu hat (MLE)	81.45	nu star (bias corrected)	77.1
Adjusted Level of Significance (β)	0.0444		
Approximate Chi Square Value (77.10, α)	57.87	Adjusted Chi Square Value (77.10, β)	57.3
95% Gamma Approximate UCL (use when n>=50)	0.325	95% Gamma Adjusted UCL (use when n<50)	0.329

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.252	SD (KM)	0.221
Variance (KM)	0.049	SE of Mean (KM)	0.0722
k hat (KM)	1.293	k star (KM)	1.219
nu hat (KM)	111.2	nu star (KM)	104.8
theta hat (KM)	0.195	theta star (KM)	0.207
80% gamma percentile (KM)	0.398	90% gamma percentile (KM)	0.552

95% gamma percentile (KM)	0.704	99% gamma percentile (KM)	1.052

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (104.80, α)	82.18	Adjusted Chi Square Value (104.80, β)	81.48
95% Gamma Approximate KM-UCL (use when n>=50)	0.321	95% Gamma Adjusted KM-UCL (use when n<50)	0.324

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.976	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.14	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.283	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	0.249	Mean in Log Scale	-1.773
SD in Original Scale	0.237	SD in Log Scale	0.902
95% t UCL (assumes normality of ROS data)	0.31	95% Percentile Bootstrap UCL	0.309
95% BCA Bootstrap UCL	0.322	95% Bootstrap t UCL	0.328
95% H-UCL (Log ROS)	0.349		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.745	KM Geo Mean	0.175
KM SD (logged)	0.87	95% Critical H Value (KM-Log)	2.224
KM Standard Error of Mean (logged)	0.296	95% H-UCL (KM -Log)	0.344
KM SD (logged)	0.87	95% Critical H Value (KM-Log)	2.224
KM Standard Error of Mean (logged)	0.296		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.435	Mean in Log Scale	-0.967
SD in Original Scale	0.156	SD in Log Scale	0.667
95% t UCL (Assumes normality)	0.475	95% H-Stat UCL	0.585

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	0.373

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.

Result (water, storm;outfall 009;uranium)

General Statistics

Total Number of Observations	40	Number of Distinct Observations	35
Number of Detects	28	Number of Non-Detects	12
Number of Distinct Detects	26	Number of Distinct Non-Detects	10
Minimum Detect	0.046	Minimum Non-Detect	0.167
Maximum Detect	1.02	Maximum Non-Detect	1.39
Variance Detects	0.0416	Percent Non-Detects	30%
Mean Detects	0.181	SD Detects	0.204
Median Detects	0.105	CV Detects	1.125
Skewness Detects	3.007	Kurtosis Detects	10.51
Mean of Logged Detects	-2.055	SD of Logged Detects	0.765

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.629	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.924	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.293	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.164	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

KM Mean	0.168	KM Standard Error of Mean	0.0314
KM SD	0.181	95% KM (BCA) UCL	0.227
95% KM (t) UCL	0.221	95% KM (Percentile Bootstrap) UCL	0.221
95% KM (z) UCL	0.22	95% KM Bootstrap t UCL	0.262
90% KM Chebyshev UCL	0.262	95% KM Chebyshev UCL	0.305
97.5% KM Chebyshev UCL	0.364	99% KM Chebyshev UCL	0.481

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	1.568	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.762	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.227	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.168	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)	1.583	k star (bias corrected MLE)	1.437
Theta hat (MLE)	0.115	Theta star (bias corrected MLE)	0.126
nu hat (MLE)	88.63	nu star (bias corrected)	80.47
Mean (detects)	0.181		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.046	Mean	0.162
Maximum	1.02	Median	0.112
SD	0.174	CV	1.078
k hat (MLE)	1.911	k star (bias corrected MLE)	1.784
Theta hat (MLE)	0.0845	Theta star (bias corrected MLE)	0.0905
nu hat (MLE)	152.9	nu star (bias corrected)	142.8
Adjusted Level of Significance (β)	0.044		
Approximate Chi Square Value (142.75, α)	116.1	Adjusted Chi Square Value (142.75, β)	115.2
95% Gamma Approximate UCL (use when n>=50)	0.199	95% Gamma Adjusted UCL (use when n<50)	0.2

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.168	SD (KM)	0.181
Variance (KM)	0.0328	SE of Mean (KM)	0.0314
k hat (KM)	0.862	k star (KM)	0.814
nu hat (KM)	68.96	nu star (KM)	65.12
theta hat (KM)	0.195	theta star (KM)	0.207
80% gamma percentile (KM)	0.275	90% gamma percentile (KM)	0.407
95% gamma percentile (KM)	0.542	99% gamma percentile (KM)	0.861

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (65.12, α)	47.56	Adjusted Chi Square Value (65.12, β)	46.99
95% Gamma Approximate KM-UCL (use when n>=50)	0.23	95% Gamma Adjusted KM-UCL (use when n<50)	0.233

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.918	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.924	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.164	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.164	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	0.162	Mean in Log Scale	-2.089
SD in Original Scale	0.173	SD in Log Scale	0.649
95% t UCL (assumes normality of ROS data)	0.208	95% Percentile Bootstrap UCL	0.21
95% BCA Bootstrap UCL	0.224	95% Bootstrap t UCL	0.249
95% H-UCL (Log ROS)	0.189		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-2.101	KM Geo Mean	0.122
KM SD (logged)	0.715	95% Critical H Value (KM-Log)	2.106
KM Standard Error of Mean (logged)	0.13	95% H-UCL (KM -Log)	0.201
KM SD (logged)	0.715	95% Critical H Value (KM-Log)	2.106
KM Standard Error of Mean (logged)	0.13		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.237	Mean in Log Scale	-1.788
SD in Original Scale	0.214	SD in Log Scale	0.836
95% t UCL (Assumes normality)	0.294	95% H-Stat UCL	0.32

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	0.305

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.

Result (water, storm;outfall 009;zinc)

General Statistics

Total Number of Observations	9	Number of Distinct Observations	8
Number of Detects	7	Number of Non-Detects	2
Number of Distinct Detects	7	Number of Distinct Non-Detects	1
Minimum Detect	11	Minimum Non-Detect	20
Maximum Detect	50	Maximum Non-Detect	20
Variance Detects	249.9	Percent Non-Detects	22.22%
Mean Detects	23.29	SD Detects	15.81
Median Detects	14	CV Detects	0.679
Skewness Detects	1.148	Kurtosis Detects	-0.428
Mean of Logged Detects	2.972	SD of Logged Detects	0.618

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 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.787	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.293	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.304	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

KM Mean	20.89	KM Standard Error of Mean	4.929
KM SD	13.67	95% KM (BCA) UCL	29
95% KM (t) UCL	30.05	95% KM (Percentile Bootstrap) UCL	29
95% KM (z) UCL	29	95% KM Bootstrap t UCL	50.89
90% KM Chebyshev UCL	35.68	95% KM Chebyshev UCL	42.37
97.5% KM Chebyshev UCL	51.67	99% KM Chebyshev UCL	69.93

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.662	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.712	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.301	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.314	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)	2.999	k star (bias corrected MLE)	1.809
Theta hat (MLE)	7.766	Theta star (bias corrected MLE)	12.87
nu hat (MLE)	41.98	nu star (bias corrected)	25.32
Mean (detects)	23.29		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	8.643	Mean	20.91
Maximum	50	Median	14
SD	14.62	CV	0.699
k hat (MLE)	2.975	k star (bias corrected MLE)	2.058
Theta hat (MLE)	7.026	Theta star (bias corrected MLE)	10.16
nu hat (MLE)	53.56	nu star (bias corrected)	37.04
Adjusted Level of Significance (β)	0.0231		
Approximate Chi Square Value (37.04, α)	24.11	Adjusted Chi Square Value (37.04, β)	21.93
95% Gamma Approximate UCL (use when n>=50)	32.12	95% Gamma Adjusted UCL (use when n<50)	35.31

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	20.89	SD (KM)	13.67
Variance (KM)	187	SE of Mean (KM)	4.929
k hat (KM)	2.334	k star (KM)	1.63
nu hat (KM)	42	nu star (KM)	29.34
theta hat (KM)	8.952	theta star (KM)	12.82
80% gamma percentile (KM)	32.02	90% gamma percentile (KM)	42.66
95% gamma percentile (KM)	52.93	99% gamma percentile (KM)	76.01

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (29.34, α)	17.97	Adjusted Chi Square Value (29.34, β)	16.12
95% Gamma Approximate KM-UCL (use when n>=50)	34.1	95% Gamma Adjusted KM-UCL (use when n<50)	38.01

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.843	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.276	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.304	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	21.09	Mean in Log Scale	2.884
SD in Original Scale	14.43	SD in Log Scale	0.572
95% t UCL (assumes normality of ROS data)	30.04	95% Percentile Bootstrap UCL	29.2
95% BCA Bootstrap UCL	31.24	95% Bootstrap t UCL	51.22
95% H-UCL (Log ROS)	33.99		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.872	KM Geo Mean	17.67
KM SD (logged)	0.54	95% Critical H Value (KM-Log)	2.297
KM Standard Error of Mean (logged)	0.195	95% H-UCL (KM -Log)	31.69
KM SD (logged)	0.54	95% Critical H Value (KM-Log)	2.297
KM Standard Error of Mean (logged)	0.195		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	20.33	Mean in Log Scale	2.823
SD in Original Scale	14.89	SD in Log Scale	0.611
95% t UCL (Assumes normality)	29.56	95% H-Stat UCL	34.52

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	30.05

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

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.

Result (water, storm;outfall 018;copper)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	13
Number of Detects	12	Number of Non-Detects	1
Number of Distinct Detects	12	Number of Distinct Non-Detects	1
Minimum Detect	0.665	Minimum Non-Detect	2
Maximum Detect	9.6	Maximum Non-Detect	2
Variance Detects	6.282	Percent Non-Detects	7.692%
Mean Detects	2.588	SD Detects	2.506
Median Detects	1.705	CV Detects	0.968
Skewness Detects	2.254	Kurtosis Detects	5.833
Mean of Logged Detects	0.629	SD of Logged Detects	0.805

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.734	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Detected Data Not Normal at 5% Significance Level	

Lilliefors Test Statistic	0.232	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.243	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

KM Mean	2.477	KM Standard Error of Mean	0.679
KM SD	2.34	95% KM (BCA) UCL	3.833
95% KM (t) UCL	3.687	95% KM (Percentile Bootstrap) UCL	3.673
95% KM (z) UCL	3.594	95% KM Bootstrap t UCL	4.8
90% KM Chebyshev UCL	4.514	95% KM Chebyshev UCL	5.436
97.5% KM Chebyshev UCL	6.716	99% KM Chebyshev UCL	9.231

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.444	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.744	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.178	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.249	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)	1.699	k star (bias corrected MLE)	1.33
Theta hat (MLE)	1.523	Theta star (bias corrected MLE)	1.946
nu hat (MLE)	40.78	nu star (bias corrected)	31.92
Mean (detects)	2.588		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.665	Mean	2.462
Maximum	9.6	Median	1.7
SD	2.442	CV	0.992
k hat (MLE)	1.687	k star (bias corrected MLE)	1.349
Theta hat (MLE)	1.459	Theta star (bias corrected MLE)	1.825
nu hat (MLE)	43.86	nu star (bias corrected)	35.08
Adjusted Level of Significance (β)	0.0301		
Approximate Chi Square Value (35.08, α)	22.53	Adjusted Chi Square Value (35.08, β)	21.1
95% Gamma Approximate UCL (use when n>=50)	3.833	95% Gamma Adjusted UCL (use when n<50)	4.092

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	2.477	SD (KM)	2.34
Variance (KM)	5.475	SE of Mean (KM)	0.679
k hat (KM)	1.121	k star (KM)	0.914
nu hat (KM)	29.15	nu star (KM)	23.75
theta hat (KM)	2.21	theta star (KM)	2.712
80% gamma percentile (KM)	4.015	90% gamma percentile (KM)	5.832
95% gamma percentile (KM)	7.663	99% gamma percentile (KM)	11.94

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (23.75, α)	13.66	Adjusted Chi Square Value (23.75, β)	12.58
95% Gamma Approximate KM-UCL (use when n>=50)	4.308	95% Gamma Adjusted KM-UCL (use when n<50)	4.677

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.947	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.138	**Lilliefors GOF Test**	

5% Lilliefors Critical Value	0.243	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	2.477	Mean in Log Scale	0.591
SD in Original Scale	2.432	SD in Log Scale	0.782
95% t UCL (assumes normality of ROS data)	3.68	95% Percentile Bootstrap UCL	3.636
95% BCA Bootstrap UCL	3.993	95% Bootstrap t UCL	4.942
95% H-UCL (Log ROS)	4.304		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.586	KM Geo Mean	1.797
KM SD (logged)	0.761	95% Critical H Value (KM-Log)	2.46
KM Standard Error of Mean (logged)	0.223	95% H-UCL (KM -Log)	4.122
KM SD (logged)	0.761	95% Critical H Value (KM-Log)	2.46
KM Standard Error of Mean (logged)	0.223		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	2.466	Mean in Log Scale	0.58
SD in Original Scale	2.44	SD in Log Scale	0.79
95% t UCL (Assumes normality)	3.672	95% H-Stat UCL	4.319

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	3.687

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

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.

Result (water, storm;outfall 018;copper (dissolved))

General Statistics

Total Number of Observations	13	Number of Distinct Observations	13
Number of Detects	12	Number of Non-Detects	1
Number of Distinct Detects	12	Number of Distinct Non-Detects	1
Minimum Detect	0.55	Minimum Non-Detect	2
Maximum Detect	4.1	Maximum Non-Detect	2
Variance Detects	0.904	Percent Non-Detects	7.692%
Mean Detects	1.731	SD Detects	0.951
Median Detects	1.5	CV Detects	0.549
Skewness Detects	1.408	Kurtosis Detects	2.727
Mean of Logged Detects	0.419	SD of Logged Detects	0.537

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.897	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.859	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.175	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.243	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

KM Mean	1.692	KM Standard Error of Mean	0.261
KM SD	0.892	95% KM (BCA) UCL	2.16
95% KM (t) UCL	2.157	95% KM (Percentile Bootstrap) UCL	2.107
95% KM (z) UCL	2.121	95% KM Bootstrap t UCL	2.311
90% KM Chebyshev UCL	2.474	95% KM Chebyshev UCL	2.828
97.5% KM Chebyshev UCL	3.32	99% KM Chebyshev UCL	4.286

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.158	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.736	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.113	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.246	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)	4.013	k star (bias corrected MLE)	3.066
Theta hat (MLE)	0.431	Theta star (bias corrected MLE)	0.565
nu hat (MLE)	96.32	nu star (bias corrected)	73.57
Mean (detects)	1.731		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.55	Mean	1.69
Maximum	4.1	Median	1.4
SD	0.922	CV	0.546
k hat (MLE)	4.191	k star (bias corrected MLE)	3.275
Theta hat (MLE)	0.403	Theta star (bias corrected MLE)	0.516
nu hat (MLE)	109	nu star (bias corrected)	85.15
Adjusted Level of Significance (β)	0.0301		
Approximate Chi Square Value (85.15, α)	64.88	Adjusted Chi Square Value (85.15, β)	62.37
95% Gamma Approximate UCL (use when n>=50)	2.218	95% Gamma Adjusted UCL (use when n<50)	2.308

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.692	SD (KM)	0.892
Variance (KM)	0.795	SE of Mean (KM)	0.261
k hat (KM)	3.601	k star (KM)	2.821
nu hat (KM)	93.62	nu star (KM)	73.35
theta hat (KM)	0.47	theta star (KM)	0.6
80% gamma percentile (KM)	2.432	90% gamma percentile (KM)	3.043
95% gamma percentile (KM)	3.615	99% gamma percentile (KM)	4.86

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (73.35, α)	54.63	Adjusted Chi Square Value (73.35, β)	52.33
95% Gamma Approximate KM-UCL (use when n>=50)	2.272	95% Gamma Adjusted KM-UCL (use when n<50)	2.372

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.991	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.859	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.101	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.243	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	1.688	Mean in Log Scale	0.399
SD in Original Scale	0.924	SD in Log Scale	0.519
95% t UCL (assumes normality of ROS data)	2.144	95% Percentile Bootstrap UCL	2.119
95% BCA Bootstrap UCL	2.225	95% Bootstrap t UCL	2.34
95% H-UCL (Log ROS)	2.349		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	0.398	KM Geo Mean	1.489
KM SD (logged)	0.51	95% Critical H Value (KM-Log)	2.124
KM Standard Error of Mean (logged)	0.151	95% H-UCL (KM -Log)	2.318
KM SD (logged)	0.51	95% Critical H Value (KM-Log)	2.124
KM Standard Error of Mean (logged)	0.151		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.675	Mean in Log Scale	0.387
SD in Original Scale	0.933	SD in Log Scale	0.527
95% t UCL (Assumes normality)	2.136	95% H-Stat UCL	2.345

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	2.157

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.

Result (water, storm;outfall 018;dioxin teq, human/mammal (epa, nds excluded))

General Statistics

Total Number of Observations	8	Number of Distinct Observations	8
		Number of Missing Observations	0
Minimum	1.7950E-7	Mean	1.1006E-6
Maximum	4.6380E-6	Median	5.0950E-7
SD	1.4713E-6	Std. Error of Mean	5.2019E-7
Coefficient of Variation	N/A	Skewness	2.527

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 5.1

Normal GOF Test

Shapiro Wilk Test Statistic	0.628	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.362	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.283	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	2.0861E-6	95% Adjusted-CLT UCL (Chen-1995)	2.4528E-6
		95% Modified-t UCL (Johnson-1978)	2.1636E-6

Gamma GOF Test

A-D Test Statistic	0.617	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.734	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.252	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.301	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	1.109	k star (bias corrected MLE)	0.776
Theta hat (MLE)	9.9260E-7	Theta star (bias corrected MLE)	1.4177E-6
nu hat (MLE)	17.74	nu star (bias corrected)	12.42
MLE Mean (bias corrected)	1.1006E-6	MLE Sd (bias corrected)	1.2491E-6
		Approximate Chi Square Value (0.05)	5.506
Adjusted Level of Significance	0.0195	Adjusted Chi Square Value	4.398

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	2.4829E-6	95% Adjusted Gamma UCL (use when n<50)	3.1083E-6

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.937	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.818	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.197	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.283	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-15.53	Mean of logged Data	-14.23
Maximum of Logged Data	-12.28	SD of logged Data	0.998

Assuming Lognormal Distribution

95% H-UCL	3.9323E-6	90% Chebyshev (MVUE) UCL	2.0761E-6
95% Chebyshev (MVUE) UCL	2.5646E-6	97.5% Chebyshev (MVUE) UCL	3.2425E-6
99% Chebyshev (MVUE) UCL	4.5743E-6		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	1.9562E-6	95% Jackknife UCL	2.0861E-6
95% Standard Bootstrap UCL	1.9101E-6	95% Bootstrap-t UCL	4.3935E-6
95% Hall's Bootstrap UCL	4.9046E-6	95% Percentile Bootstrap UCL	2.0604E-6
95% BCA Bootstrap UCL	2.5015E-6		
90% Chebyshev(Mean, Sd) UCL	2.6611E-6	95% Chebyshev(Mean, Sd) UCL	3.3680E-6
97.5% Chebyshev(Mean, Sd) UCL	4.3492E-6	99% Chebyshev(Mean, Sd) UCL	6.2764E-6

Suggested UCL to Use

95% Adjusted Gamma UCL	3.1083E-6

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.

Result (water, storm;outfall 018;gross beta)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	13

		Number of Missing Observations	0
Minimum	1.52	Mean	4.172
Maximum	6.8	Median	4.3
SD	1.32	Std. Error of Mean	0.366
Coefficient of Variation	0.316	Skewness	0.0775

Normal GOF Test

Shapiro Wilk Test Statistic	0.978	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.132	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.234	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	4.824	95% Adjusted-CLT UCL (Chen-1995)	4.782
		95% Modified-t UCL (Johnson-1978)	4.825

Gamma GOF Test

A-D Test Statistic	0.317	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.734	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.15	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.237	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	9.291	k star (bias corrected MLE)	7.199
Theta hat (MLE)	0.449	Theta star (bias corrected MLE)	0.579
nu hat (MLE)	241.6	nu star (bias corrected)	187.2
MLE Mean (bias corrected)	4.172	MLE Sd (bias corrected)	1.555
		Approximate Chi Square Value (0.05)	156.5
Adjusted Level of Significance	0.0301	Adjusted Chi Square Value	152.5

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	4.988	95% Adjusted Gamma UCL (use when n<50)	5.119

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.902	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.866	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.178	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.234	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	0.419	Mean of logged Data	1.374
Maximum of Logged Data	1.917	SD of logged Data	0.367

Assuming Lognormal Distribution

95% H-UCL	5.203	90% Chebyshev (MVUE) UCL	5.501
95% Chebyshev (MVUE) UCL	6.09	97.5% Chebyshev (MVUE) UCL	6.908
99% Chebyshev (MVUE) UCL	8.513		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	4.774	95% Jackknife UCL	4.824
95% Standard Bootstrap UCL	4.752	95% Bootstrap-t UCL	4.879

95% Hall's Bootstrap UCL	4.875	95% Percentile Bootstrap UCL	4.752
95% BCA Bootstrap UCL	4.749		
90% Chebyshev(Mean, Sd) UCL	5.27	95% Chebyshev(Mean, Sd) UCL	5.768
97.5% Chebyshev(Mean, Sd) UCL	6.458	99% Chebyshev(Mean, Sd) UCL	7.815

Suggested UCL to Use

95% Student's-t UCL	4.824

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.

Result (water, storm;outfall 018;lead)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	7
Number of Detects	6	Number of Non-Detects	7
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	0.23	Minimum Non-Detect	1
Maximum Detect	8.2	Maximum Non-Detect	1
Variance Detects	9.127	Percent Non-Detects	53.85%
Mean Detects	2.157	SD Detects	3.021
Median Detects	1.11	CV Detects	1.401
Skewness Detects	2.237	Kurtosis Detects	5.177
Mean of Logged Detects	0.0976	SD of Logged Detects	1.237

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.678	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.38	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.325	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

KM Mean	1.254	KM Standard Error of Mean	0.63
KM SD	2.057	95% KM (BCA) UCL	2.54
95% KM (t) UCL	2.377	95% KM (Percentile Bootstrap) UCL	2.345
95% KM (z) UCL	2.29	95% KM Bootstrap t UCL	4.717
90% KM Chebyshev UCL	3.144	95% KM Chebyshev UCL	4.001
97.5% KM Chebyshev UCL	5.189	99% KM Chebyshev UCL	7.524

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.4	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.718	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.254	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.342	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)	0.874	k star (bias corrected MLE)	0.548
Theta hat (MLE)	2.466	Theta star (bias corrected MLE)	3.933
nu hat (MLE)	10.49	nu star (bias corrected)	6.58
Mean (detects)	2.157		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	1.203
Maximum	8.2	Median	0.49
SD	2.193	CV	1.823
k hat (MLE)	0.405	k star (bias corrected MLE)	0.363
Theta hat (MLE)	2.967	Theta star (bias corrected MLE)	3.313
nu hat (MLE)	10.54	nu star (bias corrected)	9.44
Adjusted Level of Significance (β)	0.0301		
Approximate Chi Square Value (9.44, α)	3.595	Adjusted Chi Square Value (9.44, β)	3.099
95% Gamma Approximate UCL (use when n>=50)	3.159	95% Gamma Adjusted UCL (use when n<50)	3.664

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.254	SD (KM)	2.057
Variance (KM)	4.231	SE of Mean (KM)	0.63
k hat (KM)	0.372	k star (KM)	0.337
nu hat (KM)	9.662	nu star (KM)	8.766
theta hat (KM)	3.374	theta star (KM)	3.719
80% gamma percentile (KM)	1.972	90% gamma percentile (KM)	3.641
95% gamma percentile (KM)	5.521	99% gamma percentile (KM)	10.34

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (8.77, α)	3.186	Adjusted Chi Square Value (8.77, β)	2.725
95% Gamma Approximate KM-UCL (use when n>=50)	3.45	95% Gamma Adjusted KM-UCL (use when n<50)	4.033

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.972	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.179	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	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	1.267	Mean in Log Scale	-0.446
SD in Original Scale	2.144	SD in Log Scale	1.099
95% t UCL (assumes normality of ROS data)	2.327	95% Percentile Bootstrap UCL	2.402
95% BCA Bootstrap UCL	2.976	95% Bootstrap t UCL	5.198
95% H-UCL (Log ROS)	3.055		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.406	KM Geo Mean	0.666
KM SD (logged)	0.963	95% Critical H Value (KM-Log)	2.784
KM Standard Error of Mean (logged)	0.35	95% H-UCL (KM -Log)	2.297
KM SD (logged)	0.963	95% Critical H Value (KM-Log)	2.784
KM Standard Error of Mean (logged)	0.35		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.265	Mean in Log Scale	-0.328
SD in Original Scale	2.131	SD in Log Scale	0.898
95% t UCL (Assumes normality)	2.318	95% H-Stat UCL	2.157

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Bootstrap t UCL	4.717	Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	4.033

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.

Result (water, storm;outfall 018;manganese)

General Statistics

Total Number of Observations	9	Number of Distinct Observations	8
Number of Detects	8	Number of Non-Detects	1
Number of Distinct Detects	7	Number of Distinct Non-Detects	1
Minimum Detect	8.8	Minimum Non-Detect	20
Maximum Detect	210	Maximum Non-Detect	20
Variance Detects	5728	Percent Non-Detects	11.11%
Mean Detects	77.56	SD Detects	75.68
Median Detects	47	CV Detects	0.976
Skewness Detects	0.836	Kurtosis Detects	-0.762
Mean of Logged Detects	3.783	SD of Logged Detects	1.243

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 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.849	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.272	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.283	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

KM Mean	70.3	KM Standard Error of Mean	24.9
KM SD	69.85	95% KM (BCA) UCL	108.7
95% KM (t) UCL	116.6	95% KM (Percentile Bootstrap) UCL	111
95% KM (z) UCL	111.2	95% KM Bootstrap t UCL	133.8
90% KM Chebyshev UCL	145	95% KM Chebyshev UCL	178.8
97.5% KM Chebyshev UCL	225.8	99% KM Chebyshev UCL	318

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.398	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.735	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.211	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.301	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)	1.015	k star (bias corrected MLE)	0.718
Theta hat (MLE)	76.43	Theta star (bias corrected MLE)	108.1
nu hat (MLE)	16.24	nu star (bias corrected)	11.48
Mean (detects)	77.56		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	7.919	Mean	69.82
Maximum	210	Median	45
SD	74.5	CV	1.067
k hat (MLE)	0.896	k star (bias corrected MLE)	0.671
Theta hat (MLE)	77.96	Theta star (bias corrected MLE)	104
nu hat (MLE)	16.12	nu star (bias corrected)	12.08
Adjusted Level of Significance (β)	0.0231		
Approximate Chi Square Value (12.08, α)	5.28	Adjusted Chi Square Value (12.08, β)	4.37
95% Gamma Approximate UCL (use when n>=50)	159.8	95% Gamma Adjusted UCL (use when n<50)	193

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	70.3	SD (KM)	69.85
Variance (KM)	4879	SE of Mean (KM)	24.9
k hat (KM)	1.013	k star (KM)	0.749
nu hat (KM)	18.23	nu star (KM)	13.49
theta hat (KM)	69.41	theta star (KM)	93.82
80% gamma percentile (KM)	115.2	90% gamma percentile (KM)	173.6
95% gamma percentile (KM)	233.5	99% gamma percentile (KM)	375.5

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (13.49, α)	6.222	Adjusted Chi Square Value (13.49, β)	5.218
95% Gamma Approximate KM-UCL (use when n>=50)	152.4	95% Gamma Adjusted KM-UCL (use when n<50)	181.7

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.904	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.199	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.283	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	70.38	Mean in Log Scale	3.647
SD in Original Scale	74	SD in Log Scale	1.232
95% t UCL (assumes normality of ROS data)	116.3	95% Percentile Bootstrap UCL	114.1
95% BCA Bootstrap UCL	117.2	95% Bootstrap t UCL	132.7
95% H-UCL (Log ROS)	424.3		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	3.635	KM Geo Mean	37.89
KM SD (logged)	1.179	95% Critical H Value (KM-Log)	3.649
KM Standard Error of Mean (logged)	0.422	95% H-UCL (KM -Log)	347
KM SD (logged)	1.179	95% Critical H Value (KM-Log)	3.649
KM Standard Error of Mean (logged)	0.422		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	70.06	Mean in Log Scale	3.619
SD in Original Scale	74.29	SD in Log Scale	1.263
95% t UCL (Assumes normality)	116.1	95% H-Stat UCL	462

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	116.6

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.

Result (water, storm;outfall 018;manganese (dissolved))

General Statistics

Total Number of Observations	9	Number of Distinct Observations	7
Number of Detects	6	Number of Non-Detects	3
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	8.8	Minimum Non-Detect	20
Maximum Detect	190	Maximum Non-Detect	20
Variance Detects	5111	Percent Non-Detects	33.33%
Mean Detects	48.25	SD Detects	71.49
Median Detects	14.35	CV Detects	1.482
Skewness Detects	2.171	Kurtosis Detects	4.777
Mean of Logged Detects	3.134	SD of Logged Detects	1.244

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 5.1

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.658	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.788	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.325	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.325	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

KM Mean	36.04	KM Standard Error of Mean	20.51
KM SD	56.07	95% KM (BCA) UCL	73.93
95% KM (t) UCL	74.18	95% KM (Percentile Bootstrap) UCL	74.22
95% KM (z) UCL	69.77	95% KM Bootstrap t UCL	290.2
90% KM Chebyshev UCL	97.56	95% KM Chebyshev UCL	125.4
97.5% KM Chebyshev UCL	164.1	99% KM Chebyshev UCL	240.1

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.697	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.72	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.295	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.343	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)	0.8	k star (bias corrected MLE)	0.511
Theta hat (MLE)	60.33	Theta star (bias corrected MLE)	94.42
nu hat (MLE)	9.597	nu star (bias corrected)	6.132
Mean (detects)	48.25		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	36.21
Maximum	190	Median	9.7
SD	59.88	CV	1.654
k hat (MLE)	0.45	k star (bias corrected MLE)	0.374
Theta hat (MLE)	80.42	Theta star (bias corrected MLE)	96.75
nu hat (MLE)	8.104	nu star (bias corrected)	6.736
Adjusted Level of Significance (β)	0.0231		
Approximate Chi Square Value (6.74, α)	2.027	Adjusted Chi Square Value (6.74, β)	1.528
95% Gamma Approximate UCL (use when n>=50)	120.3	95% Gamma Adjusted UCL (use when n<50)	159.6

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	36.04	SD (KM)	56.07
Variance (KM)	3144	SE of Mean (KM)	20.51
k hat (KM)	0.413	k star (KM)	0.35
nu hat (KM)	7.438	nu star (KM)	6.292
theta hat (KM)	87.22	theta star (KM)	103.1
80% gamma percentile (KM)	57.06	90% gamma percentile (KM)	104.1
95% gamma percentile (KM)	156.8	99% gamma percentile (KM)	291.3

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (6.29, α)	1.791	Adjusted Chi Square Value (6.29, β)	1.332
95% Gamma Approximate KM-UCL (use when n>=50)	126.6	95% Gamma Adjusted KM-UCL (use when n<50)	170.3

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.828	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.788	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.256	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.325	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	36.82	Mean in Log Scale	2.921
SD in Original Scale	59.22	SD in Log Scale	1.087
95% t UCL (assumes normality of ROS data)	73.53	95% Percentile Bootstrap UCL	72.55
95% BCA Bootstrap UCL	91.25	95% Bootstrap t UCL	288.8
95% H-UCL (Log ROS)	125.5		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.889	KM Geo Mean	17.97
KM SD (logged)	1.007	95% Critical H Value (KM-Log)	3.255
KM Standard Error of Mean (logged)	0.378	95% H-UCL (KM -Log)	95.11
KM SD (logged)	1.007	95% Critical H Value (KM-Log)	3.255
KM Standard Error of Mean (logged)	0.378		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	35.5	Mean in Log Scale	2.857
SD in Original Scale	59.67	SD in Log Scale	1.068
95% t UCL (Assumes normality)	72.48	95% H-Stat UCL	110.8

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Bootstrap t UCL	290.2	3 Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	170.3

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.

Result (water, storm;outfall 018;nitrate (as n))

General Statistics

Total Number of Observations	13	Number of Distinct Observations	10
Number of Detects	11	Number of Non-Detects	2
Number of Distinct Detects	10	Number of Distinct Non-Detects	1
Minimum Detect	0.08	Minimum Non-Detect	0.11
Maximum Detect	1.1	Maximum Non-Detect	0.11
Variance Detects	0.137	Percent Non-Detects	15.38%
Mean Detects	0.366	SD Detects	0.37
Median Detects	0.22	CV Detects	1.011
Skewness Detects	1.352	Kurtosis Detects	0.506
Mean of Logged Detects	-1.441	SD of Logged Detects	0.966

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.77	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.27	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.251	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

KM Mean	0.323	KM Standard Error of Mean	0.0989
KM SD	0.34	95% KM (BCA) UCL	0.496
95% KM (t) UCL	0.499	95% KM (Percentile Bootstrap) UCL	0.481
95% KM (z) UCL	0.486	95% KM Bootstrap t UCL	0.72
90% KM Chebyshev UCL	0.62	95% KM Chebyshev UCL	0.754
97.5% KM Chebyshev UCL	0.941	99% KM Chebyshev UCL	1.308

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.598	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.746	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.193	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.261	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)	1.286	k star (bias corrected MLE)	0.996
Theta hat (MLE)	0.285	Theta star (bias corrected MLE)	0.368
nu hat (MLE)	28.3	nu star (bias corrected)	21.92
Mean (detects)	0.366		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.313
Maximum	1.1	Median	0.15
SD	0.362	CV	1.157
k hat (MLE)	0.864	k star (bias corrected MLE)	0.716
Theta hat (MLE)	0.362	Theta star (bias corrected MLE)	0.437

nu hat (MLE)	22.46	nu star (bias corrected)	18.61
Adjusted Level of Significance (β)	0.0301		
Approximate Chi Square Value (18.61, α)	9.835	Adjusted Chi Square Value (18.61, β)	8.939
95% Gamma Approximate UCL (use when n>=50)	0.592	95% Gamma Adjusted UCL (use when n<50)	0.652

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.323	SD (KM)	0.34
Variance (KM)	0.116	SE of Mean (KM)	0.0989
k hat (KM)	0.902	k star (KM)	0.745
nu hat (KM)	23.46	nu star (KM)	19.38
theta hat (KM)	0.358	theta star (KM)	0.434
80% gamma percentile (KM)	0.53	90% gamma percentile (KM)	0.799
95% gamma percentile (KM)	1.075	99% gamma percentile (KM)	1.731

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (19.38, α)	10.39	Adjusted Chi Square Value (19.38, β)	9.468
95% Gamma Approximate KM-UCL (use when n>=50)	0.602	95% Gamma Adjusted KM-UCL (use when n<50)	0.661

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.901	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.15	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.251	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	0.322	Mean in Log Scale	-1.618
SD in Original Scale	0.355	SD in Log Scale	0.988
95% t UCL (assumes normality of ROS data)	0.497	95% Percentile Bootstrap UCL	0.486
95% BCA Bootstrap UCL	0.535	95% Bootstrap t UCL	0.679
95% H-UCL (Log ROS)	0.723		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.597	KM Geo Mean	0.202
KM SD (logged)	0.923	95% Critical H Value (KM-Log)	2.717
KM Standard Error of Mean (logged)	0.269	95% H-UCL (KM -Log)	0.639
KM SD (logged)	0.923	95% Critical H Value (KM-Log)	2.717
KM Standard Error of Mean (logged)	0.269		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.318	Mean in Log Scale	-1.666
SD in Original Scale	0.358	SD in Log Scale	1.038
95% t UCL (Assumes normality)	0.495	95% H-Stat UCL	0.776

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Bootstrap t UCL	0.72	3 Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	0.661

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.

Result (water, storm;outfall 018;nitrate and nitrite (as n))

General Statistics

Total Number of Observations	13	Number of Distinct Observations	8
Number of Detects	7	Number of Non-Detects	6
Number of Distinct Detects	7	Number of Distinct Non-Detects	1
Minimum Detect	0.15	Minimum Non-Detect	0.26
Maximum Detect	1.1	Maximum Non-Detect	0.26
Variance Detects	0.141	Percent Non-Detects	46.15%
Mean Detects	0.539	SD Detects	0.376
Median Detects	0.37	CV Detects	0.697
Skewness Detects	0.761	Kurtosis Detects	-1.181
Mean of Logged Detects	-0.844	SD of Logged Detects	0.742

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.876	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.245	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.304	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

KM Mean	0.375	KM Standard Error of Mean	0.0943
KM SD	0.311	95% KM (BCA) UCL	0.549
95% KM (t) UCL	0.543	95% KM (Percentile Bootstrap) UCL	0.526
95% KM (z) UCL	0.53	95% KM Bootstrap t UCL	0.703
90% KM Chebyshev UCL	0.658	95% KM Chebyshev UCL	0.786
97.5% KM Chebyshev UCL	0.964	99% KM Chebyshev UCL	1.313

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.293	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.714	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.197	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.315	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)	2.379	k star (bias corrected MLE)	1.454
Theta hat (MLE)	0.226	Theta star (bias corrected MLE)	0.37
nu hat (MLE)	33.3	nu star (bias corrected)	20.36
Mean (detects)	0.539		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	0.349
Maximum	1.1	Median	0.221
SD	0.349	CV	1.001
k hat (MLE)	0.882	k star (bias corrected MLE)	0.73
Theta hat (MLE)	0.395	Theta star (bias corrected MLE)	0.478
nu hat (MLE)	22.93	nu star (bias corrected)	18.97
Adjusted Level of Significance (β)	0.0301		
Approximate Chi Square Value (18.97, α)	10.1	Adjusted Chi Square Value (18.97, β)	9.187
95% Gamma Approximate UCL (use when n>=50)	0.655	95% Gamma Adjusted UCL (use when n<50)	0.72

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.375	SD (KM)	0.311
Variance (KM)	0.0967	SE of Mean (KM)	0.0943
k hat (KM)	1.457	k star (KM)	1.172
nu hat (KM)	37.88	nu star (KM)	30.47
theta hat (KM)	0.258	theta star (KM)	0.32
80% gamma percentile (KM)	0.596	90% gamma percentile (KM)	0.831
95% gamma percentile (KM)	1.064	99% gamma percentile (KM)	1.598

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (30.47, α)	18.86	Adjusted Chi Square Value (30.47, β)	17.57
95% Gamma Approximate KM-UCL (use when n>=50)	0.606	95% Gamma Adjusted KM-UCL (use when n<50)	0.651

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.949	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.158	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.304	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	0.373	Mean in Log Scale	-1.288
SD in Original Scale	0.328	SD in Log Scale	0.785
95% t UCL (assumes normality of ROS data)	0.535	95% Percentile Bootstrap UCL	0.52
95% BCA Bootstrap UCL	0.551	95% Bootstrap t UCL	0.723
95% H-UCL (Log ROS)	0.661		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.241	KM Geo Mean	0.289
KM SD (logged)	0.675	95% Critical H Value (KM-Log)	2.336
KM Standard Error of Mean (logged)	0.217	95% H-UCL (KM -Log)	0.572
KM SD (logged)	0.675	95% Critical H Value (KM-Log)	2.336
KM Standard Error of Mean (logged)	0.217		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.35	Mean in Log Scale	-1.396
SD in Original Scale	0.34	SD in Log Scale	0.813
95% t UCL (Assumes normality)	0.518	95% H-Stat UCL	0.626

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	0.543

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.

Result (water, storm;outfall 018;uranium)

General Statistics

Total Number of Observations	12	Number of Distinct Observations	12
Number of Detects	10	Number of Non-Detects	2
Number of Distinct Detects	10	Number of Distinct Non-Detects	2
Minimum Detect	0.022	Minimum Non-Detect	0.693

Maximum Detect	0.475	Maximum Non-Detect	1.39
Variance Detects	0.0221	Percent Non-Detects	16.67%
Mean Detects	0.198	SD Detects	0.149
Median Detects	0.216	CV Detects	0.751
Skewness Detects	0.391	Kurtosis Detects	-0.481
Mean of Logged Detects	-2.035	SD of Logged Detects	1.112

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.933	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.842	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.145	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.262	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

KM Mean	0.198	KM Standard Error of Mean	0.047
KM SD	0.141	95% KM (BCA) UCL	0.273
95% KM (t) UCL	0.283	95% KM (Percentile Bootstrap) UCL	0.274
95% KM (z) UCL	0.276	95% KM Bootstrap t UCL	0.289
90% KM Chebyshev UCL	0.339	95% KM Chebyshev UCL	0.403
97.5% KM Chebyshev UCL	0.492	99% KM Chebyshev UCL	0.666

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.47	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.742	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.205	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.272	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)	1.344	k star (bias corrected MLE)	1.007
Theta hat (MLE)	0.147	Theta star (bias corrected MLE)	0.197
nu hat (MLE)	26.88	nu star (bias corrected)	20.15
Mean (detects)	0.198		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.022	Mean	0.193
Maximum	0.475	Median	0.18
SD	0.135	CV	0.701
k hat (MLE)	1.579	k star (bias corrected MLE)	1.24
Theta hat (MLE)	0.122	Theta star (bias corrected MLE)	0.155
nu hat (MLE)	37.9	nu star (bias corrected)	29.76
Adjusted Level of Significance (β)	0.029		
Approximate Chi Square Value (29.76, α)	18.3	Adjusted Chi Square Value (29.76, β)	16.94
95% Gamma Approximate UCL (use when n>=50)	0.313	95% Gamma Adjusted UCL (use when n<50)	0.339

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.198	SD (KM)	0.141
Variance (KM)	0.0199	SE of Mean (KM)	0.047
k hat (KM)	1.972	k star (KM)	1.534
nu hat (KM)	47.32	nu star (KM)	36.83
theta hat (KM)	0.101	theta star (KM)	0.129
80% gamma percentile (KM)	0.306	90% gamma percentile (KM)	0.411

95% gamma percentile (KM)	0.512	99% gamma percentile (KM)	0.742

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (36.83, α)	23.93	Adjusted Chi Square Value (36.83, β)	22.36
95% Gamma Approximate KM-UCL (use when n>=50)	0.305	95% Gamma Adjusted KM-UCL (use when n<50)	0.326

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.872	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.239	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	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	0.187	Mean in Log Scale	-2.035
SD in Original Scale	0.137	SD in Log Scale	1.006
95% t UCL (assumes normality of ROS data)	0.258	95% Percentile Bootstrap UCL	0.248
95% BCA Bootstrap UCL	0.258	95% Bootstrap t UCL	0.272
95% H-UCL (Log ROS)	0.527		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-2.035	KM Geo Mean	0.131
KM SD (logged)	1.055	95% Critical H Value (KM-Log)	3.016
KM Standard Error of Mean (logged)	0.352	95% H-UCL (KM -Log)	0.596
KM SD (logged)	1.055	95% Critical H Value (KM-Log)	3.016
KM Standard Error of Mean (logged)	0.352		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.252	Mean in Log Scale	-1.814
SD in Original Scale	0.198	SD in Log Scale	1.14
95% t UCL (Assumes normality)	0.355	95% H-Stat UCL	0.93

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	0.283

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.

Result (water, storm;outfall 018;zinc)

General Statistics

Total Number of Observations	13	Number of Distinct Observations	8
Number of Detects	7	Number of Non-Detects	6
Number of Distinct Detects	7	Number of Distinct Non-Detects	1
Minimum Detect	6.36	Minimum Non-Detect	20
Maximum Detect	63	Maximum Non-Detect	20
Variance Detects	386.8	Percent Non-Detects	46.15%
Mean Detects	19.7	SD Detects	19.67
Median Detects	15	CV Detects	0.998
Skewness Detects	2.332	Kurtosis Detects	5.771
Mean of Logged Detects	2.685	SD of Logged Detects	0.769

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.676	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.365	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.304	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

KM Mean	16.37	KM Standard Error of Mean	4.465
KM SD	14.2	95% KM (BCA) UCL	25.27
95% KM (t) UCL	24.32	95% KM (Percentile Bootstrap) UCL	24.09
95% KM (z) UCL	23.71	95% KM Bootstrap t UCL	31.58
90% KM Chebyshev UCL	29.76	95% KM Chebyshev UCL	35.83
97.5% KM Chebyshev UCL	44.25	99% KM Chebyshev UCL	60.79

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.587	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.717	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.27	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.316	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)	1.839	k star (bias corrected MLE)	1.146
Theta hat (MLE)	10.71	Theta star (bias corrected MLE)	17.19
nu hat (MLE)	25.75	nu star (bias corrected)	16.05
Mean (detects)	19.7		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	1.016	Mean	16.88
Maximum	63	Median	14.86
SD	15.78	CV	0.934
k hat (MLE)	1.491	k star (bias corrected MLE)	1.198
Theta hat (MLE)	11.32	Theta star (bias corrected MLE)	14.09
nu hat (MLE)	38.78	nu star (bias corrected)	31.16
Adjusted Level of Significance (β)	0.0301		
Approximate Chi Square Value (31.16, α)	19.41	Adjusted Chi Square Value (31.16, β)	18.1
95% Gamma Approximate UCL (use when n>=50)	27.11	95% Gamma Adjusted UCL (use when n<50)	29.07

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	16.37	SD (KM)	14.2
Variance (KM)	201.7	SE of Mean (KM)	4.465
k hat (KM)	1.328	k star (KM)	1.073
nu hat (KM)	34.53	nu star (KM)	27.9
theta hat (KM)	12.32	theta star (KM)	15.25
80% gamma percentile (KM)	26.18	90% gamma percentile (KM)	37.04
95% gamma percentile (KM)	47.83	99% gamma percentile (KM)	72.76

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (27.90, α)	16.85	Adjusted Chi Square Value (27.90, β)	15.63
95% Gamma Approximate KM-UCL (use when n>=50)	27.1	95% Gamma Adjusted KM-UCL (use when n<50)	29.2

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.897	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.217	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.304	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	16.78	Mean in Log Scale	2.587
SD in Original Scale	14.99	SD in Log Scale	0.658
95% t UCL (assumes normality of ROS data)	24.19	95% Percentile Bootstrap UCL	23.87
95% BCA Bootstrap UCL	28.12	95% Bootstrap t UCL	35.05
95% H-UCL (Log ROS)	25.6		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.572	KM Geo Mean	13.1
KM SD (logged)	0.608	95% Critical H Value (KM-Log)	2.246
KM Standard Error of Mean (logged)	0.219	95% H-UCL (KM -Log)	23.38
KM SD (logged)	0.608	95% Critical H Value (KM-Log)	2.246
KM Standard Error of Mean (logged)	0.219		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	15.22	Mean in Log Scale	2.508
SD in Original Scale	14.79	SD in Log Scale	0.579
95% t UCL (Assumes normality)	22.53	95% H-Stat UCL	21.01

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics
Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	29.2	95% GROS Adjusted Gamma UCL	29.07

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.

Result (water, storm;outfall 019;ammonia (as nh3))

General Statistics

Total Number of Observations	18	Number of Distinct Observations	5
Number of Detects	10	Number of Non-Detects	8
Number of Distinct Detects	3	Number of Distinct Non-Detects	2
Minimum Detect	0.28	Minimum Non-Detect	0.4
Maximum Detect	0.84	Maximum Non-Detect	0.5
Variance Detects	0.0357	Percent Non-Detects	44.44%
Mean Detects	0.364	SD Detects	0.189
Median Detects	0.28	CV Detects	0.519
Skewness Detects	2.277	Kurtosis Detects	4.765
Mean of Logged Detects	-1.094	SD of Logged Detects	0.39

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.532	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.472	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	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

KM Mean	0.327	KM Standard Error of Mean	0.0348
KM SD	0.14	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.387	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.384	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.431	95% KM Chebyshev UCL	0.478
97.5% KM Chebyshev UCL	0.544	99% KM Chebyshev UCL	0.673

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	2.437	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.728	Detected Data Not Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.487	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.267	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)	6.172	k star (bias corrected MLE)	4.387
Theta hat (MLE)	0.059	Theta star (bias corrected MLE)	0.083
nu hat (MLE)	123.4	nu star (bias corrected)	87.75
Mean (detects)	0.364		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.18	Mean	0.337
Maximum	0.84	Median	0.28
SD	0.151	CV	0.448
k hat (MLE)	7.756	k star (bias corrected MLE)	6.5
Theta hat (MLE)	0.0434	Theta star (bias corrected MLE)	0.0518
nu hat (MLE)	279.2	nu star (bias corrected)	234
Adjusted Level of Significance (β)	0.0357		
Approximate Chi Square Value (234.01, α)	199.6	Adjusted Chi Square Value (234.01, β)	196.5
95% Gamma Approximate UCL (use when n>=50)	0.395	95% Gamma Adjusted UCL (use when n<50)	0.401

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.327	SD (KM)	0.14
Variance (KM)	0.0196	SE of Mean (KM)	0.0348
k hat (KM)	5.444	k star (KM)	4.574
nu hat (KM)	196	nu star (KM)	164.7
theta hat (KM)	0.06	theta star (KM)	0.0714
80% gamma percentile (KM)	0.444	90% gamma percentile (KM)	0.531
95% gamma percentile (KM)	0.612	99% gamma percentile (KM)	0.782

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (164.67, α)	136	Adjusted Chi Square Value (164.67, β)	133.5
95% Gamma Approximate KM-UCL (use when n>=50)	0.396	95% Gamma Adjusted KM-UCL (use when n<50)	0.403

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.54	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.842	Detected Data Not Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.477	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.262	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	0.338	Mean in Log Scale	-1.141
SD in Original Scale	0.145	SD in Log Scale	0.312
95% t UCL (assumes normality of ROS data)	0.398	95% Percentile Bootstrap UCL	0.397
95% BCA Bootstrap UCL	0.42	95% Bootstrap t UCL	0.522
95% H-UCL (Log ROS)	0.386		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.173	KM Geo Mean	0.309
KM SD (logged)	0.29	95% Critical H Value (KM-Log)	1.846
KM Standard Error of Mean (logged)	0.0719	95% H-UCL (KM -Log)	0.367
KM SD (logged)	0.29	95% Critical H Value (KM-Log)	1.846
KM Standard Error of Mean (logged)	0.0719		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.308	Mean in Log Scale	-1.249
SD in Original Scale	0.153	SD in Log Scale	0.341
95% t UCL (Assumes normality)	0.37	95% H-Stat UCL	0.355

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	0.387	KM H-UCL	0.367
95% KM (BCA) 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.

Result (water, storm;outfall 019;copper)

General Statistics

Total Number of Observations	18	Number of Distinct Observations	11
Number of Detects	10	Number of Non-Detects	8
Number of Distinct Detects	9	Number of Distinct Non-Detects	2
Minimum Detect	0.58	Minimum Non-Detect	2
Maximum Detect	2.61	Maximum Non-Detect	5.2
Variance Detects	0.526	Percent Non-Detects	44.44%
Mean Detects	1.253	SD Detects	0.725
Median Detects	1.05	CV Detects	0.579
Skewness Detects	0.952	Kurtosis Detects	-0.529
Mean of Logged Detects	0.0846	SD of Logged Detects	0.551

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.843	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.842	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.284	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.262	Detected Data Not 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

KM Mean	1.078	KM Standard Error of Mean	0.158

KM SD	0.584	95% KM (BCA) UCL	1.339
95% KM (t) UCL	1.352	95% KM (Percentile Bootstrap) UCL	1.343
95% KM (z) UCL	1.337	95% KM Bootstrap t UCL	1.456
90% KM Chebyshev UCL	1.551	95% KM Chebyshev UCL	1.765
97.5% KM Chebyshev UCL	2.062	99% KM Chebyshev UCL	2.646

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.543	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.73	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.228	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.268	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)	3.705	k star (bias corrected MLE)	2.66
Theta hat (MLE)	0.338	Theta star (bias corrected MLE)	0.471
nu hat (MLE)	74.11	nu star (bias corrected)	53.21
Mean (detects)	1.253		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.344	Mean	1.088
Maximum	2.61	Median	0.997
SD	0.604	CV	0.555
k hat (MLE)	3.995	k star (bias corrected MLE)	3.366
Theta hat (MLE)	0.272	Theta star (bias corrected MLE)	0.323
nu hat (MLE)	143.8	nu star (bias corrected)	121.2
Adjusted Level of Significance (β)	0.0357		
Approximate Chi Square Value (121.17, α)	96.75	Adjusted Chi Square Value (121.17, β)	94.66
95% Gamma Approximate UCL (use when n>=50)	1.363	95% Gamma Adjusted UCL (use when n<50)	1.393

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	1.078	SD (KM)	0.584
Variance (KM)	0.341	SE of Mean (KM)	0.158
k hat (KM)	3.405	k star (KM)	2.875
nu hat (KM)	122.6	nu star (KM)	103.5
theta hat (KM)	0.317	theta star (KM)	0.375
80% gamma percentile (KM)	1.546	90% gamma percentile (KM)	1.931
95% gamma percentile (KM)	2.291	99% gamma percentile (KM)	3.073

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (103.48, α)	81.01	Adjusted Chi Square Value (103.48, β)	79.1
95% Gamma Approximate KM-UCL (use when n>=50)	1.377	95% Gamma Adjusted KM-UCL (use when n<50)	1.411

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.901	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.842	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.192	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.262	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	1.088	Mean in Log Scale	-0.0301
SD in Original Scale	0.589	SD in Log Scale	0.474

95% t UCL (assumes normality of ROS data)	1.329	95% Percentile Bootstrap UCL	1.316
95% BCA Bootstrap UCL	1.372	95% Bootstrap t UCL	1.428
95% H-UCL (Log ROS)	1.365		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.0419	KM Geo Mean	0.959
KM SD (logged)	0.46	95% Critical H Value (KM-Log)	1.984
KM Standard Error of Mean (logged)	0.133	95% H-UCL (KM -Log)	1.331
KM SD (logged)	0.46	95% Critical H Value (KM-Log)	1.984
KM Standard Error of Mean (logged)	0.133		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	1.229	Mean in Log Scale	0.1
SD in Original Scale	0.641	SD in Log Scale	0.456
95% t UCL (Assumes normality)	1.492	95% H-Stat UCL	1.526

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	1.352

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

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.

Result (water, storm;outfall 019;copper (dissolved))

General Statistics

Total Number of Observations	18	Number of Distinct Observations	12
Number of Detects	11	Number of Non-Detects	7
Number of Distinct Detects	11	Number of Distinct Non-Detects	1
Minimum Detect	0.51	Minimum Non-Detect	2
Maximum Detect	1.4	Maximum Non-Detect	2
Variance Detects	0.0842	Percent Non-Detects	38.89%
Mean Detects	0.838	SD Detects	0.29
Median Detects	0.78	CV Detects	0.346
Skewness Detects	0.994	Kurtosis Detects	-0.182
Mean of Logged Detects	-0.226	SD of Logged Detects	0.324

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.871	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.285	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.251	Detected Data Not 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

KM Mean	0.838	KM Standard Error of Mean	0.0875
KM SD	0.277	95% KM (BCA) UCL	0.976
95% KM (t) UCL	0.99	95% KM (Percentile Bootstrap) UCL	0.984
95% KM (z) UCL	0.982	95% KM Bootstrap t UCL	1.064

90% KM Chebyshev UCL	1.101	95% KM Chebyshev UCL	1.22
97.5% KM Chebyshev UCL	1.385	99% KM Chebyshev UCL	1.709

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.528	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.729	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.251	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.255	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)	10.22	k star (bias corrected MLE)	7.495
Theta hat (MLE)	0.082	Theta star (bias corrected MLE)	0.112
nu hat (MLE)	224.9	nu star (bias corrected)	164.9
Mean (detects)	0.838		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.483	Mean	0.837
Maximum	1.4	Median	0.785
SD	0.271	CV	0.324
k hat (MLE)	10.71	k star (bias corrected MLE)	8.959
Theta hat (MLE)	0.0781	Theta star (bias corrected MLE)	0.0934
nu hat (MLE)	385.4	nu star (bias corrected)	322.5
Adjusted Level of Significance (β)	0.0357		
Approximate Chi Square Value (322.52, α)	281.9	Adjusted Chi Square Value (322.52, β)	278.3
95% Gamma Approximate UCL (use when n>=50)	0.957	95% Gamma Adjusted UCL (use when n<50)	0.97

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.838	SD (KM)	0.277
Variance (KM)	0.0766	SE of Mean (KM)	0.0875
k hat (KM)	9.173	k star (KM)	7.681
nu hat (KM)	330.2	nu star (KM)	276.5
theta hat (KM)	0.0914	theta star (KM)	0.109
80% gamma percentile (KM)	1.076	90% gamma percentile (KM)	1.241
95% gamma percentile (KM)	1.389	99% gamma percentile (KM)	1.696

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (276.51, α)	239	Adjusted Chi Square Value (276.51, β)	235.7
95% Gamma Approximate KM-UCL (use when n>=50)	0.97	95% Gamma Adjusted KM-UCL (use when n<50)	0.983

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.924	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.23	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.251	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	0.834	Mean in Log Scale	-0.226
SD in Original Scale	0.265	SD in Log Scale	0.304
95% t UCL (assumes normality of ROS data)	0.943	95% Percentile Bootstrap UCL	0.934
95% BCA Bootstrap UCL	0.945	95% Bootstrap t UCL	0.96
95% H-UCL (Log ROS)	0.957		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.226	KM Geo Mean	0.797
KM SD (logged)	0.309	95% Critical H Value (KM-Log)	1.859
KM Standard Error of Mean (logged)	0.0976	95% H-UCL (KM -Log)	0.961
KM SD (logged)	0.309	95% Critical H Value (KM-Log)	1.859
KM Standard Error of Mean (logged)	0.0976		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.901	Mean in Log Scale	-0.138
SD in Original Scale	0.237	SD in Log Scale	0.273
95% t UCL (Assumes normality)	0.998	95% H-Stat UCL	1.021

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	0.99

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

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.

Result (water, storm;outfall 019;gross beta)

General Statistics

Total Number of Observations	18	Number of Distinct Observations	13
Number of Detects	11	Number of Non-Detects	7
Number of Distinct Detects	11	Number of Distinct Non-Detects	2
Minimum Detect	2.15	Minimum Non-Detect	4
Maximum Detect	11.8	Maximum Non-Detect	8
Variance Detects	10.38	Percent Non-Detects	38.89%
Mean Detects	5.118	SD Detects	3.222
Median Detects	3.65	CV Detects	0.629
Skewness Detects	1.073	Kurtosis Detects	0.0572
Mean of Logged Detects	1.468	SD of Logged Detects	0.59

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.842	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.85	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.3	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.251	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

KM Mean	4.322	KM Standard Error of Mean	0.675
KM SD	2.654	95% KM (BCA) UCL	5.467
95% KM (t) UCL	5.496	95% KM (Percentile Bootstrap) UCL	5.382
95% KM (z) UCL	5.432	95% KM Bootstrap t UCL	5.944
90% KM Chebyshev UCL	6.347	95% KM Chebyshev UCL	7.264
97.5% KM Chebyshev UCL	8.537	99% KM Chebyshev UCL	11.04

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.601	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.733	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.266	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.257	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)	3.184	k star (bias corrected MLE)	2.376
Theta hat (MLE)	1.607	Theta star (bias corrected MLE)	2.154
nu hat (MLE)	70.05	nu star (bias corrected)	52.28
Mean (detects)	5.118		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	1.205	Mean	4.37
Maximum	11.8	Median	3.489
SD	2.768	CV	0.633
k hat (MLE)	3.247	k star (bias corrected MLE)	2.743
Theta hat (MLE)	1.346	Theta star (bias corrected MLE)	1.593
nu hat (MLE)	116.9	nu star (bias corrected)	98.76
Adjusted Level of Significance (β)	0.0357		
Approximate Chi Square Value (98.76, α)	76.83	Adjusted Chi Square Value (98.76, β)	74.98
95% Gamma Approximate UCL (use when n>=50)	5.617	95% Gamma Adjusted UCL (use when n<50)	5.756

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	4.322	SD (KM)	2.654
Variance (KM)	7.045	SE of Mean (KM)	0.675
k hat (KM)	2.651	k star (KM)	2.246
nu hat (KM)	95.45	nu star (KM)	80.87
theta hat (KM)	1.63	theta star (KM)	1.924
80% gamma percentile (KM)	6.382	90% gamma percentile (KM)	8.181
95% gamma percentile (KM)	9.885	99% gamma percentile (KM)	13.64

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (80.87, α)	61.15	Adjusted Chi Square Value (80.87, β)	59.51
95% Gamma Approximate KM-UCL (use when n>=50)	5.716	95% Gamma Adjusted KM-UCL (use when n<50)	5.874

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.907	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.85	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.232	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.251	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	4.395	Mean in Log Scale	1.339
SD in Original Scale	2.707	SD in Log Scale	0.519
95% t UCL (assumes normality of ROS data)	5.505	95% Percentile Bootstrap UCL	5.458
95% BCA Bootstrap UCL	5.693	95% Bootstrap t UCL	5.949
95% H-UCL (Log ROS)	5.648		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	1.321	KM Geo Mean	3.746

KM SD (logged)	0.501	95% Critical H Value (KM-Log)	2.022
KM Standard Error of Mean (logged)	0.133	95% H-UCL (KM -Log)	5.429
KM SD (logged)	0.501	95% Critical H Value (KM-Log)	2.022
KM Standard Error of Mean (logged)	0.133		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	4.017	Mean in Log Scale	1.205
SD in Original Scale	2.886	SD in Log Scale	0.587
95% t UCL (Assumes normality)	5.2	95% H-Stat UCL	5.35

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 Adjusted Gamma UCL	5.874	95% GROS Adjusted Gamma UCL	5.756

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

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.

Result (water, storm;outfall 019;lead)

General Statistics

Total Number of Observations	18	Number of Distinct Observations	5
Number of Detects	5	Number of Non-Detects	13
Number of Distinct Detects	4	Number of Distinct Non-Detects	1
Minimum Detect	0.22	Minimum Non-Detect	1
Maximum Detect	0.37	Maximum Non-Detect	1
Variance Detects	0.00513	Percent Non-Detects	72.22%
Mean Detects	0.294	SD Detects	0.0716
Median Detects	0.27	CV Detects	0.244
Skewness Detects	0.342	Kurtosis Detects	-2.987
Mean of Logged Detects	-1.248	SD of Logged Detects	0.243

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.837	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.256	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.343	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

KM Mean	0.294	KM Standard Error of Mean	0.032
KM SD	0.0641	95% KM (BCA) UCL	N/A
95% KM (t) UCL	0.35	95% KM (Percentile Bootstrap) UCL	N/A
95% KM (z) UCL	0.347	95% KM Bootstrap t UCL	N/A
90% KM Chebyshev UCL	0.39	95% KM Chebyshev UCL	0.434
97.5% KM Chebyshev UCL	0.494	99% KM Chebyshev UCL	0.613

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.482	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.679	Detected data appear Gamma Distributed at 5% Significance Level

K-S Test Statistic	0.28	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.357	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)	21.32	k star (bias corrected MLE)	8.659
Theta hat (MLE)	0.0138	Theta star (bias corrected MLE)	0.034
nu hat (MLE)	213.2	nu star (bias corrected)	86.59
Mean (detects)	0.294		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.173	Mean	0.295
Maximum	0.437	Median	0.283
SD	0.0734	CV	0.249
k hat (MLE)	16.82	k star (bias corrected MLE)	14.06
Theta hat (MLE)	0.0175	Theta star (bias corrected MLE)	0.021
nu hat (MLE)	605.6	nu star (bias corrected)	506
Adjusted Level of Significance (β)	0.0357		
Approximate Chi Square Value (506.01, α)	454.8	Adjusted Chi Square Value (506.01, β)	450.2
95% Gamma Approximate UCL (use when n>=50)	0.328	95% Gamma Adjusted UCL (use when n<50)	0.332

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.294	SD (KM)	0.0641
Variance (KM)	0.0041	SE of Mean (KM)	0.032
k hat (KM)	21.06	k star (KM)	17.59
nu hat (KM)	758.2	nu star (KM)	633.2
theta hat (KM)	0.014	theta star (KM)	0.0167
80% gamma percentile (KM)	0.351	90% gamma percentile (KM)	0.387
95% gamma percentile (KM)	0.418	99% gamma percentile (KM)	0.481

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (633.18, α)	575.8	Adjusted Chi Square Value (633.18, β)	570.6
95% Gamma Approximate KM-UCL (use when n>=50)	0.323	95% Gamma Adjusted KM-UCL (use when n<50)	0.326

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.86	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.252	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.343	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	0.296	Mean in Log Scale	-1.248
SD in Original Scale	0.0742	SD in Log Scale	0.251
95% t UCL (assumes normality of ROS data)	0.326	95% Percentile Bootstrap UCL	0.324
95% BCA Bootstrap UCL	0.327	95% Bootstrap t UCL	0.328
95% H-UCL (Log ROS)	0.331		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-1.248	KM Geo Mean	0.287
KM SD (logged)	0.217	95% Critical H Value (KM-Log)	1.797
KM Standard Error of Mean (logged)	0.108	95% H-UCL (KM -Log)	0.323
KM SD (logged)	0.217	95% Critical H Value (KM-Log)	1.797

KM Standard Error of Mean (logged)	0.108

DL/2 Statistics

DL/2 Normal		DL/2 Log-Transformed	
Mean in Original Scale	0.443	Mean in Log Scale	-0.847
SD in Original Scale	0.101	SD in Log Scale	0.281
95% t UCL (Assumes normality)	0.484	95% H-Stat UCL	0.506

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	0.35

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.

Result (water, storm;outfall 019;nitrate (as n))

General Statistics

Total Number of Observations	18	Number of Distinct Observations	7
Number of Detects	8	Number of Non-Detects	10
Number of Distinct Detects	6	Number of Distinct Non-Detects	1
Minimum Detect	0.069	Minimum Non-Detect	0.11
Maximum Detect	0.17	Maximum Non-Detect	0.11
Variance Detects	0.00103	Percent Non-Detects	55.56%
Mean Detects	0.114	SD Detects	0.0321
Median Detects	0.113	CV Detects	0.283
Skewness Detects	0.45	Kurtosis Detects	-0.122
Mean of Logged Detects	-2.21	SD of Logged Detects	0.286

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.922	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Normal at 5% Significance Level	
Lilliefors Test Statistic	0.219	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.283	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

KM Mean	0.099	KM Standard Error of Mean	0.00736
KM SD	0.0252	95% KM (BCA) UCL	0.111
95% KM (t) UCL	0.112	95% KM (Percentile Bootstrap) UCL	0.11
95% KM (z) UCL	0.111	95% KM Bootstrap t UCL	0.112
90% KM Chebyshev UCL	0.121	95% KM Chebyshev UCL	0.131
97.5% KM Chebyshev UCL	0.145	99% KM Chebyshev UCL	0.172

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.416	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.716	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.229	**Kolmogorov-Smirnov 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)	14.33	k star (bias corrected MLE)	9.037

Theta hat (MLE)	0.00793	Theta star (bias corrected MLE)	0.0126
nu hat (MLE)	229.2	nu star (bias corrected)	144.6
Mean (detects)	0.114		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.0577	Mean	0.099
Maximum	0.17	Median	0.094
SD	0.0279	CV	0.281
k hat (MLE)	14.23	k star (bias corrected MLE)	11.9
Theta hat (MLE)	0.00696	Theta star (bias corrected MLE)	0.00832
nu hat (MLE)	512.4	nu star (bias corrected)	428.3
Adjusted Level of Significance (β)	0.0357		
Approximate Chi Square Value (428.34, α)	381.4	Adjusted Chi Square Value (428.34, β)	377.1
95% Gamma Approximate UCL (use when n>=50)	0.111	95% Gamma Adjusted UCL (use when n<50)	0.112

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.099	SD (KM)	0.0252
Variance (KM)	6.3486E-4	SE of Mean (KM)	0.00736
k hat (KM)	15.43	k star (KM)	12.89
nu hat (KM)	555.5	nu star (KM)	464.2
theta hat (KM)	0.00641	theta star (KM)	0.00768
80% gamma percentile (KM)	0.121	90% gamma percentile (KM)	0.136
95% gamma percentile (KM)	0.148	99% gamma percentile (KM)	0.174

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (464.21, α)	415.3	Adjusted Chi Square Value (464.21, β)	410.8
95% Gamma Approximate KM-UCL (use when n>=50)	0.111	95% Gamma Adjusted KM-UCL (use when n<50)	0.112

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.934	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.224	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.283	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	0.0993	Mean in Log Scale	-2.342
SD in Original Scale	0.0271	SD in Log Scale	0.259
95% t UCL (assumes normality of ROS data)	0.11	95% Percentile Bootstrap UCL	0.111
95% BCA Bootstrap UCL	0.111	95% Bootstrap t UCL	0.113
95% H-UCL (Log ROS)	0.111		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-2.342	KM Geo Mean	0.0962
KM SD (logged)	0.235	95% Critical H Value (KM-Log)	1.809
KM Standard Error of Mean (logged)	0.0751	95% H-UCL (KM -Log)	0.11
KM SD (logged)	0.235	95% Critical H Value (KM-Log)	1.809
KM Standard Error of Mean (logged)	0.0751		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.0811	Mean in Log Scale	-2.594
SD in Original Scale	0.0364	SD in Log Scale	0.398

95% t UCL (Assumes normality)	0.096	95% H-Stat UCL	0.0975

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	0.112

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.

Result (water, storm;outfall 019;selenium)

General Statistics

Total Number of Observations	18	Number of Distinct Observations	6
Number of Detects	5	Number of Non-Detects	13
Number of Distinct Detects	5	Number of Distinct Non-Detects	1
Minimum Detect	0.53	Minimum Non-Detect	2
Maximum Detect	0.96	Maximum Non-Detect	2
Variance Detects	0.0278	Percent Non-Detects	72.22%
Mean Detects	0.69	SD Detects	0.167
Median Detects	0.65	CV Detects	0.241
Skewness Detects	1.311	Kurtosis Detects	1.858
Mean of Logged Detects	-0.393	SD of Logged Detects	0.227

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.906	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.229	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.343	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

KM Mean	0.69	KM Standard Error of Mean	0.0745
KM SD	0.149	95% KM (BCA) UCL	0.837
95% KM (t) UCL	0.82	95% KM (Percentile Bootstrap) UCL	0.817
95% KM (z) UCL	0.813	95% KM Bootstrap t UCL	0.988
90% KM Chebyshev UCL	0.913	95% KM Chebyshev UCL	1.015
97.5% KM Chebyshev UCL	1.155	99% KM Chebyshev UCL	1.431

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.283	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.679	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.191	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.357	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)	23.46	k star (bias corrected MLE)	9.519
Theta hat (MLE)	0.0294	Theta star (bias corrected MLE)	0.0725
nu hat (MLE)	234.6	nu star (bias corrected)	95.19
Mean (detects)	0.69		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.403	Mean	0.692
Maximum	1.027	Median	0.667
SD	0.174	CV	0.251
k hat (MLE)	16.82	k star (bias corrected MLE)	14.06
Theta hat (MLE)	0.0412	Theta star (bias corrected MLE)	0.0493
nu hat (MLE)	605.6	nu star (bias corrected)	506
Adjusted Level of Significance (β)	0.0357		
Approximate Chi Square Value (506.02, α)	454.9	Adjusted Chi Square Value (506.02, β)	450.2
95% Gamma Approximate UCL (use when n>=50)	0.77	95% Gamma Adjusted UCL (use when n<50)	0.778

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.69	SD (KM)	0.149
Variance (KM)	0.0222	SE of Mean (KM)	0.0745
k hat (KM)	21.45	k star (KM)	17.91
nu hat (KM)	772.1	nu star (KM)	644.7
theta hat (KM)	0.0322	theta star (KM)	0.0385
80% gamma percentile (KM)	0.822	90% gamma percentile (KM)	0.905
95% gamma percentile (KM)	0.978	99% gamma percentile (KM)	1.125

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (644.71, α)	586.8	Adjusted Chi Square Value (644.71, β)	581.5
95% Gamma Approximate KM-UCL (use when n>=50)	0.758	95% Gamma Adjusted KM-UCL (use when n<50)	0.765

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.951	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.762	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.189	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.343	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	0.694	Mean in Log Scale	-0.393
SD in Original Scale	0.168	SD in Log Scale	0.239
95% t UCL (assumes normality of ROS data)	0.763	95% Percentile Bootstrap UCL	0.759
95% BCA Bootstrap UCL	0.764	95% Bootstrap t UCL	0.768
95% H-UCL (Log ROS)	0.772		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-0.393	KM Geo Mean	0.675
KM SD (logged)	0.203	95% Critical H Value (KM-Log)	1.789
KM Standard Error of Mean (logged)	0.102	95% H-UCL (KM -Log)	0.753
KM SD (logged)	0.203	95% Critical H Value (KM-Log)	1.789
KM Standard Error of Mean (logged)	0.102		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.914	Mean in Log Scale	-0.109
SD in Original Scale	0.164	SD in Log Scale	0.212
95% t UCL (Assumes normality)	0.981	95% H-Stat UCL	1.006

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	0.82

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.

Result (water, storm;outfall 019;uranium)

General Statistics

Total Number of Observations	18	Number of Distinct Observations	17
Number of Detects	16	Number of Non-Detects	2
Number of Distinct Detects	16	Number of Distinct Non-Detects	1
Minimum Detect	0.018	Minimum Non-Detect	1
Maximum Detect	1.22	Maximum Non-Detect	1
Variance Detects	0.0917	Percent Non-Detects	11.11%
Mean Detects	0.226	SD Detects	0.303
Median Detects	0.125	CV Detects	1.342
Skewness Detects	2.728	Kurtosis Detects	8.163
Mean of Logged Detects	-2.081	SD of Logged Detects	1.11

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.65	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Detected Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.302	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.213	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

KM Mean	0.218	KM Standard Error of Mean	0.0697
KM SD	0.282	95% KM (BCA) UCL	0.34
95% KM (t) UCL	0.34	95% KM (Percentile Bootstrap) UCL	0.335
95% KM (z) UCL	0.333	95% KM Bootstrap t UCL	0.505
90% KM Chebyshev UCL	0.427	95% KM Chebyshev UCL	0.522
97.5% KM Chebyshev UCL	0.654	99% KM Chebyshev UCL	0.912

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.474	**Anderson-Darling GOF Test**	
5% A-D Critical Value	0.764	Detected data appear Gamma Distributed at 5% Significance Level	
K-S Test Statistic	0.166	**Kolmogorov-Smirnov GOF**	
5% K-S Critical Value	0.221	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)	0.977	k star (bias corrected MLE)	0.836
Theta hat (MLE)	0.231	Theta star (bias corrected MLE)	0.27
nu hat (MLE)	31.27	nu star (bias corrected)	26.74
Mean (detects)	0.226		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)
For such situations, GROS method may yield incorrect values of UCLs and BTVs
This is especially true when the sample size is small.
For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.018	Mean	0.216
Maximum	1.22	Median	0.125

SD	0.288	CV	1.334
k hat (MLE)	1.001	k star (bias corrected MLE)	0.871
Theta hat (MLE)	0.216	Theta star (bias corrected MLE)	0.248
nu hat (MLE)	36.02	nu star (bias corrected)	31.35
Adjusted Level of Significance (β)	0.0357		
Approximate Chi Square Value (31.35, α)	19.56	Adjusted Chi Square Value (31.35, β)	18.66
95% Gamma Approximate UCL (use when n>=50)	0.346	95% Gamma Adjusted UCL (use when n<50)	0.362

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	0.218	SD (KM)	0.282
Variance (KM)	0.0793	SE of Mean (KM)	0.0697
k hat (KM)	0.602	k star (KM)	0.539
nu hat (KM)	21.66	nu star (KM)	19.39
theta hat (KM)	0.363	theta star (KM)	0.406
80% gamma percentile (KM)	0.36	90% gamma percentile (KM)	0.582
95% gamma percentile (KM)	0.817	99% gamma percentile (KM)	1.392

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (19.39, α)	10.4	Adjusted Chi Square Value (19.39, β)	9.772
95% Gamma Approximate KM-UCL (use when n>=50)	0.407	95% Gamma Adjusted KM-UCL (use when n<50)	0.433

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.983	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.887	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.0982	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.213	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	0.214	Mean in Log Scale	-2.094
SD in Original Scale	0.287	SD in Log Scale	1.057
95% t UCL (assumes normality of ROS data)	0.332	95% Percentile Bootstrap UCL	0.332
95% BCA Bootstrap UCL	0.385	95% Bootstrap t UCL	0.533
95% H-UCL (Log ROS)	0.432		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	-2.098	KM Geo Mean	0.123
KM SD (logged)	1.061	95% Critical H Value (KM-Log)	2.727
KM Standard Error of Mean (logged)	0.27	95% H-UCL (KM -Log)	0.434
KM SD (logged)	1.061	95% Critical H Value (KM-Log)	2.727
KM Standard Error of Mean (logged)	0.27		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	0.256	Mean in Log Scale	-1.926
SD in Original Scale	0.298	SD in Log Scale	1.135
95% t UCL (Assumes normality)	0.378	95% H-Stat UCL	0.606

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

a Adjusted KM-UCL (use when k<=1 and 15 < n < 50 but k<=1)	0.433

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.

Result (water, storm;outfall 019;zinc)

General Statistics

Total Number of Observations	18	Number of Distinct Observations	8
Number of Detects	7	Number of Non-Detects	11
Number of Distinct Detects	7	Number of Distinct Non-Detects	1
Minimum Detect	6.6	Minimum Non-Detect	20
Maximum Detect	50.2	Maximum Non-Detect	20
Variance Detects	336.8	Percent Non-Detects	61.11%
Mean Detects	24.22	SD Detects	18.35
Median Detects	14	CV Detects	0.758
Skewness Detects	0.477	Kurtosis Detects	-2.102
Mean of Logged Detects	2.899	SD of Logged Detects	0.846

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.844	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Normal at 5% Significance Level
Lilliefors Test Statistic	0.283	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.304	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

KM Mean	15.51	KM Standard Error of Mean	3.475
KM SD	12.88	95% KM (BCA) UCL	21.16
95% KM (t) UCL	21.56	95% KM (Percentile Bootstrap) UCL	21.11
95% KM (z) UCL	21.23	95% KM Bootstrap t UCL	23.21
90% KM Chebyshev UCL	25.94	95% KM Chebyshev UCL	30.66
97.5% KM Chebyshev UCL	37.22	99% KM Chebyshev UCL	50.09

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.512	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.716	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.24	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.316	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)	1.882	k star (bias corrected MLE)	1.17
Theta hat (MLE)	12.87	Theta star (bias corrected MLE)	20.7
nu hat (MLE)	26.34	nu star (bias corrected)	16.39
Mean (detects)	24.22		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	16.24
Maximum	50.2	Median	12.12
SD	14.2	CV	0.875
k hat (MLE)	0.885	k star (bias corrected MLE)	0.774
Theta hat (MLE)	18.35	Theta star (bias corrected MLE)	20.97
nu hat (MLE)	31.85	nu star (bias corrected)	27.88
Adjusted Level of Significance (β)	0.0357		
Approximate Chi Square Value (27.88, α)	16.83	Adjusted Chi Square Value (27.88, β)	16.01

95% Gamma Approximate UCL (use when n>=50)	26.89	95% Gamma Adjusted UCL (use when n<50)	28.27

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	15.51	SD (KM)	12.88
Variance (KM)	166	SE of Mean (KM)	3.475
k hat (KM)	1.45	k star (KM)	1.245
nu hat (KM)	52.19	nu star (KM)	44.82
theta hat (KM)	10.7	theta star (KM)	12.46
80% gamma percentile (KM)	24.47	90% gamma percentile (KM)	33.84
95% gamma percentile (KM)	43.05	99% gamma percentile (KM)	64.1

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (44.82, α)	30.47	Adjusted Chi Square Value (44.82, β)	29.33
95% Gamma Approximate KM-UCL (use when n>=50)	22.82	95% Gamma Adjusted KM-UCL (use when n<50)	23.7

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.881	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.803	Detected Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.229	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.304	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	16.31	Mean in Log Scale	2.523
SD in Original Scale	13.48	SD in Log Scale	0.735
95% t UCL (assumes normality of ROS data)	21.84	95% Percentile Bootstrap UCL	21.59
95% BCA Bootstrap UCL	22.8	95% Bootstrap t UCL	23.96
95% H-UCL (Log ROS)	24.53		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.504	KM Geo Mean	12.24
KM SD (logged)	0.628	95% Critical H Value (KM-Log)	2.155
KM Standard Error of Mean (logged)	0.198	95% H-UCL (KM -Log)	20.69
KM SD (logged)	0.628	95% Critical H Value (KM-Log)	2.155
KM Standard Error of Mean (logged)	0.198		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	15.53	Mean in Log Scale	2.534
SD in Original Scale	13.03	SD in Log Scale	0.585
95% t UCL (Assumes normality)	20.87	95% H-Stat UCL	20.18

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	21.56

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.

Result (water, storm;outfall 019;zinc (dissolved))

General Statistics

Total Number of Observations	18	Number of Distinct Observations	10

Number of Detects	8	Number of Non-Detects	10
Number of Distinct Detects	8	Number of Distinct Non-Detects	2
Minimum Detect	6.4	Minimum Non-Detect	20
Maximum Detect	56	Maximum Non-Detect	42
Variance Detects	304	Percent Non-Detects	55.56%
Mean Detects	17.85	SD Detects	17.43
Median Detects	10.15	CV Detects	0.977
Skewness Detects	1.893	Kurtosis Detects	3.276
Mean of Logged Detects	2.565	SD of Logged Detects	0.792

Normal GOF Test on Detects Only

Shapiro Wilk Test Statistic	0.724	**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	0.283	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

KM Mean	13.17	KM Standard Error of Mean	3.18
KM SD	11.95	95% KM (BCA) UCL	18.99
95% KM (t) UCL	18.7	95% KM (Percentile Bootstrap) UCL	18.45
95% KM (z) UCL	18.4	95% KM Bootstrap t UCL	25.13
90% KM Chebyshev UCL	22.71	95% KM Chebyshev UCL	27.03
97.5% KM Chebyshev UCL	33.03	99% KM Chebyshev UCL	44.81

Gamma GOF Tests on Detected Observations Only

A-D Test Statistic	0.698	**Anderson-Darling GOF Test**
5% A-D Critical Value	0.726	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.238	**Kolmogorov-Smirnov GOF**
5% K-S Critical Value	0.298	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)	1.727	k star (bias corrected MLE)	1.163
Theta hat (MLE)	10.33	Theta star (bias corrected MLE)	15.35
nu hat (MLE)	27.64	nu star (bias corrected)	18.61
Mean (detects)	17.85		

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 detects is small such as <1.0, especially when the sample size is small (e.g., <15-20)

For such situations, GROS method may yield incorrect values of UCLs and BTVs

This is especially true when the sample size is small.

For gamma distributed detected data, BTVs and UCLs may be computed using gamma distribution on KM estimates

Minimum	0.01	Mean	13.46
Maximum	56	Median	9.311
SD	13.08	CV	0.972
k hat (MLE)	0.923	k star (bias corrected MLE)	0.807
Theta hat (MLE)	14.57	Theta star (bias corrected MLE)	16.69
nu hat (MLE)	33.24	nu star (bias corrected)	29.03
Adjusted Level of Significance (β)	0.0357		
Approximate Chi Square Value (29.03, α)	17.74	Adjusted Chi Square Value (29.03, β)	16.89
95% Gamma Approximate UCL (use when n>=50)	22.03	95% Gamma Adjusted UCL (use when n<50)	23.13

Estimates of Gamma Parameters using KM Estimates

Mean (KM)	13.17	SD (KM)	11.95
Variance (KM)	142.9	SE of Mean (KM)	3.18
k hat (KM)	1.214	k star (KM)	1.049

nu hat (KM)	43.71	nu star (KM)	37.76
theta hat (KM)	10.85	theta star (KM)	12.56
80% gamma percentile (KM)	21.11	90% gamma percentile (KM)	29.97
95% gamma percentile (KM)	38.8	99% gamma percentile (KM)	59.22

Gamma Kaplan-Meier (KM) Statistics

Approximate Chi Square Value (37.76, α)	24.69	Adjusted Chi Square Value (37.76, β)	23.68
95% Gamma Approximate KM-UCL (use when n>=50)	20.14	95% Gamma Adjusted KM-UCL (use when n<50)	21.01

Lognormal GOF Test on Detected Observations Only

Shapiro Wilk Test Statistic	0.859	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.818	Detected Data appear Lognormal at 5% Significance Level	
Lilliefors Test Statistic	0.22	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.283	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	13.67	Mean in Log Scale	2.379
SD in Original Scale	12.35	SD in Log Scale	0.646
95% t UCL (assumes normality of ROS data)	18.74	95% Percentile Bootstrap UCL	18.68
95% BCA Bootstrap UCL	21.05	95% Bootstrap t UCL	26.35
95% H-UCL (Log ROS)	18.71		

Statistics using KM estimates on Logged Data and Assuming Lognormal Distribution

KM Mean (logged)	2.354	KM Geo Mean	10.53
KM SD (logged)	0.583	95% Critical H Value (KM-Log)	2.105
KM Standard Error of Mean (logged)	0.176	95% H-UCL (KM -Log)	16.8
KM SD (logged)	0.583	95% Critical H Value (KM-Log)	2.105
KM Standard Error of Mean (logged)	0.176		

DL/2 Statistics

DL/2 Normal		**DL/2 Log-Transformed**	
Mean in Original Scale	14.1	Mean in Log Scale	2.461
SD in Original Scale	11.98	SD in Log Scale	0.544
95% t UCL (Assumes normality)	19.01	95% H-Stat UCL	17.84

DL/2 is not a recommended method, provided for comparisons and historical reasons

Nonparametric Distribution Free UCL Statistics

Detected Data appear Gamma Distributed at 5% Significance Level

Suggested UCL to Use

95% KM Adjusted Gamma UCL	21.01	95% GROS Adjusted Gamma UCL	23.13

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.

Attachment B-3:
Estimate of Volatile Emissions from Surface Water

Appendix B

Attachment B-3

Estimate of Volatile Emissions from Surface Water

Volatilization of VOCs from surface waters is typically not considered a significant pathway for recreator scenarios. For example, the USEPA RSL calculator does not include the volatilization pathway in the derivation of recreator screening levels. This pathway is not typically evaluated due to the low likelihood of VOCs to persist in surface water due to off gassing and the significant dilution that would occur due to mixing in outdoor air. While this pathway is not considered significant, a quantitative evaluation was conducted on one Outfall to evaluate its significance for the Outfall discharges. Outfall 002 was chosen for the evaluation as it is the only Outfall where TCE, a primary COPC for the Site, was detected in the dataset used in the HHRA.

An air emission model for wastewater, WATER9, developed by the United States Environmental Protection Agency (USEPA) was selected as the modeling approach for this analysis.[1] WATER9 is an analytical model that calculates emissions of organic compounds via various pathways from wastewater and wastewater units including open channels.

The WATER9 model calculates emissions for each constituent. Emission calculations are based on the properties of the constituent, its concentration, wastewater unit types, and the path of the waste through the treatment system. The WATER9 model was used to model VOC emissions assuming an open channel with the configuration of Outfall 002.

The WATER9 model calculates emissions for each constituent. Emission calculations are based on the properties of the constituent, its concentration, wastewater unit types, and the path of the waste through the treatment system. The WATER9 model was used to model VOC emissions using the flow rate, water temperature and configuration of Outfall 002. The length of the channel segment was assumed to be 300 feet representing a stretch of drainage immediately below the outfall. The Outfall 002 TCE concentration was assumed to be the EPC of 0.733 µg/L. Cis-1,2,-DCE was also detected in Outfall 002 samples and was included in the evaluation at a concentration of 3 µg/L.

1.1 Basic Model Approach and Methodology

WATER9 emissions calculation methodology from the liquid surface is based on an overall mass transfer coefficient including the liquid-phase and the gas-phase mass transfer in series. The basic relationship describing mass transfer of a volatile constituent from liquid surface to the air is:

$$E = KAC_L$$

Where:

[1] https://www3.epa.gov/ttnchie1/software/water/water9_3/index.html

E = air emissions from the liquid surface, grams per second (g/s);

K = overall mass transfer coefficient, meters per second (m/s);

A = liquid surface area, square meters ($m^{2)}$; and

C_L = concentration of constituent in the liquid phase, grams per cubic meter ($g/m^{3)}$. C_L is a function of pond type (flow through or quiescent), initial concentration Ci, flow rate, overall mass transfer coefficient and pond geometry.

The overall mass transfer coefficient, K, is based on the liquid-phase mass transfer coefficient (k_L), the gas-phase mass transfer coefficient (k_G), and Henry's law constant in the form of a partition coefficient (K_{eq}), and is expressed as:

$$\frac{1}{K} = \frac{1}{K_L} + \frac{1}{K_G K_{eq}}$$

The equilibrium constant or partition coefficient K_{eq} is expressed as:

$$K_{eq} = H/RT$$

Where:

H = Henry's law constant, atm-m^3-$g^{-1}mol^{-1}$;

R = universal gas constant, $8.21x10^{-5}$ atm-$m^3/g^{-1}mol^{-1}K$; and

T = temperature, K

The mass transfer coefficients are dependent on several factors including diffusivity, viscosity, wind speed, and type of wastewater unit. WATER9 features a compound property database that contains physical properties for chemicals of interest. WATER9 may also accept user inputs for physical properties for chemicals of interest and site specific assumptions. A site-specific average water temperature of 11 degrees C was used based on data collected at Outfall 002. An average surface wind speed of 2.2 m/sec was used based on Site-specific estimates calculated for the SSFL (CH2MHILL, 2014).

As a part of the WATER9 model input, assumptions on the water flow, depth and width at Outfall 002 was needed. All available flow data measured at Outfall 002 (provided by Haley & Aldrich) was used in this analysis. Available flow data ranged from October 2004 to December 2014 (but does not represent all days with flow during this time period because of availability of data). The table below shows the result of the analysis.

	Flow (gal/day)	Flow (MG/day)	Flow (cfs)	# of Days with greater or equal flow	% of days with greater flow
Max Flow	43,906,800	43.9	67.9	1	0.2%
Average Flow (of days with flow)	3,830,525	3.83	5.93	64	12%
Median Flow (of days with flow)	311,340	0.31	0.48	268	50%

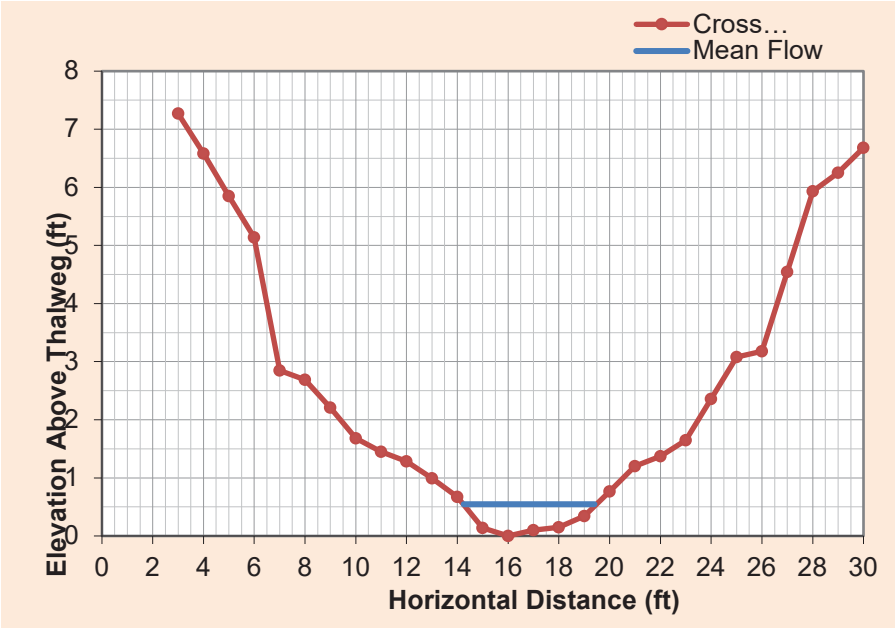
As shown in the table, the average flow is skewed by days with very high flow rates (only 12% of days with measured flow had flows equal to or greater than the average flow rate). The median could better represent the water flow characteristics; however, the average value was conservatively used in the calculations as a typical flow day to provide more coverage over the possible values. The use of an average value results in a wider surface area for emissions modeling since the median flow resulted in a smaller width of water flow.

In order to determine the width and depth of flow near Outfall 002, Manning's equation was used.

The following assumptions were used:

- Mean flow: 5.9 cfs
- Manning's roughness coefficient: 0.04 (Geosyntec Consultants, 2009)
- Longitudinal slope (%): 2.85% (Geosyntec Consultants, 2009)

A surveyed cross-section just upstream of Outfall 002 was used to determine the height and width of flow corresponding to the mean flowrate resulting in a height and width of water flow of 0.55 feet and 5.2 feet, respectively. The figure below shows the results of the Manning's Equation for the average flow.



This configuration was used along with an assumed length of 300 feet representing a stretch of drainage immediately below the outfall. Emission estimates were 1.40E-05 grams/second (g/sec) for TCE and 5.41E-05 g/sec for Cis-1,2-DCE. Model documentation is provided as attachment.

References

CH2MHILL, 2014. Air Dispersion Evaluation Report for Advanced Propulsion Testing Facility Area RFI Site, Santa Susana Field Laboratory, Ventura County, California. September.

Geosyntec Consultants, 2009. Technical Memorandum: Interim Sediment Control Measure for Outfalls 001 and 002. October.

1 - Waste Concentration.txt

A LISTING OF WASTE CONCENTRATIONS LEAVING PROCESS UNITS

01-27-2017

Compound	waste 1 ppmw	waste 2 ppmw	waste 3 ppmw	waste 4 ppmw	waste 5 ppmw
DICHLOROETHYLENE(1,2) cis	3.e-03	0.e+00	0.e+00	0.e+00	0.e+00
TRICHLOROETHYLENE	7.33e-04	0.e+00	0.e+00	0.e+00	0.e+00

A LISTING OF INPUT SPECIFICATIONS FOR EACH UNIT

02-03-2017

Type of unit is open trench

1 Description of unit	5	default
2 Underflow T (C)		11
3 Total water added at the unit (l/s)		167.5
8 Subsurface entrance=1		0
9 subsurface exit =1		0
10 width of trench (m)		1.58
11 distance to next unit (cm)		9144
12 slope of underflow conduit		0.0285
13 depth of trench (m)		0.17
19 pH (enter 0 for no pH adjustment)		0

COMPOUND PROPERTIES
02-03-2017

COMPOUND PROPERTIES OF DICHLOROETHYLENE(1,2) cis at 25 deg.C

The following compound properties are estimated.

Type of compound	C8		
density (g/cc)	1.28		
molecular weight	96.95		
diffusion coef. water (cm2/s)	1.13e-05		
diffusion coef. air (cm2/s)	0.088578		
vapor pressure (mm Hg)	200. (3.86842 psia.)		
Henry's law constant (atm-m3/mol)	0.004167	y/x= 231.479	
Reference for Henry's law: Staudinger and Roberts 1996 L S			
vapor pressure temp. coefficients	7.0223	1205.4	230.6

The enthalpy of vaporization 98.565 cal/cc.

zero order biorate constant (mg/g-hr)	10.76
first order biorate constant (l/g-hr)	0.92758
octanol water partition coefficient	2.20267

solubility ppmw 800.
the UNIFAC activity coef. in water at 25 deg. C is 1140.645
The water solubility estimated from the activity coefficient (25 C) is 4872.064
The activity coefficient in octanol at 25 deg. C is 0.80289
UNIFAC code 2162v000000000 ; CAS code 156-59-2
The estimated vapor pressure is 202.34278 mm Hg.

COMPOUND PROPERTIES OF TRICHLOROETHYLENE at 25 deg.C

The following compound properties are estimated.

Type of compound	C8		
density (g/cc)	1.4		
molecular weight	131.4		
diffusion coef. water (cm2/s)	9.1e-06		
diffusion coef. air (cm2/s)	0.079		
vapor pressure (mm Hg)	75. (1.45066 psia.)		
Henry's law constant (atm-m3/mol)	0.010113	y/x= 561.844	
Reference for Henry's law: DIPPR911			
vapor pressure temp. coefficients	6.518	1018.6	192.7

The enthalpy of vaporization 92.052 cal/cc.

zero order biorate constant (mg/g-hr)	3.9
first order biorate constant (l/g-hr)	0.88
octanol water partition coefficient	2.29

solubility ppmw 1271.277
the UNIFAC activity coef. in water at 25 deg. C is 5235.239
The water solubility estimated from the activity coefficient (25 C) is 1392.262
The activity coefficient in octanol at 25 deg. C is 0.9517
UNIFAC code 2183v000000000 ; CAS code 79-01-6
The estimated vapor diffusion coefficient is .0673 cm2/s
The estimated vapor pressure is 69.008 mm Hg.

```
      Type of unit is
      1 Total water added at the unit (l/s)            0
      2 Area of openings at unit (cm2)                 0
      3 Radius of drop pipe (cm)                       0
      4 Drop length to conduit (cm)                    0
      5 Humidity of inlet air (%)                      0
      6 Temperature of air (C)                         25
      7 Drain air velocity (ft/min)                    0
      8 manhole air velocity (ft/min)                  0
      9 Conduit air velocity (ft/min)                  0
      10 Wind speed (cm/s at 10 m)                     338
      11 distance to next unit (cm)                    9144
      12 slope of underflow conduit                    .0285
      13 friction factor liquid                        .04
      14 friction factor gas                           .006
      15 radius of underflow conduit (cm)              0
      16 Underflow T (C)                               11
      17 oscillation cycle time (min)                  0
      18 design collection velocities  (ft/s)          0
      19 design branch line fraction full              0


      DETAILED CALCULATIONS at Unit 5 default
      Type: open trench
        Project C:\Users\atesfamichael\Desktop\Boeing SSFL Emission\WATER9
Models-Mean\SSFL Open Trench TCE Emission  09:40:13
      COMPOUND:

      Type of unit is open trench
      1 Description of unit                      5     default
      2 Underflow T (C)                                11
      3 Total water added at the unit (l/s)            167.5
      8 Subsurface entrance=1                          0
      9 subsurface exit =1                             0
      10 width of trench (m)                           1.58
      11 distance to next unit (cm)                    9144
      12 slope of underflow conduit                    0.0285
      13 depth  of trench (m)                          0.17
      19 pH  (enter 0 for no pH adjustment)            0

      Trench model for mass transfer from a surface.
       The effective depth of water flow (h) is 0.38091 ft.
       The water flow rate is 1.678e+05 cm3/s.
       The velocity of the flow (v)is 3.00115 ft/s.
       The width of the unit is 158. cm.
       The oxygen diffusion coefficient (ratio) adjustment factor is 0.47998.
       reareation constant(ft/day) = 21.6 * v ^ 0.67 / h ^ 0.85 * Ratio
       The liquid phase mass transfer coefficient from surface is 1.735e-04 m/s.
      The Schmidt number is 2.06545.
      The friction velocity is 9.696 m/s
      kg is estimated as 0.003709 m/s.  Model: 3
      The slope of the U drain is 0.0285
      The water velocity is 91.475 cm/s.  (3.00115 ft/s.)
      The depth of the water is 11.61 cm (4.73878 in.)
      Kl= 1.735e-04 m/s;  Kg=  3.709023E-03 m/s
      the ratio of the mass transfer to depth is  1.21215768379141E-03
      The residence time in the trench is  99.96169 sec.
      fraction emitted 0.11412
         fraction loss in waste1 drop to hub      0.
         fraction loss in waste2 drop to hub      0.
         fraction loss in waste3 drop to hub      0.
```

fraction loss in collection hub drop	0.
fraction loss in unit	0.
fraction loss in line run	0.11412
component upstream of unit, g/s	0.
mol fract. headspace upstream (y)	0.
headspace at conduit discharge, y	0.
headspace end of conduit (y)	0.
mol fract. headspace vent base	0.
headspace flow out vent (cc/s)	0.
headspace flow down line (cc/s)	0.
KG surface (m/s)	0.003709
KL surface (m/s)	1.735e-04
flow of waste down hub (l/s)	167.5
component flow in waste into unit (g/s)	1.23e-04
total component into unit, g/s	1.23e-04
TOTAL AIR EMISSIONS (g/s)	1.404e-05
(Mg/year)	4.426e-04
EMISSION FACTOR (g/cm2-s)	9.715e-12
UNIT EXIT CONCENTRATION (ppmw)	6.494e-04

WASTEWATER TREATMENT SUMMARY II 02-03-2017 09:12:21

Project C:\Users\atesfamichael\Desktop\Boeing SSFL Emission\WATER9 Models-Mean\SSFL Open Trench TCE Emission

COMPOUND	RATE (g/s)	Fraction Air	RATE (lb/day)	loading ppmw
DICHLOROETHYLENE(1,2) cis	5.41E-05	.10753	.0103	.003
TRICHLOROETHYLENE	1.40E-05	.11412	.00267	.001

TOTAL EMISSIONS ALL COMPOUNDS	6.82E-05 g/s air emissions
TOTAL EMISSIONS ALL COMPOUNDS	. Mg/yr air emissions
TOTAL LOADING	.02 Mg/yr in waste
TOTAL WATER FLOW	167.8 L/s

Attachment B-4:

Evaluation of Potential Contribution of Water Flow from the SSFL to Offsite Downstream Locations

Attachment B-4

Addendum to the Human Health Risk Assessment for Surface Water Outfalls Santa Susana Field Laboratory, Ventura County, CA

Evaluation of Potential Contribution of Water Flow from the SSFL to Offsite Downstream Locations

Introduction

This addendum to the Human Health Risk Assessment was prepared in response to comments from the Office of Environmental Health Hazard Assessment dated June 28, 2017 regarding providing additional information on potential downstream human exposures to aquatic organisms from surface water exiting the Santa Susana Field Laboratory (SSFL). In particular, this addendum addresses potential exposures to fish and the fish consumption pathway. This addendum was developed with input and in accordance with recommendations from the SSFL Surface Water Expert Panel.

While the fish consumption pathway is considered incomplete in the outfall drainage areas due to the ephemeral nature of the drainages, there could be the potential for fishing and fish consumption at offsite locations farther downstream of SSFL where water is present in sufficient quantity year-round. To evaluate this potential, available information on fishing in the Calleguas Creek and Los Angeles River watersheds was reviewed with focus on locations where fishing is more likely to occur. An analysis was conducted to determine the percent contribution of the water flow from the SSFL to the total amount received at these locations. Because the Calleguas Creek and Los Angeles River watersheds contain numerous sources of chemicals (e.g., from urban and agricultural runoff, wastewater treatment plant effluent, etc.) that cumulatively control water quality along these receiving waters, it is important to understand the relative contribution of SSFL flows compared to all other flows to these downstream locations.

Downstream and north of the SSFL outfalls in Ventura County, receiving waters include Arroyo Simi, which flows into the Arroyo Las Posas, Calleguas Creek and finally to the Pacific Ocean at Mugu Lagoon, collectively referred to as the Calleguas Creek Watershed (Figure 1). The Southern California Coastal Water Research Project (SCCWRP) performed a study of the frequency of fishing and consuming the fish caught in both Los Angeles and Ventura Counties, which included surveys of some of the waterways (SCCWRP, 2005). Data on extent of fishing were collected by censusing anglers at sites within different fishing areas (habitats) for each watershed. The survey focused on coastal terrace streams and creeks, the mouth of rivers and estuaries, urban lakes, mountain reservoirs and streams.

For the SCCWRP study, fishing areas were targeted within the Calleguas Creek Watershed, including the estuary (Mugu Bay), seven costal terrace streams (Lower Reach Calleguas Creek -- Highway 1 to confluence with Conejo Creek, Revolon Slough, Conejo Creek, Upper Reach Calleguas Creek to Conejo Creek confluence, Arroyo Simi, Fox Barranca, and Happy Camp Canyon), and one urban Lake (Rancho Simi Park Lake). A total of 22 site visits were conducted

in this watershed, with Mugu Lagoon being visited the most times (8), followed by upper Calleguas Creek (4), Lower Calleguas Creek (3), and Arroyo Simi (3). The majority of fishers observed in the study were fishing at mountain reservoirs and urban lakes with the least likely observed at coastal terrace streams.

Over the survey, seven fishers were observed along coastal terrace streams, specifically along Arroyo Simi, which begins approximately 2.5 miles from the SSFL. In addition, it is known that Rancho Simi Park Lake, a lined urban lake adjacent to the Arroyo Simi farther downstream is stocked with fish[1]. This lake was not selected for survey due to the survey design, but fishing occurs at the lake.

Downstream and south of the SSFL in the Los Angeles River Watershed, water flows intermittently through Dayton Canyon and Chatsworth Creek and Bell Canyon and Bell Creek where Bell Creek joins the Arroyo Calabasas and forms the beginning of the upper-most main stem of the Los Angeles River. Downstream of the confluence of Bell Creek and Arroyo Calabasas, the Los Angeles River receives flow from Browns Canyon, Aliso Creek and Caballero Creek, along with flows from numerous storm drain outfalls, where water then flows into the Sepulveda Basin and Sepulveda Dam Recreation Area approximately 10 miles from the SSFL (Figure 2). The lower reach of Bell Creek as well as the Los Angeles River in this area are concrete engineered channels with limited access (vertical or near vertical concrete walls and fencing to prevent access) to the Sepulveda Basin area where the river enters an area that is soft bottomed and not concrete lined. During dry weather, when fishing activity is most likely to occur, water depths in the engineered channels are typically a few inches whereas in the Sepulveda Basin depths can reach several feet. The Sepulveda Basin is a 2,150-acre open space area to collect floodwaters and is kept in a semi-natural state. Contributions to the Sepulveda Basin also include treated wastewater effluent from the Donald C. Tillman Water Reclamation Plant and several tributaries such as Bull and Haskell Creeks.

A few studies have been conducted in the Los Angeles River to evaluate the recreational use of the engineered tributaries within the watershed and to survey fish and fishers (RWQCB, 2013, LA River Expedition, 2008 and FOLAR, 2016). In 2008, a group surveyed the Los Angeles River to determine if it was possible to kayak along its length. As a part of the survey observations indicated that no recreational activity was occurring in the lower reaches of Bell Creek and the upper reaches of the Los Angeles River due to prohibited access and limited opportunities for adjacent recreational use. In addition, there is very little flow in this section of the river except for immediately following storm events. However, at the Sepulveda Basin and Sepulveda Dam Area where fishing was observed (Los Angeles River Expedition as cited in RWQCB, 2013) water flow and depth increases and there is tree cover and a soft bottom providing a habitat for fish. The Friends of the LA River (FOLAR) have been conducting studies at popular fishing locations along the Los Angeles River including the Glendale Narrows, Long Beach and the Sepulveda Basin. The Sepulveda Basin Fish Study was started in November 2015 and study results are expected in

[1] https://www.dfg.ca.gov/m/fishplantings/Details?county=Ventura&water=Rancho%20Simi%20Park%20Lake

2018. Fish have been collected as a part of the study with the majority being small (less than 1 inch) (FOLAR, 2016).

Based on the information summarized above, two locations were selected to evaluate the percent contribution of SSFL surface water flow to the overall water flow. For SSFL's northern drainages, the Arroyo Simi at the confluence with Meier Canyon was selected as the nearest location where fishing may occur. For SSFL's southern drainages, the Sepulveda Basin is the nearest location that has fishable water and was therefore selected at the most likely location where fishing could occur.

Water Flow Evaluation

An analysis was performed to determine the percent contribution of flow from the SSFL NPDES outfalls to the total flow at the analysis locations along the Arroyo Simi and Los Angeles River identified above ("analysis locations"). The first is located on Arroyo Simi at the confluence with Meier Canyon, in the Calleguas Creek watershed. The second location is on the Los Angeles River at the beginning of the Sepulveda basin (at Louise Avenue), in the Los Angeles River watershed. These analysis locations receive flow from SSFL outfalls as described below:

- Arroyo Simi
    - Outfalls 003 through 007 and 010 – stormwater runoff draining to these outfalls is typically pumped to Silvernale Pond and then discharged through Outfall 002, as noted below. However, if these storage and pumping systems reach capacity, then overflows are discharged through each outfall to drainages that flow to Arroyo Simi.
    - Outfall 009 – includes the entire Outfall 009 watershed, with the exception of runoff from the Helipad area, which is pumped to Silvernale Pond and therefore included in Outfall 002 discharge volumes, as noted below. Overflows from the Helipad continue down toward Outfall 009.
- Los Angeles River
    - Outfall 001 – also includes flow from Outfall 011[2], which includes stormwater from the Perimeter Pond upstream.
    - Outfall 002 – also includes flow from Outfall 018[3], which includes stormwater pumped to Silvernale Pond from Outfalls 003 through 007 and 010 and the Helipad, up to the systems' storage and pumping capacity.
    - Outfall 019 – this outfall represents the proposed location for discharge from the Groundwater Extraction Treatment System (GETS), for which the analysis was performed both including and not including a constant average flowrate of 60 gallons per minute (gpm).
    - Outfall 008

The drainage areas to each SSFL outfall are shown in Table 1.

[2] Outfall 015 also discharges to Outfall 011, but was discontinued.

[3] Outfall 017 also discharges to Outfall 018, but was discontinued.

Table 1. SSFL Outfall Drainage Areas

SSFL Outfall	Drainage Area (acre)
001	306
002	360
003	11
004	5.9
005	0.0016
006	12
007	3.0
008	62
009	530
010	5.1
011	297
018	540

Analysis

To perform this analysis, the total flow at the selected analysis locations was first estimated. For consistency with the HHRA, the total annual flow during the average hydrologic water year (WY) 2009/10 was determined. The drainage areas to each analysis location were first delineated, then spatial data were compiled in order to determine representative runoff coefficients (or percent of rainfall that is converted to runoff) within the drainage areas. Spatial data describing the soils within the area[4], specifically the hydrologic soil groups, in addition to the imperviousness based on the 2011 National Land Cover Database (NLCD), were used to determine runoff coefficients, as shown in the following equation (Ventura Countywide Stormwater Quality Management Program, 2011):

$$R = 0.95 \times IMP + C_p \times (1 - IMP) \quad \textbf{(1)}$$

Where,
R = runoff coefficient
IMP = impervious fraction
C_p = pervious runoff coefficient, determined based on soil type (see Table 2)

[4] Soils data for Ventura County was provided by the Ventura County Watershed Protection District and soils data for Los Angeles County was downloaded from a National Resources Conservation Service (NRCS) SSURGO database.

Table 2. Pervious Runoff Coefficients (Ventura Countywide Stormwater Quality Management Program, 2011)

Hydrologic Soil Group[5]	C_p
D	0.15
C	0.10
B	0.05
A	0

A volumetric runoff coefficient method was then used, with the total annual rainfall of 19.48 inches in 2009/10 and the drainage area sizes previously delineated, to calculate the average annual runoff volume to each analysis location, as shown in the equation below:

$$Q = \sum_{x} \frac{P}{12} \times R_{v(x)} \times A_x \qquad \textbf{(2)}$$

Where:
Q = runoff volume (ac-ft)
P = rainfall depth (in)
$R_{v(x)}$ = volumetric runoff coefficient
A_x = drainage area (ac)
x = each unique imperviousness and soil type combination

Finally, these estimated runoff volumes were calibrated to measured streamflow data (with baseflow removed[6]) from the United States Geological Survey (USGS) Los Angeles River Sepulveda Dam (# 11092450) station. The annual runoff volumes to this station were estimated using the methodology described above for each WY from 2002/03 through 2016/17[7], and a runoff volume adjustment factor was determine based on a comparison of observed and predicted runoff volumes for all WYs examined. This adjustment factor value was found to be 0.92, and the same value was applied to predicted runoff volumes for the Arroyo Simi drainage area, which did not have a nearby streamflow gauge available to allow a separate calibration.

[5] Hydrologic soil group A is defined by a high saturated hydraulic conductivity (i.e., high infiltration potential) and therefore has low runoff potential. Alternatively, hydrologic soil group D is defined by a low saturated hydraulic conductivity and therefore has a high runoff potential.

[6] Baseflow removal was performed on the measured streamflow data to extract the flow contribution from discharges such as the treated effluent from the Tillman Water Reclamation Plant, which enters the Sepulveda Basin below the analysis location but above the streamflow gauge at the dam.

[7] These WYs were used based on the availability of recent streamflow data.

Results

The drainage area to each analysis location, in addition to the total contributing drainage area from the SSFL and the percent contributing drainage area from the SSFL, are shown in Table 3.

Table 3. Drainage Area Contributions from SSFL

Location	**Drainage Area (sq. mi.)**	**Contributing Drainage Area from SSFL** (assuming pumping to Silvernale Pond is occurring) (sq. mi.)	**Contributing Drainage Area from SSFL** (assuming pumping/storage to Silvernale Pond has reached capacity) (sq. mi.)	**% of the Total Drainage Area Contributed by SSFL** (assuming pumping to Silvernale Pond is occurring)	**% of the Total Drainage Area Contributed by SSFL** (assuming pumping/storage to Silvernale Pond has reached capacity)
Arroyo Simi (Meier Canyon confluence)	32	0.83	0.89	2.6%	2.8%
LA River (Sepulveda Basin at Louise Ave)	118	2.5	2.4	2.1%	2.1%

Once calibrated total annual runoff volumes to the analysis locations were determined, the contribution from SSFL outfalls was determined by summing daily flows measured from each outfall during the 2009/10 WY (with the exception of Outfall 019, which assumed an average GETS discharge flowrate). The total flow measured from each outfall was then compared to the calibrated total estimated runoff volumes at each downstream analysis location. These results are shown in Table 4 and Figures 1 and 2. With respect to the year to year variability of these estimates, SSFL's percent flow contribution is not expected to increase much in a wet year, when SSFL and the rest of the watersheds are flowing heavily. At these times, percent flow contribution would essentially max out at the percent area contribution (i.e., 2-3%). However, in a dry year, given SSFL's low imperviousness relative to the urban areas, SSFL's percent flow contributions could drop to near zero. For example, this effectively occurred during recent drought years when SSFL's outfalls experienced very low discharge volumes and days with flow (many outfalls were without any discharge).

Table 4. Flow Contributions from SSFL

Location	Predicted Annual Runoff Volume (adjusted) (ac-ft)	Contribution from SSFL excluding OF 019 (ac-ft)	Contribution from SSFL including OF 019 (ac ft)	Percent Contribution from SSFL excluding OF 019	Percent Contribution from SSFL including OF 019
Arroyo Simi (Meier Canyon confluence)	6,300	91	91 (unaffected)	1%	N/A
LA River (Sepulveda Basin at Louise Ave)	37,000	150	250	0.4%	0.7%

Flow contributions ranged from 0.7% to 1% depending on the drainage area. To evaluate further, the percent contribution values were used to scale the outfall-specific exposure point concentrations (EPCs) that were used for the HHRA analysis to calculate theoretical contribution concentrations from the SSFL at the downstream locations where fishing may occur. The contribution concentration estimates are theoretical in nature because they only represent what may be coming for the SSFL and not actual concentrations measured downstream which would include flows and constituent concentrations commingled from all other sources within the drainage areas to these creek/river evaluation locations (e.g., from urban and agricultural runoff, wastewater treatment plant effluent, etc.). The theoretical contribution concentrations were then compared to California Toxics Rule (CTR) human health water quality criteria values for consumption of organisms, which account for bioaccumulation and addresses the fish consumption pathway.

To calculate theoretical contribution concentrations at the downstream locations, EPCs for constituents with CTR criteria from the outfalls were identified from the HHRA. For the Arroyo Simi evaluation, the EPCs from Outfall 009 were used. For the Los Angeles River evaluation, the EPCs from Outfalls 001, 002, 008, and 019 were selected. Outfalls 011 and 018 are upstream of Outfalls 001 and 002, respectively, and therefore are represented by flows and concentrations from Outfalls 001 and 002[8].

For the Los Angeles River evaluation, a volume-weighted concentration was then calculated to provide an estimate of each constituent concentration that could be present in water flowing from the Site downstream to the Los Angeles River. To calculate the volume-weighted concentration the EPC from Outfalls 001, 002, 008 and 019 were adjusted by the proportion of the total discharge

[8] Due to SSFL stormwater capture/storage and pumping practices, these Outfall 001, 002, 011, and 018 discharge samples (which are used to establish the EPCs used in the HHRA and in this Addendum analysis) also include stormwater from Outfalls 003 through 007 and 010, as well as runoff from the helipad in the Outfall 009 watershed.

volume (measured during the 2009/10 water year) from each outfall in Table 5 below. When constituents were not detected at an outfall, one-half the maximum detection limit was used to represent the constituent concentration.

Table 5. Discharge Volume Contributions from SSFL's Southern Outfalls

Outfall	Volume (gallons) in 2009/10 WY	Percent Contribution
001	7,414,530	9.2%
002	39,222,060	49%
008	2,116,495	2.6%
019	31,536,000	39%
Total	***80,289,085***	***100%***

Table 6 summarizes the EPCs for the outfalls that flow towards the Los Angeles River. These concentrations were then volume-averaged for each constituent using the percent contributions from Table 5. Table 8 summarizes the resulting single volume-averaged EPCs to represent the blended SSFL discharge to the Los Angeles River.

For TCDD-TEQ, EPCs were calculated for this evaluation using Toxicity Equivalency Factors (TEFs) and Biological Equivalency Factors (BEFs). BEFs account for the different biological uptake from the water column of the various dioxin congeners into aquatic organisms. The United States Environmental Protection Agency (USEPA) and California EPA Regional Water Quality Control Boards have incorporated the use of BEFs for dioxin-TEQ when comparing to human health water quality criteria for consumption of organisms. USEPA has stated, "TEFs and BEFs shall be used when calculating a 2,3,7,8-TCDD toxicity equivalence concentration when implementing both human health noncancer and cancer criteria." [40 CFR, Part 132, Appendix F]. TCDD-TEQ EPC concentrations were calculated using the methodology from the HHRA using the 2005 TEFs and including "j"-estimated or DNQ (detected not quantified) congener concentrations and BEFs. Table A-1 in Attachment A presents the TCDD-TEQ EPC estimates using TEFs and BEFs for the Outfalls.

Concentrations from the Site were then adjusted by the drainage contributions presented in Table 4 to calculate theoretical contribution concentrations that may be present at the downstream locations where fishing may occur (Tables 7 and 8).

All theoretical contribution concentration estimates for the Arroyo Simi and Los Angeles River were below their applicable CTR criteria values (Tables 7 and 8). This comparison is considered conservative given the conservative nature of the CTR criteria derivation (assuming frequent fish consumption) as opposed to potential exposure from outfall discharges which would occur for only a few weeks each year, primarily during the winter months. Furthermore, bioaccumulation based human health criteria are based on equilibrium assumptions, where water and tissue are exposed over long, continuous durations, which is vastly different from and more conservative than the

episodic and shorter duration occurrence of stormflows from SSFL to the downstream fishable reaches. Therefore, equilibrium bioaccumulation is never expected to be achieved within fish-stormwater exposure timeframes.

Conclusions

Based on the review of available information on fishing in the Calleguas Creek and Los Angeles River watersheds, two locations were selected for evaluation where fishing may occur. For SSFL's northern drainages, the Arroyo Simi at the confluence with Meier Canyon approximately 2.5 miles from the SSFL was selected as the nearest location where fishing may occur. For SSFL's southern drainages, the Sepulveda Basin approximately 10 miles from the SSFL was selected as the nearest location where fishing may occur. As shown in Table 4, estimated flow contributions from SSFL at these downstream analysis locations are *de minimis*, with ≥ 99% of these wet weather flows being from stormwater runoff from other urban and undeveloped areas. As shown in Tables 7 and 8, theoretical contribution concentrations based on the outfall EPCs and flow contributions were below the CTR criteria for human consumption of aquatic organisms. Based on the evaluation, the contribution of water flow from the SSFL to water quality at these locations is considered insignificant and would not adversely impact potential fishing activities.

References

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Southern California Coastal Research Project (SCCRP), 2005. Extent of Fishing and Fish Consumption by Fishers in Ventura and Los Angeles County Watersheds in 2005. Technical Report 574 – September 2008.

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George Wolfe, 2008. Los Angeles River Expedition – A Watershed Moment. September 2008 (as cited in LARWQCB, 2013).

FIGURES

N

Calleguas Creek Watershed

At the designated location on Arroyo Simi:

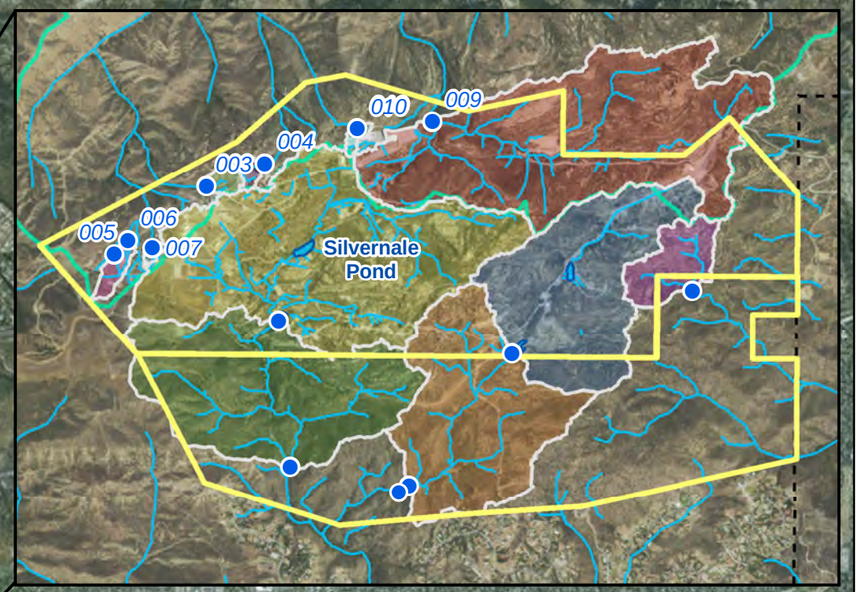
Drainage Area: **31.9 sq. miles**

Approx. contribution from SSFL: **1%**

Arroyo Simi

Meier Canyon

Rancho Simi Lake Park



Legend

- Analysis Location
- Arroyo Simi Drainage Area
- Major Watershed
- SSFL Property Boundary
- Channel
- County Boundary
- NPDES Outfall
- SSFL Watershed

SSFL Flow Contribution to Arroyo Simi

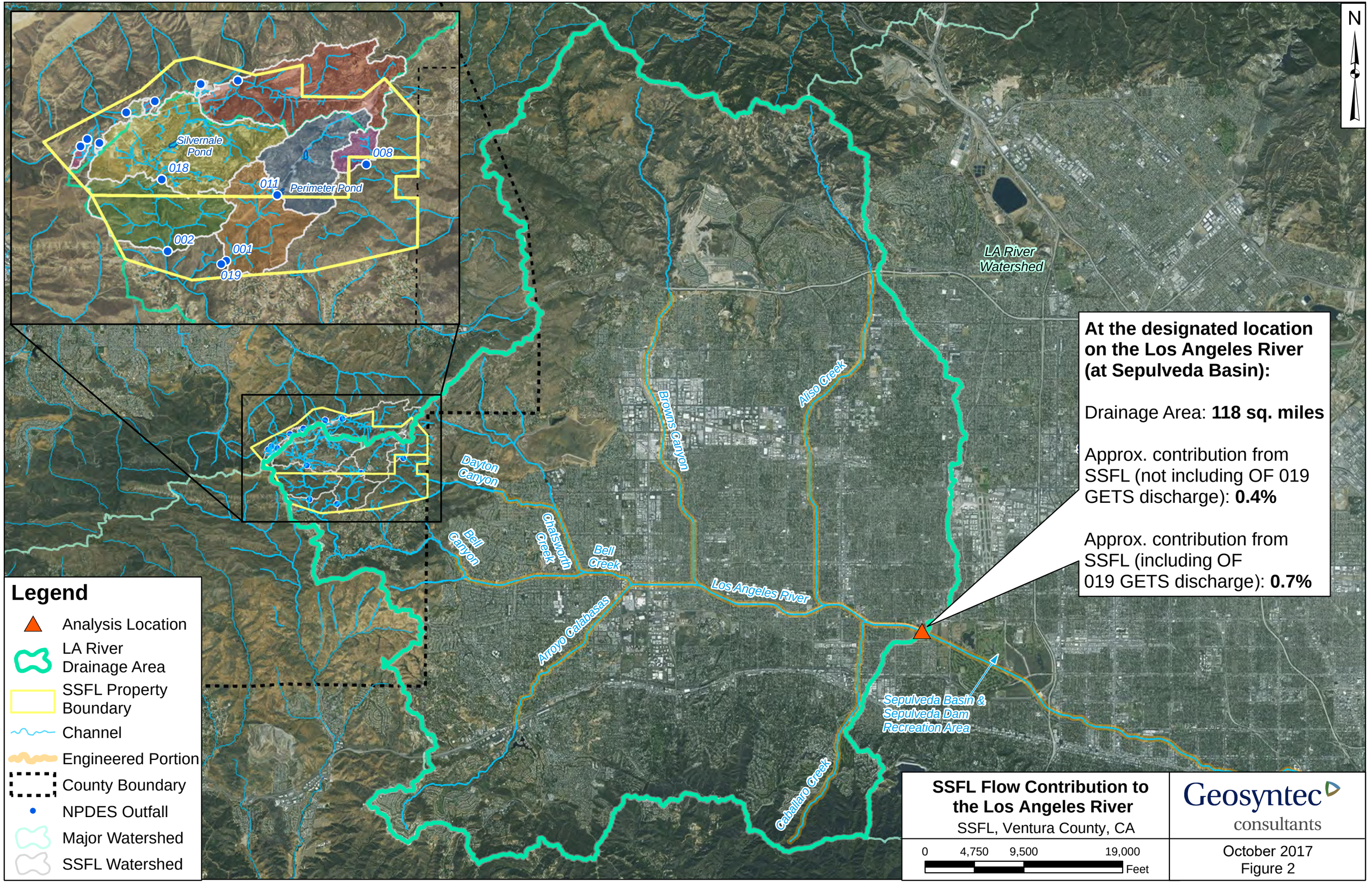
SSFL, Ventura County, CA

0 3,000 6,000 12,000 Feet

Geosyntec consultants

October 2017
Figure 1

Date: 9/22/2017, Path: Z:\GIS\Projects\Boeing\SSFL\2017 LA0406\HHRA_Flow_Analysis\HHRA_Flow_ArroyoSimi_20170922(2).mxd, User: SIsaac


N
Silvernale Pond
018
008
011
Perimeter Pond
002
001
019
LA River Watershed
Browns Canyon
Aliso Creek
Dayton Canyon
Chatsworth Creek
Bell Canyon
Bell Creek
Los Angeles River
Arroyo Calabasas
Sepulveda Basin & Sepulveda Dam Recreation Area
Caballero Creek
At the designated location on the Los Angeles River (at Sepulveda Basin):
Drainage Area: 118 sq. miles
Approx. contribution from SSFL (not including OF 019 GETS discharge): 0.4%
Approx. contribution from SSFL (including OF 019 GETS discharge): 0.7%
Legend
Analysis Location
LA River Drainage Area
SSFL Property Boundary
Channel
Engineered Portion
County Boundary
NPDES Outfall
Major Watershed
SSFL Watershed
SSFL Flow Contribution to the Los Angeles River
SSFL, Ventura County, CA
0 4,750 9,500 19,000
Feet
Geosyntec consultants
October 2017
Figure 2
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TABLES

Table 6
Concentrations from Outfalls 001, 002, 008 and 019 used in Flow-Volume Weighted Concentration

Analyte	Outfall	Outfall Concentration
2,3,7,8-TCDD TEQ [(1)]	001	9.3E-07
2,3,7,8-TCDD TEQ [(1)]	002	7.7E-08
2,3,7,8-TCDD TEQ [(1)]	008	2.6E-06
2,3,7,8-TCDD TEQ [(1)]	019	2.9E-06
Antimony	001	0.45
Antimony	002	0.3
Antimony	008	0.442
Antimony	019	0.15
Bis(2-ethylhexyl) phthalate	001	0.805
Bis(2-ethylhexyl) phthalate	002	1.005
Bis(2-ethylhexyl) phthalate	008	1.87
Bis(2-ethylhexyl) phthalate	019	3.29
Cyanide Anion	001	1.5
Cyanide Anion	002	1.5
Cyanide Anion	008	8.7
Cyanide Anion	019	1.5
Diethyl phthalate	001	0.226
Diethyl phthalate	002	0.245
Diethyl phthalate	008	0.166
Diethyl phthalate	019	0.226
Mercury	001	0.05
Mercury	002	0.032
Mercury	008	0.029
Mercury	019	0.05
Mercury (dissolved)	001	0.05
Mercury (dissolved)	002	0.03
Mercury (dissolved)	008	0.16
Mercury (dissolved)	019	0.23
Nickel	001	12
Nickel	002	8.3
Nickel	008	20
Nickel	019	2.9
Pentachlorophenol	001	1.5
Pentachlorophenol	002	0.505
Pentachlorophenol	008	1.685
Pentachlorophenol	019	8.3

Table 6
Concentrations from Outfalls 001, 002, 008 and 019 used in Flow-Volume Weighted Concentration

Analyte	Outfall	Outfall Concentration
Thallium (dissolved)	001	0.5
Thallium (dissolved)	002	0.25
Thallium (dissolved)	008	1.2
Thallium (dissolved)	019	0.1
Trichloroethene (TCE)	001	0.13
Trichloroethene (TCE)	002	0.733
Trichloroethene (TCE)	008	0.13
Trichloroethene (TCE)	019	0.13

(1) TCDD-TEQ values calculated using:
a. Detected Not Quantified (DNQ) estimated concentrations below the reported limit
b. 2005 Toxicity Equivalency Factors (TEFs)
c. Bioequivalency Factors (BEFs)
TEQ - Toxicity Equivalents
All Concentrations in µg/L

Table 7
Theoretical Contribution Concentrations for Arroyo Simi Compared to California Toxics Rule Criteria

CAS Number	Analyte	Outfall EPC	Theoretical Contribution Concentation	CTR [(1)]	Above CTR?
1746-01-6	2,3,7,8-TCDD TEQ	6.8E-07	6.8E-09	1.4E-08	No
7440-36-0	Antimony	0.813	0.00813	4300	No
7440-36-0	Antimony (dissolved)	0.795	0.00795	4300	No
117-81-7	Bis(2-ethylhexyl) phthalate	10.6	0.106	5.9	No
84-66-2	Diethyl phthalate	0.257	0.00257	120000	No
7439-97-6	Mercury	0.11	0.0011	0.051	No
7440-02-0	Nickel	6.17	0.0617	4600	No
7440-02-0	Nickel (dissolved)	2	0.02	4600	No
87-86-5	Pentachlorophenol	1.46	0.0146	8.2	No
7440-28-0	Thallium	0.43	0.0043	6.3	No
7440-28-0	Thallium (dissolved)	0.29	0.0029	6.3	No

Notes:
CTR - California Toxics Rule
TEQ - dioxin-toxicity equivalents
EPC - Exposure Point Concentration
DNQ - Detected Not Quantified
(1) Criteria for Human Consumption of Aquatic Organisms
All Concentrations in micrograms per liter (µg/L)

Table 8

Theoretical Contribution Concentrations for Los Angeles River Compared to California Toxics Rule Criteria

CAS Number	Analyte	Outfall EPC (volume-weighted)	Theoretical Contribution Concentation	CTR [(1)]	Above CTR?
1746-01-6	2,3,7,8-TCDD TEQ	1.3E-06	9.3E-09	1.4E-08	No
7440-36-0	Antimony	0.33	0.0023	4300	No
117-81-7	Bis(2-ethylhexyl) phthalate	2.3	0.016	5.9	No
57-12-5	Cyanide Anion	8.7	0.061	220000	No
84-66-2	Diethyl phthalate	0.23	0.0016	120000	No
7439-97-6	Mercury	0.045	0.00032	0.051	No
7439-97-6	Mercury (dissolved)	0.12	0.00084	0.051	No
7440-02-0	Nickel	6.8	0.048	4600	No
87-86-5	Pentachlorophenol	1.5	0.011	8.2	No
7440-28-0	Thallium (dissolved)	0.29	0.0020	6.3	No
79-01-6	Trichloroethene (TCE)	0.73	0.0051	81	No

Notes:

CTR - California Toxics Rule

TEQ - dioxin-toxicity equivalents

EPC - Exposure Point Concentration

DNQ - Detected Not Quantified

(1) Criteria for Human Consumption of Aquatic Organisms

All Concentrations in micrograms per liter (µg/L)

ATTACHMENT A-1

Table A-1
TCDD-TEQ Exposure Point Concentrations

Outfall	Dioxin TEQ with 2005 TEF and BEF, DNQ Included	
	EPC Value (µg/L)	EPC Type
001	9.3E-07	Maximum Detected Value
002	7.7E-08	95% Student's-t UCL (1)
008	2.6E-06	Maximum Detected Value
009	6.8E-07	95% Adjusted Gamma UCL (1)
019	2.9E-06	Maximum Detected Value

Notes:

(1) Data sufficient for 95 percent Upper Confidence Limit (UCL) calculation

CTR - California Toxics Rule (criteria for human consumption of aquatic organisms)

TEQ - dioxin-toxicity equivalents

TEF - toxicity equivalency factor

BEF - bioaccumulation equivalency factor

EPC - Exposure Point Concentration

DNQ - Detected Not Quantified

µg/L - microgram per liter

UCL Statistics for Uncensored Full Data Sets

User Selected Options	
Date/Time of Computation	ProUCL 5.110/5/2017 3:19:48 PM
From File	qryHLE_UCL_Calc_Input_030_ProUCL_Ready_Take2.xls
Full Precision	OFF
Confidence Coefficient	95%
Number of Bootstrap Operations	2000

Result (water, storm;outfall 002;dioxin teq with bef, human/mammal

General Statistics

Total Number of Observations	11	Number of Distinct Observations	11
		Number of Missing Observations	0
Minimum	5.280E-11	Mean	4.6563E-8
Maximum	1.8190E-7	Median	3.0660E-8
SD	5.4928E-8	Std. Error of Mean	1.6561E-8
Coefficient of Variation	N/A	Skewness	1.69

Normal GOF Test

Shapiro Wilk Test Statistic	0.817	**Shapiro Wilk GOF Test**
5% Shapiro Wilk Critical Value	0.85	Data Not Normal at 5% Significance Level
Lilliefors Test Statistic	0.219	**Lilliefors GOF Test**
5% Lilliefors Critical Value	0.251	Data appear 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	7.6580E-8	95% Adjusted-CLT UCL (Chen-1995)	8.2819E-8
		95% Modified-t UCL (Johnson-1978)	7.7986E-8

Gamma GOF Test

A-D Test Statistic	0.275	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.785	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.156	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.27	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.481	k star (bias corrected MLE)	0.41
Theta hat (MLE)	9.6839E-8	Theta star (bias corrected MLE)	1.1349E-7
nu hat (MLE)	10.58	nu star (bias corrected)	9.027
MLE Mean (bias corrected)	4.6563E-8	MLE Sd (bias corrected)	7.2693E-8
		Approximate Chi Square Value (0.05)	3.343
Adjusted Level of Significance	0.0278	Adjusted Chi Square Value	2.804

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50))	1.2573E-7	95% Adjusted Gamma UCL (use when n<50)	1.4991E-7

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.858	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.85	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.24	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.251	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-23.66	Mean of logged Data	-18.21
Maximum of Logged Data	-15.52	SD of logged Data	2.54

Assuming Lognormal Distribution

95% H-UCL	5.3279E-5	90% Chebyshev (MVUE) UCL	4.7360E-7
95% Chebyshev (MVUE) UCL	6.2307E-7	97.5% Chebyshev (MVUE) UCL	8.3053E-7
99% Chebyshev (MVUE) UCL	1.2380E-6		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	7.3804E-8	95% Jackknife UCL	7.6580E-8
95% Standard Bootstrap UCL	7.2840E-8	95% Bootstrap-t UCL	9.7377E-8
95% Hall's Bootstrap UCL	1.2176E-7	95% Percentile Bootstrap UCL	7.4408E-8
95% BCA Bootstrap UCL	8.2728E-8		
90% Chebyshev(Mean, Sd) UCL	9.6247E-8	95% Chebyshev(Mean, Sd) UCL	1.1875E-7
97.5% Chebyshev(Mean, Sd) UCL	1.4999E-7	99% Chebyshev(Mean, Sd) UCL	2.1135E-7

Suggested UCL to Use

95% Student's-t UCL 7.6580E-8

When a data set follows an approximate (e.g., normal) distribution passing one of the GOF test
When applicable, it is suggested to use a UCL based upon a distribution (e.g., gamma) passing both GOF tests in ProUCL

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.

Result (water, storm;outfall 009;dioxin teq with bef, human/mammal

General Statistics

Total Number of Observations	38	Number of Distinct Observations	37
		Number of Missing Observations	0
Minimum	3.360E-11	Mean	3.6975E-7
Maximum	2.3600E-6	Median	5.1980E-8
SD	6.8200E-7	Std. Error of Mean	1.1063E-7
Coefficient of Variation	N/A	Skewness	2.175

Normal GOF Test

Shapiro Wilk Test Statistic	0.586	**Shapiro Wilk GOF Test**	
5% Shapiro Wilk Critical Value	0.938	Data Not Normal at 5% Significance Level	
Lilliefors Test Statistic	0.296	**Lilliefors GOF Test**	
5% Lilliefors Critical Value	0.142	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	5.5640E-7	95% Adjusted-CLT UCL (Chen-1995)	5.9345E-7
		95% Modified-t UCL (Johnson-1978)	5.6291E-7

Gamma GOF Test

A-D Test Statistic	0.649	**Anderson-Darling Gamma GOF Test**
5% A-D Critical Value	0.86	Detected data appear Gamma Distributed at 5% Significance Level
K-S Test Statistic	0.118	**Kolmogorov-Smirnov Gamma GOF Test**
5% K-S Critical Value	0.156	Detected data appear Gamma Distributed at 5% Significance Level

Detected data appear Gamma Distributed at 5% Significance Level

Gamma Statistics

k hat (MLE)	0.295	k star (bias corrected MLE)	0.289
Theta hat (MLE)	1.2549E-6	Theta star (bias corrected MLE)	1.2798E-6
nu hat (MLE)	22.39	nu star (bias corrected)	21.96
MLE Mean (bias corrected)	3.6975E-7	MLE Sd (bias corrected)	6.8789E-7
		Approximate Chi Square Value (0.05)	12.31
Adjusted Level of Significance	0.0434	Adjusted Chi Square Value	12.01

Assuming Gamma Distribution

95% Approximate Gamma UCL (use when n>=50)	6.5972E-7	95% Adjusted Gamma UCL (use when n<50)	6.7620E-7

Lognormal GOF Test

Shapiro Wilk Test Statistic	0.951	**Shapiro Wilk Lognormal GOF Test**
5% Shapiro Wilk Critical Value	0.938	Data appear Lognormal at 5% Significance Level
Lilliefors Test Statistic	0.102	**Lilliefors Lognormal GOF Test**
5% Lilliefors Critical Value	0.142	Data appear Lognormal at 5% Significance Level

Data appear Lognormal at 5% Significance Level

Lognormal Statistics

Minimum of Logged Data	-24.12	Mean of logged Data	-17.16
Maximum of Logged Data	-12.96	SD of logged Data	2.881

Assuming Lognormal Distribution

95% H-UCL	2.5058E-5	90% Chebyshev (MVUE) UCL	4.3973E-6
95% Chebyshev (MVUE) UCL	5.7381E-6	97.5% Chebyshev (MVUE) UCL	7.5992E-6
99% Chebyshev (MVUE) UCL	1.1255E-5		

Nonparametric Distribution Free UCL Statistics

Data appear to follow a Discernible Distribution at 5% Significance Level

Nonparametric Distribution Free UCLs

95% CLT UCL	5.5173E-7	95% Jackknife UCL	5.5640E-7
95% Standard Bootstrap UCL	5.4702E-7	95% Bootstrap-t UCL	6.4402E-7
95% Hall's Bootstrap UCL	5.5565E-7	95% Percentile Bootstrap UCL	5.5853E-7
95% BCA Bootstrap UCL	5.9807E-7		
90% Chebyshev(Mean, Sd) UCL	7.0166E-7	95% Chebyshev(Mean, Sd) UCL	8.5200E-7
97.5% Chebyshev(Mean, Sd) UCL	1.0607E-6	99% Chebyshev(Mean, Sd) UCL	1.4706E-6

Suggested UCL to Use

95% Adjusted Gamma UCL	6.7620E-7

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.

APPENDIX C

EPA RSL Online Calculator Output for Chemicals for Site-Specific Recreational User Exposure Scenario – Surface Water

OUTFALL 001

Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	3
EF_{rec-c} (exposure frequency - child) day/year	3
EF_{rec-a} (exposure frequency - adult) day/year	3
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	3
EF_{6-16} (mutagenic exposure frequency) day/year	3
EF_{16-30} (mutagenic exposure frequency) day/year	3
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

Output generated 28SEP2016:17:17:57

Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.025
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.059
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	6422.4
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	14743.2
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

Site-specific

Recreator Screening Levels (RSL) for Surface Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?
TCDD, 2,3,7,8-	1746-01-6	No	Yes	Organics	1.30E+05	U	7.00E-10	U	-		1	0.808	321.98	0.5	No

Chemical	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$	$DA_{event\ (nc\ adult)}$	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
TCDD, 2,3,7,8-	-	-	-	7.86E-03	-	7.86E-03	7.98E-02	-	7.98E-02	4.26E-01	-	4.26E-01	7.86E-03 ca*

Output generated 28SEP2016:17:17:57

Site-specific

Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$
TCDD, 2,3,7,8-	Organics	1.30E+05	U	7.00E-10	U	-		1	0.808	321.98	0.5	No	-	-
*Total Risk/HI		-		-		-		-	-	-	-		-	-

Chemical	$DA_{event\ (nc\ adult)}$	Concentration (ug/L)	Ingestion Risk	Dermal Risk	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
TCDD, 2,3,7,8-	-	0.00000227	2.89E-10	-	2.89E-10	2.84E-05	-	2.84E-05	5.33E-06	-	5.33E-06
*Total Risk/HI	-		2.89E-10	-	2.89E-10	2.84E-05	-	2.84E-05	5.33E-06	-	5.33E-06

Output generated 28SEP2016:17:17:57

Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	6
EF_{rec-c} (exposure frequency - child) day/year	6
EF_{rec-a} (exposure frequency - adult) day/year	6
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	6
EF_{6-16} (mutagenic exposure frequency) day/year	6
EF_{16-30} (mutagenic exposure frequency) day/year	6
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

Output generated 11JAN2017:17:44:13

Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.05
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.117
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	12844.8
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	29486.4
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

Output generated 11JAN2017:17:44:13

Site-specific

Recreator Screening Levels (RSL) for Surface Water

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; E = see user guide Section 2.3.5; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide)

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?
TCDD, 2,3,7,8-	1746-01-6	No	Yes	Organics	1.30E+05	U	7.00E-10	U	-		1	0.808	322	0.5	No

Chemical	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$	$DA_{event\ (nc\ adult)}$	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
TCDD, 2,3,7,8-	-	-	-	3.93E-03	-	3.93E-03	3.99E-02	-	3.99E-02	2.13E-01	-	2.13E-01	3.93E-03 ca*

Output generated 11JAN2017:17:44:13

Site-specific

Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$
TCDD, 2,3,7,8-	Organics	1.30E+05	U	7.00E-10	U	-		1	0.808	322	0.5	No	-	-
*Total Risk/HI		-		-		-		-	-	-	-		-	-

Chemical	$DA_{event\ (nc\ adult)}$	Concentration (ug/L)	Ingestion Risk	Dermal Risk	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
TCDD, 2,3,7,8-	-	0.00000227	5.77E-10	-	5.77E-10	5.69E-05	-	5.69E-05	1.07E-05	-	1.07E-05
*Total Risk/HI	-		5.77E-10	-	5.77E-10	5.69E-05	-	5.69E-05	1.07E-05	-	1.07E-05

Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	3
EF_{rec-c} (exposure frequency - child) day/year	3
EF_{rec-a} (exposure frequency - adult) day/year	3
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	3
EF_{6-16} (mutagenic exposure frequency) day/year	3
EF_{16-30} (mutagenic exposure frequency) day/year	3
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.025
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.059
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	6422.4
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	14743.2
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

Site-specific

Recreator Screening Levels (RSL) for Surface Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref
Aluminum	7429-90-5	No	No	Inorganics	-		1.00E+00	U	-	
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		4.00E-04	U	-	
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	9.50E+00	U	3.50E-06	U	-	
Barium	7440-39-3	No	No	Inorganics	-		2.00E-01	U	-	
Boron And Borates Only	7440-42-8	No	No	Inorganics	-		2.00E-01	U	-	
Cadmium (Water)	7440-43-9	No	No	Inorganics	-		5.00E-04	U	-	
Chromium, Total	7440-47-3	No	No	Inorganics	-		1.50E+00	U	-	
Cobalt	7440-48-4	No	No	Inorganics	-		3.00E-04	U	-	
Copper	7440-50-8	No	No	Inorganics	-		4.00E-02	U	-	
Dibutyl Phthalate	84-74-2	No	No	Organics	-		1.00E-01	U	-	
Diethyl Phthalate	84-66-2	No	No	Organics	-		8.00E-01	U	-	
Fluoride	16984-48-8	No	No	Inorganics	-		4.00E-02	U	-	
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		2.40E-02	U	-	
Nickel Soluble Salts	7440-02-0	No	No	Inorganics	-		1.10E-02	U	-	
Nitrate	14797-55-8	No	No	Inorganics	-		1.60E+00	U	-	
Nitrate + Nitrite (as N)	NA	No	No	Inorganics	-		1.60E+00	U	-	
Pentachlorophenol	87-86-5	No	No	Organics	8.10E-02	U	5.00E-03	U	-	
Perchlorate and Perchlorate Salts	14797-73-0	No	No	Inorganics	-		7.00E-04	U	-	
Selenium	7782-49-2	No	No	Inorganics	-		5.00E-03	U	-	
Vanadium and Compounds	7440-62-2	No	No	Inorganics	-		5.04E-03	U	-	
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		3.00E-01	U	-	

Site-specific

Recreator Screening Levels (RSL) for Surface Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	DA_{event} (nc child)	DA_{event} (nc adult)	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)
Aluminum	1	0.001	26.982	1	Yes	-	769.06869	1613.6163	-	-
Antimony (metallic)	0.15	0.001	124.77	1	Yes	-	0.0461441	0.096817	-	-
Arsenic, Inorganic	1	0.001	77.946	1	Yes	0.0004188	0.0026917	0.0056477	1.08E+02	2.09E+02
Barium	0.07	0.001	139.36	1	Yes	-	10.766962	22.590628	-	-
Boron And Borates Only	1	0.001	13.84	1	Yes	-	153.81374	322.72325	-	-
Cadmium (Water)	0.05	0.001	112.4	1	Yes	-	0.0192267	0.0403404	-	-
Chromium, Total	0.013	0.001	51.996	1	Yes	-	14.996839	31.465517	-	-
Cobalt	1	0.0004	58.93	1	Yes	-	0.2307206	0.4840849	-	-
Copper	1	0.001	63.546	1	Yes	-	30.762748	64.544651	-	-
Dibutyl Phthalate	1	0.042	278.35	0.9	Yes	-	76.906869	161.36163	-	-
Diethyl Phthalate	1	0.0036	222.24	1	Yes	-	615.25495	1290.893	-	-
Fluoride	1	0.001	38	1	Yes	-	30.762748	64.544651	-	-
Manganese (Non-diet)	0.04	0.001	54.938	1	Yes	-	0.7383059	1.5490716	-	-
Nickel Soluble Salts	0.04	0.0002	58.71	1	Yes	-	0.3383902	0.7099912	-	-
Nitrate	1	0.001	62	1	Yes	-	1230.5099	2581.786	-	-
Nitrate + Nitrite (as N)	1	0.001	-	0	Yes	-	1230.5099	2581.786	-	-
Pentachlorophenol	1	0.127	266.34	0.9	Yes	0.0491144	3.8453434	8.0680813	1.26E+04	6.09E+01
Perchlorate and Perchlorate Salts	1	0.001	117.49	1	Yes	-	0.5383481	1.1295314	-	-
Selenium	1	0.001	78.96	1	Yes	-	3.8453434	8.0680813	-	-
Vanadium and Compounds	0.026	0.001	50.94	1	Yes	-	0.1007788	0.2114483	-	-
Zinc and Compounds	1	0.0006	65.37	1	Yes	-	230.72061	484.08488	-	-

Site-specific

Recreator Screening Levels (RSL) for Surface Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
Aluminum	-	1.14E+08	3.85E+08	8.80E+07	6.08E+08	8.07E+08	3.47E+08	8.80E+07 nc
Antimony (metallic)	-	4.56E+04	2.31E+04	1.53E+04	2.43E+05	4.84E+04	4.04E+04	1.53E+04 nc
Arsenic, Inorganic	7.11E+01	3.99E+02	1.35E+03	3.08E+02	2.13E+03	2.82E+03	1.21E+03	7.11E+01 ca**
Barium	-	2.28E+07	5.38E+06	4.36E+06	1.22E+08	1.13E+07	1.03E+07	4.36E+06 nc
Boron And Borates Only	-	2.28E+07	7.69E+07	1.76E+07	1.22E+08	1.61E+08	6.94E+07	1.76E+07 nc
Cadmium (Water)	-	5.70E+04	9.61E+03	8.23E+03	3.04E+05	2.02E+04	1.89E+04	8.23E+03 nc
Chromium, Total	-	1.71E+08	7.50E+06	7.18E+06	9.13E+08	1.57E+07	1.55E+07	7.18E+06 nc
Cobalt	-	3.42E+04	2.88E+05	3.06E+04	1.83E+05	6.05E+05	1.40E+05	3.06E+04 nc
Copper	-	4.56E+06	1.54E+07	3.52E+06	2.43E+07	3.23E+07	1.39E+07	3.52E+06 nc
Dibutyl Phthalate	-	1.14E+07	2.67E+05	2.61E+05	6.08E+07	5.60E+05	5.55E+05	2.61E+05 nc
Diethyl Phthalate	-	9.13E+07	3.22E+07	2.38E+07	4.87E+08	6.75E+07	5.93E+07	2.38E+07 nc
Fluoride	-	4.56E+06	1.54E+07	3.52E+06	2.43E+07	3.23E+07	1.39E+07	3.52E+06 nc
Manganese (Non-diet)	-	2.74E+06	3.69E+05	3.25E+05	1.46E+07	7.75E+05	7.36E+05	3.25E+05 nc
Nickel Soluble Salts	-	1.25E+06	8.46E+05	5.05E+05	6.69E+06	1.77E+06	1.40E+06	5.05E+05 nc
Nitrate	-	1.83E+08	6.15E+08	1.41E+08	9.73E+08	1.29E+09	5.55E+08	1.41E+08 nc
Nitrate + Nitrite (as N)	-	1.83E+08	6.15E+08	1.41E+08	9.73E+08	1.29E+09	5.55E+08	1.41E+08 nc
Pentachlorophenol	6.06E+01	5.70E+05	4.77E+03	4.73E+03	3.04E+06	1.00E+04	9.97E+03	6.06E+01 ca*
Perchlorate and Perchlorate Salts	-	7.98E+04	2.69E+05	6.16E+04	4.26E+05	5.65E+05	2.43E+05	6.16E+04 nc
Selenium	-	5.70E+05	1.92E+06	4.40E+05	3.04E+06	4.03E+06	1.73E+06	4.40E+05 nc
Vanadium and Compounds	-	5.75E+05	5.04E+04	4.63E+04	3.07E+06	1.06E+05	1.02E+05	4.63E+04 nc
Zinc and Compounds	-	3.42E+07	1.92E+08	2.90E+07	1.83E+08	4.03E+08	1.26E+08	2.90E+07 nc

Site-specific

Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$
Aluminum	Inorganics	-		1.00E+00	U	-		1	0.001	26.982	1	Yes	-	769.06869
Antimony (metallic)	Inorganics	-		4.00E-04	U	-		0.15	0.001	124.77	1	Yes	-	0.0461441
Arsenic, Inorganic	Inorganics	9.50E+00	U	3.50E-06	U	-		1	0.001	77.946	1	Yes	0.0004188	0.0026917
Barium	Inorganics	-		2.00E-01	U	-		0.07	0.001	139.36	1	Yes	-	10.766962
Boron And Borates Only	Inorganics	-		2.00E-01	U	-		1	0.001	13.84	1	Yes	-	153.81374
Cadmium (Water)	Inorganics	-		5.00E-04	U	-		0.05	0.001	112.4	1	Yes	-	0.0192267
Chromium, Total	Inorganics	-		1.50E+00	U	-		0.013	0.001	51.996	1	Yes	-	14.996839
Cobalt	Inorganics	-		3.00E-04	U	-		1	0.0004	58.93	1	Yes	-	0.2307206
Copper	Inorganics	-		4.00E-02	U	-		1	0.001	63.546	1	Yes	-	30.762748
Dibutyl Phthalate	Organics	-		1.00E-01	U	-		1	0.042	278.35	0.9	Yes	-	76.906869
Diethyl Phthalate	Organics	-		8.00E-01	U	-		1	0.0036	222.24	1	Yes	-	615.25495
Fluoride	Inorganics	-		4.00E-02	U	-		1	0.001	38	1	Yes	-	30.762748
Manganese (Non-diet)	Inorganics	-		2.40E-02	U	-		0.04	0.001	54.938	1	Yes	-	0.7383059
Nickel Soluble Salts	Inorganics	-		1.10E-02	U	-		0.04	0.0002	58.71	1	Yes	-	0.3383902
Nitrate	Inorganics	-		1.60E+00	U	-		1	0.001	62	1	Yes	-	1230.5099
Nitrate + Nitrite (as N)	Inorganics	-		1.60E+00	U	-		1	0.001	-	0	Yes	-	1230.5099
Pentachlorophenol	Organics	8.10E-02	U	5.00E-03	U	-		1	0.127	266.34	0.9	Yes	0.0491144	3.8453434
Perchlorate and Perchlorate Salts	Inorganics	-		7.00E-04	U	-		1	0.001	117.49	1	Yes	-	0.5383481
Selenium	Inorganics	-		5.00E-03	U	-		1	0.001	78.96	1	Yes	-	3.8453434
Vanadium and Compounds	Inorganics	-		5.04E-03	U	-		0.026	0.001	50.94	1	Yes	-	0.1007788
Zinc and Compounds	Inorganics	-		3.00E-01	U	-		1	0.0006	65.37	1	Yes	-	230.72061
**Total Risk/HI*		-		-		-		-	-	-	-		-	-

Site-specific

Recreator Risk for Surface Water

Chemical	DA_{event} (nc adult)	Concentration (ug/L)	Ingestion Risk	Dermal Risk	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
Aluminum	1613.6163	11000.000	-	-	-	9.64E-05	2.86E-05	1.25E-04	1.81E-05	1.36E-05	3.17E-05
Antimony (metallic)	0.096817	0.450	-	-	-	9.86E-06	1.95E-05	2.94E-05	1.85E-06	9.30E-06	1.11E-05
Arsenic, Inorganic	0.0056477	7.900	7.34E-08	3.77E-08	1.11E-07	1.98E-02	5.87E-03	2.57E-02	3.71E-03	2.80E-03	6.51E-03
Barium	22.590628	110.000	-	-	-	4.82E-06	2.04E-05	2.53E-05	9.04E-07	9.74E-06	1.06E-05
Boron And Borates Only	322.72325	52.000	-	-	-	2.28E-06	6.76E-07	2.96E-06	4.27E-07	3.22E-07	7.50E-07
Cadmium (Water)	0.0403404	0.270	-	-	-	4.73E-06	2.81E-05	3.28E-05	8.88E-07	1.34E-05	1.43E-05
Chromium, Total	31.465517	15.000	-	-	-	8.77E-08	2.00E-06	2.09E-06	1.64E-08	9.53E-07	9.70E-07
Cobalt	0.4840849	5.000	-	-	-	1.46E-04	1.73E-05	1.63E-04	2.74E-05	8.26E-06	3.57E-05
Copper	64.544651	14.300	-	-	-	3.13E-06	9.30E-07	4.06E-06	5.88E-07	4.43E-07	1.03E-06
Dibutyl Phthalate	161.36163	0.396	-	-	-	3.47E-08	1.48E-06	1.52E-06	6.51E-09	7.08E-07	7.14E-07
Diethyl Phthalate	1290.893	0.226	-	-	-	2.48E-09	7.02E-09	9.50E-09	4.64E-10	3.35E-09	3.81E-09
Fluoride	64.544651	220.000	-	-	-	4.82E-05	1.43E-05	6.25E-05	9.04E-06	6.82E-06	1.59E-05
Manganese (Non-diet)	1.5490716	400.000	-	-	-	1.46E-04	1.08E-03	1.23E-03	2.74E-05	5.16E-04	5.44E-04
Nickel Soluble Salts	0.7099912	12.000	-	-	-	9.56E-06	1.42E-05	2.37E-05	1.79E-06	6.76E-06	8.55E-06
Nitrate	2581.786	1400.000	-	-	-	7.67E-06	2.28E-06	9.95E-06	1.44E-06	1.08E-06	2.52E-06
Nitrate + Nitrite (as N)	2581.786	1400.000	-	-	-	7.67E-06	2.28E-06	9.95E-06	1.44E-06	1.08E-06	2.52E-06
Pentachlorophenol	8.0680813	1.500	1.19E-10	2.46E-08	2.48E-08	2.63E-06	3.15E-04	3.17E-04	4.93E-07	1.50E-04	1.50E-04
Perchlorate and Perchlorate Salts	1.1295314	1.400	-	-	-	1.75E-05	5.20E-06	2.27E-05	3.29E-06	2.48E-06	5.77E-06
Selenium	8.0680813	1.300	-	-	-	2.28E-06	6.76E-07	2.96E-06	4.27E-07	3.22E-07	7.50E-07
Vanadium and Compounds	0.2114483	27.000	-	-	-	4.70E-05	5.36E-04	5.83E-04	8.81E-06	2.55E-04	2.64E-04
Zinc and Compounds	484.08488	76.000	-	-	-	2.22E-06	3.95E-07	2.62E-06	4.16E-07	1.88E-07	6.05E-07
*Total Risk/HI	-		7.36E-08	6.24E-08	1.36E-07	2.03E-02	7.96E-03	2.83E-02	3.82E-03	3.79E-03	7.61E-03

Output generated 26SEP2016:16:39:42

Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	6
EF_{rec-c} (exposure frequency - child) day/year	6
EF_{rec-a} (exposure frequency - adult) day/year	6
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	6
EF_{6-16} (mutagenic exposure frequency) day/year	6
EF_{16-30} (mutagenic exposure frequency) day/year	6
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

Output generated 10JAN2017:18:47:09

Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.05
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.117
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	12844.8
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	29486.4
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

Site-specific

Recreator Screening Levels (RSL) for Surface Water

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; E = see user guide Section 2.3.5; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide)

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref
Aluminum	7429-90-5	No	No	Inorganics	-		1.00E+00	U	-	
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		4.00E-04	U	-	
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	9.50E+00	U	3.50E-06	U	-	
Barium	7440-39-3	No	No	Inorganics	-		2.00E-01	U	-	
Boron And Borates Only	7440-42-8	No	No	Inorganics	-		2.00E-01	U	-	
Cadmium (Water)	7440-43-9	No	No	Inorganics	-		5.00E-04	U	-	
Chromium, Total	7440-47-3	No	No	Inorganics	-		1.50E+00	U	-	
Cobalt	7440-48-4	No	No	Inorganics	-		3.00E-04	U	-	
Copper	7440-50-8	No	No	Inorganics	-		4.00E-02	U	-	
Dibutyl Phthalate	84-74-2	No	No	Organics	-		1.00E-01	U	-	
Diethyl Phthalate	84-66-2	No	No	Organics	-		8.00E-01	U	-	
Fluoride	16984-48-8	No	No	Inorganics	-		4.00E-02	U	-	
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		2.40E-02	U	-	
Nickel Soluble Salts	7440-02-0	No	No	Inorganics	-		1.10E-02	U	-	
Nitrate	14797-55-8	No	No	Inorganics	-		1.60E+00	U	-	
Nitrate + Nitrite (as N)	NA	No	No	Inorganics	-		1.60E+00	U	-	
Pentachlorophenol	87-86-5	No	No	Organics	8.10E-02	U	5.00E-03	U	-	
Perchlorate and Perchlorate Salts	14797-73-0	No	No	Inorganics	-		7.00E-04	U	-	
Selenium	7782-49-2	No	No	Inorganics	-		5.00E-03	U	-	
Vanadium and Compounds	7440-62-2	No	No	Inorganics	-		5.04E-03	U	-	
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		3.00E-01	U	-	

Site-specific

Recreator Screening Levels (RSL) for Surface Water

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Chemical	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	DA_{event} (nc child)	DA_{event} (nc adult)	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)
Aluminum	1	0.001	27	1	Yes	-	384.53434	806.80813	-	-
Antimony (metallic)	0.15	0.001	122	1	Yes	-	0.0230721	0.0484085	-	-
Arsenic, Inorganic	1	0.001	74.9	1	Yes	0.0002094	0.0013459	0.0028238	5.38E+01	1.05E+02
Barium	0.07	0.001	137	1	Yes	-	5.3834808	11.295314	-	-
Boron And Borates Only	1	0.001	13.8	1	Yes	-	76.906869	161.36163	-	-
Cadmium (Water)	0.05	0.001	112	1	Yes	-	0.0096134	0.0201702	-	-
Chromium, Total	0.013	0.001	52	1	Yes	-	7.4984197	15.732759	-	-
Cobalt	1	0.0004	58.9	1	Yes	-	0.1153603	0.2420424	-	-
Copper	1	0.001	63.5	1	Yes	-	15.381374	32.272325	-	-
Dibutyl Phthalate	1	0.042	278	0.9	Yes	-	38.453434	80.680813	-	-
Diethyl Phthalate	1	0.0036	222	1	Yes	-	307.62748	645.44651	-	-
Fluoride	1	0.001	38	1	Yes	-	15.381374	32.272325	-	-
Manganese (Non-diet)	0.04	0.001	54.9	1	Yes	-	0.369153	0.7745358	-	-
Nickel Soluble Salts	0.04	0.0002	58.7	1	Yes	-	0.1691951	0.3549956	-	-
Nitrate	1	0.001	62	1	Yes	-	615.25495	1290.893	-	-
Nitrate + Nitrite (as N)	1	0.001	-	0	Yes	-	615.25495	1290.893	-	-
Pentachlorophenol	1	0.127	266	0.9	Yes	0.0245572	1.9226717	4.0340407	6.31E+03	3.05E+01
Perchlorate and Perchlorate Salts	1	0.001	117	1	Yes	-	0.269174	0.5647657	-	-
Selenium	1	0.001	79	1	Yes	-	1.9226717	4.0340407	-	-
Vanadium and Compounds	0.026	0.001	50.9	1	Yes	-	0.0503894	0.1057241	-	-
Zinc and Compounds	1	0.0006	65.4	1	Yes	-	115.3603	242.04244	-	-

Site-specific

Recreator Screening Levels (RSL) for Surface Water

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; E = see user guide Section 2.3.5; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide)

Chemical	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
Aluminum	-	5.70E+07	1.92E+08	4.40E+07	3.04E+08	4.03E+08	1.73E+08	4.40E+07 nc
Antimony (metallic)	-	2.28E+04	1.15E+04	7.66E+03	1.22E+05	2.42E+04	2.02E+04	7.66E+03 nc
Arsenic, Inorganic	3.55E+01	2.00E+02	6.73E+02	1.54E+02	1.06E+03	1.41E+03	6.07E+02	3.55E+01 ca**
Barium	-	1.14E+07	2.69E+06	2.18E+06	6.08E+07	5.65E+06	5.17E+06	2.18E+06 nc
Boron And Borates Only	-	1.14E+07	3.85E+07	8.80E+06	6.08E+07	8.07E+07	3.47E+07	8.80E+06 nc
Cadmium (Water)	-	2.85E+04	4.81E+03	4.11E+03	1.52E+05	1.01E+04	9.46E+03	4.11E+03 nc
Chromium, Total	-	8.55E+07	3.75E+06	3.59E+06	4.56E+08	7.87E+06	7.73E+06	3.59E+06 nc
Cobalt	-	1.71E+04	1.44E+05	1.53E+04	9.13E+04	3.03E+05	7.01E+04	1.53E+04 nc
Copper	-	2.28E+06	7.69E+06	1.76E+06	1.22E+07	1.61E+07	6.94E+06	1.76E+06 nc
Dibutyl Phthalate	-	5.70E+06	1.34E+05	1.31E+05	3.04E+07	2.80E+05	2.78E+05	1.31E+05 nc
Diethyl Phthalate	-	4.56E+07	1.61E+07	1.19E+07	2.43E+08	3.38E+07	2.97E+07	1.19E+07 nc
Fluoride	-	2.28E+06	7.69E+06	1.76E+06	1.22E+07	1.61E+07	6.94E+06	1.76E+06 nc
Manganese (Non-diet)	-	1.37E+06	1.85E+05	1.63E+05	7.30E+06	3.87E+05	3.68E+05	1.63E+05 nc
Nickel Soluble Salts	-	6.27E+05	4.23E+05	2.53E+05	3.35E+06	8.87E+05	7.01E+05	2.53E+05 nc
Nitrate	-	9.13E+07	3.08E+08	7.04E+07	4.87E+08	6.45E+08	2.77E+08	7.04E+07 nc
Nitrate + Nitrite (as N)	-	9.13E+07	3.08E+08	7.04E+07	4.87E+08	6.45E+08	2.77E+08	7.04E+07 nc
Pentachlorophenol	3.04E+01	2.85E+05	2.39E+03	2.37E+03	1.52E+06	5.01E+03	4.99E+03	3.04E+01 ca*
Perchlorate and Perchlorate Salts	-	3.99E+04	1.35E+05	3.08E+04	2.13E+05	2.82E+05	1.21E+05	3.08E+04 nc
Selenium	-	2.85E+05	9.61E+05	2.20E+05	1.52E+06	2.02E+06	8.67E+05	2.20E+05 nc
Vanadium and Compounds	-	2.87E+05	2.52E+04	2.32E+04	1.53E+06	5.29E+04	5.11E+04	2.32E+04 nc
Zinc and Compounds	-	1.71E+07	9.61E+07	1.45E+07	9.13E+07	2.02E+08	6.28E+07	1.45E+07 nc

Site-specific

Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$
Aluminum	Inorganics	-		1.00E+00	U	-		1	0.001	27	1	Yes	-	384.53434
Antimony (metallic)	Inorganics	-		4.00E-04	U	-		0.15	0.001	122	1	Yes	-	0.0230721
Arsenic, Inorganic	Inorganics	9.50E+00	U	3.50E-06	U	-		1	0.001	74.9	1	Yes	0.0002094	0.0013459
Barium	Inorganics	-		2.00E-01	U	-		0.07	0.001	137	1	Yes	-	5.3834808
Boron And Borates Only	Inorganics	-		2.00E-01	U	-		1	0.001	13.8	1	Yes	-	76.906869
Cadmium (Water)	Inorganics	-		5.00E-04	U	-		0.05	0.001	112	1	Yes	-	0.0096134
Chromium, Total	Inorganics	-		1.50E+00	U	-		0.013	0.001	52	1	Yes	-	7.4984197
Cobalt	Inorganics	-		3.00E-04	U	-		1	0.0004	58.9	1	Yes	-	0.1153603
Copper	Inorganics	-		4.00E-02	U	-		1	0.001	63.5	1	Yes	-	15.381374
Dibutyl Phthalate	Organics	-		1.00E-01	U	-		1	0.042	278	0.9	Yes	-	38.453434
Diethyl Phthalate	Organics	-		8.00E-01	U	-		1	0.0036	222	1	Yes	-	307.62748
Fluoride	Inorganics	-		4.00E-02	U	-		1	0.001	38	1	Yes	-	15.381374
Manganese (Non-diet)	Inorganics	-		2.40E-02	U	-		0.04	0.001	54.9	1	Yes	-	0.369153
Nickel Soluble Salts	Inorganics	-		1.10E-02	U	-		0.04	0.0002	58.7	1	Yes	-	0.1691951
Nitrate	Inorganics	-		1.60E+00	U	-		1	0.001	62	1	Yes	-	615.25495
Nitrate + Nitrite (as N)	Inorganics	-		1.60E+00	U	-		1	0.001	-	0	Yes	-	615.25495
Pentachlorophenol	Organics	8.10E-02	U	5.00E-03	U	-		1	0.127	266	0.9	Yes	0.0245572	1.9226717
Perchlorate and Perchlorate Salts	Inorganics	-		7.00E-04	U	-		1	0.001	117	1	Yes	-	0.269174
Selenium	Inorganics	-		5.00E-03	U	-		1	0.001	79	1	Yes	-	1.9226717
Vanadium and Compounds	Inorganics	-		5.04E-03	U	-		0.026	0.001	50.9	1	Yes	-	0.0503894
Zinc and Compounds	Inorganics	-		3.00E-01	U	-		1	0.0006	65.4	1	Yes	-	115.3603
*Total Risk/HI		-		-		-		-	-	-	-		-	-

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Site-specific

Recreator Risk for Surface Water

Chemical	DA_{event} (nc adult)	Concentration (ug/L)	Ingestion Risk	Dermal Risk	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
Aluminum	806.80813	11000.000	-	-	-	1.93E-04	5.72E-05	2.50E-04	3.62E-05	2.73E-05	6.34E-05
Antimony (metallic)	0.0484085	0.450	-	-	-	1.97E-05	3.90E-05	5.87E-05	3.70E-06	1.86E-05	2.23E-05
Arsenic, Inorganic	0.0028238	7.900	1.47E-07	7.55E-08	2.22E-07	3.96E-02	1.17E-02	5.13E-02	7.42E-03	5.60E-03	1.30E-02
Barium	11.295314	110.000	-	-	-	9.64E-06	4.09E-05	5.05E-05	1.81E-06	1.95E-05	2.13E-05
Boron And Borates Only	161.36163	52.000	-	-	-	4.56E-06	1.35E-06	5.91E-06	8.55E-07	6.45E-07	1.50E-06
Cadmium (Water)	0.0201702	0.270	-	-	-	9.47E-06	5.62E-05	6.56E-05	1.78E-06	2.68E-05	2.85E-05
Chromium, Total	15.732759	15.000	-	-	-	1.75E-07	4.00E-06	4.18E-06	3.29E-08	1.91E-06	1.94E-06
Cobalt	0.2420424	5.000	-	-	-	2.92E-04	3.47E-05	3.27E-04	5.48E-05	1.65E-05	7.13E-05
Copper	32.272325	14.300	-	-	-	6.27E-06	1.86E-06	8.13E-06	1.18E-06	8.86E-07	2.06E-06
Dibutyl Phthalate	80.680813	0.396	-	-	-	6.94E-08	2.96E-06	3.03E-06	1.30E-08	1.41E-06	1.42E-06
Diethyl Phthalate	645.44651	0.226	-	-	-	4.95E-09	1.40E-08	1.90E-08	9.29E-10	6.69E-09	7.61E-09
Fluoride	32.272325	220.000	-	-	-	9.64E-05	2.86E-05	1.25E-04	1.81E-05	1.36E-05	3.17E-05
Manganese (Non-diet)	0.7745358	400.000	-	-	-	2.92E-04	2.17E-03	2.46E-03	5.48E-05	1.03E-03	1.09E-03
Nickel Soluble Salts	0.3549956	12.000	-	-	-	1.91E-05	2.84E-05	4.75E-05	3.59E-06	1.35E-05	1.71E-05
Nitrate	1290.893	1400.000	-	-	-	1.53E-05	4.55E-06	1.99E-05	2.88E-06	2.17E-06	5.05E-06
Nitrate + Nitrite (as N)	1290.893	1400.000	-	-	-	1.53E-05	4.55E-06	1.99E-05	2.88E-06	2.17E-06	5.05E-06
Pentachlorophenol	4.0340407	1.500	2.38E-10	4.92E-08	4.94E-08	5.26E-06	6.28E-04	6.33E-04	9.86E-07	2.99E-04	3.00E-04
Perchlorate and Perchlorate Salts	0.5647657	1.400	-	-	-	3.51E-05	1.04E-05	4.55E-05	6.58E-06	4.96E-06	1.15E-05
Selenium	4.0340407	1.300	-	-	-	4.56E-06	1.35E-06	5.91E-06	8.55E-07	6.45E-07	1.50E-06
Vanadium and Compounds	0.1057241	27.000	-	-	-	9.39E-05	1.07E-03	1.17E-03	1.76E-05	5.11E-04	5.28E-04
Zinc and Compounds	242.04244	76.000	-	-	-	4.44E-06	7.91E-07	5.23E-06	8.33E-07	3.77E-07	1.21E-06
*Total Risk/HI	-		1.47E-07	1.25E-07	2.72E-07	4.07E-02	1.59E-02	5.66E-02	7.63E-03	7.59E-03	1.52E-02

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OUTFALL 002

Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	9
EF_{rec-c} (exposure frequency - child) day/year	9
EF_{rec-a} (exposure frequency - adult) day/year	9
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	9
EF_{6-16} (mutagenic exposure frequency) day/year	9
EF_{16-30} (mutagenic exposure frequency) day/year	9
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.074
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.176
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	19267.2
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	44229.6
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

Site-specific

Recreator Screening Levels (RSL) for Surface Water

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; E = see user guide Section 2.3.5; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide)

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?
TCDD, 2,3,7,8-	1746-01-6	No	Yes	Organics	1.30E+05	U	7.00E-10	U	-		1	0.808	322	0.5	No

Chemical	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$	$DA_{event\ (nc\ adult)}$	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
TCDD, 2,3,7,8-	-	-	-	2.66E-03	-	2.66E-03	2.66E-02	-	2.66E-02	1.42E-01	-	1.42E-01	2.66E-03 ca*

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Site-specific

Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$
TCDD, 2,3,7,8-	Organics	1.30E+05	U	7.00E-10	U	-		1	0.808	322	0.5	No	-	-
*Total Risk/HI		-		-		-		-	-	-	-		-	-

Chemical	$DA_{event\ (nc\ adult)}$	Concentration (ug/L)	Ingestion Risk	Dermal Risk	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
TCDD, 2,3,7,8-	-	0.0000014786	5.57E-10	-	5.57E-10	5.56E-05	-	5.56E-05	1.04E-05	-	1.04E-05
*Total Risk/HI	-		5.57E-10	-	5.57E-10	5.56E-05	-	5.56E-05	1.04E-05	-	1.04E-05

Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	18
EF_{rec-c} (exposure frequency - child) day/year	18
EF_{rec-a} (exposure frequency - adult) day/year	18
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	18
EF_{6-16} (mutagenic exposure frequency) day/year	18
EF_{16-30} (mutagenic exposure frequency) day/year	18
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.149
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.351
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	38534.4
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	88459.2
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

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Site-specific

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Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?
TCDD, 2,3,7,8-	1746-01-6	No	Yes	Organics	1.30E+05	U	7.00E-10	U	-		1	0.808	322	0.5	No

Chemical	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$	$DA_{event\ (nc\ adult)}$	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
TCDD, 2,3,7,8-	-	-	-	1.32E-03	-	1.32E-03	1.33E-02	-	1.33E-02	7.10E-02	-	7.10E-02	1.32E-03 ca*

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Site-specific

Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$
TCDD, 2,3,7,8-	Organics	1.30E+05	U	7.00E-10	U	-		1	0.808	322	0.5	No	-	-
*Total Risk/HI		-		-		-		-	-	-	-		-	-

Chemical	$DA_{event\ (nc\ adult)}$	Concentration (ug/L)	Ingestion Risk	Dermal Risk	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
TCDD, 2,3,7,8-	-	0.0000014786	1.12E-09	-	1.12E-09	1.11E-04	-	1.11E-04	2.08E-05	-	2.08E-05
*Total Risk/HI	-		1.12E-09	-	1.12E-09	1.11E-04	-	1.11E-04	2.08E-05	-	2.08E-05

Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	9
EF_{rec-c} (exposure frequency - child) day/year	9
EF_{rec-a} (exposure frequency - adult) day/year	9
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	9
EF_{6-16} (mutagenic exposure frequency) day/year	9
EF_{16-30} (mutagenic exposure frequency) day/year	9
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.074
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.176
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	19267.2
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	44229.6
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

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Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		4.00E-04	U	-	
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	9.50E+00	U	3.50E-06	U	-	
Barium	7440-39-3	No	No	Inorganics	-		2.00E-01	U	-	
Benzoic Acid	65-85-0	No	No	Organics	-		4.00E+00	U	-	
Beryllium and compounds	7440-41-7	No	No	Inorganics	-		2.00E-04	U	-	
Boron And Borates Only	7440-42-8	No	No	Inorganics	-		2.00E-01	U	-	
Cadmium (Water)	7440-43-9	No	No	Inorganics	-		5.00E-04	U	-	
Chromium, Total	7440-47-3	No	No	Inorganics	-		1.50E+00	U	-	
Cobalt	7440-48-4	No	No	Inorganics	-		3.00E-04	U	-	
Copper	7440-50-8	No	No	Inorganics	-		4.00E-02	U	-	
Dibutyl Phthalate	84-74-2	No	No	Organics	-		1.00E-01	U	-	
Dichloroethylene, 1,2-cis-	156-59-2	No	Yes	Organics	-		2.00E-03	U	-	
Diethyl Phthalate	84-66-2	No	No	Organics	-		8.00E-01	U	-	
Fluoride	16984-48-8	No	No	Inorganics	-		4.00E-02	U	-	
Isophorone	78-59-1	No	No	Organics	9.50E-04	U	2.00E-01	U	-	
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		2.40E-02	U	-	
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		1.60E-04	U	-	
Nickel Soluble Salts	7440-02-0	No	No	Inorganics	-		1.10E-02	U	-	
Nitrate	14797-55-8	No	No	Inorganics	-		1.60E+00	U	-	
Nitrate + Nitrite (as N)	NA	No	No	Inorganics	-		1.60E+00	U	-	
Nitrite	14797-65-0	No	No	Inorganics	-		1.00E-01	U	-	
Perchlorate and Perchlorate Salts	14797-73-0	No	No	Inorganics	-		7.00E-04	U	-	
Selenium	7782-49-2	No	No	Inorganics	-		5.00E-03	U	-	
Trichloroethylene	79-01-6	Yes	Yes	Organics	4.60E-02	U	5.00E-04	U	-	
Vanadium and Compounds	7440-62-2	No	No	Inorganics	-		5.04E-03	U	-	
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		3.00E-01	U	-	

Site-specific

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Chemical	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	DA_{event} (nc child)	DA_{event} (nc adult)	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)
Antimony (metallic)	0.15	0.001	122	1	Yes	-	0.0153814	0.0322723	-	-
Arsenic, Inorganic	1	0.001	74.9	1	Yes	0.0001396	0.0008972	0.0018826	3.63E+01	6.98E+01
Barium	0.07	0.001	137	1	Yes	-	3.5889872	7.5302093	-	-
Benzoic Acid	1	0.00565	122	1	Yes	-	1025.4249	2151.4884	-	-
Beryllium and compounds	0.007	0.001	9.01	1	Yes	-	0.0003589	0.000753	-	-
Boron And Borates Only	1	0.001	13.8	1	Yes	-	51.271246	107.57442	-	-
Cadmium (Water)	0.05	0.001	112	1	Yes	-	0.0064089	0.0134468	-	-
Chromium, Total	0.013	0.001	52	1	Yes	-	4.9989465	10.488506	-	-
Cobalt	1	0.0004	58.9	1	Yes	-	0.0769069	0.1613616	-	-
Copper	1	0.001	63.5	1	Yes	-	10.254249	21.514884	-	-
Dibutyl Phthalate	1	0.042	278	0.9	Yes	-	25.635623	53.787209	-	-
Dichloroethylene, 1,2-cis-	1	0.011	96.9	1	Yes	-	0.5127125	1.0757442	-	-
Diethyl Phthalate	1	0.0036	222	1	Yes	-	205.08498	430.29767	-	-
Fluoride	1	0.001	38	1	Yes	-	10.254249	21.514884	-	-
Isophorone	1	0.00354	138	1	Yes	1.395882	51.271246	107.57442	3.63E+05	1.22E+05
Manganese (Non-diet)	0.04	0.001	54.9	1	Yes	-	0.246102	0.5163572	-	-
Mercury (elemental)	1	0.001	201	1	Yes	-	0.041017	0.0860595	-	-
Nickel Soluble Salts	0.04	0.0002	58.7	1	Yes	-	0.1127967	0.2366637	-	-
Nitrate	1	0.001	62	1	Yes	-	410.16997	860.59534	-	-
Nitrate + Nitrite (as N)	1	0.001	-	0	Yes	-	410.16997	860.59534	-	-
Nitrite	1	0.001	47	1	Yes	-	25.635623	53.787209	-	-
Perchlorate and Perchlorate Salts	1	0.001	117	1	Yes	-	0.1794494	0.3765105	-	-
Selenium	1	0.001	79	1	Yes	-	1.2817811	2.6893604	-	-
Trichloroethylene	1	0.0116	131	1	Yes	0.0227402	0.1281781	0.268936	5.84E+03	6.32E+02
Vanadium and Compounds	0.026	0.001	50.9	1	Yes	-	0.0335929	0.0704828	-	-
Zinc and Compounds	1	0.0006	65.4	1	Yes	-	76.906869	161.36163	-	-

Site-specific

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Chemical	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
Antimony (metallic)	-	1.52E+04	7.69E+03	5.11E+03	8.11E+04	1.61E+04	1.35E+04	5.11E+03 nc
Arsenic, Inorganic	2.39E+01	1.33E+02	4.49E+02	1.03E+02	7.10E+02	9.41E+02	4.05E+02	2.39E+01 ca**
Barium	-	7.60E+06	1.79E+06	1.45E+06	4.06E+07	3.77E+06	3.45E+06	1.45E+06 nc
Benzoic Acid	-	1.52E+08	6.07E+07	4.34E+07	8.11E+08	1.27E+08	1.10E+08	4.34E+07 nc
Beryllium and compounds	-	7.60E+03	1.79E+02	1.75E+02	4.06E+04	3.77E+02	3.73E+02	1.75E+02 nc
Boron And Borates Only	-	7.60E+06	2.56E+07	5.86E+06	4.06E+07	5.38E+07	2.31E+07	5.86E+06 nc
Cadmium (Water)	-	1.90E+04	3.20E+03	2.74E+03	1.01E+05	6.72E+03	6.31E+03	2.74E+03 nc
Chromium, Total	-	5.70E+07	2.50E+06	2.39E+06	3.04E+08	5.24E+06	5.16E+06	2.39E+06 nc
Cobalt	-	1.14E+04	9.61E+04	1.02E+04	6.08E+04	2.02E+05	4.67E+04	1.02E+04 nc
Copper	-	1.52E+06	5.13E+06	1.17E+06	8.11E+06	1.08E+07	4.62E+06	1.17E+06 nc
Dibutyl Phthalate	-	3.80E+06	8.91E+04	8.71E+04	2.03E+07	1.87E+05	1.85E+05	8.71E+04 nc
Dichloroethylene, 1,2-cis-	-	7.60E+04	1.74E+04	1.41E+04	4.06E+05	3.64E+04	3.34E+04	1.41E+04 nc
Diethyl Phthalate	-	3.04E+07	1.07E+07	7.94E+06	1.62E+08	2.25E+07	1.98E+07	7.94E+06 nc
Fluoride	-	1.52E+06	5.13E+06	1.17E+06	8.11E+06	1.08E+07	4.62E+06	1.17E+06 nc
Isophorone	9.13E+04	7.60E+06	4.48E+06	2.82E+06	4.06E+07	9.39E+06	7.63E+06	9.13E+04 ca*
Manganese (Non-diet)	-	9.13E+05	1.23E+05	1.08E+05	4.87E+06	2.58E+05	2.45E+05	1.08E+05 nc
Mercury (elemental)	-	6.08E+03	2.05E+04	4.69E+03	3.24E+04	4.30E+04	1.85E+04	4.69E+03 nc
Nickel Soluble Salts	-	4.18E+05	2.82E+05	1.68E+05	2.23E+06	5.92E+05	4.68E+05	1.68E+05 nc
Nitrate	-	6.08E+07	2.05E+08	4.69E+07	3.24E+08	4.30E+08	1.85E+08	4.69E+07 nc
Nitrate + Nitrite (as N)	-	6.08E+07	2.05E+08	4.69E+07	3.24E+08	4.30E+08	1.85E+08	4.69E+07 nc
Nitrite	-	3.80E+06	1.28E+07	2.93E+06	2.03E+07	2.69E+07	1.16E+07	2.93E+06 nc
Perchlorate and Perchlorate Salts	-	2.66E+04	8.97E+04	2.05E+04	1.42E+05	1.88E+05	8.09E+04	2.05E+04 nc
Selenium	-	1.90E+05	6.41E+05	1.47E+05	1.01E+06	1.34E+06	5.78E+05	1.47E+05 nc
Trichloroethylene	5.71E+02	1.90E+04	3.56E+03	3.00E+03	1.01E+05	7.48E+03	6.97E+03	5.71E+02 ca**
Vanadium and Compounds	-	1.92E+05	1.68E+04	1.54E+04	1.02E+06	3.52E+04	3.41E+04	1.54E+04 nc
Zinc and Compounds	-	1.14E+07	6.41E+07	9.68E+06	6.08E+07	1.34E+08	4.19E+07	9.68E+06 nc

Site-specific

Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$
Antimony (metallic)	Inorganics	-		4.00E-04	U	-		0.15	0.001	122	1	Yes	-	0.0153814
Arsenic, Inorganic	Inorganics	9.50E+00	U	3.50E-06	U	-		1	0.001	74.9	1	Yes	0.0001396	0.0008972
Barium	Inorganics	-		2.00E-01	U	-		0.07	0.001	137	1	Yes	-	3.5889872
Benzoic Acid	Organics	-		4.00E+00	U	-		1	0.00565	122	1	Yes	-	1025.4249
Beryllium and compounds	Inorganics	-		2.00E-04	U	-		0.007	0.001	9.01	1	Yes	-	0.0003589
Boron And Borates Only	Inorganics	-		2.00E-01	U	-		1	0.001	13.8	1	Yes	-	51.271246
Cadmium (Water)	Inorganics	-		5.00E-04	U	-		0.05	0.001	112	1	Yes	-	0.0064089
Chromium, Total	Inorganics	-		1.50E+00	U	-		0.013	0.001	52	1	Yes	-	4.9989465
Cobalt	Inorganics	-		3.00E-04	U	-		1	0.0004	58.9	1	Yes	-	0.0769069
Copper	Inorganics	-		4.00E-02	U	-		1	0.001	63.5	1	Yes	-	10.254249
Dibutyl Phthalate	Organics	-		1.00E-01	U	-		1	0.042	278	0.9	Yes	-	25.635623
Dichloroethylene, 1,2-cis-	Organics	-		2.00E-03	U	-		1	0.011	96.9	1	Yes	-	0.5127125
Diethyl Phthalate	Organics	-		8.00E-01	U	-		1	0.0036	222	1	Yes	-	205.08498
Fluoride	Inorganics	-		4.00E-02	U	-		1	0.001	38	1	Yes	-	10.254249
Isophorone	Organics	9.50E-04	U	2.00E-01	U	-		1	0.00354	138	1	Yes	1.395882	51.271246
Manganese (Non-diet)	Inorganics	-		2.40E-02	U	-		0.04	0.001	54.9	1	Yes	-	0.246102
Mercury (elemental)	Inorganics	-		1.60E-04	U	-		1	0.001	201	1	Yes	-	0.041017
Nickel Soluble Salts	Inorganics	-		1.10E-02	U	-		0.04	0.0002	58.7	1	Yes	-	0.1127967
Nitrate	Inorganics	-		1.60E+00	U	-		1	0.001	62	1	Yes	-	410.16997
Nitrate + Nitrite (as N)	Inorganics	-		1.60E+00	U	-		1	0.001	-	0	Yes	-	410.16997
Nitrite	Inorganics	-		1.00E-01	U	-		1	0.001	47	1	Yes	-	25.635623
Perchlorate and Perchlorate Salts	Inorganics	-		7.00E-04	U	-		1	0.001	117	1	Yes	-	0.1794494
Selenium	Inorganics	-		5.00E-03	U	-		1	0.001	79	1	Yes	-	1.2817811
Trichloroethylene	Organics	4.60E-02	U	5.00E-04	U	-		1	0.0116	131	1	Yes	0.0227402	0.1281781
Vanadium and Compounds	Inorganics	-		5.04E-03	U	-		0.026	0.001	50.9	1	Yes	-	0.0335929
Zinc and Compounds	Inorganics	-		3.00E-01	U	-		1	0.0006	65.4	1	Yes	-	76.906869
**Total Risk/HI*		-		-		-		-	-	-	-		-	-

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Site-specific

Recreator Risk for Surface Water

Chemical	DA_{event} (nc adult)	Concentration (ug/L)	Ingestion Risk	Dermal Risk	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
Antimony (metallic)	0.0322723	0.590	-	-	-	3.88E-05	7.67E-05	1.16E-04	7.27E-06	3.66E-05	4.38E-05
Arsenic, Inorganic	0.0018826	5.700	1.57E-07	8.17E-08	2.39E-07	4.28E-02	1.27E-02	5.55E-02	8.03E-03	6.06E-03	1.41E-02
Barium	7.5302093	68.50	-	-	-	9.01E-06	3.82E-05	4.72E-05	1.69E-06	1.82E-05	1.99E-05
Benzoic Acid	2151.4884	2.960	-	-	-	1.95E-08	4.88E-08	6.83E-08	3.65E-09	2.33E-08	2.69E-08
Beryllium and compounds	0.000753	0.310	-	-	-	4.08E-05	1.73E-03	1.77E-03	7.64E-06	8.23E-04	8.31E-04
Boron And Borates Only	107.57442	85.00	-	-	-	1.12E-05	3.32E-06	1.45E-05	2.10E-06	1.58E-06	3.68E-06
Cadmium (Water)	0.0134468	0.140	-	-	-	7.36E-06	4.37E-05	5.11E-05	1.38E-06	2.08E-05	2.22E-05
Chromium, Total	10.488506	3.300	-	-	-	5.79E-08	1.32E-06	1.38E-06	1.08E-08	6.29E-07	6.40E-07
Cobalt	0.1613616	4.800	-	-	-	4.21E-04	4.99E-05	4.71E-04	7.89E-05	2.38E-05	1.03E-04
Copper	21.514884	4.294	-	-	-	2.82E-06	8.38E-07	3.66E-06	5.29E-07	3.99E-07	9.29E-07
Dibutyl Phthalate	53.787209	0.396	-	-	-	1.04E-07	4.44E-06	4.55E-06	1.95E-08	2.12E-06	2.14E-06
Dichloroethylene, 1,2-cis-	1.0757442	3.000	-	-	-	3.95E-05	1.73E-04	2.12E-04	7.40E-06	8.23E-05	8.97E-05
Diethyl Phthalate	430.29767	0.245	-	-	-	8.05E-09	2.28E-08	3.09E-08	1.51E-09	1.09E-08	1.24E-08
Fluoride	21.514884	390.0	-	-	-	2.56E-04	7.61E-05	3.33E-04	4.81E-05	3.63E-05	8.43E-05
Isophorone	107.57442	0.257	7.07E-13	2.11E-12	2.82E-12	3.38E-08	5.74E-08	9.12E-08	6.34E-09	2.74E-08	3.37E-08
Manganese (Non-diet)	0.5163572	128.2	-	-	-	1.40E-04	1.04E-03	1.18E-03	2.63E-05	4.97E-04	5.23E-04
Mercury (elemental)	0.0860595	0.032	-	-	-	5.26E-06	1.56E-06	6.82E-06	9.86E-07	7.44E-07	1.73E-06
Nickel Soluble Salts	0.2366637	8.300	-	-	-	1.98E-05	2.94E-05	4.93E-05	3.72E-06	1.40E-05	1.77E-05
Nitrate	860.59534	1494.	-	-	-	2.46E-05	7.28E-06	3.18E-05	4.60E-06	3.47E-06	8.08E-06
Nitrate + Nitrite (as N)	860.59534	1528.	-	-	-	2.51E-05	7.45E-06	3.26E-05	4.71E-06	3.55E-06	8.26E-06
Nitrite	53.787209	100.0	-	-	-	2.63E-05	7.80E-06	3.41E-05	4.93E-06	3.72E-06	8.65E-06
Perchlorate and Perchlorate Salts	0.3765105	2.200	-	-	-	8.27E-05	2.45E-05	1.07E-04	1.55E-05	1.17E-05	2.72E-05
Selenium	2.6893604	0.650	-	-	-	3.42E-06	1.01E-06	4.43E-06	6.41E-07	4.83E-07	1.12E-06
Trichloroethylene	0.268936	0.733	1.25E-10	1.16E-09	1.28E-09	3.86E-05	2.06E-04	2.44E-04	7.23E-06	9.80E-05	1.05E-04
Vanadium and Compounds	0.0704828	36.00	-	-	-	1.88E-04	2.14E-03	2.33E-03	3.52E-05	1.02E-03	1.06E-03
Zinc and Compounds	161.36163	22.03	-	-	-	1.93E-06	3.44E-07	2.28E-06	3.62E-07	1.64E-07	5.26E-07
*Total Risk/HI	-		1.57E-07	8.28E-08	2.40E-07	4.42E-02	1.84E-02	6.26E-02	8.29E-03	8.76E-03	1.70E-02

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	18
EF_{rec-c} (exposure frequency - child) day/year	18
EF_{rec-a} (exposure frequency - adult) day/year	18
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	18
EF_{6-16} (mutagenic exposure frequency) day/year	18
EF_{16-30} (mutagenic exposure frequency) day/year	18
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.149
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.351
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	38534.4
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	88459.2
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

Site-specific

Recreator Screening Levels (RSL) for Surface Water

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; E = see user guide Section 2.3.5; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide)

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		4.00E-04	U	-	
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	9.50E+00	U	3.50E-06	U	-	
Barium	7440-39-3	No	No	Inorganics	-		2.00E-01	U	-	
Benzoic Acid	65-85-0	No	No	Organics	-		4.00E+00	U	-	
Beryllium and compounds	7440-41-7	No	No	Inorganics	-		2.00E-04	U	-	
Boron And Borates Only	7440-42-8	No	No	Inorganics	-		2.00E-01	U	-	
Cadmium (Water)	7440-43-9	No	No	Inorganics	-		5.00E-04	U	-	
Chromium, Total	7440-47-3	No	No	Inorganics	-		1.50E+00	U	-	
Cobalt	7440-48-4	No	No	Inorganics	-		3.00E-04	U	-	
Copper	7440-50-8	No	No	Inorganics	-		4.00E-02	U	-	
Dibutyl Phthalate	84-74-2	No	No	Organics	-		1.00E-01	U	-	
Dichloroethylene, 1,2-cis-	156-59-2	No	Yes	Organics	-		2.00E-03	U	-	
Diethyl Phthalate	84-66-2	No	No	Organics	-		8.00E-01	U	-	
Fluoride	16984-48-8	No	No	Inorganics	-		4.00E-02	U	-	
Isophorone	78-59-1	No	No	Organics	9.50E-04	U	2.00E-01	U	-	
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		2.40E-02	U	-	
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		1.60E-04	U	-	
Nickel Soluble Salts	7440-02-0	No	No	Inorganics	-		1.10E-02	U	-	
Nitrate	14797-55-8	No	No	Inorganics	-		1.60E+00	U	-	
Nitrate + Nitrite (as N)	NA	No	No	Inorganics	-		1.60E+00	U	-	
Nitrite	14797-65-0	No	No	Inorganics	-		1.00E-01	U	-	
Perchlorate and Perchlorate Salts	14797-73-0	No	No	Inorganics	-		7.00E-04	U	-	
Selenium	7782-49-2	No	No	Inorganics	-		5.00E-03	U	-	
Trichloroethylene	79-01-6	Yes	Yes	Organics	4.60E-02	U	5.00E-04	U	-	
Vanadium and Compounds	7440-62-2	No	No	Inorganics	-		5.04E-03	U	-	
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		3.00E-01	U	-	

Site-specific

Recreator Screening Levels (RSL) for Surface Water

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; E = see user guide Section 2.3.5; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide)

Chemical	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	DA_{event} (nc child)	DA_{event} (nc adult)	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)
Antimony (metallic)	0.15	0.001	122	1	Yes	-	0.0076907	0.0161362	-	-
Arsenic, Inorganic	1	0.001	74.9	1	Yes	0.0000698	0.0004486	0.0009413	1.81E+01	3.49E+01
Barium	0.07	0.001	137	1	Yes	-	1.7944936	3.7651046	-	-
Benzoic Acid	1	0.00565	122	1	Yes	-	512.71246	1075.7442	-	-
Beryllium and compounds	0.007	0.001	9.01	1	Yes	-	0.0001794	0.0003765	-	-
Boron And Borates Only	1	0.001	13.8	1	Yes	-	25.635623	53.787209	-	-
Cadmium (Water)	0.05	0.001	112	1	Yes	-	0.0032045	0.0067234	-	-
Chromium, Total	0.013	0.001	52	1	Yes	-	2.4994732	5.2442529	-	-
Cobalt	1	0.0004	58.9	1	Yes	-	0.0384534	0.0806808	-	-
Copper	1	0.001	63.5	1	Yes	-	5.1271246	10.757442	-	-
Dibutyl Phthalate	1	0.042	278	0.9	Yes	-	12.817811	26.893604	-	-
Dichloroethylene, 1,2-cis-	1	0.011	96.9	1	Yes	-	0.2563562	0.5378721	-	-
Diethyl Phthalate	1	0.0036	222	1	Yes	-	102.54249	215.14884	-	-
Fluoride	1	0.001	38	1	Yes	-	5.1271246	10.757442	-	-
Isophorone	1	0.00354	138	1	Yes	0.697941	25.635623	53.787209	1.81E+05	6.09E+04
Manganese (Non-diet)	0.04	0.001	54.9	1	Yes	-	0.123051	0.2581786	-	-
Mercury (elemental)	1	0.001	201	1	Yes	-	0.0205085	0.0430298	-	-
Nickel Soluble Salts	0.04	0.0002	58.7	1	Yes	-	0.0563984	0.1183319	-	-
Nitrate	1	0.001	62	1	Yes	-	205.08498	430.29767	-	-
Nitrate + Nitrite (as N)	1	0.001	-	0	Yes	-	205.08498	430.29767	-	-
Nitrite	1	0.001	47	1	Yes	-	12.817811	26.893604	-	-
Perchlorate and Perchlorate Salts	1	0.001	117	1	Yes	-	0.0897247	0.1882552	-	-
Selenium	1	0.001	79	1	Yes	-	0.6408906	1.3446802	-	-
Trichloroethylene	1	0.0116	131	1	Yes	0.0113701	0.0640891	0.134468	2.91E+03	3.16E+02
Vanadium and Compounds	0.026	0.001	50.9	1	Yes	-	0.0167965	0.0352414	-	-
Zinc and Compounds	1	0.0006	65.4	1	Yes	-	38.453434	80.680813	-	-

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Site-specific

Recreator Screening Levels (RSL) for Surface Water

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; E = see user guide Section 2.3.5; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide)

Chemical	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
Antimony (metallic)	-	7.60E+03	3.85E+03	2.55E+03	4.06E+04	8.07E+03	6.73E+03	2.55E+03 nc
Arsenic, Inorganic	1.19E+01	6.65E+01	2.24E+02	5.13E+01	3.55E+02	4.71E+02	2.02E+02	1.19E+01 ca**
Barium	-	3.80E+06	8.97E+05	7.26E+05	2.03E+07	1.88E+06	1.72E+06	7.26E+05 nc
Benzoic Acid	-	7.60E+07	3.03E+07	2.17E+07	4.06E+08	6.36E+07	5.50E+07	2.17E+07 nc
Beryllium and compounds	-	3.80E+03	8.97E+01	8.77E+01	2.03E+04	1.88E+02	1.87E+02	8.77E+01 nc
Boron And Borates Only	-	3.80E+06	1.28E+07	2.93E+06	2.03E+07	2.69E+07	1.16E+07	2.93E+06 nc
Cadmium (Water)	-	9.51E+03	1.60E+03	1.37E+03	5.07E+04	3.36E+03	3.15E+03	1.37E+03 nc
Chromium, Total	-	2.85E+07	1.25E+06	1.20E+06	1.52E+08	2.62E+06	2.58E+06	1.20E+06 nc
Cobalt	-	5.70E+03	4.81E+04	5.10E+03	3.04E+04	1.01E+05	2.34E+04	5.10E+03 nc
Copper	-	7.60E+05	2.56E+06	5.86E+05	4.06E+06	5.38E+06	2.31E+06	5.86E+05 nc
Dibutyl Phthalate	-	1.90E+06	4.46E+04	4.35E+04	1.01E+07	9.35E+04	9.26E+04	4.35E+04 nc
Dichloroethylene, 1,2-cis-	-	3.80E+04	8.68E+03	7.07E+03	2.03E+05	1.82E+04	1.67E+04	7.07E+03 nc
Diethyl Phthalate	-	1.52E+07	5.37E+06	3.97E+06	8.11E+07	1.13E+07	9.89E+06	3.97E+06 nc
Fluoride	-	7.60E+05	2.56E+06	5.86E+05	4.06E+06	5.38E+06	2.31E+06	5.86E+05 nc
Isophorone	4.56E+04	3.80E+06	2.24E+06	1.41E+06	2.03E+07	4.70E+06	3.81E+06	4.56E+04 ca*
Manganese (Non-diet)	-	4.56E+05	6.15E+04	5.42E+04	2.43E+06	1.29E+05	1.23E+05	5.42E+04 nc
Mercury (elemental)	-	3.04E+03	1.03E+04	2.35E+03	1.62E+04	2.15E+04	9.25E+03	2.35E+03 nc
Nickel Soluble Salts	-	2.09E+05	1.41E+05	8.42E+04	1.12E+06	2.96E+05	2.34E+05	8.42E+04 nc
Nitrate	-	3.04E+07	1.03E+08	2.35E+07	1.62E+08	2.15E+08	9.25E+07	2.35E+07 nc
Nitrate + Nitrite (as N)	-	3.04E+07	1.03E+08	2.35E+07	1.62E+08	2.15E+08	9.25E+07	2.35E+07 nc
Nitrite	-	1.90E+06	6.41E+06	1.47E+06	1.01E+07	1.34E+07	5.78E+06	1.47E+06 nc
Perchlorate and Perchlorate Salts	-	1.33E+04	4.49E+04	1.03E+04	7.10E+04	9.41E+04	4.05E+04	1.03E+04 nc
Selenium	-	9.51E+04	3.20E+05	7.33E+04	5.07E+05	6.72E+05	2.89E+05	7.33E+04 nc
Trichloroethylene	2.85E+02	9.51E+03	1.78E+03	1.50E+03	5.07E+04	3.74E+03	3.48E+03	2.85E+02 ca**
Vanadium and Compounds	-	9.58E+04	8.40E+03	7.72E+03	5.11E+05	1.76E+04	1.70E+04	7.72E+03 nc
Zinc and Compounds	-	5.70E+06	3.20E+07	4.84E+06	3.04E+07	6.72E+07	2.09E+07	4.84E+06 nc

Site-specific

Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$
Antimony (metallic)	Inorganics	-		4.00E-04	U	-		0.15	0.001	122	1	Yes	-	0.0076907
Arsenic, Inorganic	Inorganics	9.50E+00	U	3.50E-06	U	-		1	0.001	74.9	1	Yes	0.0000698	0.0004486
Barium	Inorganics	-		2.00E-01	U	-		0.07	0.001	137	1	Yes	-	1.7944936
Benzoic Acid	Organics	-		4.00E+00	U	-		1	0.00565	122	1	Yes	-	512.71246
Beryllium and compounds	Inorganics	-		2.00E-04	U	-		0.007	0.001	9.01	1	Yes	-	0.0001794
Boron And Borates Only	Inorganics	-		2.00E-01	U	-		1	0.001	13.8	1	Yes	-	25.635623
Cadmium (Water)	Inorganics	-		5.00E-04	U	-		0.05	0.001	112	1	Yes	-	0.0032045
Chromium, Total	Inorganics	-		1.50E+00	U	-		0.013	0.001	52	1	Yes	-	2.4994732
Cobalt	Inorganics	-		3.00E-04	U	-		1	0.0004	58.9	1	Yes	-	0.0384534
Copper	Inorganics	-		4.00E-02	U	-		1	0.001	63.5	1	Yes	-	5.1271246
Dibutyl Phthalate	Organics	-		1.00E-01	U	-		1	0.042	278	0.9	Yes	-	12.817811
Dichloroethylene, 1,2-cis-	Organics	-		2.00E-03	U	-		1	0.011	96.9	1	Yes	-	0.2563562
Diethyl Phthalate	Organics	-		8.00E-01	U	-		1	0.0036	222	1	Yes	-	102.54249
Fluoride	Inorganics	-		4.00E-02	U	-		1	0.001	38	1	Yes	-	5.1271246
Isophorone	Organics	9.50E-04	U	2.00E-01	U	-		1	0.00354	138	1	Yes	0.697941	25.635623
Manganese (Non-diet)	Inorganics	-		2.40E-02	U	-		0.04	0.001	54.9	1	Yes	-	0.123051
Mercury (elemental)	Inorganics	-		1.60E-04	U	-		1	0.001	201	1	Yes	-	0.0205085
Nickel Soluble Salts	Inorganics	-		1.10E-02	U	-		0.04	0.0002	58.7	1	Yes	-	0.0563984
Nitrate	Inorganics	-		1.60E+00	U	-		1	0.001	62	1	Yes	-	205.08498
Nitrate + Nitrite (as N)	Inorganics	-		1.60E+00	U	-		1	0.001	-	0	Yes	-	205.08498
Nitrite	Inorganics	-		1.00E-01	U	-		1	0.001	47	1	Yes	-	12.817811
Perchlorate and Perchlorate Salts	Inorganics	-		7.00E-04	U	-		1	0.001	117	1	Yes	-	0.0897247
Selenium	Inorganics	-		5.00E-03	U	-		1	0.001	79	1	Yes	-	0.6408906
Trichloroethylene	Organics	4.60E-02	U	5.00E-04	U	-		1	0.0116	131	1	Yes	0.0113701	0.0640891
Vanadium and Compounds	Inorganics	-		5.04E-03	U	-		0.026	0.001	50.9	1	Yes	-	0.0167965
Zinc and Compounds	Inorganics	-		3.00E-01	U	-		1	0.0006	65.4	1	Yes	-	38.453434
**Total Risk/HI*		-		-		-		-	-	-	-		-	-

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Site-specific

Recreator Risk for Surface Water

Chemical	DA_{event} (nc adult)	Concentration (ug/L)	Ingestion Risk	Dermal Risk	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
Antimony (metallic)	0.0161362	0.590	-	-	-	7.76E-05	1.53E-04	2.31E-04	1.45E-05	7.31E-05	8.77E-05
Arsenic, Inorganic	0.0009413	5.700	3.16E-07	1.63E-07	4.79E-07	8.57E-02	2.54E-02	1.11E-01	1.61E-02	1.21E-02	2.82E-02
Barium	3.7651046	68.50	-	-	-	1.80E-05	7.63E-05	9.44E-05	3.38E-06	3.64E-05	3.98E-05
Benzoic Acid	1075.7442	2.960	-	-	-	3.89E-08	9.76E-08	1.37E-07	7.30E-09	4.65E-08	5.38E-08
Beryllium and compounds	0.0003765	0.310	-	-	-	8.15E-05	3.46E-03	3.54E-03	1.53E-05	1.65E-03	1.66E-03
Boron And Borates Only	53.787209	85.00	-	-	-	2.24E-05	6.63E-06	2.90E-05	4.19E-06	3.16E-06	7.35E-06
Cadmium (Water)	0.0067234	0.140	-	-	-	1.47E-05	8.74E-05	1.02E-04	2.76E-06	4.16E-05	4.44E-05
Chromium, Total	5.2442529	3.300	-	-	-	1.16E-07	2.64E-06	2.76E-06	2.17E-08	1.26E-06	1.28E-06
Cobalt	0.0806808	4.800	-	-	-	8.42E-04	9.99E-05	9.42E-04	1.58E-04	4.76E-05	2.05E-04
Copper	10.757442	4.294	-	-	-	5.65E-06	1.68E-06	7.32E-06	1.06E-06	7.98E-07	1.86E-06
Dibutyl Phthalate	26.893604	0.396	-	-	-	2.08E-07	8.89E-06	9.10E-06	3.91E-08	4.24E-06	4.27E-06
Dichloroethylene, 1,2-cis-	0.5378721	3.000	-	-	-	7.89E-05	3.46E-04	4.24E-04	1.48E-05	1.65E-04	1.79E-04
Diethyl Phthalate	215.14884	0.245	-	-	-	1.61E-08	4.56E-08	6.17E-08	3.02E-09	2.17E-08	2.48E-08
Fluoride	10.757442	390.0	-	-	-	5.13E-04	1.52E-04	6.65E-04	9.62E-05	7.25E-05	1.69E-04
Isophorone	53.787209	0.257	1.42E-12	4.22E-12	5.64E-12	6.76E-08	1.15E-07	1.82E-07	1.27E-08	5.47E-08	6.74E-08
Manganese (Non-diet)	0.2581786	128.2	-	-	-	2.81E-04	2.08E-03	2.36E-03	5.27E-05	9.93E-04	1.05E-03
Mercury (elemental)	0.0430298	0.032	-	-	-	1.05E-05	3.12E-06	1.36E-05	1.97E-06	1.49E-06	3.46E-06
Nickel Soluble Salts	0.1183319	8.300	-	-	-	3.97E-05	5.89E-05	9.86E-05	7.44E-06	2.81E-05	3.55E-05
Nitrate	430.29767	1494.	-	-	-	4.91E-05	1.46E-05	6.37E-05	9.21E-06	6.94E-06	1.62E-05
Nitrate + Nitrite (as N)	430.29767	1528.	-	-	-	5.02E-05	1.49E-05	6.51E-05	9.42E-06	7.10E-06	1.65E-05
Nitrite	26.893604	100.0	-	-	-	5.26E-05	1.56E-05	6.82E-05	9.86E-06	7.44E-06	1.73E-05
Perchlorate and Perchlorate Salts	0.1882552	2.200	-	-	-	1.65E-04	4.90E-05	2.14E-04	3.10E-05	2.34E-05	5.44E-05
Selenium	1.3446802	0.650	-	-	-	6.84E-06	2.03E-06	8.87E-06	1.28E-06	9.67E-07	2.25E-06
Trichloroethylene	0.134468	0.733	2.52E-10	2.32E-09	2.57E-09	7.71E-05	4.11E-04	4.88E-04	1.45E-05	1.96E-04	2.10E-04
Vanadium and Compounds	0.0352414	36.00	-	-	-	3.76E-04	4.29E-03	4.66E-03	7.05E-05	2.04E-03	2.11E-03
Zinc and Compounds	80.680813	22.03	-	-	-	3.86E-06	6.87E-07	4.55E-06	7.24E-07	3.28E-07	1.05E-06
*Total Risk/HI	-		3.16E-07	1.66E-07	4.82E-07	8.84E-02	3.67E-02	1.25E-01	1.66E-02	1.75E-02	3.41E-02

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	5
EF_{rec-c} (exposure frequency - child) day/year	5
EF_{rec-a} (exposure frequency - adult) day/year	5
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	5
EF_{6-16} (mutagenic exposure frequency) day/year	5
EF_{16-30} (mutagenic exposure frequency) day/year	5
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.041
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.097
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	10704
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	24572
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

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Recreator Screening Levels (RSL) for Surface Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?
TCDD, 2,3,7,8-	1746-01-6	No	Yes	Organics	1.30E+05	U	7.00E-10	U	-		1	0.808	321.98	0.5	No

Chemical	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$	$DA_{event\ (nc\ adult)}$	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
TCDD, 2,3,7,8-	-	-	-	4.79E-03	-	4.79E-03	4.79E-02	-	4.79E-02	2.56E-01	-	2.56E-01	4.79E-03 ca**

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Site-specific

Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$
TCDD, 2,3,7,8-	Organics	1.30E+05	U	7.00E-10	U	-		1	0.808	321.98	0.5	No	-	-
*Total Risk/HI		-		-		-		-	-	-	-		-	-

Chemical	$DA_{event\ (nc\ adult)}$	Concentration (ug/L)	Ingestion Risk	Dermal Risk	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
TCDD, 2,3,7,8-	-	0.0000026168	5.46E-10	-	5.46E-10	5.46E-05	-	5.46E-05	1.02E-05	-	1.02E-05
*Total Risk/HI	-		5.46E-10	-	5.46E-10	5.46E-05	-	5.46E-05	1.02E-05	-	1.02E-05

Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	10
EF_{rec-c} (exposure frequency - child) day/year	10
EF_{rec-a} (exposure frequency - adult) day/year	10
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	10
EF_{6-16} (mutagenic exposure frequency) day/year	10
EF_{16-30} (mutagenic exposure frequency) day/year	10
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.083
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.195
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	21408
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	49144
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

Site-specific

Recreator Screening Levels (RSL) for Surface Water

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; E = see user guide Section 2.3.5; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide)

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?
TCDD, 2,3,7,8-	1746-01-6	No	Yes	Organics	1.30E+05	U	7.00E-10	U	-		1	0.808	322	0.5	No

Chemical	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$	$DA_{event\ (nc\ adult)}$	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
TCDD, 2,3,7,8-	-	-	-	2.37E-03	-	2.37E-03	2.40E-02	-	2.40E-02	1.28E-01	-	1.28E-01	2.37E-03 ca*

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Site-specific

Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$
TCDD, 2,3,7,8-	Organics	1.30E+05	U	7.00E-10	U			1	0.808	322	0.5	No	-	-
*Total Risk/HI		-		-		-		-	-	-	-		-	-

Chemical	$DA_{event\ (nc\ adult)}$	Concentration (ug/L)	Ingestion Risk	Dermal Risk	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
TCDD, 2,3,7,8-	-	0.0000026168	1.11E-09	-	1.11E-09	1.09E-04	-	1.09E-04	2.05E-05	-	2.05E-05
*Total Risk/HI	-		1.11E-09	-	1.11E-09	1.09E-04	-	1.09E-04	2.05E-05	-	2.05E-05

Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	5
EF_{rec-c} (exposure frequency - child) day/year	5
EF_{rec-a} (exposure frequency - adult) day/year	5
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	5
EF_{6-16} (mutagenic exposure frequency) day/year	5
EF_{16-30} (mutagenic exposure frequency) day/year	5
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.041
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.097
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	10704
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	24572
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

Site-specific

Recreator Screening Levels (RSL) for Surface Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref
Aluminum	7429-90-5	No	No	Inorganics	-		1.00E+00	U	-	
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		4.00E-04	U	-	
Bis(2-ethylhexyl)phthalate	117-81-7	No	No	Organics	3.00E-03	U	2.00E-02	U	-	
Boron And Borates Only	7440-42-8	No	No	Inorganics	-		2.00E-01	U	-	
Cadmium (Water)	7440-43-9	No	No	Inorganics	-		5.00E-04	U	-	
Chromium, Total	7440-47-3	No	No	Inorganics	-		1.50E+00	U	-	
Copper	7440-50-8	No	No	Inorganics	-		4.00E-02	U	-	
Cyanide (CN-)	57-12-5	No	Yes	Inorganics	-		6.00E-04	U	-	
Diethyl Phthalate	84-66-2	No	No	Organics	-		8.00E-01	U	-	
Endrin aldehyde	7421-93-4	No	No	Organics	-		3.00E-04	U	-	
Fluoride	16984-48-8	No	No	Inorganics	-		4.00E-02	U	-	
Hexachlorocyclohexane, Beta-	319-85-7	No	No	Organics	1.50E+00	U	-		-	
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		1.60E-04	U	-	
Nickel Soluble Salts	7440-02-0	No	No	Inorganics	-		1.10E-02	U	-	
Nitrate	14797-55-8	No	No	Inorganics	-		1.60E+00	U	-	
Nitrate + Nitrite (as N)	NA	No	No	Inorganics	-		1.60E+00	U	-	
Perchlorate and Perchlorate Salts	14797-73-0	No	No	Inorganics	-		7.00E-04	U	-	
Selenium	7782-49-2	No	No	Inorganics	-		5.00E-03	U	-	
Thallium (Soluble Salts)	7440-28-0	No	No	Inorganics	-		1.00E-05	U	-	
Vanadium and Compounds	7440-62-2	No	No	Inorganics	-		5.04E-03	U	-	
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		3.00E-01	U	-	

Site-specific

Recreator Screening Levels (RSL) for Surface Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	DA_{event} (nc child)	DA_{event} (nc adult)	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)
Aluminum	1	0.001	26.982	1	Yes	-	461.44121	968.16976	-	-
Antimony (metallic)	0.15	0.001	124.77	1	Yes	-	0.0276865	0.0580902	-	-
Bis(2-ethylhexyl)phthalate	1	1.13	390.57	0.8	No	-	-	-	2.08E+05	-
Boron And Borates Only	1	0.001	13.84	1	Yes	-	92.288243	193.63395	-	-
Cadmium (Water)	0.05	0.001	112.4	1	Yes	-	0.011536	0.0242042	-	-
Chromium, Total	0.013	0.001	51.996	1	Yes	-	8.9981037	18.87931	-	-
Copper	1	0.001	63.546	1	Yes	-	18.457649	38.72679	-	-
Cyanide (CN-)	1	0.001	26.018	1	Yes	-	0.2768647	0.5809019	-	-
Diethyl Phthalate	1	0.0036	222.24	1	Yes	-	369.15297	774.53581	-	-
Endrin aldehyde	1	0.0178	380.91	0.8	Yes	-	0.1384324	0.2904509	-	-
Fluoride	1	0.001	38	1	Yes	-	18.457649	38.72679	-	-
Hexachlorocyclohexane, Beta-	1	0.0206	290.83	0.9	Yes	0.0015913	-	-	4.15E+02	1.04E+01
Mercury (elemental)	1	0.001	200.59	1	Yes	-	0.0738306	0.1549072	-	-
Nickel Soluble Salts	0.04	0.0002	58.71	1	Yes	-	0.2030341	0.4259947	-	-
Nitrate	1	0.001	62	1	Yes	-	738.30594	1549.0716	-	-
Nitrate + Nitrite (as N)	1	0.001	-	0	Yes	-	738.30594	1549.0716	-	-
Perchlorate and Perchlorate Salts	1	0.001	117.49	1	Yes	-	0.3230088	0.6777188	-	-
Selenium	1	0.001	78.96	1	Yes	-	2.3072061	4.8408488	-	-
Thallium (Soluble Salts)	1	0.001	205.38	1	Yes	-	0.0046144	0.0096817	-	-
Vanadium and Compounds	0.026	0.001	50.94	1	Yes	-	0.0604673	0.126869	-	-
Zinc and Compounds	1	0.0006	65.37	1	Yes	-	138.43236	290.45093	-	-

Site-specific

Recreator Screening Levels (RSL) for Surface Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
Aluminum	-	6.84E+07	2.31E+08	5.28E+07	3.65E+08	4.84E+08	2.08E+08	5.28E+07 nc
Antimony (metallic)	-	2.74E+04	1.38E+04	9.19E+03	1.46E+05	2.90E+04	2.42E+04	9.19E+03 nc
Bis(2-ethylhexyl)phthalate	2.08E+05	1.37E+06	-	1.37E+06	7.30E+06	-	7.30E+06	2.08E+05 ca**
Boron And Borates Only	-	1.37E+07	4.61E+07	1.06E+07	7.30E+07	9.68E+07	4.16E+07	1.06E+07 nc
Cadmium (Water)	-	3.42E+04	5.77E+03	4.94E+03	1.83E+05	1.21E+04	1.13E+04	4.94E+03 nc
Chromium, Total	-	1.03E+08	4.50E+06	4.31E+06	5.48E+08	9.44E+06	9.28E+06	4.31E+06 nc
Copper	-	2.74E+06	9.23E+06	2.11E+06	1.46E+07	1.94E+07	8.32E+06	2.11E+06 nc
Cyanide (CN-)	-	4.11E+04	1.38E+05	3.17E+04	2.19E+05	2.90E+05	1.25E+05	3.17E+04 nc
Diethyl Phthalate	-	5.48E+07	1.93E+07	1.43E+07	2.92E+08	4.05E+07	3.56E+07	1.43E+07 nc
Endrin aldehyde	-	2.05E+04	6.58E+02	6.38E+02	1.10E+05	1.38E+03	1.36E+03	6.38E+02 nc
Fluoride	-	2.74E+06	9.23E+06	2.11E+06	1.46E+07	1.94E+07	8.32E+06	2.11E+06 nc
Hexachlorocyclohexane, Beta-	1.01E+01	-	-	-	-	-	-	1.01E+01 ca
Mercury (elemental)	-	1.10E+04	3.69E+04	8.45E+03	5.84E+04	7.75E+04	3.33E+04	8.45E+03 nc
Nickel Soluble Salts	-	7.53E+05	5.08E+05	3.03E+05	4.02E+06	1.06E+06	8.42E+05	3.03E+05 nc
Nitrate	-	1.10E+08	3.69E+08	8.45E+07	5.84E+08	7.75E+08	3.33E+08	8.45E+07 nc
Nitrate + Nitrite (as N)	-	1.10E+08	3.69E+08	8.45E+07	5.84E+08	7.75E+08	3.33E+08	8.45E+07 nc
Perchlorate and Perchlorate Salts	-	4.79E+04	1.62E+05	3.69E+04	2.56E+05	3.39E+05	1.46E+05	3.69E+04 nc
Selenium	-	3.42E+05	1.15E+06	2.64E+05	1.83E+06	2.42E+06	1.04E+06	2.64E+05 nc
Thallium (Soluble Salts)	-	6.84E+02	2.31E+03	5.28E+02	3.65E+03	4.84E+03	2.08E+03	5.28E+02 nc
Vanadium and Compounds	-	3.45E+05	3.02E+04	2.78E+04	1.84E+06	6.34E+04	6.13E+04	2.78E+04 nc
Zinc and Compounds	-	2.05E+07	1.15E+08	1.74E+07	1.10E+08	2.42E+08	7.54E+07	1.74E+07 nc

Site-specific

Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)
Aluminum	Inorganics	-		1.00E+00	U	-		1	0.001
Antimony (metallic)	Inorganics	-		4.00E-04	U	-		0.15	0.001
Bis(2-ethylhexyl)phthalate	Organics	3.00E-03	U	2.00E-02	U	-		1	1.13
Boron And Borates Only	Inorganics	-		2.00E-01	U	-		1	0.001
Cadmium (Water)	Inorganics	-		5.00E-04	U	-		0.05	0.001
Chromium, Total	Inorganics	-		1.50E+00	U	-		0.013	0.001
Copper	Inorganics	-		4.00E-02	U	-		1	0.001
Cyanide (CN-)	Inorganics	-		6.00E-04	U	-		1	0.001
Diethyl Phthalate	Organics	-		8.00E-01	U	-		1	0.0036
Endrin aldehyde	Organics	-		3.00E-04	U	-		1	0.0178
Fluoride	Inorganics	-		4.00E-02	U	-		1	0.001
Hexachlorocyclohexane, Beta-	Organics	1.50E+00	U	-		-		1	0.0206
Mercury (elemental)	Inorganics	-		1.60E-04	U	-		1	0.001
Nickel Soluble Salts	Inorganics	-		1.10E-02	U	-		0.04	0.0002
Nitrate	Inorganics	-		1.60E+00	U	-		1	0.001
Nitrate + Nitrite (as N)	Inorganics	-		1.60E+00	U	-		1	0.001
Perchlorate and Perchlorate Salts	Inorganics	-		7.00E-04	U	-		1	0.001
Selenium	Inorganics	-		5.00E-03	U	-		1	0.001
Thallium (Soluble Salts)	Inorganics	-		1.00E-05	U	-		1	0.001
Vanadium and Compounds	Inorganics	-		5.04E-03	U	-		0.026	0.001
Zinc and Compounds	Inorganics	-		3.00E-01	U	-		1	0.0006
*Total Risk/HI		-		-		-		-	-

Site-specific

Recreator Risk for Surface Water

Chemical	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$	$DA_{event\ (nc\ adult)}$	Concentration (ug/L)	Ingestion Risk	Dermal Risk
Aluminum	26.982	1	Yes	-	461.44121	968.16976	12000.0000	-	-
Antimony (metallic)	124.77	1	Yes	-	0.0276865	0.0580902	0.4420	-	-
Bis(2-ethylhexyl)phthalate	390.57	0.8	No	-	-	-	1.8700	9.00E-12	-
Boron And Borates Only	13.84	1	Yes	-	92.288243	193.63395	95.0000	-	-
Cadmium (Water)	112.4	1	Yes	-	0.011536	0.0242042	0.4600	-	-
Chromium, Total	51.996	1	Yes	-	8.9981037	18.87931	16.0000	-	-
Copper	63.546	1	Yes	-	18.457649	38.72679	9.0840	-	-
Cyanide (CN-)	26.018	1	Yes	-	0.2768647	0.5809019	8.7000	-	-
Diethyl Phthalate	222.24	1	Yes	-	369.15297	774.53581	0.1660	-	-
Endrin aldehyde	380.91	0.8	Yes	-	0.1384324	0.2904509	0.0027	-	-
Fluoride	38	1	Yes	-	18.457649	38.72679	260.0000	-	-
Hexachlorocyclohexane, Beta-	290.83	0.9	Yes	0.0015913	-	-	0.0052	1.25E-11	5.01E-10
Mercury (elemental)	200.59	1	Yes	-	0.0738306	0.1549072	0.1600	-	-
Nickel Soluble Salts	58.71	1	Yes	-	0.2030341	0.4259947	20.0000	-	-
Nitrate	62	1	Yes	-	738.30594	1549.0716	2174.0000	-	-
Nitrate + Nitrite (as N)	-	0	Yes	-	738.30594	1549.0716	2177.0000	-	-
Perchlorate and Perchlorate Salts	117.49	1	Yes	-	0.3230088	0.6777188	2.4280	-	-
Selenium	78.96	1	Yes	-	2.3072061	4.8408488	1.3000	-	-
Thallium (Soluble Salts)	205.38	1	Yes	-	0.0046144	0.0096817	1.2000	-	-
Vanadium and Compounds	50.94	1	Yes	-	0.0604673	0.126869	30.0000	-	-
Zinc and Compounds	65.37	1	Yes	-	138.43236	290.45093	36.7500	-	-
**Total Risk/HI*	-	-		-	-	-		*2.15E-11*	*5.01E-10*

Site-specific

Recreator Risk for Surface Water

Chemical	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
Aluminum	-	1.75E-04	5.20E-05	2.27E-04	3.29E-05	2.48E-05	5.77E-05
Antimony (metallic)	-	1.61E-05	3.19E-05	4.81E-05	3.03E-06	1.52E-05	1.82E-05
Bis(2-ethylhexyl)phthalate	9.00E-12	1.37E-06	-	1.37E-06	2.56E-07	-	2.56E-07
Boron And Borates Only	-	6.94E-06	2.06E-06	9.00E-06	1.30E-06	9.81E-07	2.28E-06
Cadmium (Water)	-	1.34E-05	7.98E-05	9.32E-05	2.52E-06	3.80E-05	4.05E-05
Chromium, Total	-	1.56E-07	3.56E-06	3.71E-06	2.92E-08	1.69E-06	1.72E-06
Copper	-	3.32E-06	9.84E-07	4.30E-06	6.22E-07	4.69E-07	1.09E-06
Cyanide (CN-)	-	2.12E-04	6.28E-05	2.75E-04	3.97E-05	3.00E-05	6.97E-05
Diethyl Phthalate	-	3.03E-09	8.60E-09	1.16E-08	5.68E-10	4.10E-09	4.67E-09
Endrin aldehyde	-	1.32E-07	4.10E-06	4.24E-06	2.47E-08	1.96E-06	1.98E-06
Fluoride	-	9.50E-05	2.82E-05	1.23E-04	1.78E-05	1.34E-05	3.12E-05
Hexachlorocyclohexane, Beta-	5.13E-10	-	-	-	-	-	-
Mercury (elemental)	-	1.46E-05	4.33E-06	1.89E-05	2.74E-06	2.07E-06	4.81E-06
Nickel Soluble Salts	-	2.66E-05	3.94E-05	6.60E-05	4.98E-06	1.88E-05	2.38E-05
Nitrate	-	1.99E-05	5.89E-06	2.57E-05	3.72E-06	2.81E-06	6.53E-06
Nitrate + Nitrite (as N)	-	1.99E-05	5.90E-06	2.58E-05	3.73E-06	2.81E-06	6.54E-06
Perchlorate and Perchlorate Salts	-	5.07E-05	1.50E-05	6.57E-05	9.50E-06	7.17E-06	1.67E-05
Selenium	-	3.80E-06	1.13E-06	4.93E-06	7.12E-07	5.37E-07	1.25E-06
Thallium (Soluble Salts)	-	1.75E-03	5.20E-04	2.27E-03	3.29E-04	2.48E-04	5.77E-04
Vanadium and Compounds	-	8.70E-05	9.92E-04	1.08E-03	1.63E-05	4.73E-04	4.89E-04
Zinc and Compounds	-	1.79E-06	3.19E-07	2.11E-06	3.36E-07	1.52E-07	4.87E-07
**Total Risk/HI*	*5.22E-10*	*2.50E-03*	*1.85E-03*	*4.35E-03*	*4.69E-04*	*8.82E-04*	*1.35E-03*

Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	10
EF_{rec-c} (exposure frequency - child) day/year	10
EF_{rec-a} (exposure frequency - adult) day/year	10
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	10
EF_{6-16} (mutagenic exposure frequency) day/year	10
EF_{16-30} (mutagenic exposure frequency) day/year	10
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.083
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.195
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	21408
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	49144
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

Site-specific

Recreator Screening Levels (RSL) for Surface Water

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; E = see user guide Section 2.3.5; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide)

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref
Aluminum	7429-90-5	No	No	Inorganics	-		1.00E+00	U	-	
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		4.00E-04	U	-	
Bis(2-ethylhexyl)phthalate	117-81-7	No	No	Organics	3.00E-03	U	2.00E-02	U	-	
Boron And Borates Only	7440-42-8	No	No	Inorganics	-		2.00E-01	U	-	
Cadmium (Water)	7440-43-9	No	No	Inorganics	-		5.00E-04	U	-	
Chromium, Total	7440-47-3	No	No	Inorganics	-		1.50E+00	U	-	
Copper	7440-50-8	No	No	Inorganics	-		4.00E-02	U	-	
Cyanide (CN-)	57-12-5	No	Yes	Inorganics	-		6.00E-04	U	-	
Diethyl Phthalate	84-66-2	No	No	Organics	-		8.00E-01	U	-	
Endrin aldehyde	7421-93-4	No	No	Organics	-		3.00E-04	U	-	
Fluoride	16984-48-8	No	No	Inorganics	-		4.00E-02	U	-	
Hexachlorocyclohexane, Beta-	319-85-7	No	No	Organics	1.50E+00	U	-		-	
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		1.60E-04	U	-	
Nickel Soluble Salts	7440-02-0	No	No	Inorganics	-		1.10E-02	U	-	
Nitrate	14797-55-8	No	No	Inorganics	-		1.60E+00	U	-	
Nitrate + Nitrite (as N)	NA	No	No	Inorganics	-		1.60E+00	U	-	
Perchlorate and Perchlorate Salts	14797-73-0	No	No	Inorganics	-		7.00E-04	U	-	
Selenium	7782-49-2	No	No	Inorganics	-		5.00E-03	U	-	
Thallium (Soluble Salts)	7440-28-0	No	No	Inorganics	-		1.00E-05	U	-	
Vanadium and Compounds	7440-62-2	No	No	Inorganics	-		5.04E-03	U	-	
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		3.00E-01	U	-	

Site-specific

Recreator Screening Levels (RSL) for Surface Water

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Chemical	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	DA_{event} (nc child)	DA_{event} (nc adult)	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)
Aluminum	1	0.001	27	1	Yes	-	230.72061	484.08488	-	-
Antimony (metallic)	0.15	0.001	122	1	Yes	-	0.0138432	0.0290451	-	-
Bis(2-ethylhexyl)phthalate	1	1.13	391	0.8	No	-	-	-	1.03E+05	-
Boron And Borates Only	1	0.001	13.8	1	Yes	-	46.144121	96.816976	-	-
Cadmium (Water)	0.05	0.001	112	1	Yes	-	0.005768	0.0121021	-	-
Chromium, Total	0.013	0.001	52	1	Yes	-	4.4990518	9.4396552	-	-
Copper	1	0.001	63.5	1	Yes	-	9.2288243	19.363395	-	-
Cyanide (CN-)	1	0.001	26	1	Yes	-	0.1384324	0.2904509	-	-
Diethyl Phthalate	1	0.0036	222	1	Yes	-	184.57649	387.2679	-	-
Endrin aldehyde	1	0.0178	381	0.8	Yes	-	0.0692162	0.1452255	-	-
Fluoride	1	0.001	38	1	Yes	-	9.2288243	19.363395	-	-
Hexachlorocyclohexane, Beta-	1	0.0206	291	0.9	Yes	0.0007957	-	-	2.05E+02	5.19E+00
Mercury (elemental)	1	0.001	201	1	Yes	-	0.0369153	0.0774536	-	-
Nickel Soluble Salts	0.04	0.0002	58.7	1	Yes	-	0.1015171	0.2129973	-	-
Nitrate	1	0.001	62	1	Yes	-	369.15297	774.53581	-	-
Nitrate + Nitrite (as N)	1	0.001	-	0	Yes	-	369.15297	774.53581	-	-
Perchlorate and Perchlorate Salts	1	0.001	117	1	Yes	-	0.1615044	0.3388594	-	-
Selenium	1	0.001	79	1	Yes	-	1.153603	2.4204244	-	-
Thallium (Soluble Salts)	1	0.001	204	1	Yes	-	0.0023072	0.0048408	-	-
Vanadium and Compounds	0.026	0.001	50.9	1	Yes	-	0.0302336	0.0634345	-	-
Zinc and Compounds	1	0.0006	65.4	1	Yes	-	69.216182	145.22546	-	-

Site-specific

Recreator Screening Levels (RSL) for Surface Water

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Chemical	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
Aluminum	-	3.42E+07	1.15E+08	2.64E+07	1.83E+08	2.42E+08	1.04E+08	2.64E+07 nc
Antimony (metallic)	-	1.37E+04	6.92E+03	4.60E+03	7.30E+04	1.45E+04	1.21E+04	4.60E+03 nc
Bis(2-ethylhexyl)phthalate	1.03E+05	6.84E+05	-	6.84E+05	3.65E+06	-	3.65E+06	1.03E+05 ca**
Boron And Borates Only	-	6.84E+06	2.31E+07	5.28E+06	3.65E+07	4.84E+07	2.08E+07	5.28E+06 nc
Cadmium (Water)	-	1.71E+04	2.88E+03	2.47E+03	9.13E+04	6.05E+03	5.67E+03	2.47E+03 nc
Chromium, Total	-	5.13E+07	2.25E+06	2.16E+06	2.74E+08	4.72E+06	4.64E+06	2.16E+06 nc
Copper	-	1.37E+06	4.61E+06	1.06E+06	7.30E+06	9.68E+06	4.16E+06	1.06E+06 nc
Cyanide (CN-)	-	2.05E+04	6.92E+04	1.58E+04	1.10E+05	1.45E+05	6.24E+04	1.58E+04 nc
Diethyl Phthalate	-	2.74E+07	9.67E+06	7.14E+06	1.46E+08	2.03E+07	1.78E+07	7.14E+06 nc
Endrin aldehyde	-	1.03E+04	3.29E+02	3.19E+02	5.48E+04	6.90E+02	6.81E+02	3.19E+02 nc
Fluoride	-	1.37E+06	4.61E+06	1.06E+06	7.30E+06	9.68E+06	4.16E+06	1.06E+06 nc
Hexachlorocyclohexane, Beta-	5.06E+00	-	-	-	-	-	-	5.06E+00 ca
Mercury (elemental)	-	5.48E+03	1.85E+04	4.22E+03	2.92E+04	3.87E+04	1.66E+04	4.22E+03 nc
Nickel Soluble Salts	-	3.76E+05	2.54E+05	1.52E+05	2.01E+06	5.32E+05	4.21E+05	1.52E+05 nc
Nitrate	-	5.48E+07	1.85E+08	4.22E+07	2.92E+08	3.87E+08	1.66E+08	4.22E+07 nc
Nitrate + Nitrite (as N)	-	5.48E+07	1.85E+08	4.22E+07	2.92E+08	3.87E+08	1.66E+08	4.22E+07 nc
Perchlorate and Perchlorate Salts	-	2.40E+04	8.08E+04	1.85E+04	1.28E+05	1.69E+05	7.28E+04	1.85E+04 nc
Selenium	-	1.71E+05	5.77E+05	1.32E+05	9.13E+05	1.21E+06	5.20E+05	1.32E+05 nc
Thallium (Soluble Salts)	-	3.42E+02	1.15E+03	2.64E+02	1.83E+03	2.42E+03	1.04E+03	2.64E+02 nc
Vanadium and Compounds	-	1.72E+05	1.51E+04	1.39E+04	9.20E+05	3.17E+04	3.07E+04	1.39E+04 nc
Zinc and Compounds	-	1.03E+07	5.77E+07	8.71E+06	5.48E+07	1.21E+08	3.77E+07	8.71E+06 nc

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Site-specific

Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)
Aluminum	Inorganics	-		1.00E+00	U	-		1	0.001
Antimony (metallic)	Inorganics	-		4.00E-04	U	-		0.15	0.001
Bis(2-ethylhexyl)phthalate	Organics	3.00E-03	U	2.00E-02	U	-		1	1.13
Boron And Borates Only	Inorganics	-		2.00E-01	U	-		1	0.001
Cadmium (Water)	Inorganics	-		5.00E-04	U	-		0.05	0.001
Chromium, Total	Inorganics	-		1.50E+00	U	-		0.013	0.001
Copper	Inorganics	-		4.00E-02	U	-		1	0.001
Cyanide (CN-)	Inorganics	-		6.00E-04	U	-		1	0.001
Diethyl Phthalate	Organics	-		8.00E-01	U	-		1	0.0036
Endrin aldehyde	Organics	-		3.00E-04	U	-		1	0.0178
Fluoride	Inorganics	-		4.00E-02	U	-		1	0.001
Hexachlorocyclohexane, Beta-	Organics	1.50E+00	U	-		-		1	0.0206
Mercury (elemental)	Inorganics	-		1.60E-04	U	-		1	0.001
Nickel Soluble Salts	Inorganics	-		1.10E-02	U	-		0.04	0.0002
Nitrate	Inorganics	-		1.60E+00	U	-		1	0.001
Nitrate + Nitrite (as N)	Inorganics	-		1.60E+00	U	-		1	0.001
Perchlorate and Perchlorate Salts	Inorganics	-		7.00E-04	U	-		1	0.001
Selenium	Inorganics	-		5.00E-03	U	-		1	0.001
Thallium (Soluble Salts)	Inorganics	-		1.00E-05	U	-		1	0.001
Vanadium and Compounds	Inorganics	-		5.04E-03	U	-		0.026	0.001
Zinc and Compounds	Inorganics	-		3.00E-01	U	-		1	0.0006
*Total Risk/HI		-		-		-		-	-

Site-specific

Recreator Risk for Surface Water

Chemical	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$	$DA_{event\ (nc\ adult)}$	Concentration (ug/L)	Ingestion Risk	Dermal Risk
Aluminum	27	1	Yes	-	230.72061	484.08488	12000.0000	-	-
Antimony (metallic)	122	1	Yes	-	0.0138432	0.0290451	0.4420	-	-
Bis(2-ethylhexyl)phthalate	391	0.8	No	-	-	-	1.8700	1.82E-11	-
Boron And Borates Only	13.8	1	Yes	-	46.144121	96.816976	95.0000	-	-
Cadmium (Water)	112	1	Yes	-	0.005768	0.0121021	0.4600	-	-
Chromium, Total	52	1	Yes	-	4.4990518	9.4396552	16.0000	-	-
Copper	63.5	1	Yes	-	9.2288243	19.363395	9.0840	-	-
Cyanide (CN-)	26	1	Yes	-	0.1384324	0.2904509	8.7000	-	-
Diethyl Phthalate	222	1	Yes	-	184.57649	387.2679	0.1660	-	-
Endrin aldehyde	381	0.8	Yes	-	0.0692162	0.1452255	0.0027	-	-
Fluoride	38	1	Yes	-	9.2288243	19.363395	260.0000	-	-
Hexachlorocyclohexane, Beta-	291	0.9	Yes	0.0007957	-	-	0.0052	2.53E-11	1.00E-09
Mercury (elemental)	201	1	Yes	-	0.0369153	0.0774536	0.1600	-	-
Nickel Soluble Salts	58.7	1	Yes	-	0.1015171	0.2129973	20.0000	-	-
Nitrate	62	1	Yes	-	369.15297	774.53581	2174.0000	-	-
Nitrate + Nitrite (as N)	-	0	Yes	-	369.15297	774.53581	2177.0000	-	-
Perchlorate and Perchlorate Salts	117	1	Yes	-	0.1615044	0.3388594	2.4280	-	-
Selenium	79	1	Yes	-	1.153603	2.4204244	1.3000	-	-
Thallium (Soluble Salts)	204	1	Yes	-	0.0023072	0.0048408	1.2000	-	-
Vanadium and Compounds	50.9	1	Yes	-	0.0302336	0.0634345	30.0000	-	-
Zinc and Compounds	65.4	1	Yes	-	69.216182	145.22546	36.7500	-	-
**Total Risk/HI*	-	-		-	-	-		*4.36E-11*	*1.00E-09*

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Site-specific

Recreator Risk for Surface Water

Chemical	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
Aluminum	-	3.51E-04	1.04E-04	4.55E-04	6.58E-05	4.96E-05	1.15E-04
Antimony (metallic)	-	3.23E-05	6.39E-05	9.62E-05	6.05E-06	3.04E-05	3.65E-05
Bis(2-ethylhexyl)phthalate	1.82E-11	2.73E-06	-	2.73E-06	5.12E-07	-	5.12E-07
Boron And Borates Only	-	1.39E-05	4.12E-06	1.80E-05	2.60E-06	1.96E-06	4.57E-06
Cadmium (Water)	-	2.69E-05	1.60E-04	1.86E-04	5.04E-06	7.60E-05	8.11E-05
Chromium, Total	-	3.12E-07	7.11E-06	7.42E-06	5.84E-08	3.39E-06	3.45E-06
Copper	-	6.64E-06	1.97E-06	8.61E-06	1.24E-06	9.38E-07	2.18E-06
Cyanide (CN-)	-	4.24E-04	1.26E-04	5.49E-04	7.95E-05	5.99E-05	1.39E-04
Diethyl Phthalate	-	6.06E-09	1.72E-08	2.32E-08	1.14E-09	8.18E-09	9.32E-09
Endrin aldehyde	-	2.63E-07	8.21E-06	8.47E-06	4.93E-08	3.91E-06	3.96E-06
Fluoride	-	1.90E-04	5.63E-05	2.46E-04	3.56E-05	2.69E-05	6.25E-05
Hexachlorocyclohexane, Beta-	1.03E-09	-	-	-	-	-	-
Mercury (elemental)	-	2.92E-05	8.67E-06	3.79E-05	5.48E-06	4.13E-06	9.61E-06
Nickel Soluble Salts	-	5.31E-05	7.88E-05	1.32E-04	9.96E-06	3.76E-05	4.75E-05
Nitrate	-	3.97E-05	1.18E-05	5.15E-05	7.45E-06	5.61E-06	1.31E-05
Nitrate + Nitrite (as N)	-	3.98E-05	1.18E-05	5.16E-05	7.46E-06	5.62E-06	1.31E-05
Perchlorate and Perchlorate Salts	-	1.01E-04	3.01E-05	1.31E-04	1.90E-05	1.43E-05	3.33E-05
Selenium	-	7.60E-06	2.25E-06	9.85E-06	1.42E-06	1.07E-06	2.50E-06
Thallium (Soluble Salts)	-	3.51E-03	1.04E-03	4.55E-03	6.58E-04	4.96E-04	1.15E-03
Vanadium and Compounds	-	1.74E-04	1.98E-03	2.16E-03	3.26E-05	9.46E-04	9.78E-04
Zinc and Compounds	-	3.58E-06	6.37E-07	4.22E-06	6.71E-07	3.04E-07	9.75E-07
**Total Risk/HI*	*1.05E-09*	*5.00E-03*	*3.70E-03*	*8.70E-03*	*9.38E-04*	*1.76E-03*	*2.70E-03*

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	13
EF_{rec-c} (exposure frequency - child) day/year	13
EF_{rec-a} (exposure frequency - adult) day/year	13
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	13
EF_{6-16} (mutagenic exposure frequency) day/year	13
EF_{16-30} (mutagenic exposure frequency) day/year	13
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.107
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.254
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	27830.4
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	63887.2
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

Site-specific

Recreator Screening Levels (RSL) for Surface Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?
TCDD, 2,3,7,8-	1746-01-6	No	Yes	Organics	1.30E+05	U	7.00E-10	U	-		1	0.808	321.98	0.5	No

Chemical	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$	$DA_{event\ (nc\ adult)}$	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
TCDD, 2,3,7,8-	-	-	-	1.84E-03	-	1.84E-03	1.84E-02	-	1.84E-02	9.83E-02	-	9.83E-02	1.84E-03 ca*

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Site-specific

Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$
TCDD, 2,3,7,8-	Organics	1.30E+05	U	7.00E-10	U	-		1	0.808	321.98	0.5	No	-	-
*Total Risk/HI		-		-		-		-	-	-	-		-	-

Chemical	$DA_{event\ (nc\ adult)}$	Concentration (ug/L)	Ingestion Risk	Dermal Risk	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
TCDD, 2,3,7,8-	-	0.0000027423	1.49E-09	-	1.49E-09	1.49E-04	-	1.49E-04	2.79E-05	-	2.79E-05
*Total Risk/HI	-		1.49E-09	-	1.49E-09	1.49E-04	-	1.49E-04	2.79E-05	-	2.79E-05

Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	26
EF_{rec-c} (exposure frequency - child) day/year	26
EF_{rec-a} (exposure frequency - adult) day/year	26
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	26
EF_{6-16} (mutagenic exposure frequency) day/year	26
EF_{16-30} (mutagenic exposure frequency) day/year	26
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.215
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.507
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	55660.8
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	127774.4
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

Site-specific

Recreator Screening Levels (RSL) for Surface Water

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; E = see user guide Section 2.3.5; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide)

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?
TCDD, 2,3,7,8-	1746-01-6	No	Yes	Organics	1.30E+05	U	7.00E-10	U	-		1	0.808	322	0.5	No

Chemical	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$	$DA_{event\ (nc\ adult)}$	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
TCDD, 2,3,7,8-	-	-	-	9.14E-04	-	9.14E-04	9.21E-03	-	9.21E-03	4.91E-02	-	4.91E-02	9.14E-04 ca*

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Site-specific

Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$
TCDD, 2,3,7,8-	Organics	1.30E+05	U	7.00E-10	U	-		1	0.808	322	0.5	No	-	-
*Total Risk/HI		-		-		-		-	-	-	-		-	-

Chemical	$DA_{event\ (nc\ adult)}$	Concentration (ug/L)	Ingestion Risk	Dermal Risk	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
TCDD, 2,3,7,8-	-	0.0000027423	3.00E-09	-	3.00E-09	2.98E-04	-	2.98E-04	5.58E-05	-	5.58E-05
*Total Risk/HI	-		3.00E-09	-	3.00E-09	2.98E-04	-	2.98E-04	5.58E-05	-	5.58E-05

Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	13
EF_{rec-c} (exposure frequency - child) day/year	13
EF_{rec-a} (exposure frequency - adult) day/year	13
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	13
EF_{6-16} (mutagenic exposure frequency) day/year	13
EF_{16-30} (mutagenic exposure frequency) day/year	13
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.107
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.254
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	27830.4
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	63887.2
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

Site-specific

Recreator Screening Levels (RSL) for Surface Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day)$^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m^3)	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)
Aluminum	7429-90-5	No	No	Inorganics	-		1.00E+00	U	-		1	0.001
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		4.00E-04	U	-		0.15	0.001
Bis(2-ethylhexyl)phthalate	117-81-7	No	No	Organics	3.00E-03	U	2.00E-02	U	-		1	1.13
Boron And Borates Only	7440-42-8	No	No	Inorganics	-		2.00E-01	U	-		1	0.001
Cadmium (Water)	7440-43-9	No	No	Inorganics	-		5.00E-04	U	-		0.05	0.001
Chromium(VI)	18540-29-9	Yes	No	Inorganics	5.00E-01	U	3.00E-03	U	-		0.025	0.002
Chromium, Total	7440-47-3	No	No	Inorganics	-		1.50E+00	U	-		0.013	0.001
Copper	7440-50-8	No	No	Inorganics	-		4.00E-02	U	-		1	0.001
Diethyl Phthalate	84-66-2	No	No	Organics	-		8.00E-01	U	-		1	0.0036
Fluoride	16984-48-8	No	No	Inorganics	-		4.00E-02	U	-		1	0.001
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		1.60E-04	U	-		1	0.001
Nickel Soluble Salts	7440-02-0	No	No	Inorganics	-		1.10E-02	U	-		0.04	0.0002
Nitrate + Nitrite (as N)	NA	No	No	Inorganics	-		1.60E+00	U	-		1	0.001
Pentachlorophenol	87-86-5	No	No	Organics	8.10E-02	U	5.00E-03	U	-		1	0.127
Selenium	7782-49-2	No	No	Inorganics	-		5.00E-03	U	-		1	0.001
Silver	7440-22-4	No	No	Inorganics	-		5.00E-03	U	-		0.04	0.0006
Thallium (Soluble Salts)	7440-28-0	No	No	Inorganics	-		1.00E-05	U	-		1	0.001
Vanadium and Compounds	7440-62-2	No	No	Inorganics	-		5.04E-03	U	-		0.026	0.001
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		3.00E-01	U	-		1	0.0006

Site-specific

Recreator Screening Levels (RSL) for Surface Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$	$DA_{event\ (nc\ adult)}$	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)
Aluminum	26.982	1	Yes	-	177.47739	372.37299	-	-	-	2.63E+07	8.87E+07
Antimony (metallic)	124.77	1	Yes	-	0.0106486	0.0223424	-	-	-	1.05E+04	5.32E+03
Bis(2-ethylhexyl)phthalate	390.57	0.8	No	-	-	-	7.96E+04	-	7.96E+04	5.26E+05	-
Boron And Borates Only	13.84	1	Yes	-	35.495478	74.474597	-	-	-	5.26E+06	1.77E+07
Cadmium (Water)	112.4	1	Yes	-	0.0044369	0.0093093	-	-	-	1.32E+04	2.22E+03
Chromium(VI)	52	1	Yes	0.00002	0.0133108	0.027928	2.01E+02	5.00E+00	4.88E+00	7.90E+04	3.33E+03
Chromium, Total	51.996	1	Yes	-	3.4608091	7.2612732	-	-	-	3.95E+07	1.73E+06
Copper	63.546	1	Yes	-	7.0990956	14.894919	-	-	-	1.05E+06	3.55E+06
Diethyl Phthalate	222.24	1	Yes	-	141.98191	297.89839	-	-	-	2.11E+07	7.42E+06
Fluoride	38	1	Yes	-	7.0990956	14.894919	-	-	-	1.05E+06	3.55E+06
Mercury (elemental)	200.59	1	Yes	-	0.0283964	0.0595797	-	-	-	4.21E+03	1.42E+04
Nickel Soluble Salts	58.71	1	Yes	-	0.0780901	0.1638441	-	-	-	2.90E+05	1.95E+05
Nitrate + Nitrite (as N)	-	0	Yes	-	283.96382	595.79678	-	-	-	4.21E+07	1.42E+08
Pentachlorophenol	266.34	0.9	Yes	0.0113341	0.8873869	1.8618649	2.95E+03	1.40E+01	1.40E+01	1.32E+05	1.10E+03
Selenium	78.96	1	Yes	-	0.8873869	1.8618649	-	-	-	1.32E+05	4.44E+05
Silver	107.87	1	Yes	-	0.0354955	0.0744746	-	-	-	1.32E+05	2.96E+04
Thallium (Soluble Salts)	205.38	1	Yes	-	0.0017748	0.0037237	-	-	-	2.63E+02	8.87E+02
Vanadium and Compounds	50.94	1	Yes	-	0.0232566	0.0487958	-	-	-	1.33E+05	1.16E+04
Zinc and Compounds	65.37	1	Yes	-	53.243217	111.7119	-	-	-	7.90E+06	4.44E+07

Site-specific

Recreator Screening Levels (RSL) for Surface Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
Aluminum	2.03E+07	1.40E+08	1.86E+08	8.00E+07	2.03E+07 nc
Antimony (metallic)	3.54E+03	5.62E+04	1.12E+04	9.32E+03	3.54E+03 nc
Bis(2-ethylhexyl)phthalate	5.26E+05	2.81E+06	-	2.81E+06	7.96E+04 ca**
Boron And Borates Only	4.06E+06	2.81E+07	3.72E+07	1.60E+07	4.06E+06 nc
Cadmium (Water)	1.90E+03	7.02E+04	4.65E+03	4.37E+03	1.90E+03 nc
Chromium(VI)	3.19E+03	4.21E+05	6.98E+03	6.87E+03	4.88E+00 ca
Chromium, Total	1.66E+06	2.11E+08	3.63E+06	3.57E+06	1.66E+06 nc
Copper	8.12E+05	5.62E+06	7.45E+06	3.20E+06	8.12E+05 nc
Diethyl Phthalate	5.49E+06	1.12E+08	1.56E+07	1.37E+07	5.49E+06 nc
Fluoride	8.12E+05	5.62E+06	7.45E+06	3.20E+06	8.12E+05 nc
Mercury (elemental)	3.25E+03	2.25E+04	2.98E+04	1.28E+04	3.25E+03 nc
Nickel Soluble Salts	1.17E+05	1.54E+06	4.10E+05	3.24E+05	1.17E+05 nc
Nitrate + Nitrite (as N)	3.25E+07	2.25E+08	2.98E+08	1.28E+08	3.25E+07 nc
Pentachlorophenol	1.09E+03	7.02E+05	2.31E+03	2.30E+03	1.40E+01 ca*
Selenium	1.02E+05	7.02E+05	9.31E+05	4.00E+05	1.02E+05 nc
Silver	2.42E+04	7.02E+05	6.21E+04	5.70E+04	2.42E+04 nc
Thallium (Soluble Salts)	2.03E+02	1.40E+03	1.86E+03	8.00E+02	2.03E+02 nc
Vanadium and Compounds	1.07E+04	7.08E+05	2.44E+04	2.36E+04	1.07E+04 nc
Zinc and Compounds	6.70E+06	4.21E+07	9.31E+07	2.90E+07	6.70E+06 nc

Site-specific

Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?
Aluminum	Inorganics	-		1.00E+00	U	-		1	0.001	26.982	1	Yes
Antimony (metallic)	Inorganics	-		4.00E-04	U	-		0.15	0.001	124.77	1	Yes
Bis(2-ethylhexyl)phthalate	Organics	3.00E-03	U	2.00E-02	U	-		1	1.13	390.57	0.8	No
Boron And Borates Only	Inorganics	-		2.00E-01	U	-		1	0.001	13.84	1	Yes
Cadmium (Water)	Inorganics	-		5.00E-04	U	-		0.05	0.001	112.4	1	Yes
Chromium(VI)	Inorganics	5.00E-01	U	3.00E-03	U	-		0.025	0.002	52	1	Yes
Chromium, Total	Inorganics	-		1.50E+00	U	-		0.013	0.001	51.996	1	Yes
Copper	Inorganics	-		4.00E-02	U	-		1	0.001	63.546	1	Yes
Diethyl Phthalate	Organics	-		8.00E-01	U	-		1	0.0036	222.24	1	Yes
Fluoride	Inorganics	-		4.00E-02	U	-		1	0.001	38	1	Yes
Mercury (elemental)	Inorganics	-		1.60E-04	U	-		1	0.001	200.59	1	Yes
Nickel Soluble Salts	Inorganics	-		1.10E-02	U	-		0.04	0.0002	58.71	1	Yes
Nitrate + Nitrite (as N)	Inorganics	-		1.60E+00	U	-		1	0.001	-	0	Yes
Pentachlorophenol	Organics	8.10E-02	U	5.00E-03	U	-		1	0.127	266.34	0.9	Yes
Selenium	Inorganics	-		5.00E-03	U	-		1	0.001	78.96	1	Yes
Silver	Inorganics	-		5.00E-03	U	-		0.04	0.0006	107.87	1	Yes
Thallium (Soluble Salts)	Inorganics	-		1.00E-05	U	-		1	0.001	205.38	1	Yes
Vanadium and Compounds	Inorganics	-		5.04E-03	U	-		0.026	0.001	50.94	1	Yes
Zinc and Compounds	Inorganics	-		3.00E-01	U	-		1	0.0006	65.37	1	Yes
*Total Risk/HI		-		-		-		-	-	-	-	

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Site-specific

Recreator Risk for Surface Water

Chemical	$DA_{event\ (ca)}$	DA_{event} (nc child)	DA_{event} (nc adult)	Concentration (ug/L)	Ingestion Risk	Dermal Risk	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ
Aluminum	-	177.47739	372.37299	4400.000	-	-	-	1.67E-04	4.96E-05
Antimony (metallic)	-	0.0106486	0.0223424	0.813	-	-	-	7.72E-05	1.53E-04
Bis(2-ethylhexyl)phthalate	-	-	-	10.600	1.33E-10	-	1.33E-10	2.01E-05	-
Boron And Borates Only	-	35.495478	74.474597	53.000	-	-	-	1.01E-05	2.99E-06
Cadmium (Water)	-	0.0044369	0.0093093	0.229	-	-	-	1.74E-05	1.03E-04
Chromium(VI)	0.00002	0.0133108	0.027928	0.410	2.04E-09	8.20E-08	8.41E-08	5.19E-06	1.23E-04
Chromium, Total	-	3.4608091	7.2612732	7.900	-	-	-	2.00E-07	4.57E-06
Copper	-	7.0990956	14.894919	5.408	-	-	-	5.14E-06	1.52E-06
Diethyl Phthalate	-	141.98191	297.89839	0.257	-	-	-	1.22E-08	3.46E-08
Fluoride	-	7.0990956	14.894919	200.000	-	-	-	1.90E-04	5.63E-05
Mercury (elemental)	-	0.0283964	0.0595797	0.110	-	-	-	2.61E-05	7.75E-06
Nickel Soluble Salts	-	0.0780901	0.1638441	6.170	-	-	-	2.13E-05	3.16E-05
Nitrate + Nitrite (as N)	-	283.96382	595.79678	775.000	-	-	-	1.84E-05	5.46E-06
Pentachlorophenol	0.0113341	0.8873869	1.8618649	1.460	4.95E-10	1.04E-07	1.04E-07	1.11E-05	1.33E-03
Selenium	-	0.8873869	1.8618649	10.000	-	-	-	7.60E-05	2.25E-05
Silver	-	0.0354955	0.0744746	0.620	-	-	-	4.71E-06	2.10E-05
Thallium (Soluble Salts)	-	0.0017748	0.0037237	0.430	-	-	-	1.63E-03	4.85E-04
Vanadium and Compounds	-	0.0232566	0.0487958	13.000	-	-	-	9.80E-05	1.12E-03
Zinc and Compounds	-	53.243217	111.7119	30.050	-	-	-	3.81E-06	6.77E-07
*Total Risk/HI	-	-	-		2.67E-09	1.86E-07	1.89E-07	2.39E-03	3.51E-03

Site-specific

Recreator Risk for Surface Water

Chemical	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
Aluminum	2.17E-04	3.13E-05	2.36E-05	5.50E-05
Antimony (metallic)	2.30E-04	1.45E-05	7.28E-05	8.73E-05
Bis(2-ethylhexyl)phthalate	2.01E-05	3.78E-06	-	3.78E-06
Boron And Borates Only	1.31E-05	1.89E-06	1.42E-06	3.31E-06
Cadmium (Water)	1.21E-04	3.26E-06	4.92E-05	5.25E-05
Chromium(VI)	1.28E-04	9.74E-07	5.87E-05	5.97E-05
Chromium, Total	4.77E-06	3.75E-08	2.18E-06	2.21E-06
Copper	6.66E-06	9.63E-07	7.26E-07	1.69E-06
Diethyl Phthalate	4.68E-08	2.29E-09	1.65E-08	1.88E-08
Fluoride	2.46E-04	3.56E-05	2.69E-05	6.25E-05
Mercury (elemental)	3.39E-05	4.90E-06	3.69E-06	8.59E-06
Nickel Soluble Salts	5.29E-05	4.00E-06	1.51E-05	1.91E-05
Nitrate + Nitrite (as N)	2.39E-05	3.45E-06	2.60E-06	6.05E-06
Pentachlorophenol	1.34E-03	2.08E-06	6.33E-04	6.35E-04
Selenium	9.85E-05	1.42E-05	1.07E-05	2.50E-05
Silver	2.57E-05	8.83E-07	9.99E-06	1.09E-05
Thallium (Soluble Salts)	2.12E-03	3.06E-04	2.31E-04	5.37E-04
Vanadium and Compounds	1.22E-03	1.84E-05	5.33E-04	5.51E-04
Zinc and Compounds	4.48E-06	7.14E-07	3.23E-07	1.04E-06
**Total Risk/HI*	*5.90E-03*	*4.47E-04*	*1.67E-03*	*2.12E-03*

Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	26
EF_{rec-c} (exposure frequency - child) day/year	26
EF_{rec-a} (exposure frequency - adult) day/year	26
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	26
EF_{6-16} (mutagenic exposure frequency) day/year	26
EF_{16-30} (mutagenic exposure frequency) day/year	26
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.215
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.507
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	55660.8
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	127774.4
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

Site-specific

Recreator Screening Levels (RSL) for Surface Water

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; E = see user guide Section 2.3.5; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide)

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day)$^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m^3)	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)
Aluminum	7429-90-5	No	No	Inorganics	-		1.00E+00	U	-		1	0.001
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		4.00E-04	U	-		0.15	0.001
Bis(2-ethylhexyl)phthalate	117-81-7	No	No	Organics	3.00E-03	U	2.00E-02	U	-		1	1.13
Boron And Borates Only	7440-42-8	No	No	Inorganics	-		2.00E-01	U	-		1	0.001
Cadmium (Water)	7440-43-9	No	No	Inorganics	-		5.00E-04	U	-		0.05	0.001
Chromium(VI)	18540-29-9	Yes	No	Inorganics	5.00E-01	U	3.00E-03	U	-		0.025	0.002
Chromium, Total	7440-47-3	No	No	Inorganics	-		1.50E+00	U	-		0.013	0.001
Copper	7440-50-8	No	No	Inorganics	-		4.00E-02	U	-		1	0.001
Diethyl Phthalate	84-66-2	No	No	Organics	-		8.00E-01	U	-		1	0.0036
Fluoride	16984-48-8	No	No	Inorganics	-		4.00E-02	U	-		1	0.001
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		1.60E-04	U	-		1	0.001
Nickel Soluble Salts	7440-02-0	No	No	Inorganics	-		1.10E-02	U	-		0.04	0.0002
Nitrate + Nitrite (as N)	NA	No	No	Inorganics	-		1.60E+00	U	-		1	0.001
Pentachlorophenol	87-86-5	No	No	Organics	8.10E-02	U	5.00E-03	U	-		1	0.127
Selenium	7782-49-2	No	No	Inorganics	-		5.00E-03	U	-		1	0.001
Silver	7440-22-4	No	No	Inorganics	-		5.00E-03	U	-		0.04	0.0006
Thallium (Soluble Salts)	7440-28-0	No	No	Inorganics	-		1.00E-05	U	-		1	0.001
Vanadium and Compounds	7440-62-2	No	No	Inorganics	-		5.04E-03	U	-		0.026	0.001
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		3.00E-01	U	-		1	0.0006

Site-specific

Recreator Screening Levels (RSL) for Surface Water

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; E = see user guide Section 2.3.5; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide)

Chemical	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	DA_{event} (nc child)	DA_{event} (nc adult)	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)
Aluminum	27	1	Yes	-	88.738695	186.18649	-	-	-	1.32E+07	4.44E+07
Antimony (metallic)	122	1	Yes	-	0.0053243	0.0111712	-	-	-	5.26E+03	2.66E+03
Bis(2-ethylhexyl)phthalate	391	0.8	No	-	-	-	3.96E+04	-	3.96E+04	2.63E+05	-
Boron And Borates Only	13.8	1	Yes	-	17.747739	37.237299	-	-	-	2.63E+06	8.87E+06
Cadmium (Water)	112	1	Yes	-	0.0022185	0.0046547	-	-	-	6.58E+03	1.11E+03
Chromium(VI)	52	1	Yes	9.9981E-6	0.0066554	0.013964	1.01E+02	2.50E+00	2.44E+00	3.95E+04	1.66E+03
Chromium, Total	52	1	Yes	-	1.7304046	3.6306366	-	-	-	1.97E+07	8.65E+05
Copper	63.5	1	Yes	-	3.5495478	7.4474597	-	-	-	5.26E+05	1.77E+06
Diethyl Phthalate	222	1	Yes	-	70.990956	148.94919	-	-	-	1.05E+07	3.72E+06
Fluoride	38	1	Yes	-	3.5495478	7.4474597	-	-	-	5.26E+05	1.77E+06
Mercury (elemental)	201	1	Yes	-	0.0141982	0.0297898	-	-	-	2.11E+03	7.10E+03
Nickel Soluble Salts	58.7	1	Yes	-	0.039045	0.0819221	-	-	-	1.45E+05	9.76E+04
Nitrate + Nitrite (as N)	-	0	Yes	-	141.98191	297.89839	-	-	-	2.11E+07	7.10E+07
Pentachlorophenol	266	0.9	Yes	0.005667	0.4436935	0.9309325	1.47E+03	7.04E+00	7.01E+00	6.58E+04	5.51E+02
Selenium	79	1	Yes	-	0.4436935	0.9309325	-	-	-	6.58E+04	2.22E+05
Silver	108	1	Yes	-	0.0177477	0.0372373	-	-	-	6.58E+04	1.48E+04
Thallium (Soluble Salts)	204	1	Yes	-	0.0008874	0.0018619	-	-	-	1.32E+02	4.44E+02
Vanadium and Compounds	50.9	1	Yes	-	0.0116283	0.0243979	-	-	-	6.63E+04	5.81E+03
Zinc and Compounds	65.4	1	Yes	-	26.621608	55.855948	-	-	-	3.95E+06	2.22E+07

Site-specific

Recreator Screening Levels (RSL) for Surface Water

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; E = see user guide Section 2.3.5; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide)

Chemical	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
Aluminum	1.02E+07	7.02E+07	9.31E+07	4.00E+07	1.02E+07 nc
Antimony (metallic)	1.77E+03	2.81E+04	5.59E+03	4.66E+03	1.77E+03 nc
Bis(2-ethylhexyl)phthalate	2.63E+05	1.40E+06	-	1.40E+06	3.96E+04 ca**
Boron And Borates Only	2.03E+06	1.40E+07	1.86E+07	8.00E+06	2.03E+06 nc
Cadmium (Water)	9.49E+02	3.51E+04	2.33E+03	2.18E+03	9.49E+02 nc
Chromium(VI)	1.60E+03	2.11E+05	3.49E+03	3.43E+03	2.44E+00 ca
Chromium, Total	8.29E+05	1.05E+08	1.82E+06	1.78E+06	8.29E+05 nc
Copper	4.06E+05	2.81E+06	3.72E+06	1.60E+06	4.06E+05 nc
Diethyl Phthalate	2.75E+06	5.62E+07	7.80E+06	6.85E+06	2.75E+06 nc
Fluoride	4.06E+05	2.81E+06	3.72E+06	1.60E+06	4.06E+05 nc
Mercury (elemental)	1.62E+03	1.12E+04	1.49E+04	6.40E+03	1.62E+03 nc
Nickel Soluble Salts	5.83E+04	7.72E+05	2.05E+05	1.62E+05	5.83E+04 nc
Nitrate + Nitrite (as N)	1.62E+07	1.12E+08	1.49E+08	6.40E+07	1.62E+07 nc
Pentachlorophenol	5.47E+02	3.51E+05	1.16E+03	1.15E+03	7.01E+00 ca*
Selenium	5.08E+04	3.51E+05	4.65E+05	2.00E+05	5.08E+04 nc
Silver	1.21E+04	3.51E+05	3.10E+04	2.85E+04	1.21E+04 nc
Thallium (Soluble Salts)	1.02E+02	7.02E+02	9.31E+02	4.00E+02	1.02E+02 nc
Vanadium and Compounds	5.35E+03	3.54E+05	1.22E+04	1.18E+04	5.35E+03 nc
Zinc and Compounds	3.35E+06	2.11E+07	4.65E+07	1.45E+07	3.35E+06 nc

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Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)
Aluminum	Inorganics	-		1.00E+00	U	-		1	0.001
Antimony (metallic)	Inorganics	-		4.00E-04	U	-		0.15	0.001
Bis(2-ethylhexyl)phthalate	Organics	3.00E-03	U	2.00E-02	U	-		1	1.13
Boron And Borates Only	Inorganics	-		2.00E-01	U	-		1	0.001
Cadmium (Water)	Inorganics	-		5.00E-04	U	-		0.05	0.001
Chromium(VI)	Inorganics	5.00E-01	U	3.00E-03	U	-		0.025	0.002
Chromium, Total	Inorganics	-		1.50E+00	U	-		0.013	0.001
Copper	Inorganics	-		4.00E-02	U	-		1	0.001
Diethyl Phthalate	Organics	-		8.00E-01	U	-		1	0.0036
Fluoride	Inorganics	-		4.00E-02	U	-		1	0.001
Mercury (elemental)	Inorganics	-		1.60E-04	U	-		1	0.001
Nickel Soluble Salts	Inorganics	-		1.10E-02	U	-		0.04	0.0002
Nitrate + Nitrite (as N)	Inorganics	-		1.60E+00	U	-		1	0.001
Pentachlorophenol	Organics	8.10E-02	U	5.00E-03	U	-		1	0.127
Selenium	Inorganics	-		5.00E-03	U	-		1	0.001
Silver	Inorganics	-		5.00E-03	U	-		0.04	0.0006
Thallium (Soluble Salts)	Inorganics	-		1.00E-05	U	-		1	0.001
Vanadium and Compounds	Inorganics	-		5.04E-03	U	-		0.026	0.001
Zinc and Compounds	Inorganics	-		3.00E-01	U	-		1	0.0006
*Total Risk/HI		-		-		-		-	-

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Recreator Risk for Surface Water

Chemical	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	DA_{event} (nc child)	DA_{event} (nc adult)	Concentration (ug/L)	Ingestion Risk	Dermal Risk
Aluminum	27	1	Yes	-	88.738695	186.18649	4400.000	-	-
Antimony (metallic)	122	1	Yes	-	0.0053243	0.0111712	0.813	-	-
Bis(2-ethylhexyl)phthalate	391	0.8	No	-	-	-	10.600	2.68E-10	-
Boron And Borates Only	13.8	1	Yes	-	17.747739	37.237299	53.000	-	-
Cadmium (Water)	112	1	Yes	-	0.0022185	0.0046547	0.229	-	-
Chromium(VI)	52	1	Yes	9.9981E-6	0.0066554	0.013964	0.410	4.07E-09	1.64E-07
Chromium, Total	52	1	Yes	-	1.7304046	3.6306366	7.900	-	-
Copper	63.5	1	Yes	-	3.5495478	7.4474597	5.408	-	-
Diethyl Phthalate	222	1	Yes	-	70.990956	148.94919	0.257	-	-
Fluoride	38	1	Yes	-	3.5495478	7.4474597	200.000	-	-
Mercury (elemental)	201	1	Yes	-	0.0141982	0.0297898	0.110	-	-
Nickel Soluble Salts	58.7	1	Yes	-	0.039045	0.0819221	6.170	-	-
Nitrate + Nitrite (as N)	-	0	Yes	-	141.98191	297.89839	775.000	-	-
Pentachlorophenol	266	0.9	Yes	0.005667	0.4436935	0.9309325	1.460	9.95E-10	2.07E-07
Selenium	79	1	Yes	-	0.4436935	0.9309325	10.000	-	-
Silver	108	1	Yes	-	0.0177477	0.0372373	0.620	-	-
Thallium (Soluble Salts)	204	1	Yes	-	0.0008874	0.0018619	0.430	-	-
Vanadium and Compounds	50.9	1	Yes	-	0.0116283	0.0243979	13.000	-	-
Zinc and Compounds	65.4	1	Yes	-	26.621608	55.855948	30.050	-	-
*Total Risk/HI	-	-		-	-	-		5.33E-09	3.71E-07

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Recreator Risk for Surface Water

Chemical	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
Aluminum	-	3.34E-04	9.92E-05	4.33E-04	6.27E-05	4.73E-05	1.10E-04
Antimony (metallic)	-	1.54E-04	3.05E-04	4.60E-04	2.90E-05	1.46E-04	1.75E-04
Bis(2-ethylhexyl)phthalate	2.68E-10	4.03E-05	-	4.03E-05	7.55E-06	-	7.55E-06
Boron And Borates Only	-	2.01E-05	5.97E-06	2.61E-05	3.78E-06	2.85E-06	6.62E-06
Cadmium (Water)	-	3.48E-05	2.06E-04	2.41E-04	6.52E-06	9.84E-05	1.05E-04
Chromium(VI)	1.68E-07	1.04E-05	2.46E-04	2.57E-04	1.95E-06	1.17E-04	1.19E-04
Chromium, Total	-	4.00E-07	9.13E-06	9.53E-06	7.50E-08	4.35E-06	4.43E-06
Copper	-	1.03E-05	3.05E-06	1.33E-05	1.93E-06	1.45E-06	3.38E-06
Diethyl Phthalate	-	2.44E-08	6.91E-08	9.35E-08	4.58E-09	3.29E-08	3.75E-08
Fluoride	-	3.80E-04	1.13E-04	4.93E-04	7.12E-05	5.37E-05	1.25E-04
Mercury (elemental)	-	5.22E-05	1.55E-05	6.77E-05	9.79E-06	7.39E-06	1.72E-05
Nickel Soluble Salts	-	4.26E-05	6.32E-05	1.06E-04	7.99E-06	3.01E-05	3.81E-05
Nitrate + Nitrite (as N)	-	3.68E-05	1.09E-05	4.77E-05	6.90E-06	5.20E-06	1.21E-05
Pentachlorophenol	2.08E-07	2.22E-05	2.65E-03	2.67E-03	4.16E-06	1.26E-03	1.27E-03
Selenium	-	1.52E-04	4.51E-05	1.97E-04	2.85E-05	2.15E-05	5.00E-05
Silver	-	9.42E-06	4.19E-05	5.13E-05	1.77E-06	2.00E-05	2.17E-05
Thallium (Soluble Salts)	-	3.27E-03	9.69E-04	4.24E-03	6.13E-04	4.62E-04	1.07E-03
Vanadium and Compounds	-	1.96E-04	2.24E-03	2.43E-03	3.67E-05	1.07E-03	1.10E-03
Zinc and Compounds	-	7.61E-06	1.35E-06	8.97E-06	1.43E-06	6.46E-07	2.07E-06
**Total Risk/HI*	*3.77E-07*	*4.77E-03*	*7.02E-03*	*1.18E-02*	*8.95E-04*	*3.35E-03*	*4.24E-03*

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	1
EF_{rec-c} (exposure frequency - child) day/year	1
EF_{rec-a} (exposure frequency - adult) day/year	1
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	1
EF_{6-16} (mutagenic exposure frequency) day/year	1
EF_{16-30} (mutagenic exposure frequency) day/year	1
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

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Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.008
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.02
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	2140.8
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	4914.4
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

Site-specific

Recreator Screening Levels (RSL) for Surface Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?
TCDD, 2,3,7,8-	1746-01-6	No	Yes	Organics	1.30E+05	U	7.00E-10	U	-		1	0.808	321.98	0.5	No

Chemical	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$	$DA_{event\ (nc\ adult)}$	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
TCDD, 2,3,7,8-	-	-	-	2.46E-02	-	2.46E-02	2.40E-01	-	2.40E-01	1.28E+00	-	1.28E+00	2.46E-02 ca**

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Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$
TCDD, 2,3,7,8-	Organics	1.30E+05	U	7.00E-10	U	-		1	0.808	321.98	0.5	No	-	-
*Total Risk/HI		-		-		-		-	-	-	-		-	-

Chemical	$DA_{event\ (nc\ adult)}$	Concentration (ug/L)	Ingestion Risk	Dermal Risk	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
TCDD, 2,3,7,8-	-	0.000003299	1.34E-10	-	1.34E-10	1.38E-05	-	1.38E-05	2.58E-06	-	2.58E-06
*Total Risk/HI	-		*1.34E-10*	-	*1.34E-10*	*1.38E-05*	-	*1.38E-05*	*2.58E-06*	-	*2.58E-06*

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Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	2
EF_{rec-c} (exposure frequency - child) day/year	2
EF_{rec-a} (exposure frequency - adult) day/year	2
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	2
EF_{6-16} (mutagenic exposure frequency) day/year	2
EF_{16-30} (mutagenic exposure frequency) day/year	2
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

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Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.017
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.039
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	4281.6
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	9828.8
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

Site-specific

Recreator Screening Levels (RSL) for Surface Water

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; E = see user guide Section 2.3.5; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide)

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?
TCDD, 2,3,7,8-	1746-01-6	No	Yes	Organics	1.30E+05	U	7.00E-10	U	-		1	0.808	322	0.5	No

Chemical	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$	$DA_{event\ (nc\ adult)}$	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
TCDD, 2,3,7,8-	-	-	-	1.16E-02	-	1.16E-02	1.20E-01	-	1.20E-01	6.39E-01	-	6.39E-01	1.16E-02 ca*

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Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$
TCDD, 2,3,7,8-	Organics	1.30E+05	U	7.00E-10	U	-		1	0.808	322	0.5	No	-	-
*Total Risk/HI		-		-		-		-	-	-	-		-	-

Chemical	$DA_{event\ (nc\ adult)}$	Concentration (ug/L)	Ingestion Risk	Dermal Risk	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
TCDD, 2,3,7,8-	-	0.000003299	2.85E-10	-	2.85E-10	2.75E-05	-	2.75E-05	5.16E-06	-	5.16E-06
*Total Risk/HI	-		2.85E-10	-	2.85E-10	2.75E-05	-	2.75E-05	5.16E-06	-	5.16E-06

Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	1
EF_{rec-c} (exposure frequency - child) day/year	1
EF_{rec-a} (exposure frequency - adult) day/year	1
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	1
EF_{6-16} (mutagenic exposure frequency) day/year	1
EF_{16-30} (mutagenic exposure frequency) day/year	1
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.008
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.02
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	2140.8
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	4914.4
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

Site-specific

Recreator Screening Levels (RSL) for Surface Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		4.00E-04	U	-	
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	9.50E+00	U	3.50E-06	U	-	
Barium	7440-39-3	No	No	Inorganics	-		2.00E-01	U	-	
Boron And Borates Only	7440-42-8	No	No	Inorganics	-		2.00E-01	U	-	
Butyl Benzyl Phthalate	85-68-7	No	No	Organics	1.90E-03	U	2.00E-01	U	-	
Cadmium (Water)	7440-43-9	No	No	Inorganics	-		5.00E-04	U	-	
Chromium, Total	7440-47-3	No	No	Inorganics	-		1.50E+00	U	-	
Cobalt	7440-48-4	No	No	Inorganics	-		3.00E-04	U	-	
Copper	7440-50-8	No	No	Inorganics	-		4.00E-02	U	-	
Dibutyl Phthalate	84-74-2	No	No	Organics	-		1.00E-01	U	-	
Diethyl Phthalate	84-66-2	No	No	Organics	-		8.00E-01	U	-	
Fluoride	16984-48-8	No	No	Inorganics	-		4.00E-02	U	-	
Isophorone	78-59-1	No	No	Organics	9.50E-04	U	2.00E-01	U	-	
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		2.40E-02	U	-	
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		1.60E-04	U	-	
Nickel Soluble Salts	7440-02-0	No	No	Inorganics	-		1.10E-02	U	-	
Nitrate	14797-55-8	No	No	Inorganics	-		1.60E+00	U	-	
Nitrate + Nitrite (as N)	NA	No	No	Inorganics	-		1.60E+00	U	-	
Pentachlorophenol	87-86-5	No	No	Organics	8.10E-02	U	5.00E-03	U	-	
Selenium	7782-49-2	No	No	Inorganics	-		5.00E-03	U	-	
Silver	7440-22-4	No	No	Inorganics	-		5.00E-03	U	-	
Thallium (Soluble Salts)	7440-28-0	No	No	Inorganics	-		1.00E-05	U	-	
Vanadium and Compounds	7440-62-2	No	No	Inorganics	-		5.04E-03	U	-	
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		3.00E-01	U	-	

Site-specific

Recreator Screening Levels (RSL) for Surface Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$	$DA_{event\ (nc\ adult)}$	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)
Antimony (metallic)	0.15	0.001	124.77	1	Yes	-	0.1384324	0.2904509	-	-
Arsenic, Inorganic	1	0.001	77.946	1	Yes	0.0012563	0.0080752	0.016943	3.36E+02	6.28E+02
Barium	0.07	0.001	139.36	1	Yes	-	32.300885	67.771883	-	-
Boron And Borates Only	1	0.001	13.84	1	Yes	-	461.44121	968.16976	-	-
Butyl Benzyl Phthalate	1	0.0385	312.37	0.9	Yes	6.2814688	461.44121	968.16976	1.68E+06	1.91E+04
Cadmium (Water)	0.05	0.001	112.4	1	Yes	-	0.0576802	0.1210212	-	-
Chromium, Total	0.013	0.001	51.996	1	Yes	-	44.990518	94.396552	-	-
Cobalt	1	0.0004	58.93	1	Yes	-	0.6921618	1.4522546	-	-
Copper	1	0.001	63.546	1	Yes	-	92.288243	193.63395	-	-
Dibutyl Phthalate	1	0.042	278.35	0.9	Yes	-	230.72061	484.08488	-	-
Diethyl Phthalate	1	0.0036	222.24	1	Yes	-	1845.7649	3872.679	-	-
Fluoride	1	0.001	38	1	Yes	-	92.288243	193.63395	-	-
Isophorone	1	0.00354	138.21	1	Yes	12.562938	461.44121	968.16976	3.36E+06	1.10E+06
Manganese (Non-diet)	0.04	0.001	54.938	1	Yes	-	2.2149178	4.6472149	-	-
Mercury (elemental)	1	0.001	200.59	1	Yes	-	0.369153	0.7745358	-	-
Nickel Soluble Salts	0.04	0.0002	58.71	1	Yes	-	1.0151707	2.1299735	-	-
Nitrate	1	0.001	62	1	Yes	-	3691.5297	7745.3581	-	-
Nitrate + Nitrite (as N)	1	0.001	-	0	Yes	-	3691.5297	7745.3581	-	-
Pentachlorophenol	1	0.127	266.34	0.9	Yes	0.1473431	11.53603	24.204244	3.94E+04	1.83E+02
Selenium	1	0.001	78.96	1	Yes	-	11.53603	24.204244	-	-
Silver	0.04	0.0006	107.87	1	Yes	-	0.4614412	0.9681698	-	-
Thallium (Soluble Salts)	1	0.001	205.38	1	Yes	-	0.0230721	0.0484085	-	-
Vanadium and Compounds	0.026	0.001	50.94	1	Yes	-	0.3023363	0.6343448	-	-
Zinc and Compounds	1	0.0006	65.37	1	Yes	-	692.16182	1452.2546	-	-

Site-specific

Recreator Screening Levels (RSL) for Surface Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
Antimony (metallic)	-	1.37E+05	6.92E+04	4.60E+04	7.30E+05	1.45E+05	1.21E+05	4.60E+04 nc
Arsenic, Inorganic	2.19E+02	1.20E+03	4.04E+03	9.24E+02	6.39E+03	8.47E+03	3.64E+03	2.19E+02 ca**
Barium	-	6.84E+07	1.62E+07	1.31E+07	3.65E+08	3.39E+07	3.10E+07	1.31E+07 nc
Boron And Borates Only	-	6.84E+07	2.31E+08	5.28E+07	3.65E+08	4.84E+08	2.08E+08	5.28E+07 nc
Butyl Benzyl Phthalate	1.89E+04	6.84E+07	1.40E+06	1.37E+06	3.65E+08	2.94E+06	2.92E+06	1.89E+04 ca*
Cadmium (Water)	-	1.71E+05	2.88E+04	2.47E+04	9.13E+05	6.05E+04	5.67E+04	2.47E+04 nc
Chromium, Total	-	5.13E+08	2.25E+07	2.16E+07	2.74E+09	4.72E+07	4.64E+07	2.16E+07 nc
Cobalt	-	1.03E+05	8.65E+05	9.18E+04	5.48E+05	1.82E+06	4.21E+05	9.18E+04 nc
Copper	-	1.37E+07	4.61E+07	1.06E+07	7.30E+07	9.68E+07	4.16E+07	1.06E+07 nc
Dibutyl Phthalate	-	3.42E+07	8.00E+05	7.82E+05	1.83E+08	1.68E+06	1.66E+06	7.82E+05 nc
Diethyl Phthalate	-	2.74E+08	9.65E+07	7.14E+07	1.46E+09	2.03E+08	1.78E+08	7.14E+07 nc
Fluoride	-	1.37E+07	4.61E+07	1.06E+07	7.30E+07	9.68E+07	4.16E+07	1.06E+07 nc
Isophorone	8.26E+05	6.84E+07	4.03E+07	2.53E+07	3.65E+08	8.45E+07	6.86E+07	8.26E+05 ca*
Manganese (Non-diet)	-	8.21E+06	1.11E+06	9.76E+05	4.38E+07	2.32E+06	2.21E+06	9.76E+05 nc
Mercury (elemental)	-	5.48E+04	1.85E+05	4.22E+04	2.92E+05	3.87E+05	1.66E+05	4.22E+04 nc
Nickel Soluble Salts	-	3.76E+06	2.54E+06	1.52E+06	2.01E+07	5.32E+06	4.21E+06	1.52E+06 nc
Nitrate	-	5.48E+08	1.85E+09	4.22E+08	2.92E+09	3.87E+09	1.66E+09	4.22E+08 nc
Nitrate + Nitrite (as N)	-	5.48E+08	1.85E+09	4.22E+08	2.92E+09	3.87E+09	1.66E+09	4.22E+08 nc
Pentachlorophenol	1.82E+02	1.71E+06	1.43E+04	1.42E+04	9.13E+06	3.00E+04	2.99E+04	1.82E+02 ca*
Selenium	-	1.71E+06	5.77E+06	1.32E+06	9.13E+06	1.21E+07	5.20E+06	1.32E+06 nc
Silver	-	1.71E+06	3.85E+05	3.14E+05	9.13E+06	8.07E+05	7.41E+05	3.14E+05 nc
Thallium (Soluble Salts)	-	3.42E+03	1.15E+04	2.64E+03	1.83E+04	2.42E+04	1.04E+04	2.64E+03 nc
Vanadium and Compounds	-	1.72E+06	1.51E+05	1.39E+05	9.20E+06	3.17E+05	3.07E+05	1.39E+05 nc
Zinc and Compounds	-	1.03E+08	5.77E+08	8.71E+07	5.48E+08	1.21E+09	3.77E+08	8.71E+07 nc

Site-specific

Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$
Antimony (metallic)	Inorganics	-		4.00E-04	U	-		0.15	0.001	124.77	1	Yes	-	0.1384324
Arsenic, Inorganic	Inorganics	9.50E+00	U	3.50E-06	U	-		1	0.001	77.946	1	Yes	0.0012563	0.0080752
Barium	Inorganics	-		2.00E-01	U	-		0.07	0.001	139.36	1	Yes	-	32.300885
Boron And Borates Only	Inorganics	-		2.00E-01	U	-		1	0.001	13.84	1	Yes	-	461.44121
Butyl Benzyl Phthalate	Organics	1.90E-03	U	2.00E-01	U	-		1	0.0385	312.37	0.9	Yes	6.2814688	461.44121
Cadmium (Water)	Inorganics	-		5.00E-04	U	-		0.05	0.001	112.4	1	Yes	-	0.0576802
Chromium, Total	Inorganics	-		1.50E+00	U	-		0.013	0.001	51.996	1	Yes	-	44.990518
Cobalt	Inorganics	-		3.00E-04	U	-		1	0.0004	58.93	1	Yes	-	0.6921618
Copper	Inorganics	-		4.00E-02	U	-		1	0.001	63.546	1	Yes	-	92.288243
Dibutyl Phthalate	Organics	-		1.00E-01	U	-		1	0.042	278.35	0.9	Yes	-	230.72061
Diethyl Phthalate	Organics	-		8.00E-01	U	-		1	0.0036	222.24	1	Yes	-	1845.7649
Fluoride	Inorganics	-		4.00E-02	U	-		1	0.001	38	1	Yes	-	92.288243
Isophorone	Organics	9.50E-04	U	2.00E-01	U	-		1	0.00354	138.21	1	Yes	12.562938	461.44121
Manganese (Non-diet)	Inorganics	-		2.40E-02	U	-		0.04	0.001	54.938	1	Yes	-	2.2149178
Mercury (elemental)	Inorganics	-		1.60E-04	U	-		1	0.001	200.59	1	Yes	-	0.369153
Nickel Soluble Salts	Inorganics	-		1.10E-02	U	-		0.04	0.0002	58.71	1	Yes	-	1.0151707
Nitrate	Inorganics	-		1.60E+00	U	-		1	0.001	62	1	Yes	-	3691.5297
Nitrate + Nitrite (as N)	Inorganics	-		1.60E+00	U	-		1	0.001	-	0	Yes	-	3691.5297
Pentachlorophenol	Organics	8.10E-02	U	5.00E-03	U	-		1	0.127	266.34	0.9	Yes	0.1473431	11.53603
Selenium	Inorganics	-		5.00E-03	U	-		1	0.001	78.96	1	Yes	-	11.53603
Silver	Inorganics	-		5.00E-03	U	-		0.04	0.0006	107.87	1	Yes	-	0.4614412
Thallium (Soluble Salts)	Inorganics	-		1.00E-05	U	-		1	0.001	205.38	1	Yes	-	0.0230721
Vanadium and Compounds	Inorganics	-		5.04E-03	U	-		0.026	0.001	50.94	1	Yes	-	0.3023363
Zinc and Compounds	Inorganics	-		3.00E-01	U	-		1	0.0006	65.37	1	Yes	-	692.16182
**Total Risk/HI*		-		-		-		-	-	-	-		-	-

Site-specific

Recreator Risk for Surface Water

Chemical	DA_{event} (nc adult)	Concentration (ug/L)	Ingestion Risk	Dermal Risk	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
Antimony (metallic)	0.2904509	1.000	-	-	-	7.31E-06	1.44E-05	2.18E-05	1.37E-06	6.89E-06	8.26E-06
Arsenic, Inorganic	0.016943	8.900	2.65E-08	1.42E-08	4.06E-08	7.43E-03	2.20E-03	9.64E-03	1.39E-03	1.05E-03	2.44E-03
Barium	67.771883	68.00	-	-	-	9.94E-07	4.21E-06	5.20E-06	1.86E-07	2.01E-06	2.19E-06
Boron And Borates Only	968.16976	44.00	-	-	-	6.43E-07	1.91E-07	8.34E-07	1.21E-07	9.09E-08	2.11E-07
Butyl Benzyl Phthalate	968.16976	1.300	7.73E-13	6.81E-11	6.89E-11	1.90E-08	9.27E-07	9.46E-07	3.56E-09	4.42E-07	4.45E-07
Cadmium (Water)	0.1210212	0.300	-	-	-	1.75E-06	1.04E-05	1.22E-05	3.29E-07	4.96E-06	5.29E-06
Chromium, Total	94.396552	25.00	-	-	-	4.87E-08	1.11E-06	1.16E-06	9.13E-09	5.30E-07	5.39E-07
Cobalt	1.4522546	3.000	-	-	-	2.92E-05	3.47E-06	3.27E-05	5.48E-06	1.65E-06	7.13E-06
Copper	193.63395	8.700	-	-	-	6.36E-07	1.89E-07	8.24E-07	1.19E-07	8.99E-08	2.09E-07
Dibutyl Phthalate	484.08488	0.396	-	-	-	1.16E-08	4.95E-07	5.06E-07	2.17E-09	2.36E-07	2.38E-07
Diethyl Phthalate	3872.679	0.302	-	-	-	1.10E-09	3.13E-09	4.23E-09	2.07E-10	1.49E-09	1.70E-09
Fluoride	193.63395	210.0	-	-	-	1.53E-05	4.55E-06	1.99E-05	2.88E-06	2.17E-06	5.05E-06
Isophorone	968.16976	0.094	2.80E-14	8.58E-14	1.14E-13	1.37E-09	2.34E-09	3.71E-09	2.58E-10	1.11E-09	1.37E-09
Manganese (Non-diet)	4.6472149	150.0	-	-	-	1.83E-05	1.35E-04	1.54E-04	3.42E-06	6.46E-05	6.80E-05
Mercury (elemental)	0.7745358	0.120	-	-	-	2.19E-06	6.50E-07	2.84E-06	4.11E-07	3.10E-07	7.21E-07
Nickel Soluble Salts	2.1299735	4.500	-	-	-	1.20E-06	1.77E-06	2.97E-06	2.24E-07	8.45E-07	1.07E-06
Nitrate	7745.3581	970.0	-	-	-	1.77E-06	5.26E-07	2.30E-06	3.32E-07	2.50E-07	5.83E-07
Nitrate + Nitrite (as N)	7745.3581	970.0	-	-	-	1.77E-06	5.26E-07	2.30E-06	3.32E-07	2.50E-07	5.83E-07
Pentachlorophenol	24.204244	1.500	3.80E-11	8.21E-09	8.25E-09	8.77E-07	1.05E-04	1.06E-04	1.64E-07	5.00E-05	5.02E-05
Selenium	24.204244	0.560	-	-	-	3.27E-07	9.71E-08	4.24E-07	6.14E-08	4.63E-08	1.08E-07
Silver	0.9681698	0.120	-	-	-	7.01E-08	3.12E-07	3.82E-07	1.32E-08	1.49E-07	1.62E-07
Thallium (Soluble Salts)	0.0484085	0.200	-	-	-	5.84E-05	1.73E-05	7.58E-05	1.10E-05	8.26E-06	1.92E-05
Vanadium and Compounds	0.6343448	25.00	-	-	-	1.45E-05	1.65E-04	1.80E-04	2.72E-06	7.88E-05	8.15E-05
Zinc and Compounds	1452.2546	60.00	-	-	-	5.84E-07	1.04E-07	6.88E-07	1.10E-07	4.96E-08	1.59E-07
*Total Risk/HI	-		2.65E-08	2.25E-08	4.90E-08	7.59E-03	2.67E-03	1.03E-02	1.42E-03	1.27E-03	2.70E-03

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	2
EF_{rec-c} (exposure frequency - child) day/year	2
EF_{rec-a} (exposure frequency - adult) day/year	2
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	2
EF_{6-16} (mutagenic exposure frequency) day/year	2
EF_{16-30} (mutagenic exposure frequency) day/year	2
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.017
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.039
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	4281.6
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	9828.8
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

Site-specific

Recreator Screening Levels (RSL) for Surface Water

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; E = see user guide Section 2.3.5; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide)

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		4.00E-04	U	-	
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	9.50E+00	U	3.50E-06	U	-	
Barium	7440-39-3	No	No	Inorganics	-		2.00E-01	U	-	
Boron And Borates Only	7440-42-8	No	No	Inorganics	-		2.00E-01	U	-	
Butyl Benzyl Phthalate	85-68-7	No	No	Organics	1.90E-03	U	2.00E-01	U	-	
Cadmium (Water)	7440-43-9	No	No	Inorganics	-		5.00E-04	U	-	
Chromium, Total	7440-47-3	No	No	Inorganics	-		1.50E+00	U	-	
Cobalt	7440-48-4	No	No	Inorganics	-		3.00E-04	U	-	
Copper	7440-50-8	No	No	Inorganics	-		4.00E-02	U	-	
Dibutyl Phthalate	84-74-2	No	No	Organics	-		1.00E-01	U	-	
Diethyl Phthalate	84-66-2	No	No	Organics	-		8.00E-01	U	-	
Fluoride	16984-48-8	No	No	Inorganics	-		4.00E-02	U	-	
Isophorone	78-59-1	No	No	Organics	9.50E-04	U	2.00E-01	U	-	
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		2.40E-02	U	-	
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		1.60E-04	U	-	
Nickel Soluble Salts	7440-02-0	No	No	Inorganics	-		1.10E-02	U	-	
Nitrate	14797-55-8	No	No	Inorganics	-		1.60E+00	U	-	
Nitrate + Nitrite (as N)	NA	No	No	Inorganics	-		1.60E+00	U	-	
Pentachlorophenol	87-86-5	No	No	Organics	8.10E-02	U	5.00E-03	U	-	
Selenium	7782-49-2	No	No	Inorganics	-		5.00E-03	U	-	
Silver	7440-22-4	No	No	Inorganics	-		5.00E-03	U	-	
Thallium (Soluble Salts)	7440-28-0	No	No	Inorganics	-		1.00E-05	U	-	
Vanadium and Compounds	7440-62-2	No	No	Inorganics	-		5.04E-03	U	-	
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		3.00E-01	U	-	

Site-specific

Recreator Screening Levels (RSL) for Surface Water

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Chemical	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	DA_{event} (nc child)	DA_{event} (nc adult)	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)
Antimony (metallic)	0.15	0.001	122	1	Yes	-	0.0692162	0.1452255	-	-
Arsenic, Inorganic	1	0.001	74.9	1	Yes	0.0006281	0.0040376	0.0084715	1.58E+02	3.14E+02
Barium	0.07	0.001	137	1	Yes	-	16.150442	33.885942	-	-
Boron And Borates Only	1	0.001	13.8	1	Yes	-	230.72061	484.08488	-	-
Butyl Benzyl Phthalate	1	0.0385	312	0.9	Yes	3.1407344	230.72061	484.08488	7.91E+05	9.57E+03
Cadmium (Water)	0.05	0.001	112	1	Yes	-	0.0288401	0.0605106	-	-
Chromium, Total	0.013	0.001	52	1	Yes	-	22.495259	47.198276	-	-
Cobalt	1	0.0004	58.9	1	Yes	-	0.3460809	0.7261273	-	-
Copper	1	0.001	63.5	1	Yes	-	46.144121	96.816976	-	-
Dibutyl Phthalate	1	0.042	278	0.9	Yes	-	115.3603	242.04244	-	-
Diethyl Phthalate	1	0.0036	222	1	Yes	-	922.88243	1936.3395	-	-
Fluoride	1	0.001	38	1	Yes	-	46.144121	96.816976	-	-
Isophorone	1	0.00354	138	1	Yes	6.2814688	230.72061	484.08488	1.58E+06	5.49E+05
Manganese (Non-diet)	0.04	0.001	54.9	1	Yes	-	1.1074589	2.3236074	-	-
Mercury (elemental)	1	0.001	201	1	Yes	-	0.1845765	0.3872679	-	-
Nickel Soluble Salts	0.04	0.0002	58.7	1	Yes	-	0.5075853	1.0649867	-	-
Nitrate	1	0.001	62	1	Yes	-	1845.7649	3872.679	-	-
Nitrate + Nitrite (as N)	1	0.001	-	0	Yes	-	1845.7649	3872.679	-	-
Pentachlorophenol	1	0.127	266	0.9	Yes	0.0736715	5.7680152	12.102122	1.86E+04	9.15E+01
Selenium	1	0.001	79	1	Yes	-	5.7680152	12.102122	-	-
Silver	0.04	0.0006	108	1	Yes	-	0.2307206	0.4840849	-	-
Thallium (Soluble Salts)	1	0.001	204	1	Yes	-	0.011536	0.0242042	-	-
Vanadium and Compounds	0.026	0.001	50.9	1	Yes	-	0.1511681	0.3171724	-	-
Zinc and Compounds	1	0.0006	65.4	1	Yes	-	346.08091	726.12732	-	-

Site-specific

Recreator Screening Levels (RSL) for Surface Water

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Chemical	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
Antimony (metallic)	-	6.84E+04	3.46E+04	2.30E+04	3.65E+05	7.26E+04	6.06E+04	2.30E+04 nc
Arsenic, Inorganic	1.05E+02	5.99E+02	2.02E+03	4.62E+02	3.19E+03	4.24E+03	1.82E+03	1.05E+02 ca**
Barium	-	3.42E+07	8.08E+06	6.53E+06	1.83E+08	1.69E+07	1.55E+07	6.53E+06 nc
Boron And Borates Only	-	3.42E+07	1.15E+08	2.64E+07	1.83E+08	2.42E+08	1.04E+08	2.64E+07 nc
Butyl Benzyl Phthalate	9.45E+03	3.42E+07	7.03E+05	6.89E+05	1.83E+08	1.47E+06	1.46E+06	9.45E+03 ca*
Cadmium (Water)	-	8.55E+04	1.44E+04	1.23E+04	4.56E+05	3.03E+04	2.84E+04	1.23E+04 nc
Chromium, Total	-	2.57E+08	1.12E+07	1.08E+07	1.37E+09	2.36E+07	2.32E+07	1.08E+07 nc
Cobalt	-	5.13E+04	4.33E+05	4.59E+04	2.74E+05	9.08E+05	2.10E+05	4.59E+04 nc
Copper	-	6.84E+06	2.31E+07	5.28E+06	3.65E+07	4.84E+07	2.08E+07	5.28E+06 nc
Dibutyl Phthalate	-	1.71E+07	4.01E+05	3.92E+05	9.13E+07	8.41E+05	8.34E+05	3.92E+05 nc
Diethyl Phthalate	-	1.37E+08	4.83E+07	3.57E+07	7.30E+08	1.01E+08	8.90E+07	3.57E+07 nc
Fluoride	-	6.84E+06	2.31E+07	5.28E+06	3.65E+07	4.84E+07	2.08E+07	5.28E+06 nc
Isophorone	4.07E+05	3.42E+07	2.01E+07	1.27E+07	1.83E+08	4.23E+07	3.43E+07	4.07E+05 ca*
Manganese (Non-diet)	-	4.11E+06	5.54E+05	4.88E+05	2.19E+07	1.16E+06	1.10E+06	4.88E+05 nc
Mercury (elemental)	-	2.74E+04	9.23E+04	2.11E+04	1.46E+05	1.94E+05	8.32E+04	2.11E+04 nc
Nickel Soluble Salts	-	1.88E+06	1.27E+06	7.58E+05	1.00E+07	2.66E+06	2.10E+06	7.58E+05 nc
Nitrate	-	2.74E+08	9.23E+08	2.11E+08	1.46E+09	1.94E+09	8.32E+08	2.11E+08 nc
Nitrate + Nitrite (as N)	-	2.74E+08	9.23E+08	2.11E+08	1.46E+09	1.94E+09	8.32E+08	2.11E+08 nc
Pentachlorophenol	9.11E+01	8.55E+05	7.16E+03	7.11E+03	4.56E+06	1.50E+04	1.50E+04	9.11E+01 ca*
Selenium	-	8.55E+05	2.88E+06	6.60E+05	4.56E+06	6.05E+06	2.60E+06	6.60E+05 nc
Silver	-	8.55E+05	1.92E+05	1.57E+05	4.56E+06	4.03E+05	3.71E+05	1.57E+05 nc
Thallium (Soluble Salts)	-	1.71E+03	5.77E+03	1.32E+03	9.13E+03	1.21E+04	5.20E+03	1.32E+03 nc
Vanadium and Compounds	-	8.62E+05	7.56E+04	6.95E+04	4.60E+06	1.59E+05	1.53E+05	6.95E+04 nc
Zinc and Compounds	-	5.13E+07	2.88E+08	4.36E+07	2.74E+08	6.05E+08	1.88E+08	4.36E+07 nc

Site-specific

Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$
Antimony (metallic)	Inorganics	-		4.00E-04	U	-		0.15	0.001	122	1	Yes	-	0.0692162
Arsenic, Inorganic	Inorganics	9.50E+00	U	3.50E-06	U	-		1	0.001	74.9	1	Yes	0.0006281	0.0040376
Barium	Inorganics	-		2.00E-01	U	-		0.07	0.001	137	1	Yes	-	16.150442
Boron And Borates Only	Inorganics	-		2.00E-01	U	-		1	0.001	13.8	1	Yes	-	230.72061
Butyl Benzyl Phthalate	Organics	1.90E-03	U	2.00E-01	U	-		1	0.0385	312	0.9	Yes	3.1407344	230.72061
Cadmium (Water)	Inorganics	-		5.00E-04	U	-		0.05	0.001	112	1	Yes	-	0.0288401
Chromium, Total	Inorganics	-		1.50E+00	U	-		0.013	0.001	52	1	Yes	-	22.495259
Cobalt	Inorganics	-		3.00E-04	U	-		1	0.0004	58.9	1	Yes	-	0.3460809
Copper	Inorganics	-		4.00E-02	U	-		1	0.001	63.5	1	Yes	-	46.144121
Dibutyl Phthalate	Organics	-		1.00E-01	U	-		1	0.042	278	0.9	Yes	-	115.3603
Diethyl Phthalate	Organics	-		8.00E-01	U	-		1	0.0036	222	1	Yes	-	922.88243
Fluoride	Inorganics	-		4.00E-02	U	-		1	0.001	38	1	Yes	-	46.144121
Isophorone	Organics	9.50E-04	U	2.00E-01	U	-		1	0.00354	138	1	Yes	6.2814688	230.72061
Manganese (Non-diet)	Inorganics	-		2.40E-02	U	-		0.04	0.001	54.9	1	Yes	-	1.1074589
Mercury (elemental)	Inorganics	-		1.60E-04	U	-		1	0.001	201	1	Yes	-	0.1845765
Nickel Soluble Salts	Inorganics	-		1.10E-02	U	-		0.04	0.0002	58.7	1	Yes	-	0.5075853
Nitrate	Inorganics	-		1.60E+00	U	-		1	0.001	62	1	Yes	-	1845.7649
Nitrate + Nitrite (as N)	Inorganics	-		1.60E+00	U	-		1	0.001	-	0	Yes	-	1845.7649
Pentachlorophenol	Organics	8.10E-02	U	5.00E-03	U	-		1	0.127	266	0.9	Yes	0.0736715	5.7680152
Selenium	Inorganics	-		5.00E-03	U	-		1	0.001	79	1	Yes	-	5.7680152
Silver	Inorganics	-		5.00E-03	U	-		0.04	0.0006	108	1	Yes	-	0.2307206
Thallium (Soluble Salts)	Inorganics	-		1.00E-05	U	-		1	0.001	204	1	Yes	-	0.011536
Vanadium and Compounds	Inorganics	-		5.04E-03	U	-		0.026	0.001	50.9	1	Yes	-	0.1511681
Zinc and Compounds	Inorganics	-		3.00E-01	U	-		1	0.0006	65.4	1	Yes	-	346.08091
**Total Risk/HI*		-		-		-		-	-	-	-		-	-

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Site-specific

Recreator Risk for Surface Water

Chemical	DA_{event} (nc adult)	Concentration (ug/L)	Ingestion Risk	Dermal Risk	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
Antimony (metallic)	0.1452255	1.000	-	-	-	1.46E-05	2.89E-05	4.35E-05	2.74E-06	1.38E-05	1.65E-05
Arsenic, Inorganic	0.0084715	8.900	5.63E-08	2.83E-08	8.46E-08	1.49E-02	4.41E-03	1.93E-02	2.79E-03	2.10E-03	4.89E-03
Barium	33.885942	68.00	-	-	-	1.99E-06	8.42E-06	1.04E-05	3.73E-07	4.01E-06	4.39E-06
Boron And Borates Only	484.08488	44.00	-	-	-	1.29E-06	3.81E-07	1.67E-06	2.41E-07	1.82E-07	4.23E-07
Butyl Benzyl Phthalate	484.08488	1.300	1.64E-12	1.36E-10	1.38E-10	3.80E-08	1.85E-06	1.89E-06	7.12E-09	8.82E-07	8.89E-07
Cadmium (Water)	0.0605106	0.300	-	-	-	3.51E-06	2.08E-05	2.43E-05	6.58E-07	9.92E-06	1.06E-05
Chromium, Total	47.198276	25.00	-	-	-	9.74E-08	2.22E-06	2.32E-06	1.83E-08	1.06E-06	1.08E-06
Cobalt	0.7261273	3.000	-	-	-	5.84E-05	6.93E-06	6.54E-05	1.10E-05	3.31E-06	1.43E-05
Copper	96.816976	8.700	-	-	-	1.27E-06	3.77E-07	1.65E-06	2.38E-07	1.80E-07	4.18E-07
Dibutyl Phthalate	242.04244	0.396	-	-	-	2.31E-08	9.87E-07	1.01E-06	4.34E-09	4.71E-07	4.75E-07
Diethyl Phthalate	1936.3395	0.302	-	-	-	2.21E-09	6.25E-09	8.45E-09	4.14E-10	2.98E-09	3.39E-09
Fluoride	96.816976	210.0	-	-	-	3.07E-05	9.10E-06	3.98E-05	5.75E-06	4.34E-06	1.01E-05
Isophorone	484.08488	0.094	5.94E-14	1.71E-13	2.31E-13	2.75E-09	4.67E-09	7.41E-09	5.15E-10	2.22E-09	2.74E-09
Manganese (Non-diet)	2.3236074	150.0	-	-	-	3.65E-05	2.71E-04	3.07E-04	6.85E-06	1.29E-04	1.36E-04
Mercury (elemental)	0.3872679	0.120	-	-	-	4.38E-06	1.30E-06	5.68E-06	8.22E-07	6.20E-07	1.44E-06
Nickel Soluble Salts	1.0649867	4.500	-	-	-	2.39E-06	3.55E-06	5.94E-06	4.48E-07	1.69E-06	2.14E-06
Nitrate	3872.679	970.0	-	-	-	3.54E-06	1.05E-06	4.59E-06	6.64E-07	5.01E-07	1.17E-06
Nitrate + Nitrite (as N)	3872.679	970.0	-	-	-	3.54E-06	1.05E-06	4.59E-06	6.64E-07	5.01E-07	1.17E-06
Pentachlorophenol	12.102122	1.500	8.08E-11	1.64E-08	1.65E-08	1.75E-06	2.09E-04	2.11E-04	3.29E-07	9.98E-05	1.00E-04
Selenium	12.102122	0.560	-	-	-	6.55E-07	1.94E-07	8.49E-07	1.23E-07	9.25E-08	2.15E-07
Silver	0.4840849	0.120	-	-	-	1.40E-07	6.24E-07	7.64E-07	2.63E-08	2.97E-07	3.24E-07
Thallium (Soluble Salts)	0.0242042	0.200	-	-	-	1.17E-04	3.47E-05	1.52E-04	2.19E-05	1.65E-05	3.84E-05
Vanadium and Compounds	0.3171724	25.00	-	-	-	2.90E-05	3.31E-04	3.60E-04	5.44E-06	1.58E-04	1.63E-04
Zinc and Compounds	726.12732	60.00	-	-	-	1.17E-06	2.08E-07	1.38E-06	2.19E-07	9.92E-08	3.18E-07
*Total Risk/HI	-		5.63E-08	4.49E-08	1.01E-07	1.52E-02	5.34E-03	2.05E-02	2.85E-03	2.55E-03	5.39E-03

Output generated 11JAN2017:16:35:17

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	6
EF_{rec-c} (exposure frequency - child) day/year	6
EF_{rec-a} (exposure frequency - adult) day/year	6
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	6
EF_{6-16} (mutagenic exposure frequency) day/year	6
EF_{16-30} (mutagenic exposure frequency) day/year	6
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.05
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.117
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	12844.8
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	29486.4
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

Site-specific

Recreator Screening Levels (RSL) for Surface Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?
TCDD, 2,3,7,8-	1746-01-6	No	Yes	Organics	1.30E+05	U	7.00E-10	U	-		1	0.808	321.98	0.5	No

Chemical	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$	$DA_{event\ (nc\ adult)}$	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
TCDD, 2,3,7,8-	-	-	-	3.93E-03	-	3.93E-03	3.99E-02	-	3.99E-02	2.13E-01	-	2.13E-01	3.93E-03 ca*

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Site-specific

Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$
TCDD, 2,3,7,8-	Organics	1.30E+05	U	7.00E-10	U	-		1	0.808	321.98	0.5	No	-	-
*Total Risk/HI		-		-		-		-	-	-	-		-	-

Chemical	$DA_{event\ (nc\ adult)}$	Concentration (ug/L)	Ingestion Risk	Dermal Risk	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
TCDD, 2,3,7,8-	-	0.0000031084	7.91E-10	-	7.91E-10	7.79E-05	-	7.79E-05	1.46E-05	-	1.46E-05
*Total Risk/HI	-		*7.91E-10*	-	*7.91E-10*	*7.79E-05*	-	*7.79E-05*	*1.46E-05*	-	*1.46E-05*

Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	12
EF_{rec-c} (exposure frequency - child) day/year	12
EF_{rec-a} (exposure frequency - adult) day/year	12
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	12
EF_{6-16} (mutagenic exposure frequency) day/year	12
EF_{16-30} (mutagenic exposure frequency) day/year	12
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

Output generated 11JAN2017:17:55:28

Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.099
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.234
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	25689.6
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	58972.8
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

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Site-specific

Recreator Screening Levels (RSL) for Surface Water

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; E = see user guide Section 2.3.5; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide)

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?
TCDD, 2,3,7,8-	1746-01-6	No	Yes	Organics	1.30E+05	U	7.00E-10	U	-		1	0.808	322	0.5	No

Chemical	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$	$DA_{event\ (nc\ adult)}$	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
TCDD, 2,3,7,8-	-	-	-	1.99E-03	-	1.99E-03	2.00E-02	-	2.00E-02	1.06E-01	-	1.06E-01	1.99E-03 ca*

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Site-specific

Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$
TCDD, 2,3,7,8-	Organics	1.30E+05	U	7.00E-10	U	-		1	0.808	322	0.5	No	-	-
*Total Risk/HI		-		-		-		-	-	-	-		-	-

Chemical	$DA_{event\ (nc\ adult)}$	Concentration (ug/L)	Ingestion Risk	Dermal Risk	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
TCDD, 2,3,7,8-	-	0.0000031084	1.57E-09	-	1.57E-09	1.56E-04	-	1.56E-04	2.92E-05	-	2.92E-05
*Total Risk/HI	-		1.57E-09	-	1.57E-09	1.56E-04	-	1.56E-04	2.92E-05	-	2.92E-05

Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	6
EF_{rec-c} (exposure frequency - child) day/year	6
EF_{rec-a} (exposure frequency - adult) day/year	6
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	6
EF_{6-16} (mutagenic exposure frequency) day/year	6
EF_{16-30} (mutagenic exposure frequency) day/year	6
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.05
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.117
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	12844.8
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	29486.4
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

Site-specific

Recreator Screening Levels (RSL) for Surface Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		4.00E-04	U	-	
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	9.50E+00	U	3.50E-06	U	-	
Barium	7440-39-3	No	No	Inorganics	-		2.00E-01	U	-	
Benzene	71-43-2	No	Yes	Organics	1.00E-01	U	4.00E-03	U	-	
Bis(2-ethylhexyl)phthalate	117-81-7	No	No	Organics	3.00E-03	U	2.00E-02	U	-	
Boron And Borates Only	7440-42-8	No	No	Inorganics	-		2.00E-01	U	-	
Bromodichloromethane	75-27-4	No	Yes	Organics	1.30E-01	U	2.00E-02	U	-	
Butyl Benzyl Phthalate	85-68-7	No	No	Organics	1.90E-03	U	2.00E-01	U	-	
Cadmium (Water)	7440-43-9	No	No	Inorganics	-		5.00E-04	U	-	
Chloroform	67-66-3	No	Yes	Organics	1.90E-02	U	1.00E-02	U	-	
Chromium(VI)	18540-29-9	Yes	No	Inorganics	5.00E-01	U	3.00E-03	U	-	
Chromium, Total	7440-47-3	No	No	Inorganics	-		1.50E+00	U	-	
Cobalt	7440-48-4	No	No	Inorganics	-		3.00E-04	U	-	
Copper	7440-50-8	No	No	Inorganics	-		4.00E-02	U	-	
Dibromochloromethane	124-48-1	No	Yes	Organics	8.40E-02	U	2.00E-02	U	-	
Dichloroethane, 1,2-	107-06-2	No	Yes	Organics	4.70E-02	U	6.00E-03	U	-	
Diethyl Phthalate	84-66-2	No	No	Organics	-		8.00E-01	U	-	
Fluoride	16984-48-8	No	No	Inorganics	-		4.00E-02	U	-	
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		2.40E-02	U	-	
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		1.60E-04	U	-	
Methylene Chloride	75-09-2	Yes	Yes	Organics	1.40E-02	U	6.00E-03	U	-	
Nickel Soluble Salts	7440-02-0	No	No	Inorganics	-		1.10E-02	U	-	
Nitrate	14797-55-8	No	No	Inorganics	-		1.60E+00	U	-	
Nitrate + Nitrite (as N)	NA	No	No	Inorganics	-		1.60E+00	U	-	
Nitrite	14797-65-0	No	No	Inorganics	-		1.00E-01	U	-	
Selenium	7782-49-2	No	No	Inorganics	-		5.00E-03	U	-	
Thallium (Soluble Salts)	7440-28-0	No	No	Inorganics	-		1.00E-05	U	-	
Vanadium and Compounds	7440-62-2	No	No	Inorganics	-		5.04E-03	U	-	
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		3.00E-01	U	-	

Site-specific

Recreator Screening Levels (RSL) for Surface Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$	$DA_{event\ (nc\ adult)}$	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)
Antimony (metallic)	0.15	0.001	124.77	1	Yes	-	0.0230721	0.0484085	-	-
Arsenic, Inorganic	1	0.001	77.946	1	Yes	0.0002094	0.0013459	0.0028238	5.38E+01	1.05E+02
Barium	0.07	0.001	139.36	1	Yes	-	5.3834808	11.295314	-	-
Benzene	1	0.0149	78.115	1	Yes	0.0198913	1.5381374	3.2272325	5.11E+03	5.32E+02
Bis(2-ethylhexyl)phthalate	1	1.13	390.57	0.8	No	-	-	-	1.70E+05	-
Boron And Borates Only	1	0.001	13.84	1	Yes	-	76.906869	161.36163	-	-
Bromodichloromethane	1	0.00402	163.83	1	Yes	0.015301	7.6906869	16.136163	3.93E+03	1.04E+03
Butyl Benzyl Phthalate	1	0.0385	312.37	0.9	Yes	1.0469115	76.906869	161.36163	2.69E+05	3.18E+03
Cadmium (Water)	0.05	0.001	112.4	1	Yes	-	0.0096134	0.0201702	-	-
Chloroform	1	0.00683	119.38	1	Yes	0.1046911	3.8453434	8.0680813	2.69E+04	5.19E+03
Chromium(VI)	0.025	0.002	52	1	Yes	0.0000433	0.0288401	0.0605106	4.37E+02	1.08E+01
Chromium, Total	0.013	0.001	51.996	1	Yes	-	7.4984197	15.732759	-	-
Cobalt	1	0.0004	58.93	1	Yes	-	0.1153603	0.2420424	-	-
Copper	1	0.001	63.546	1	Yes	-	15.381374	32.272325	-	-
Dibromochloromethane	1	0.00289	208.28	1	Yes	0.0236801	7.6906869	16.136163	6.08E+03	1.69E+03
Dichloroethane, 1,2-	1	0.0042	98.96	1	Yes	0.042322	2.3072061	4.8408488	1.09E+04	3.69E+03
Diethyl Phthalate	1	0.0036	222.24	1	Yes	-	307.62748	645.44651	-	-
Fluoride	1	0.001	38	1	Yes	-	15.381374	32.272325	-	-
Manganese (Non-diet)	0.04	0.001	54.938	1	Yes	-	0.369153	0.7745358	-	-
Mercury (elemental)	1	0.001	200.59	1	Yes	-	0.0615255	0.1290893	-	-
Methylene Chloride	1	0.00354	84.933	1	Yes	0.0618929	2.3072061	4.8408488	1.56E+04	6.69E+03
Nickel Soluble Salts	0.04	0.0002	58.71	1	Yes	-	0.1691951	0.3549956	-	-
Nitrate	1	0.001	62	1	Yes	-	615.25495	1290.893	-	-
Nitrate + Nitrite (as N)	1	0.001	-	0	Yes	-	615.25495	1290.893	-	-
Nitrite	1	0.001	47.01	1	Yes	-	38.453434	80.680813	-	-
Selenium	1	0.001	78.96	1	Yes	-	1.9226717	4.0340407	-	-
Thallium (Soluble Salts)	1	0.001	205.38	1	Yes	-	0.0038453	0.0080681	-	-
Vanadium and Compounds	0.026	0.001	50.94	1	Yes	-	0.0503894	0.1057241	-	-
Zinc and Compounds	1	0.0006	65.37	1	Yes	-	115.3603	242.04244	-	-

Site-specific

Recreator Screening Levels (RSL) for Surface Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
Antimony (metallic)	-	2.28E+04	1.15E+04	7.66E+03	1.22E+05	2.42E+04	2.02E+04	7.66E+03 nc
Arsenic, Inorganic	3.55E+01	2.00E+02	6.73E+02	1.54E+02	1.06E+03	1.41E+03	6.07E+02	3.55E+01 ca**
Barium	-	1.14E+07	2.69E+06	2.18E+06	6.08E+07	5.65E+06	5.17E+06	2.18E+06 nc
Benzene	4.82E+02	2.28E+05	4.12E+04	3.49E+04	1.22E+06	8.63E+04	8.06E+04	4.82E+02 ca*
Bis(2-ethylhexyl)phthalate	1.70E+05	1.14E+06	-	1.14E+06	6.08E+06	-	6.08E+06	1.70E+05 ca**
Boron And Borates Only	-	1.14E+07	3.85E+07	8.80E+06	6.08E+07	8.07E+07	3.47E+07	8.80E+06 nc
Bromodichloromethane	8.25E+02	1.14E+06	5.25E+05	3.59E+05	6.08E+06	1.10E+06	9.32E+05	8.25E+02 ca
Butyl Benzyl Phthalate	3.14E+03	1.14E+07	2.34E+05	2.29E+05	6.08E+07	4.90E+05	4.86E+05	3.14E+03 ca*
Cadmium (Water)	-	2.85E+04	4.81E+03	4.11E+03	1.52E+05	1.01E+04	9.46E+03	4.11E+03 nc
Chloroform	4.35E+03	5.70E+05	1.91E+05	1.43E+05	3.04E+06	4.00E+05	3.54E+05	4.35E+03 ca*
Chromium(VI)	1.06E+01	1.71E+05	7.21E+03	6.92E+03	9.13E+05	1.51E+04	1.49E+04	1.06E+01 ca
Chromium, Total	-	8.55E+07	3.75E+06	3.59E+06	4.56E+08	7.87E+06	7.73E+06	3.59E+06 nc
Cobalt	-	1.71E+04	1.44E+05	1.53E+04	9.13E+04	3.03E+05	7.01E+04	1.53E+04 nc
Copper	-	2.28E+06	7.69E+06	1.76E+06	1.22E+07	1.61E+07	6.94E+06	1.76E+06 nc
Dibromochloromethane	1.32E+03	1.14E+06	5.48E+05	3.70E+05	6.08E+06	1.15E+06	9.67E+05	1.32E+03 ca
Dichloroethane, 1,2-	2.75E+03	3.42E+05	2.01E+05	1.27E+05	1.83E+06	4.22E+05	3.42E+05	2.75E+03 ca*
Diethyl Phthalate	-	4.56E+07	1.61E+07	1.19E+07	2.43E+08	3.38E+07	2.96E+07	1.19E+07 nc
Fluoride	-	2.28E+06	7.69E+06	1.76E+06	1.22E+07	1.61E+07	6.94E+06	1.76E+06 nc
Manganese (Non-diet)	-	1.37E+06	1.85E+05	1.63E+05	7.30E+06	3.87E+05	3.68E+05	1.63E+05 nc
Mercury (elemental)	-	9.13E+03	3.08E+04	7.04E+03	4.87E+04	6.45E+04	2.77E+04	7.04E+03 nc
Methylene Chloride	4.68E+03	3.42E+05	2.50E+05	1.44E+05	1.83E+06	5.24E+05	4.07E+05	4.68E+03 ca*
Nickel Soluble Salts	-	6.27E+05	4.23E+05	2.53E+05	3.35E+06	8.87E+05	7.01E+05	2.53E+05 nc
Nitrate	-	9.13E+07	3.08E+08	7.04E+07	4.87E+08	6.45E+08	2.77E+08	7.04E+07 nc
Nitrate + Nitrite (as N)	-	9.13E+07	3.08E+08	7.04E+07	4.87E+08	6.45E+08	2.77E+08	7.04E+07 nc
Nitrite	-	5.70E+06	1.92E+07	4.40E+06	3.04E+07	4.03E+07	1.73E+07	4.40E+06 nc
Selenium	-	2.85E+05	9.61E+05	2.20E+05	1.52E+06	2.02E+06	8.67E+05	2.20E+05 nc
Thallium (Soluble Salts)	-	5.70E+02	1.92E+03	4.40E+02	3.04E+03	4.03E+03	1.73E+03	4.40E+02 nc
Vanadium and Compounds	-	2.87E+05	2.52E+04	2.32E+04	1.53E+06	5.29E+04	5.11E+04	2.32E+04 nc
Zinc and Compounds	-	1.71E+07	9.61E+07	1.45E+07	9.13E+07	2.02E+08	6.28E+07	1.45E+07 nc

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Site-specific

Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?
Antimony (metallic)	Inorganics	-		4.00E-04	U	-		0.15	0.001	124.77	1	Yes
Arsenic, Inorganic	Inorganics	9.50E+00	U	3.50E-06	U	-		1	0.001	77.946	1	Yes
Barium	Inorganics	-		2.00E-01	U	-		0.07	0.001	139.36	1	Yes
Benzene	Organics	1.00E-01	U	4.00E-03	U	-		1	0.0149	78.115	1	Yes
Bis(2-ethylhexyl)phthalate	Organics	3.00E-03	U	2.00E-02	U	-		1	1.13	390.57	0.8	No
Boron And Borates Only	Inorganics	-		2.00E-01	U	-		1	0.001	13.84	1	Yes
Bromodichloromethane	Organics	1.30E-01	U	2.00E-02	U	-		1	0.00402	163.83	1	Yes
Butyl Benzyl Phthalate	Organics	1.90E-03	U	2.00E-01	U	-		1	0.0385	312.37	0.9	Yes
Cadmium (Water)	Inorganics	-		5.00E-04	U	-		0.05	0.001	112.4	1	Yes
Chloroform	Organics	1.90E-02	U	1.00E-02	U	-		1	0.00683	119.38	1	Yes
Chromium(VI)	Inorganics	5.00E-01	U	3.00E-03	U	-		0.025	0.002	52	1	Yes
Chromium, Total	Inorganics	-		1.50E+00	U	-		0.013	0.001	51.996	1	Yes
Cobalt	Inorganics	-		3.00E-04	U	-		1	0.0004	58.93	1	Yes
Copper	Inorganics	-		4.00E-02	U	-		1	0.001	63.546	1	Yes
Dibromochloromethane	Organics	8.40E-02	U	2.00E-02	U	-		1	0.00289	208.28	1	Yes
Dichloroethane, 1,2-	Organics	4.70E-02	U	6.00E-03	U	-		1	0.0042	98.96	1	Yes
Diethyl Phthalate	Organics	-		8.00E-01	U	-		1	0.0036	222.24	1	Yes
Fluoride	Inorganics	-		4.00E-02	U	-		1	0.001	38	1	Yes
Manganese (Non-diet)	Inorganics	-		2.40E-02	U	-		0.04	0.001	54.938	1	Yes
Mercury (elemental)	Inorganics	-		1.60E-04	U	-		1	0.001	200.59	1	Yes
Methylene Chloride	Organics	1.40E-02	U	6.00E-03	U	-		1	0.00354	84.933	1	Yes
Nickel Soluble Salts	Inorganics	-		1.10E-02	U	-		0.04	0.0002	58.71	1	Yes
Nitrate	Inorganics	-		1.60E+00	U	-		1	0.001	62	1	Yes
Nitrate + Nitrite (as N)	Inorganics	-		1.60E+00	U	-		1	0.001	-	0	Yes
Nitrite	Inorganics	-		1.00E-01	U	-		1	0.001	47.01	1	Yes
Selenium	Inorganics	-		5.00E-03	U	-		1	0.001	78.96	1	Yes
Thallium (Soluble Salts)	Inorganics	-		1.00E-05	U	-		1	0.001	205.38	1	Yes
Vanadium and Compounds	Inorganics	-		5.04E-03	U	-		0.026	0.001	50.94	1	Yes
Zinc and Compounds	Inorganics	-		3.00E-01	U	-		1	0.0006	65.37	1	Yes
*Total Risk/HI		-		-		-		-	-	-	-	

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Site-specific

Recreator Risk for Surface Water

Chemical	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$	$DA_{event\ (nc\ adult)}$	Concentration (ug/L)	Ingestion Risk	Dermal Risk	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ
Antimony (metallic)	-	0.0230721	0.0484085	0.430	-	-	-	1.88E-05	3.73E-05
Arsenic, Inorganic	0.0002094	0.0013459	0.0028238	8.300	1.54E-07	7.93E-08	2.34E-07	4.16E-02	1.23E-02
Barium	-	5.3834808	11.295314	62.00	-	-	-	5.44E-06	2.30E-05
Benzene	0.0198913	1.5381374	3.2272325	0.840	1.64E-10	1.58E-09	1.74E-09	3.68E-06	2.04E-05
Bis(2-ethylhexyl)phthalate	-	-	-	1.600	9.39E-12	-	9.39E-12	1.40E-06	-
Boron And Borates Only	-	76.906869	161.36163	200.0	-	-	-	1.75E-05	5.20E-06
Bromodichloromethane	0.015301	7.6906869	16.136163	1.200	3.05E-10	1.15E-09	1.45E-09	1.05E-06	2.29E-06
Butyl Benzyl Phthalate	1.0469115	76.906869	161.36163	3.280	1.22E-11	1.03E-09	1.04E-09	2.88E-07	1.40E-05
Cadmium (Water)	-	0.0096134	0.0201702	0.270	-	-	-	9.47E-06	5.62E-05
Chloroform	0.1046911	3.8453434	8.0680813	19.00	7.06E-10	3.66E-09	4.37E-09	3.33E-05	9.96E-05
Chromium(VI)	0.0000433	0.0288401	0.0605106	0.260	5.95E-10	2.40E-08	2.46E-08	1.52E-06	3.61E-05
Chromium, Total	-	7.4984197	15.732759	2.000	-	-	-	2.34E-08	5.33E-07
Cobalt	-	0.1153603	0.2420424	3.500	-	-	-	2.05E-04	2.43E-05
Copper	-	15.381374	32.272325	3.687	-	-	-	1.62E-06	4.79E-07
Dibromochloromethane	0.0236801	7.6906869	16.136163	0.980	1.61E-10	5.81E-10	7.42E-10	8.59E-07	1.79E-06
Dichloroethane, 1,2-	0.042322	2.3072061	4.8408488	2.400	2.21E-10	6.51E-10	8.72E-10	7.01E-06	1.19E-05
Diethyl Phthalate	-	307.62748	645.44651	0.200	-	-	-	4.38E-09	1.24E-08
Fluoride	-	15.381374	32.272325	190.0	-	-	-	8.33E-05	2.47E-05
Manganese (Non-diet)	-	0.369153	0.7745358	190.0	-	-	-	1.39E-04	1.03E-03
Mercury (elemental)	-	0.0615255	0.1290893	0.033	-	-	-	3.62E-06	1.07E-06
Methylene Chloride	0.0618929	2.3072061	4.8408488	0.970	6.22E-11	1.45E-10	2.07E-10	2.83E-06	3.89E-06
Nickel Soluble Salts	-	0.1691951	0.3549956	2.300	-	-	-	3.67E-06	5.44E-06
Nitrate	-	615.25495	1290.893	691.0	-	-	-	7.57E-06	2.25E-06
Nitrate + Nitrite (as N)	-	615.25495	1290.893	543.0	-	-	-	5.95E-06	1.77E-06
Nitrite	-	38.453434	80.680813	110.0	-	-	-	1.93E-05	5.72E-06
Selenium	-	1.9226717	4.0340407	0.540	-	-	-	1.89E-06	5.62E-07
Thallium (Soluble Salts)	-	0.0038453	0.0080681	0.240	-	-	-	4.21E-04	1.25E-04
Vanadium and Compounds	-	0.0503894	0.1057241	27.00	-	-	-	9.39E-05	1.07E-03
Zinc and Compounds	-	115.3603	242.04244	29.20	-	-	-	1.71E-06	3.04E-07
*Total Risk/HI	-	-	-		1.57E-07	1.12E-07	2.69E-07	4.27E-02	1.49E-02

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Site-specific

Recreator Risk for Surface Water

Chemical	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
Antimony (metallic)	5.61E-05	3.53E-06	1.78E-05	2.13E-05
Arsenic, Inorganic	5.39E-02	7.80E-03	5.88E-03	1.37E-02
Barium	2.85E-05	1.02E-06	1.10E-05	1.20E-05
Benzene	2.41E-05	6.90E-07	9.73E-06	1.04E-05
Bis(2-ethylhexyl)phthalate	1.40E-06	2.63E-07	-	2.63E-07
Boron And Borates Only	2.27E-05	3.29E-06	2.48E-06	5.77E-06
Bromodichloromethane	3.34E-06	1.97E-07	1.09E-06	1.29E-06
Butyl Benzyl Phthalate	1.43E-05	5.39E-08	6.69E-06	6.74E-06
Cadmium (Water)	6.56E-05	1.78E-06	2.68E-05	2.85E-05
Chloroform	1.33E-04	6.25E-06	4.75E-05	5.37E-05
Chromium(VI)	3.76E-05	2.85E-07	1.72E-05	1.75E-05
Chromium, Total	5.57E-07	4.38E-09	2.54E-07	2.59E-07
Cobalt	2.29E-04	3.84E-05	1.16E-05	4.99E-05
Copper	2.10E-06	3.03E-07	2.28E-07	5.32E-07
Dibromochloromethane	2.65E-06	1.61E-07	8.52E-07	1.01E-06
Dichloroethane, 1,2-	1.90E-05	1.32E-06	5.69E-06	7.01E-06
Diethyl Phthalate	1.68E-08	8.22E-10	5.93E-09	6.75E-09
Fluoride	1.08E-04	1.56E-05	1.18E-05	2.74E-05
Manganese (Non-diet)	1.17E-03	2.60E-05	4.91E-04	5.17E-04
Mercury (elemental)	4.69E-06	6.78E-07	5.11E-07	1.19E-06
Methylene Chloride	6.72E-06	5.32E-07	1.85E-06	2.38E-06
Nickel Soluble Salts	9.10E-06	6.87E-07	2.59E-06	3.28E-06
Nitrate	9.82E-06	1.42E-06	1.07E-06	2.49E-06
Nitrate + Nitrite (as N)	7.72E-06	1.12E-06	8.41E-07	1.96E-06
Nitrite	2.50E-05	3.62E-06	2.73E-06	6.34E-06
Selenium	2.46E-06	3.55E-07	2.68E-07	6.23E-07
Thallium (Soluble Salts)	5.46E-04	7.89E-05	5.95E-05	1.38E-04
Vanadium and Compounds	1.17E-03	1.76E-05	5.11E-04	5.28E-04
Zinc and Compounds	2.01E-06	3.20E-07	1.45E-07	4.65E-07
**Total Risk/HI*	*5.76E-02*	*8.00E-03*	*7.12E-03*	*1.51E-02*

Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	12
EF_{rec-c} (exposure frequency - child) day/year	12
EF_{rec-a} (exposure frequency - adult) day/year	12
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	12
EF_{6-16} (mutagenic exposure frequency) day/year	12
EF_{16-30} (mutagenic exposure frequency) day/year	12
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.099
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.234
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	25689.6
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	58972.8
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

Site-specific

Recreator Screening Levels (RSL) for Surface Water

Key: I = IRIS; P = PPRTV; D = DWSHA; O = OPP; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; F = See FAQ; J = New Jersey; E = see user guide Section 2.3.5; L = see user guide on lead; M = mutagen; S = see user guide Section 5; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; n = noncancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; SSL values are based on DAF=1; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide)

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day)$^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m^3)	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		4.00E-04	U	-		0.15	0.001
Arsenic, Inorganic	7440-38-2	No	No	Inorganics	9.50E+00	U	3.50E-06	U	-		1	0.001
Barium	7440-39-3	No	No	Inorganics	-		2.00E-01	U	-		0.07	0.001
Benzene	71-43-2	No	Yes	Organics	1.00E-01	U	4.00E-03	U	-		1	0.0149
Bis(2-ethylhexyl)phthalate	117-81-7	No	No	Organics	3.00E-03	U	2.00E-02	U	-		1	1.13
Boron And Borates Only	7440-42-8	No	No	Inorganics	-		2.00E-01	U	-		1	0.001
Bromodichloromethane	75-27-4	No	Yes	Organics	1.30E-01	U	2.00E-02	U	-		1	0.00402
Butyl Benzyl Phthalate	85-68-7	No	No	Organics	1.90E-03	U	2.00E-01	U	-		1	0.0385
Cadmium (Water)	7440-43-9	No	No	Inorganics	-		5.00E-04	U	-		0.05	0.001
Chloroform	67-66-3	No	Yes	Organics	1.90E-02	U	1.00E-02	U	-		1	0.00683
Chromium(VI)	18540-29-9	Yes	No	Inorganics	5.00E-01	U	3.00E-03	U	-		0.025	0.002
Chromium, Total	7440-47-3	No	No	Inorganics	-		1.50E+00	U	-		0.013	0.001
Cobalt	7440-48-4	No	No	Inorganics	-		3.00E-04	U	-		1	0.0004
Copper	7440-50-8	No	No	Inorganics	-		4.00E-02	U	-		1	0.001
Dibromochloromethane	124-48-1	No	Yes	Organics	8.40E-02	U	2.00E-02	U	-		1	0.00289
Dichloroethane, 1,2-	107-06-2	No	Yes	Organics	4.70E-02	U	6.00E-03	U	-		1	0.0042
Diethyl Phthalate	84-66-2	No	No	Organics	-		8.00E-01	U	-		1	0.0036
Fluoride	16984-48-8	No	No	Inorganics	-		4.00E-02	U	-		1	0.001
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		2.40E-02	U	-		0.04	0.001
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		1.60E-04	U	-		1	0.001
Methylene Chloride	75-09-2	Yes	Yes	Organics	1.40E-02	U	6.00E-03	U	-		1	0.00354
Nickel Soluble Salts	7440-02-0	No	No	Inorganics	-		1.10E-02	U	-		0.04	0.0002
Nitrate	14797-55-8	No	No	Inorganics	-		1.60E+00	U	-		1	0.001
Nitrate + Nitrite (as N)	NA	No	No	Inorganics	-		1.60E+00	U	-		1	0.001
Nitrite	14797-65-0	No	No	Inorganics	-		1.00E-01	U	-		1	0.001
Selenium	7782-49-2	No	No	Inorganics	-		5.00E-03	U	-		1	0.001
Thallium (Soluble Salts)	7440-28-0	No	No	Inorganics	-		1.00E-05	U	-		1	0.001
Vanadium and Compounds	7440-62-2	No	No	Inorganics	-		5.04E-03	U	-		0.026	0.001
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		3.00E-01	U	-		1	0.0006

Site-specific

Recreator Screening Levels (RSL) for Surface Water

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Chemical	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	DA_{event} (nc child)	DA_{event} (nc adult)	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)
Antimony (metallic)	122	1	Yes	-	0.011536	0.0242042	-	-	-	1.14E+04	5.77E+03
Arsenic, Inorganic	74.9	1	Yes	0.0001047	0.0006729	0.0014119	2.72E+01	5.23E+01	1.79E+01	9.98E+01	3.36E+02
Barium	137	1	Yes	-	2.6917404	5.6476569	-	-	-	5.70E+06	1.35E+06
Benzene	78.1	1	Yes	0.0099457	0.7690687	1.6136163	2.58E+03	2.66E+02	2.41E+02	1.14E+05	2.06E+04
Bis(2-ethylhexyl)phthalate	391	0.8	No	-	-	-	8.60E+04	-	8.60E+04	5.70E+05	-
Boron And Borates Only	13.8	1	Yes	-	38.453434	80.680813	-	-	-	5.70E+06	1.92E+07
Bromodichloromethane	164	1	Yes	0.0076505	3.8453434	8.0680813	1.99E+03	5.22E+02	4.13E+02	5.70E+05	2.62E+05
Butyl Benzyl Phthalate	312	0.9	Yes	0.5234557	38.453434	80.680813	1.36E+05	1.59E+03	1.58E+03	5.70E+06	1.17E+05
Cadmium (Water)	112	1	Yes	-	0.0048067	0.0100851	-	-	-	1.43E+04	2.40E+03
Chloroform	119	1	Yes	0.0523456	1.9226717	4.0340407	1.36E+04	2.60E+03	2.18E+03	2.85E+05	9.55E+04
Chromium(VI)	52	1	Yes	0.0000217	0.01442	0.0302553	2.18E+02	5.42E+00	5.28E+00	8.55E+04	3.61E+03
Chromium, Total	52	1	Yes	-	3.7492099	7.8663793	-	-	-	4.28E+07	1.87E+06
Cobalt	58.9	1	Yes	-	0.0576802	0.1210212	-	-	-	8.55E+03	7.21E+04
Copper	63.5	1	Yes	-	7.6906869	16.136163	-	-	-	1.14E+06	3.85E+06
Dibromochloromethane	208	1	Yes	0.0118401	3.8453434	8.0680813	3.07E+03	8.45E+02	6.63E+02	5.70E+05	2.75E+05
Dichloroethane, 1,2-	99	1	Yes	0.021161	1.153603	2.4204244	5.49E+03	1.84E+03	1.38E+03	1.71E+05	1.00E+05
Diethyl Phthalate	222	1	Yes	-	153.81374	322.72325	-	-	-	2.28E+07	8.06E+06
Fluoride	38	1	Yes	-	7.6906869	16.136163	-	-	-	1.14E+06	3.85E+06
Manganese (Non-diet)	54.9	1	Yes	-	0.1845765	0.3872679	-	-	-	6.84E+05	9.23E+04
Mercury (elemental)	201	1	Yes	-	0.0307627	0.0645447	-	-	-	4.56E+03	1.54E+04
Methylene Chloride	84.9	1	Yes	0.0309465	1.153603	2.4204244	7.80E+03	3.35E+03	2.34E+03	1.71E+05	1.25E+05
Nickel Soluble Salts	58.7	1	Yes	-	0.0845976	0.1774978	-	-	-	3.14E+05	2.11E+05
Nitrate	62	1	Yes	-	307.62748	645.44651	-	-	-	4.56E+07	1.54E+08
Nitrate + Nitrite (as N)	-	0	Yes	-	307.62748	645.44651	-	-	-	4.56E+07	1.54E+08
Nitrite	47	1	Yes	-	19.226717	40.340407	-	-	-	2.85E+06	9.61E+06
Selenium	79	1	Yes	-	0.9613359	2.0170203	-	-	-	1.43E+05	4.81E+05
Thallium (Soluble Salts)	204	1	Yes	-	0.0019227	0.004034	-	-	-	2.85E+02	9.61E+02
Vanadium and Compounds	50.9	1	Yes	-	0.0251947	0.0528621	-	-	-	1.44E+05	1.26E+04
Zinc and Compounds	65.4	1	Yes	-	57.680152	121.02122	-	-	-	8.55E+06	4.81E+07

Site-specific

Recreator Screening Levels (RSL) for Surface Water

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Chemical	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
Antimony (metallic)	3.83E+03	6.08E+04	1.21E+04	1.01E+04	3.83E+03 nc
Arsenic, Inorganic	7.70E+01	5.32E+02	7.06E+02	3.03E+02	1.79E+01 ca**
Barium	1.09E+06	3.04E+07	2.82E+06	2.58E+06	1.09E+06 nc
Benzene	1.74E+04	6.08E+05	4.32E+04	4.03E+04	2.41E+02 ca*
Bis(2-ethylhexyl)phthalate	5.70E+05	3.04E+06	-	3.04E+06	8.60E+04 ca**
Boron And Borates Only	4.40E+06	3.04E+07	4.03E+07	1.73E+07	4.40E+06 nc
Bromodichloromethane	1.80E+05	3.04E+06	5.50E+05	4.66E+05	4.13E+02 ca
Butyl Benzyl Phthalate	1.15E+05	3.04E+07	2.46E+05	2.44E+05	1.58E+03 ca*
Cadmium (Water)	2.06E+03	7.60E+04	5.04E+03	4.73E+03	2.06E+03 nc
Chloroform	7.15E+04	1.52E+06	2.00E+05	1.77E+05	2.18E+03 ca*
Chromium(VI)	3.46E+03	4.56E+05	7.56E+03	7.44E+03	5.28E+00 ca
Chromium, Total	1.80E+06	2.28E+08	3.93E+06	3.87E+06	1.80E+06 nc
Cobalt	7.65E+03	4.56E+04	1.51E+05	3.51E+04	7.65E+03 nc
Copper	8.80E+05	6.08E+06	8.07E+06	3.47E+06	8.80E+05 nc
Dibromochloromethane	1.85E+05	3.04E+06	5.76E+05	4.84E+05	6.63E+02 ca
Dichloroethane, 1,2-	6.33E+04	9.13E+05	2.11E+05	1.71E+05	1.38E+03 ca*
Diethyl Phthalate	5.95E+06	1.22E+08	1.69E+07	1.48E+07	5.95E+06 nc
Fluoride	8.80E+05	6.08E+06	8.07E+06	3.47E+06	8.80E+05 nc
Manganese (Non-diet)	8.13E+04	3.65E+06	1.94E+05	1.84E+05	8.13E+04 nc
Mercury (elemental)	3.52E+03	2.43E+04	3.23E+04	1.39E+04	3.52E+03 nc
Methylene Chloride	7.22E+04	9.13E+05	2.62E+05	2.03E+05	2.34E+03 ca*
Nickel Soluble Salts	1.26E+05	1.67E+06	4.44E+05	3.51E+05	1.26E+05 nc
Nitrate	3.52E+07	2.43E+08	3.23E+08	1.39E+08	3.52E+07 nc
Nitrate + Nitrite (as N)	3.52E+07	2.43E+08	3.23E+08	1.39E+08	3.52E+07 nc
Nitrite	2.20E+06	1.52E+07	2.02E+07	8.67E+06	2.20E+06 nc
Selenium	1.10E+05	7.60E+05	1.01E+06	4.34E+05	1.10E+05 nc
Thallium (Soluble Salts)	2.20E+02	1.52E+03	2.02E+03	8.67E+02	2.20E+02 nc
Vanadium and Compounds	1.16E+04	7.67E+05	2.64E+04	2.56E+04	1.16E+04 nc
Zinc and Compounds	7.26E+06	4.56E+07	1.01E+08	3.14E+07	7.26E+06 nc

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Site-specific

Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)
Antimony (metallic)	Inorganics	-		4.00E-04	U	-		0.15	0.001
Arsenic, Inorganic	Inorganics	9.50E+00	U	3.50E-06	U	-		1	0.001
Barium	Inorganics	-		2.00E-01	U	-		0.07	0.001
Benzene	Organics	1.00E-01	U	4.00E-03	U	-		1	0.0149
Bis(2-ethylhexyl)phthalate	Organics	3.00E-03	U	2.00E-02	U	-		1	1.13
Boron And Borates Only	Inorganics	-		2.00E-01	U	-		1	0.001
Bromodichloromethane	Organics	1.30E-01	U	2.00E-02	U	-		1	0.00402
Butyl Benzyl Phthalate	Organics	1.90E-03	U	2.00E-01	U	-		1	0.0385
Cadmium (Water)	Inorganics	-		5.00E-04	U	-		0.05	0.001
Chloroform	Organics	1.90E-02	U	1.00E-02	U	-		1	0.00683
Chromium(VI)	Inorganics	5.00E-01	U	3.00E-03	U	-		0.025	0.002
Chromium, Total	Inorganics	-		1.50E+00	U	-		0.013	0.001
Cobalt	Inorganics	-		3.00E-04	U	-		1	0.0004
Copper	Inorganics	-		4.00E-02	U	-		1	0.001
Dibromochloromethane	Organics	8.40E-02	U	2.00E-02	U	-		1	0.00289
Dichloroethane, 1,2-	Organics	4.70E-02	U	6.00E-03	U	-		1	0.0042
Diethyl Phthalate	Organics	-		8.00E-01	U	-		1	0.0036
Fluoride	Inorganics	-		4.00E-02	U	-		1	0.001
Manganese (Non-diet)	Inorganics	-		2.40E-02	U	-		0.04	0.001
Mercury (elemental)	Inorganics	-		1.60E-04	U	-		1	0.001
Methylene Chloride	Organics	1.40E-02	U	6.00E-03	U	-		1	0.00354
Nickel Soluble Salts	Inorganics	-		1.10E-02	U	-		0.04	0.0002
Nitrate	Inorganics	-		1.60E+00	U	-		1	0.001
Nitrate + Nitrite (as N)	Inorganics	-		1.60E+00	U	-		1	0.001
Nitrite	Inorganics	-		1.00E-01	U	-		1	0.001
Selenium	Inorganics	-		5.00E-03	U	-		1	0.001
Thallium (Soluble Salts)	Inorganics	-		1.00E-05	U	-		1	0.001
Vanadium and Compounds	Inorganics	-		5.04E-03	U	-		0.026	0.001
Zinc and Compounds	Inorganics	-		3.00E-01	U	-		1	0.0006
*Total Risk/HI		-		-		-		-	-

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Site-specific

Recreator Risk for Surface Water

Chemical	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$	$DA_{event\ (nc\ adult)}$	Concentration (ug/L)	Ingestion Risk	Dermal Risk
Antimony (metallic)	122	1	Yes	-	0.011536	0.0242042	0.430	-	-
Arsenic, Inorganic	74.9	1	Yes	0.0001047	0.0006729	0.0014119	8.300	3.06E-07	1.59E-07
Barium	137	1	Yes	-	2.6917404	5.6476569	62.00	-	-
Benzene	78.1	1	Yes	0.0099457	0.7690687	1.6136163	0.840	3.25E-10	3.16E-09
Bis(2-ethylhexyl)phthalate	391	0.8	No	-	-	-	1.600	1.86E-11	-
Boron And Borates Only	13.8	1	Yes	-	38.453434	80.680813	200.0	-	-
Bromodichloromethane	164	1	Yes	0.0076505	3.8453434	8.0680813	1.200	6.04E-10	2.30E-09
Butyl Benzyl Phthalate	312	0.9	Yes	0.5234557	38.453434	80.680813	3.280	2.41E-11	2.06E-09
Cadmium (Water)	112	1	Yes	-	0.0048067	0.0100851	0.270	-	-
Chloroform	119	1	Yes	0.0523456	1.9226717	4.0340407	19.00	1.40E-09	7.31E-09
Chromium(VI)	52	1	Yes	0.0000217	0.01442	0.0302553	0.260	1.19E-09	4.80E-08
Chromium, Total	52	1	Yes	-	3.7492099	7.8663793	2.000	-	-
Cobalt	58.9	1	Yes	-	0.0576802	0.1210212	3.500	-	-
Copper	63.5	1	Yes	-	7.6906869	16.136163	3.687	-	-
Dibromochloromethane	208	1	Yes	0.0118401	3.8453434	8.0680813	0.980	3.19E-10	1.16E-09
Dichloroethane, 1,2-	99	1	Yes	0.021161	1.153603	2.4204244	2.400	4.37E-10	1.30E-09
Diethyl Phthalate	222	1	Yes	-	153.81374	322.72325	0.200	-	-
Fluoride	38	1	Yes	-	7.6906869	16.136163	190.0	-	-
Manganese (Non-diet)	54.9	1	Yes	-	0.1845765	0.3872679	190.0	-	-
Mercury (elemental)	201	1	Yes	-	0.0307627	0.0645447	0.033	-	-
Methylene Chloride	84.9	1	Yes	0.0309465	1.153603	2.4204244	0.970	1.24E-10	2.90E-10
Nickel Soluble Salts	58.7	1	Yes	-	0.0845976	0.1774978	2.300	-	-
Nitrate	62	1	Yes	-	307.62748	645.44651	691.0	-	-
Nitrate + Nitrite (as N)	-	0	Yes	-	307.62748	645.44651	543.0	-	-
Nitrite	47	1	Yes	-	19.226717	40.340407	110.0	-	-
Selenium	79	1	Yes	-	0.9613359	2.0170203	0.540	-	-
Thallium (Soluble Salts)	204	1	Yes	-	0.0019227	0.004034	0.240	-	-
Vanadium and Compounds	50.9	1	Yes	-	0.0251947	0.0528621	27.00	-	-
Zinc and Compounds	65.4	1	Yes	-	57.680152	121.02122	29.20	-	-
**Total Risk/HI*	-	-		-	-	-		*3.10E-07*	*2.24E-07*

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Site-specific

Recreator Risk for Surface Water

Chemical	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
Antimony (metallic)	-	3.77E-05	7.45E-05	1.12E-04	7.07E-06	3.55E-05	4.26E-05
Arsenic, Inorganic	4.64E-07	8.32E-02	2.47E-02	1.08E-01	1.56E-02	1.18E-02	2.74E-02
Barium	-	1.09E-05	4.61E-05	5.69E-05	2.04E-06	2.20E-05	2.40E-05
Benzene	3.48E-09	7.36E-06	4.08E-05	4.82E-05	1.38E-06	1.95E-05	2.08E-05
Bis(2-ethylhexyl)phthalate	1.86E-11	2.81E-06	-	2.81E-06	5.26E-07	-	5.26E-07
Boron And Borates Only	-	3.51E-05	1.04E-05	4.55E-05	6.58E-06	4.96E-06	1.15E-05
Bromodichloromethane	2.91E-09	2.10E-06	4.58E-06	6.68E-06	3.95E-07	2.18E-06	2.58E-06
Butyl Benzyl Phthalate	2.08E-09	5.75E-07	2.80E-05	2.86E-05	1.08E-07	1.33E-05	1.35E-05
Cadmium (Water)	-	1.89E-05	1.12E-04	1.31E-04	3.55E-06	5.35E-05	5.71E-05
Chloroform	8.71E-09	6.66E-05	1.99E-04	2.66E-04	1.25E-05	9.48E-05	1.07E-04
Chromium(VI)	4.92E-08	3.04E-06	7.21E-05	7.52E-05	5.70E-07	3.44E-05	3.49E-05
Chromium, Total	-	4.68E-08	1.07E-06	1.11E-06	8.77E-09	5.08E-07	5.17E-07
Cobalt	-	4.09E-04	4.85E-05	4.58E-04	7.67E-05	2.31E-05	9.98E-05
Copper	-	3.23E-06	9.59E-07	4.19E-06	6.06E-07	4.57E-07	1.06E-06
Dibromochloromethane	1.48E-09	1.72E-06	3.57E-06	5.29E-06	3.22E-07	1.70E-06	2.02E-06
Dichloroethane, 1,2-	1.74E-09	1.40E-05	2.39E-05	3.79E-05	2.63E-06	1.14E-05	1.40E-05
Diethyl Phthalate	-	8.77E-09	2.48E-08	3.36E-08	1.64E-09	1.18E-08	1.35E-08
Fluoride	-	1.67E-04	4.94E-05	2.16E-04	3.12E-05	2.35E-05	5.48E-05
Manganese (Non-diet)	-	2.78E-04	2.06E-03	2.34E-03	5.21E-05	9.81E-04	1.03E-03
Mercury (elemental)	-	7.23E-06	2.15E-06	9.38E-06	1.36E-06	1.02E-06	2.38E-06
Methylene Chloride	4.14E-10	5.67E-06	7.77E-06	1.34E-05	1.06E-06	3.71E-06	4.77E-06
Nickel Soluble Salts	-	7.33E-06	1.09E-05	1.82E-05	1.37E-06	5.18E-06	6.56E-06
Nitrate	-	1.51E-05	4.49E-06	1.96E-05	2.84E-06	2.14E-06	4.98E-06
Nitrate + Nitrite (as N)	-	1.19E-05	3.53E-06	1.54E-05	2.23E-06	1.68E-06	3.91E-06
Nitrite	-	3.86E-05	1.14E-05	5.00E-05	7.23E-06	5.45E-06	1.27E-05
Selenium	-	3.79E-06	1.12E-06	4.91E-06	7.10E-07	5.35E-07	1.25E-06
Thallium (Soluble Salts)	-	8.42E-04	2.50E-04	1.09E-03	1.58E-04	1.19E-04	2.77E-04
Vanadium and Compounds	-	1.88E-04	2.14E-03	2.33E-03	3.52E-05	1.02E-03	1.06E-03
Zinc and Compounds	-	3.41E-06	6.07E-07	4.02E-06	6.40E-07	2.90E-07	9.30E-07
*Total Risk/HI	5.34E-07	8.53E-02	2.99E-02	1.15E-01	1.60E-02	1.42E-02	3.02E-02

OUTFALL 019

Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	50
EF_{rec-c} (exposure frequency - child) day/year	50
EF_{rec-a} (exposure frequency - adult) day/year	50
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	50
EF_{6-16} (mutagenic exposure frequency) day/year	50
EF_{16-30} (mutagenic exposure frequency) day/year	50
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.413
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.975
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	107040
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	245720
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

Site-specific

Recreator Screening Levels (RSL) for Surface Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?
TCDD, 2,3,7,8-	1746-01-6	No	Yes	Organics	1.30E+05	U	7.00E-10	U	-		1	0.808	321.98	0.5	No

Chemical	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$	$DA_{event\ (nc\ adult)}$	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
TCDD, 2,3,7,8-	-	-	-	4.76E-04	-	4.76E-04	4.79E-03	-	4.79E-03	2.56E-02	-	2.56E-02	4.76E-04 ca*

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Site-specific

Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$
TCDD, 2,3,7,8-	Organics	1.30E+05	U	7.00E-10	U	-	U	1	0.808	321.98	0.5	No	-	-
*Total Risk/HI		-		-		-		-	-	-	-		-	-

Chemical	$DA_{event\ (nc\ adult)}$	Concentration (ug/L)	Ingestion Risk	Dermal Risk	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
TCDD, 2,3,7,8-	-	0.0000032	6.72E-09	-	6.72E-09	6.68E-04	-	6.68E-04	1.25E-04	-	1.25E-04
*Total Risk/HI	-		6.72E-09	-	6.72E-09	6.68E-04	-	6.68E-04	1.25E-04	-	1.25E-04

Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	1.0E-6
THQ (target hazard quotient) unitless	1
ED_{rec} (exposure duration - recreator) year	24
ED_{rec-c} (exposure duration - child) year	4
ED_{rec-a} (exposure duration - adult) year	20
ED_{0-2} (mutagenic exposure duration) year	0
ED_{2-6} (mutagenic exposure duration) year	4
ED_{6-16} (mutagenic exposure duration) year	10
ED_{16-30} (mutagenic exposure duration) year	10
THQ (target hazard quotient) unitless	1
LT (lifetime - recreator) year	70
EF (exposure frequency) day/year	50
EF_{rec-c} (exposure frequency - child) day/year	50
EF_{rec-a} (exposure frequency - adult) day/year	50
EF_{0-2} (mutagenic exposure frequency) day/year	0
EF_{2-6} (mutagenic exposure frequency) day/year	50
EF_{6-16} (mutagenic exposure frequency) day/year	50
EF_{16-30} (mutagenic exposure frequency) day/year	50
$ET_{rec-adj}$ (age-adjusted exposure time) hour/event	2
$ET_{rec-madj}$ (mutagenic age-adjusted exposure time) hour/event	2
ET_{rec-a} (exposure time - adult) hour/event	2
ET_{rec-c} (exposure time - child) hour/event	2
ET_{0-2} (mutagenic exposure time) hour/event	0
ET_{2-6} (mutagenic exposure time) hour/event	2
ET_{6-16} (mutagenic exposure time) hour/event	2
ET_{16-30} (mutagenic exposure time) hour/event	2
EV_{rec-c} (child) events/day	1
EV_{rec-a} (adult) events/day	1
EV_{0-2} (mutagenic) events/day	0
EV_{2-6} (mutagenic) events/day	1
EV_{6-16} (mutagenic) events/day	1
EV_{16-30} (mutagenic) events/day	1
BW_{rec-c} (body weight - child) kg	15
BW_{rec-a} (body weight - adult) kg	80

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Site-specific

Recreator Equation Inputs for Surface Water

Variable	Value
BW_{0-2} (mutagenic body weight) kg	0
BW_{2-6} (mutagenic body weight) kg	15
BW_{6-16} (mutagenic body weight) kg	80
BW_{16-30} (mutagenic body weight) kg	80
SA_{rec-c} (skin surface area - child) cm^2	2373
SA_{rec-a} (skin surface area - adult) cm^2	2373
SA_{0-2} (mutagenic skin surface area) cm^2	0
SA_{2-6} (mutagenic skin surface area) cm^2	2373
SA_{6-16} (mutagenic skin surface area) cm^2	6032
SA_{16-30} (mutagenic skin surface area) cm^2	6032
$IFW_{rec-adj}$ (age-adjusted water intake rate) L/kg	0.413
$IFWM_{rec-adj}$ (mutagenic age-adjusted water intake rate) L/kg	0.975
$DFW_{rec-adj}$ (age-adjusted dermal factor) cm^2-event/kg	107040
$DFWM_{rec-adj}$ (mutagenic age-adjusted dermal factor) cm^2-event/kg	245720
IRW_{rec-c} (water intake rate - child) L/hr	0.008
IRW_{rec-a} (water intake rate - adult) L/hr	0.008
IRW_{0-2} (mutagenic water intake rate) L/hr	0
IRW_{2-6} (mutagenic water intake rate) L/hr	0.0075
IRW_{6-16} (mutagenic water intake rate) L/hr	0.0075
IRW_{16-30} (mutagenic water intake rate) L/hr	0.0075
l_{sc} (apparent thickness of stratum corneum) cm	0.001

Site-specific

Recreator Screening Levels (RSL) for Surface Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	CAS Number	Mutagen?	VOC?	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref
Antimony (metallic)	7440-36-0	No	No	Inorganics	-		4.00E-04	U	-	
Barium	7440-39-3	No	No	Inorganics	-		2.00E-01	U	-	
Bis(2-ethylhexyl)phthalate	117-81-7	No	No	Organics	3.00E-03	U	2.00E-02	U	-	
Boron And Borates Only	7440-42-8	No	No	Inorganics	-		2.00E-01	U	-	
Cadmium (Water)	7440-43-9	No	No	Inorganics	-		5.00E-04	U	-	
Chromium(VI)	18540-29-9	Yes	No	Inorganics	5.00E-01	U	3.00E-03	U	-	
Chromium, Total	7440-47-3	No	No	Inorganics	-		1.50E+00	U	-	
Copper	7440-50-8	No	No	Inorganics	-		4.00E-02	U	-	
Diethyl Phthalate	84-66-2	No	No	Organics	-		8.00E-01	U	-	
Fluoride	16984-48-8	No	No	Inorganics	-		4.00E-02	U	-	
Hexachlorocyclohexane, Alpha-	319-84-6	No	No	Organics	2.70E+00	U	8.00E-03	U	-	
Manganese (Non-diet)	7439-96-5	No	No	Inorganics	-		2.40E-02	U	-	
Mercury (elemental)	7439-97-6	No	Yes	Inorganics	-		1.60E-04	U	-	
Naphthalene	91-20-3	No	Yes	Organics	1.20E-01	U	2.00E-02	U	-	
Nickel Soluble Salts	7440-02-0	No	No	Inorganics	-		1.10E-02	U	-	
Nitrate	14797-55-8	No	No	Inorganics	-		1.60E+00	U	-	
Perchlorate and Perchlorate Salts	14797-73-0	No	No	Inorganics	-		7.00E-04	U	-	
Selenium	7782-49-2	No	No	Inorganics	-		5.00E-03	U	-	
Vanadium and Compounds	7440-62-2	No	No	Inorganics	-		5.04E-03	U	-	
Zinc and Compounds	7440-66-6	No	No	Inorganics	-		3.00E-01	U	-	

Site-specific

Recreator Screening Levels (RSL) for Surface Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	RAGSe GIABS (unitless)	K_p (cm/hr)	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	DA_{event} (nc child)	DA_{event} (nc adult)	Ingestion SL TR=1.0E-6 (ug/L)	Dermal SL TR=1.0E-6 (ug/L)
Antimony (metallic)	0.15	0.001	124.77	1	Yes	-	0.0027686	0.005809	-	-
Barium	0.07	0.001	139.36	1	Yes	-	0.6460177	1.3554377	-	-
Bis(2-ethylhexyl)phthalate	1	1.13	390.57	0.8	No	-	-	-	2.06E+04	-
Boron And Borates Only	1	0.001	13.84	1	Yes	-	9.2288243	19.363395	-	-
Cadmium (Water)	0.05	0.001	112.4	1	Yes	-	0.0011536	0.0024204	-	-
Chromium(VI)	0.025	0.002	52	1	Yes	5.199E-6	0.0034608	0.0072613	5.24E+01	1.30E+00
Chromium, Total	0.013	0.001	51.996	1	Yes	-	0.8998104	1.887931	-	-
Copper	1	0.001	63.546	1	Yes	-	1.8457649	3.872679	-	-
Diethyl Phthalate	1	0.0036	222.24	1	Yes	-	36.915297	77.453581	-	-
Fluoride	1	0.001	38	1	Yes	-	1.8457649	3.872679	-	-
Hexachlorocyclohexane, Alpha-	1	0.0206	290.83	0.9	Yes	0.0000884	0.369153	0.7745358	2.29E+01	5.77E-01
Manganese (Non-diet)	0.04	0.001	54.938	1	Yes	-	0.0442984	0.0929443	-	-
Mercury (elemental)	1	0.001	200.59	1	Yes	-	0.0073831	0.0154907	-	-
Naphthalene	1	0.0466	128.18	1	Yes	0.0019891	0.9228824	1.9363395	5.16E+02	1.43E+01
Nickel Soluble Salts	0.04	0.0002	58.71	1	Yes	-	0.0203034	0.0425995	-	-
Nitrate	1	0.001	62	1	Yes	-	73.830594	154.90716	-	-
Perchlorate and Perchlorate Salts	1	0.001	117.49	1	Yes	-	0.0323009	0.0677719	-	-
Selenium	1	0.001	78.96	1	Yes	-	0.2307206	0.4840849	-	-
Vanadium and Compounds	0.026	0.001	50.94	1	Yes	-	0.0060467	0.0126869	-	-
Zinc and Compounds	1	0.0006	65.37	1	Yes	-	13.843236	29.045093	-	-

Site-specific

Recreator Screening Levels (RSL) for Surface Water

ca=Cancer, nc=Noncancer, ca* (Where nc SL < 100 x ca SL),
ca** (Where nc SL < 10 x ca SL), max=SL exceeds ceiling limit (see User's Guide), sat=SL exceeds csat,
Smax=Soil SL exceeds ceiling limit and has been substituted with the max value (see User's Guide),
Ssat=Soil inhalation SL exceeds csat and has been substituted with the csat

Chemical	Carcinogenic SL TR=1.0E-6 (ug/L)	Ingestion SL (Child) THQ=1 (ug/L)	Dermal SL (Child) THQ=1 (ug/L)	Noncarcinogenic SL (Child) THQ=1 (ug/L)	Ingestion SL (Adult) THQ=1 (ug/L)	Dermal SL (Adult) THQ=1 (ug/L)	Noncarcinogenic SL (Adult) THQ=1 (ug/L)	Screening Level (ug/L)
Antimony (metallic)	-	2.74E+03	1.38E+03	9.19E+02	1.46E+04	2.90E+03	2.42E+03	9.19E+02 nc
Barium	-	1.37E+06	3.23E+05	2.61E+05	7.30E+06	6.78E+05	6.20E+05	2.61E+05 nc
Bis(2-ethylhexyl)phthalate	2.06E+04	1.37E+05	-	1.37E+05	7.30E+05	-	7.30E+05	2.06E+04 ca**
Boron And Borates Only	-	1.37E+06	4.61E+06	1.06E+06	7.30E+06	9.68E+06	4.16E+06	1.06E+06 nc
Cadmium (Water)	-	3.42E+03	5.77E+02	4.94E+02	1.83E+04	1.21E+03	1.13E+03	4.94E+02 nc
Chromium(VI)	1.27E+00	2.05E+04	8.65E+02	8.30E+02	1.10E+05	1.82E+03	1.79E+03	1.27E+00 ca
Chromium, Total	-	1.03E+07	4.50E+05	4.31E+05	5.48E+07	9.44E+05	9.28E+05	4.31E+05 nc
Copper	-	2.74E+05	9.23E+05	2.11E+05	1.46E+06	1.94E+06	8.32E+05	2.11E+05 nc
Diethyl Phthalate	-	5.48E+06	1.93E+06	1.43E+06	2.92E+07	4.05E+06	3.56E+06	1.43E+06 nc
Fluoride	-	2.74E+05	9.23E+05	2.11E+05	1.46E+06	1.94E+06	8.32E+05	2.11E+05 nc
Hexachlorocyclohexane, Alpha-	5.63E-01	5.48E+04	2.41E+03	2.31E+03	2.92E+05	5.05E+03	4.97E+03	5.63E-01 ca
Manganese (Non-diet)	-	1.64E+05	2.21E+04	1.95E+04	8.76E+05	4.65E+04	4.41E+04	1.95E+04 nc
Mercury (elemental)	-	1.10E+03	3.69E+03	8.45E+02	5.84E+03	7.75E+03	3.33E+03	8.45E+02 nc
Naphthalene	1.39E+01	1.37E+05	6.65E+03	6.34E+03	7.30E+05	1.40E+04	1.37E+04	1.39E+01 ca
Nickel Soluble Salts	-	7.53E+04	5.08E+04	3.03E+04	4.02E+05	1.06E+05	8.42E+04	3.03E+04 nc
Nitrate	-	1.10E+07	3.69E+07	8.45E+06	5.84E+07	7.75E+07	3.33E+07	8.45E+06 nc
Perchlorate and Perchlorate Salts	-	4.79E+03	1.62E+04	3.69E+03	2.56E+04	3.39E+04	1.46E+04	3.69E+03 nc
Selenium	-	3.42E+04	1.15E+05	2.64E+04	1.83E+05	2.42E+05	1.04E+05	2.64E+04 nc
Vanadium and Compounds	-	3.45E+04	3.02E+03	2.78E+03	1.84E+05	6.34E+03	6.13E+03	2.78E+03 nc
Zinc and Compounds	-	2.05E+06	1.15E+07	1.74E+06	1.10E+07	2.42E+07	7.54E+06	1.74E+06 nc

Site-specific

Recreator Risk for Surface Water

Chemical	Chemical Type	Ingestion SF (mg/kg-day) $^{-1}$	SFO Ref	Chronic RfD (mg/kg-day)	Chronic RfD Ref	Chronic RfC (mg/m ^{3})	Chronic RfC Ref	RAGSe GIABS (unitless)	K_p (cm/hr)
Antimony (metallic)	Inorganics	-		4.00E-04	U	-		0.15	0.001
Barium	Inorganics	-		2.00E-01	U	-		0.07	0.001
Bis(2-ethylhexyl)phthalate	Organics	3.00E-03	U	2.00E-02	U	-		1	1.13
Boron And Borates Only	Inorganics	-		2.00E-01	U	-		1	0.001
Cadmium (Water)	Inorganics	-		5.00E-04	U	-		0.05	0.001
Chromium(VI)	Inorganics	5.00E-01	U	3.00E-03	U	-		0.025	0.002
Chromium, Total	Inorganics	-		1.50E+00	U	-		0.013	0.001
Copper	Inorganics	-		4.00E-02	U	-		1	0.001
Diethyl Phthalate	Organics	-		8.00E-01	U	-		1	0.0036
Fluoride	Inorganics	-		4.00E-02	U	-		1	0.001
Hexachlorocyclohexane, Alpha-	Organics	2.70E+00	U	8.00E-03	U	-		1	0.0206
Manganese (Non-diet)	Inorganics	-		2.40E-02	U	-		0.04	0.001
Mercury (elemental)	Inorganics	-		1.60E-04	U	-		1	0.001
Naphthalene	Organics	1.20E-01	U	2.00E-02	U	-		1	0.0466
Nickel Soluble Salts	Inorganics	-		1.10E-02	U	-		0.04	0.0002
Nitrate	Inorganics	-		1.60E+00	U	-		1	0.001
Perchlorate and Perchlorate Salts	Inorganics	-		7.00E-04	U	-		1	0.001
Selenium	Inorganics	-		5.00E-03	U	-		1	0.001
Vanadium and Compounds	Inorganics	-		5.04E-03	U	-		0.026	0.001
Zinc and Compounds	Inorganics	-		3.00E-01	U	-		1	0.0006
*Total Risk/HI		-		-		-		-	-

Output generated 26SEP2016:20:18:17

Site-specific

Recreator Risk for Surface Water

Chemical	MW	FA (unitless)	In EPD?	$DA_{event\ (ca)}$	$DA_{event\ (nc\ child)}$	$DA_{event\ (nc\ adult)}$	Concentration (ug/L)	Ingestion Risk	Dermal Risk
Antimony (metallic)	124.77	1	Yes	-	0.0027686	0.005809	0.7500	-	-
Barium	139.36	1	Yes	-	0.6460177	1.3554377	26.000	-	-
Bis(2-ethylhexyl)phthalate	390.57	0.8	No	-	-	-	3.2900	1.60E-10	-
Boron And Borates Only	13.84	1	Yes	-	9.2288243	19.363395	66.000	-	-
Cadmium (Water)	112.4	1	Yes	-	0.0011536	0.0024204	0.1800	-	-
Chromium(VI)	52	1	Yes	5.199E-6	0.0034608	0.0072613	1.1000	2.10E-08	8.46E-07
Chromium, Total	51.996	1	Yes	-	0.8998104	1.887931	2.3000	-	-
Copper	63.546	1	Yes	-	1.8457649	3.872679	1.3520	-	-
Diethyl Phthalate	222.24	1	Yes	-	36.915297	77.453581	0.2260	-	-
Fluoride	38	1	Yes	-	1.8457649	3.872679	350.00	-	-
Hexachlorocyclohexane, Alpha-	290.83	0.9	Yes	0.0000884	0.369153	0.7745358	0.0025	1.09E-10	4.33E-09
Manganese (Non-diet)	54.938	1	Yes	-	0.0442984	0.0929443	24.000	-	-
Mercury (elemental)	200.59	1	Yes	-	0.0073831	0.0154907	0.2300	-	-
Naphthalene	128.18	1	Yes	0.0019891	0.9228824	1.9363395	0.1510	2.93E-10	1.05E-08
Nickel Soluble Salts	58.71	1	Yes	-	0.0203034	0.0425995	2.9000	-	-
Nitrate	62	1	Yes	-	73.830594	154.90716	112.00	-	-
Perchlorate and Perchlorate Salts	117.49	1	Yes	-	0.0323009	0.0677719	0.9600	-	-
Selenium	78.96	1	Yes	-	0.2307206	0.4840849	1.1000	-	-
Vanadium and Compounds	50.94	1	Yes	-	0.0060467	0.0126869	3.3000	-	-
Zinc and Compounds	65.37	1	Yes	-	13.843236	29.045093	23.130	-	-
**Total Risk/HI*	-	-		-	-	-		*2.15E-08*	*8.61E-07*

Output generated 26SEP2016:20:18:17

Site-specific

Recreator Risk for Surface Water

Chemical	Carcinogenic Risk	Ingestion Child HQ	Dermal Child HQ	Noncarcinogenic Child HQ	Ingestion Adult HQ	Dermal Adult HQ	Noncarcinogenic Adult HQ
Antimony (metallic)	-	2.74E-04	5.42E-04	8.16E-04	5.14E-05	2.58E-04	3.10E-04
Barium	-	1.90E-05	8.05E-05	9.95E-05	3.56E-06	3.84E-05	4.19E-05
Bis(2-ethylhexyl)phthalate	1.60E-10	2.40E-05	-	2.40E-05	4.51E-06	-	4.51E-06
Boron And Borates Only	-	4.82E-05	1.43E-05	6.25E-05	9.04E-06	6.82E-06	1.59E-05
Cadmium (Water)	-	5.26E-05	3.12E-04	3.65E-04	9.86E-06	1.49E-04	1.59E-04
Chromium(VI)	8.67E-07	5.36E-05	1.27E-03	1.32E-03	1.00E-05	6.06E-04	6.16E-04
Chromium, Total	-	2.24E-07	5.11E-06	5.34E-06	4.20E-08	2.44E-06	2.48E-06
Copper	-	4.94E-06	1.46E-06	6.40E-06	9.26E-07	6.98E-07	1.62E-06
Diethyl Phthalate	-	4.13E-08	1.17E-07	1.58E-07	7.74E-09	5.58E-08	6.35E-08
Fluoride	-	1.28E-03	3.79E-04	1.66E-03	2.40E-04	1.81E-04	4.20E-04
Hexachlorocyclohexane, Alpha-	4.44E-09	4.57E-08	1.04E-06	1.08E-06	8.56E-09	4.95E-07	5.03E-07
Manganese (Non-diet)	-	1.46E-04	1.08E-03	1.23E-03	2.74E-05	5.16E-04	5.44E-04
Mercury (elemental)	-	2.10E-04	6.23E-05	2.72E-04	3.94E-05	2.97E-05	6.91E-05
Naphthalene	1.08E-08	1.10E-06	2.27E-05	2.38E-05	2.07E-07	1.08E-05	1.10E-05
Nickel Soluble Salts	-	3.85E-05	5.71E-05	9.57E-05	7.22E-06	2.72E-05	3.45E-05
Nitrate	-	1.02E-05	3.03E-06	1.33E-05	1.92E-06	1.45E-06	3.36E-06
Perchlorate and Perchlorate Salts	-	2.00E-04	5.94E-05	2.60E-04	3.76E-05	2.83E-05	6.59E-05
Selenium	-	3.21E-05	9.54E-06	4.17E-05	6.03E-06	4.54E-06	1.06E-05
Vanadium and Compounds	-	9.57E-05	1.09E-03	1.19E-03	1.79E-05	5.20E-04	5.38E-04
Zinc and Compounds	-	1.13E-05	2.01E-06	1.33E-05	2.11E-06	9.56E-07	3.07E-06
**Total Risk/HI*	*8.83E-07*	*2.50E-03*	*5.00E-03*	*7.50E-03*	*4.69E-04*	*2.38E-03*	*2.85E-03*

Output generated 26SEP2016:20:18:17

APPENDIX D

EPA PRG Online Calculator Output for Radionuclides for Site-Specific Recreational User Exposure Scenario – Surface Water

OUTFALL 001

Site-Specific
Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	0.000001
EF_{rec-c} (exposure frequency - recreator child) day/yr	3
EF_{rec-a} (exposure frequency - recreator adult) day/yr	3
ED_{rec} (exposure duration - recreator) yr	24
ED_{rec-c} (exposure duration - recreator child) yr	4
ED_{rec-a} (exposure duration - recreator adult) yr	20
$ET_{event-rec-c}$ (exposure time - recreator child) hr/event	2
$ET_{event-rec-a}$ (exposure time - recreator adult) hr/event	2
EV_{rec-c} (number of bathing events per day - recreator child) event/day	1
EV_{rec-a} (number of bathing events per day - recreator adult) event/day	1
$DFA_{rec-adj}$ (age-adjusted immersion factor - recreator) hr	144
$IFW_{rec-adj}$ (age-adjusted water intake rate - recreator) L	1.08
IRW_{rec-c} (water intake rate - recreator child) L/hr	0.0075
IRW_{rec-a} (water intake rate - recreator adult) L/hr	0.0075

Output generated 13JAN2017:13:47:49

Site-Specific
Recreator PRGs and Risk for Surface Water

Isotope	Ingestion PRG (pCi/L)	Immersion PRG (pCi/L)	Total PRG (pCi/L)	EPC (pCi/L)	Carcinogenic Risk
**Secular Equilibrium PRG for Ra-226*	*3.03E+02*	*3.62E+06*	*3.03E+02*	0.31	1.02E-09
**Secular Equilibrium PRG for Ra-228*	*6.92E+02*	*2.66E+06*	*6.92E+02*	0.715	1.03E-09
**Secular Equilibrium PRG for U-235*	*1.27E+03*	*1.10E+07*	*1.27E+03*	0.687	5.41E-10

Output generated 13JAN2017:13:47:49

Site-Specific
Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	0.000001
EF_{rec-c} (exposure frequency - recreator child) day/yr	6
EF_{rec-a} (exposure frequency - recreator adult) day/yr	6
ED_{rec} (exposure duration - recreator) yr	24
ED_{rec-c} (exposure duration - recreator child) yr	4
ED_{rec-a} (exposure duration - recreator adult) yr	20
$ET_{event-rec-c}$ (exposure time - recreator child) hr/event	2
$ET_{event-rec-a}$ (exposure time - recreator adult) hr/event	2
EV_{rec-c} (number of bathing events per day - recreator child) event/day	1
EV_{rec-a} (number of bathing events per day - recreator adult) event/day	1
$DFA_{rec-adj}$ (age-adjusted immersion factor - recreator) hr	288
$IFW_{rec-adj}$ (age-adjusted water intake rate - recreator) L	2.16
IRW_{rec-c} (water intake rate - recreator child) L/hr	0.0075
IRW_{rec-a} (water intake rate - recreator adult) L/hr	0.0075

Output generated 13JAN2017:13:55:54

Site-Specific
Recreator PRGs and Risk for Surface Water

Isotope	Ingestion PRG (pCi/L)	Immersion PRG (pCi/L)	Total PRG (pCi/L)	EPC (pCi/L)	Carcinogenic Risk
**Secular Equilibrium PRG for Ra-226*	*1.52E+02*	*1.81E+06*	*1.52E+02*	0.31	2.04E-09
**Secular Equilibrium PRG for Ra-228*	*3.46E+02*	*1.33E+06*	*3.46E+02*	0.715	2.07E-09
**Secular Equilibrium PRG for U-235*	*6.33E+02*	*5.48E+06*	*6.33E+02*	0.687	1.09E-09

Output generated 13JAN2017:13:55:54

OUTFALL 002

Site-Specific
Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	0.000001
$EF_{rec\text{-}c}$ (exposure frequency - recreator child) day/yr	9
$EF_{rec\text{-}a}$ (exposure frequency - recreator adult) day/yr	9
ED_{rec} (exposure duration - recreator) yr	24
$ED_{rec\text{-}c}$ (exposure duration - recreator child) yr	4
$ED_{rec\text{-}a}$ (exposure duration - recreator adult) yr	20
$ET_{event\text{-}rec\text{-}c}$ (exposure time - recreator child) hr/event	2
$ET_{event\text{-}rec\text{-}a}$ (exposure time - recreator adult) hr/event	2
$EV_{rec\text{-}c}$ (number of bathing events per day - recreator child) event/day	1
$EV_{rec\text{-}a}$ (number of bathing events per day - recreator adult) event/day	1
$DFA_{rec\text{-}adj}$ (age-adjusted immersion factor - recreator) hr	432
$IFW_{rec\text{-}adj}$ (age-adjusted water intake rate - recreator) L	3.24
$IRW_{rec\text{-}c}$ (water intake rate - recreator child) L/hr	0.0075
$IRW_{rec\text{-}a}$ (water intake rate - recreator adult) L/hr	0.0075

Output generated 13JAN2017:14:02:16

Site-Specific
Recreator PRGs and Risk for Surface Water

Isotope	Ingestion PRG (pCi/L)	Immersion PRG (pCi/L)	Total PRG (pCi/L)	EPC (pCi/L)	Carcinogenic Risk
**Secular Equilibrium PRG for Ra-226*	*1.01E+02*	*1.21E+06*	*1.01E+02*	0.456	4.51E-09
**Secular Equilibrium PRG for U-235*	*4.22E+02*	*3.65E+06*	*4.22E+02*	0.885	2.10E-09

Output generated 13JAN2017:14:02:16

Site-Specific
Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	0.000001
EF_{rec-c} (exposure frequency - recreator child) day/yr	18
EF_{rec-a} (exposure frequency - recreator adult) day/yr	18
ED_{rec} (exposure duration - recreator) yr	24
ED_{rec-c} (exposure duration - recreator child) yr	4
ED_{rec-a} (exposure duration - recreator adult) yr	20
$ET_{event-rec-c}$ (exposure time - recreator child) hr/event	2
$ET_{event-rec-a}$ (exposure time - recreator adult) hr/event	2
EV_{rec-c} (number of bathing events per day - recreator child) event/day	1
EV_{rec-a} (number of bathing events per day - recreator adult) event/day	1
$DFA_{rec-adj}$ (age-adjusted immersion factor - recreator) hr	864
$IFW_{rec-adj}$ (age-adjusted water intake rate - recreator) L	6.48
IRW_{rec-c} (water intake rate - recreator child) L/hr	0.0075
IRW_{rec-a} (water intake rate - recreator adult) L/hr	0.0075

Output generated 13JAN2017:14:05:46

Site-Specific
Recreator PRGs and Risk for Surface Water

Isotope	Ingestion PRG (pCi/L)	Immersion PRG (pCi/L)	Total PRG (pCi/L)	EPC (pCi/L)	Carcinogenic Risk
**Secular Equilibrium PRG for Ra-226*	*5.05E+01*	*6.04E+05*	*5.05E+01*	0.456	9.03E-09
**Secular Equilibrium PRG for U-235*	*2.11E+02*	*1.83E+06*	*2.11E+02*	0.885	4.19E-09

Output generated 13JAN2017:14:05:46

OUTFALL 008

Site-Specific
Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	0.000001
EF_{rec-c} (exposure frequency - recreator child) day/yr	5
EF_{rec-a} (exposure frequency - recreator adult) day/yr	5
ED_{rec} (exposure duration - recreator) yr	24
ED_{rec-c} (exposure duration - recreator child) yr	4
ED_{rec-a} (exposure duration - recreator adult) yr	20
$ET_{event-rec-c}$ (exposure time - recreator child) hr/event	2
$ET_{event-rec-a}$ (exposure time - recreator adult) hr/event	2
EV_{rec-c} (number of bathing events per day - recreator child) event/day	1
EV_{rec-a} (number of bathing events per day - recreator adult) event/day	1
$DFA_{rec-adj}$ (age-adjusted immersion factor - recreator) hr	240
$IFW_{rec-adj}$ (age-adjusted water intake rate - recreator) L	1.8
IRW_{rec-c} (water intake rate - recreator child) L/hr	0.0075
IRW_{rec-a} (water intake rate - recreator adult) L/hr	0.0075

Output generated 13JAN2017:14:15:30

Site-Specific
Recreator PRGs and Risk for Surface Water

Isotope	Ingestion PRG (pCi/L)	Immersion PRG (pCi/L)	Total PRG (pCi/L)	EPC (pCi/L)	Carcinogenic Risk
**Secular Equilibrium PRG for K-40*	*2.25E+04*	*2.33E+07*	*2.25E+04*	21	9.33E-10
**Secular Equilibrium PRG for Ra-226*	*1.82E+02*	*2.17E+06*	*1.82E+02*	0.613	3.37E-09
**Secular Equilibrium PRG for Ra-228*	*4.15E+02*	*1.59E+06*	*4.15E+02*	0.699	1.68E-09
**Secular Equilibrium PRG for U-235*	*7.60E+02*	*6.58E+06*	*7.60E+02*	0.969	1.28E-09

Output generated 13JAN2017:14:15:30

Site-Specific
Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	0.000001
$EF_{rec\text{-}c}$ (exposure frequency - recreator child) day/yr	10
$EF_{rec\text{-}a}$ (exposure frequency - recreator adult) day/yr	10
ED_{rec} (exposure duration - recreator) yr	24
$ED_{rec\text{-}c}$ (exposure duration - recreator child) yr	4
$ED_{rec\text{-}a}$ (exposure duration - recreator adult) yr	20
$ET_{event\text{-}rec\text{-}c}$ (exposure time - recreator child) hr/event	2
$ET_{event\text{-}rec\text{-}a}$ (exposure time - recreator adult) hr/event	2
$EV_{rec\text{-}c}$ (number of bathing events per day - recreator child) event/day	1
$EV_{rec\text{-}a}$ (number of bathing events per day - recreator adult) event/day	1
$DFA_{rec\text{-}adj}$ (age-adjusted immersion factor - recreator) hr	480
$IFW_{rec\text{-}adj}$ (age-adjusted water intake rate - recreator) L	3.6
$IRW_{rec\text{-}c}$ (water intake rate - recreator child) L/hr	0.0075
$IRW_{rec\text{-}a}$ (water intake rate - recreator adult) L/hr	0.0075

Output generated 13JAN2017:14:19:43

Site-Specific
Recreator PRGs and Risk for Surface Water

Isotope	Ingestion PRG (pCi/L)	Immersion PRG (pCi/L)	Total PRG (pCi/L)	EPC (pCi/L)	Carcinogenic Risk
**Secular Equilibrium PRG for K-40*	*1.13E+04*	*1.17E+07*	*1.12E+04*	21	1.88E-09
**Secular Equilibrium PRG for Ra-226*	*9.09E+01*	*1.09E+06*	*9.09E+01*	0.613	6.74E-09
**Secular Equilibrium PRG for Ra-228*	*2.08E+02*	*7.97E+05*	*2.08E+02*	0.699	3.36E-09
**Secular Equilibrium PRG for U-235*	*3.80E+02*	*3.29E+06*	*3.80E+02*	0.969	2.55E-09

Output generated 13JAN2017:14:19:43

OUTFALL 009

Site-Specific
Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	0.000001
EF_{rec-c} (exposure frequency - recreator child) day/yr	13
EF_{rec-a} (exposure frequency - recreator adult) day/yr	13
ED_{rec} (exposure duration - recreator) yr	24
ED_{rec-c} (exposure duration - recreator child) yr	4
ED_{rec-a} (exposure duration - recreator adult) yr	20
$ET_{event-rec-c}$ (exposure time - recreator child) hr/event	2
$ET_{event-rec-a}$ (exposure time - recreator adult) hr/event	2
EV_{rec-c} (number of bathing events per day - recreator child) event/day	1
EV_{rec-a} (number of bathing events per day - recreator adult) event/day	1
$DFA_{rec-adj}$ (age-adjusted immersion factor - recreator) hr	624
$IFW_{rec-adj}$ (age-adjusted water intake rate - recreator) L	4.68
IRW_{rec-c} (water intake rate - recreator child) L/hr	0.0075
IRW_{rec-a} (water intake rate - recreator adult) L/hr	0.0075

Output generated 13JAN2017:14:25:10

Site-Specific
Recreator PRGs and Risk for Surface Water

Isotope	Ingestion PRG (pCi/L)	Immersion PRG (pCi/L)	Total PRG (pCi/L)	EPC (pCi/L)	Carcinogenic Risk
**Secular Equilibrium PRG for Ra-226*	*7.00E+01*	*8.36E+05*	*6.99E+01*	0.373	5.34E-09
**Secular Equilibrium PRG for Ra-228*	*1.60E+02*	*6.13E+05*	*1.60E+02*	0.6	3.75E-09
**Secular Equilibrium PRG for Sr-90*	*2.89E+03*	*3.54E+08*	*2.89E+03*	0.66	2.28E-10
**Secular Equilibrium PRG for U-235*	*2.92E+02*	*2.53E+06*	*2.92E+02*	0.305	1.04E-09

Output generated 13JAN2017:14:25:10

Site-Specific
Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	0.000001
EF_{rec-c} (exposure frequency - recreator child) day/yr	26
EF_{rec-a} (exposure frequency - recreator adult) day/yr	26
ED_{rec} (exposure duration - recreator) yr	24
ED_{rec-c} (exposure duration - recreator child) yr	4
ED_{rec-a} (exposure duration - recreator adult) yr	20
$ET_{event-rec-c}$ (exposure time - recreator child) hr/event	2
$ET_{event-rec-a}$ (exposure time - recreator adult) hr/event	2
EV_{rec-c} (number of bathing events per day - recreator child) event/day	1
EV_{rec-a} (number of bathing events per day - recreator adult) event/day	1
$DFA_{rec-adj}$ (age-adjusted immersion factor - recreator) hr	1248
$IFW_{rec-adj}$ (age-adjusted water intake rate - recreator) L	9.36
IRW_{rec-c} (water intake rate - recreator child) L/hr	0.0075
IRW_{rec-a} (water intake rate - recreator adult) L/hr	0.0075

Output generated 13JAN2017:14:29:21

Site-Specific
Recreator PRGs and Risk for Surface Water

Isotope	Ingestion PRG (pCi/L)	Immersion PRG (pCi/L)	Total PRG (pCi/L)	EPC (pCi/L)	Carcinogenic Risk
**Secular Equilibrium PRG for Ra-226*	*3.50E+01*	*4.18E+05*	*3.50E+01*	0.373	1.07E-08
**Secular Equilibrium PRG for Ra-228*	*7.98E+01*	*3.06E+05*	*7.98E+01*	0.6	7.52E-09
**Secular Equilibrium PRG for Sr-90*	*1.45E+03*	*1.77E+08*	*1.45E+03*	0.66	4.55E-10
**Secular Equilibrium PRG for U-235*	*1.46E+02*	*1.26E+06*	*1.46E+02*	0.305	2.09E-09

Output generated 13JAN2017:14:29:21

OUTFALL 011

Site-Specific
Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	0.000001
$EF_{rec\text{-}c}$ (exposure frequency - recreator child) day/yr	1
$EF_{rec\text{-}a}$ (exposure frequency - recreator adult) day/yr	1
ED_{rec} (exposure duration - recreator) yr	24
$ED_{rec\text{-}c}$ (exposure duration - recreator child) yr	4
$ED_{rec\text{-}a}$ (exposure duration - recreator adult) yr	20
$ET_{event\text{-}rec\text{-}c}$ (exposure time - recreator child) hr/event	2
$ET_{event\text{-}rec\text{-}a}$ (exposure time - recreator adult) hr/event	2
$EV_{rec\text{-}c}$ (number of bathing events per day - recreator child) event/day	1
$EV_{rec\text{-}a}$ (number of bathing events per day - recreator adult) event/day	1
$DFA_{rec\text{-}adj}$ (age-adjusted immersion factor - recreator) hr	48
$IFW_{rec\text{-}adj}$ (age-adjusted water intake rate - recreator) L	0.36
$IRW_{rec\text{-}c}$ (water intake rate - recreator child) L/hr	0.0075
$IRW_{rec\text{-}a}$ (water intake rate - recreator adult) L/hr	0.0075

Output generated 13JAN2017:14:54:18

Site-Specific
Recreator PRGs and Risk for Surface Water

Isotope	Ingestion PRG (pCi/L)	Immersion PRG (pCi/L)	Total PRG (pCi/L)	EPC (pCi/L)	Carcinogenic Risk
**Secular Equilibrium PRG for Ra-226*	*9.09E+02*	*1.09E+07*	*9.09E+02*	0.888	9.77E-10
**Secular Equilibrium PRG for Ra-228*	*2.08E+03*	*7.97E+06*	*2.08E+03*	0.33	1.59E-10
**Secular Equilibrium PRG for U-235*	*3.80E+03*	*3.29E+07*	*3.80E+03*	0.566	1.49E-10

Output generated 13JAN2017:14:54:18

Site-Specific
Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	0.000001
$EF_{rec\text{-}c}$ (exposure frequency - recreator child) day/yr	2
$EF_{rec\text{-}a}$ (exposure frequency - recreator adult) day/yr	2
ED_{rec} (exposure duration - recreator) yr	24
$ED_{rec\text{-}c}$ (exposure duration - recreator child) yr	4
$ED_{rec\text{-}a}$ (exposure duration - recreator adult) yr	20
$ET_{event\text{-}rec\text{-}c}$ (exposure time - recreator child) hr/event	2
$ET_{event\text{-}rec\text{-}a}$ (exposure time - recreator adult) hr/event	2
$EV_{rec\text{-}c}$ (number of bathing events per day - recreator child) event/day	1
$EV_{rec\text{-}a}$ (number of bathing events per day - recreator adult) event/day	1
$DFA_{rec\text{-}adj}$ (age-adjusted immersion factor - recreator) hr	96
$IFW_{rec\text{-}adj}$ (age-adjusted water intake rate - recreator) L	0.72
$IRW_{rec\text{-}c}$ (water intake rate - recreator child) L/hr	0.0075
$IRW_{rec\text{-}a}$ (water intake rate - recreator adult) L/hr	0.0075

Output generated 13JAN2017:14:58:48

Site-Specific
Recreator PRGs and Risk for Surface Water

Isotope	Ingestion PRG (pCi/L)	Immersion PRG (pCi/L)	Total PRG (pCi/L)	EPC (pCi/L)	Carcinogenic Risk
**Secular Equilibrium PRG for Ra-226*	*4.55E+02*	*5.43E+06*	*4.55E+02*	0.888	1.95E-09
**Secular Equilibrium PRG for Ra-228*	*1.04E+03*	*3.98E+06*	*1.04E+03*	0.33	3.17E-10
**Secular Equilibrium PRG for U-235*	*1.90E+03*	*1.64E+07*	*1.90E+03*	0.566	2.98E-10

Output generated 13JAN2017:14:58:48

OUTFALL 018

Site-Specific
Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	0.000001
$EF_{rec\text{-}c}$ (exposure frequency - recreator child) day/yr	6
$EF_{rec\text{-}a}$ (exposure frequency - recreator adult) day/yr	6
ED_{rec} (exposure duration - recreator) yr	24
$ED_{rec\text{-}c}$ (exposure duration - recreator child) yr	4
$ED_{rec\text{-}a}$ (exposure duration - recreator adult) yr	20
$ET_{event\text{-}rec\text{-}c}$ (exposure time - recreator child) hr/event	2
$ET_{event\text{-}rec\text{-}a}$ (exposure time - recreator adult) hr/event	2
$EV_{rec\text{-}c}$ (number of bathing events per day - recreator child) event/day	1
$EV_{rec\text{-}a}$ (number of bathing events per day - recreator adult) event/day	1
$DFA_{rec\text{-}adj}$ (age-adjusted immersion factor - recreator) hr	288
$IFW_{rec\text{-}adj}$ (age-adjusted water intake rate - recreator) L	2.16
$IRW_{rec\text{-}c}$ (water intake rate - recreator child) L/hr	0.0075
$IRW_{rec\text{-}a}$ (water intake rate - recreator adult) L/hr	0.0075

Output generated 13JAN2017:15:05:23

Site-Specific
Recreator PRGs and Risk for Surface Water

Isotope	Ingestion PRG (pCi/L)	Immersion PRG (pCi/L)	Total PRG (pCi/L)	EPC (pCi/L)	Carcinogenic Risk
**Secular Equilibrium PRG for H-3*	*9.13E+06*	-	*9.13E+06*	740	8.11E-11
**Secular Equilibrium PRG for Ra-226*	*1.52E+02*	*1.81E+06*	*1.52E+02*	0.688	4.53E-09
**Secular Equilibrium PRG for Sr-90*	*6.27E+03*	*7.66E+08*	*6.27E+03*	0.61	9.73E-11
**Secular Equilibrium PRG for U-235*	*6.33E+02*	*5.48E+06*	*6.33E+02*	0.283	4.47E-10

Output generated 13JAN2017:15:05:23

Site-Specific
Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	0.000001
EF_{rec-c} (exposure frequency - recreator child) day/yr	12
EF_{rec-a} (exposure frequency - recreator adult) day/yr	12
ED_{rec} (exposure duration - recreator) yr	24
ED_{rec-c} (exposure duration - recreator child) yr	4
ED_{rec-a} (exposure duration - recreator adult) yr	20
$ET_{event-rec-c}$ (exposure time - recreator child) hr/event	2
$ET_{event-rec-a}$ (exposure time - recreator adult) hr/event	2
EV_{rec-c} (number of bathing events per day - recreator child) event/day	1
EV_{rec-a} (number of bathing events per day - recreator adult) event/day	1
$DFA_{rec-adj}$ (age-adjusted immersion factor - recreator) hr	576
$IFW_{rec-adj}$ (age-adjusted water intake rate - recreator) L	4.32
IRW_{rec-c} (water intake rate - recreator child) L/hr	0.0075
IRW_{rec-a} (water intake rate - recreator adult) L/hr	0.0075

Output generated 13JAN2017:15:10:54

Site-Specific
Recreator PRGs and Risk for Surface Water

Isotope	Ingestion PRG (pCi/L)	Immersion PRG (pCi/L)	Total PRG (pCi/L)	EPC (pCi/L)	Carcinogenic Risk
**Secular Equilibrium PRG for H-3*	*4.57E+06*	-	*4.57E+06*	740	1.62E-10
**Secular Equilibrium PRG for Ra-226*	*7.58E+01*	*9.05E+05*	*7.58E+01*	0.688	9.08E-09
**Secular Equilibrium PRG for Sr-90*	*3.13E+03*	*3.83E+08*	*3.13E+03*	0.61	1.95E-10
**Secular Equilibrium PRG for U-235*	*3.17E+02*	*2.74E+06*	*3.16E+02*	0.283	8.96E-10

Output generated 13JAN2017:15:10:54

OUTFALL 019

Site-Specific
Recreator Equation Inputs for Surface Water

Variable	Value
TR (target cancer risk) unitless	0.000001
$EF_{rec\text{-}c}$ (exposure frequency - recreator child) day/yr	50
$EF_{rec\text{-}a}$ (exposure frequency - recreator adult) day/yr	50
ED_{rec} (exposure duration - recreator) yr	24
$ED_{rec\text{-}c}$ (exposure duration - recreator child) yr	4
$ED_{rec\text{-}a}$ (exposure duration - recreator adult) yr	20
$ET_{event\text{-}rec\text{-}c}$ (exposure time - recreator child) hr/event	2
$ET_{event\text{-}rec\text{-}a}$ (exposure time - recreator adult) hr/event	2
$EV_{rec\text{-}c}$ (number of bathing events per day - recreator child) event/day	1
$EV_{rec\text{-}a}$ (number of bathing events per day - recreator adult) event/day	1
$DFA_{rec\text{-}adj}$ (age-adjusted immersion factor - recreator) hr	2400
$IFW_{rec\text{-}adj}$ (age-adjusted water intake rate - recreator) L	18
$IRW_{rec\text{-}c}$ (water intake rate - recreator child) L/hr	0.0075
$IRW_{rec\text{-}a}$ (water intake rate - recreator adult) L/hr	0.0075

Output generated 13JAN2017:15:17:01

Site-Specific
Recreator PRGs and Risk for Surface Water

Isotope	Ingestion PRG (pCi/L)	Immersion PRG (pCi/L)	Total PRG (pCi/L)	EPC (pCi/L)	Carcinogenic Risk
**Secular Equilibrium PRG for Ra-226*	*1.82E+01*	*2.17E+05*	*1.82E+01*	0.566	3.11E-08
**Secular Equilibrium PRG for U-235*	*7.60E+01*	*6.58E+05*	*7.60E+01*	0.433	5.70E-09

Output generated 13JAN2017:15:17:01

APPENDIX E

Risk Assessment Database

(On Compact Disc)