Appendix 8C
Screening Analysis

8C.1 Constituent Screening Analysis

A constituent "screening analysis" was performed as the first portion of the overall analysis of water quality effects of implementing the Alternatives. As with all analyses of water quality effects, this screening analysis was conducted relative to the effect thresholds of significance for implementation of the Alternatives. First, the screening analysis determined which constituents had no potential to exceed the thresholds of significance and, thus, did not warrant further assessment to satisfy CEQA and NEPA. Then, this analysis identified a list of "constituents of concern" that were further analyzed as part of assessing their potential water quality related impacts under the Alternatives. For these constituents, it was further determined which ones could be assessed quantitatively, based on data availability and the behavior of the constituent in the aquatic environment, and which ones, based on these same considerations, needed to be assessed qualitatively.

Constituents assessed were identified based on the following considerations:

- Availability of historical monitoring data
- Constituents having adopted Federal water quality criteria or State water quality objectives
- Constituents on State's U.S. EPA approved 2010 Clean Water Act Section 303(d) list in the Delta
- Constituents identified in public scoping comments
- Constituents deserving assessment based on professional judgment

This screening analysis evaluated 182 water quality constituents/parameters. This appendix describes the sequence of steps used to conduct the screening analysis. The initial steps included data acquisition, site selection, naming consistency and data cleanup. These initial steps were taken to characterize the water quality of the three major source waters to the Delta (i.e., Sacramento River (SAC), San Joaquin River (SJR), and San Francisco Bay (BAY)); (see Data Locations). A screening algorithm was developed to assess water quality constituents present in source waters according to the criteria listed above to determine "constituents of concern" via a series of decision steps. This appendix concludes with an identification of the constituents among the initial 182 assessed that received adequate analysis, for the purposes of the EIS/EIR, via this screening analysis vs. those that were carried forward for more detailed alternative-by-alternative analyses because of the potential for adverse changes for those constituents/parameters under various alternatives, relative to Existing Conditions and the No Action Alternative. A description of the QA/QC procedures utilized is also provided.

8C.1.1 Data Sources

This section describes sources for data used in the screening analysis. Water quality data in the Delta has been collected by a myriad of public and private organizations. However, for consistency and due to data availability concerns, the input data for the screening analysis was limited to two data sets that were publically available via the web and managed by a public agency (i.e., data from the DWR Water Data Library and the Bay Delta and Tributaries Project [BDAT]).

8C.1.1.1 Data Locations

Location naming conventions varied by data source. Therefore, standardized source water locations and sample locations were assigned; referred to as BDCP Source Water and BDCP Location, respectively. These locations are shown in Table SA-1.

Table SA-1. BDCP Source Water Locations and Original Dataset Location Names

Original Sample Location	Station Code	Data Source	BDCP Location	BDCP Source Water
Sacramento River @ Chipps Island	D10	BDAT	Chipps	
Sacramento River @ Mallard Island	E0B80261551	DWR	SacR-Mallard	BAY
Suisun Bay @ Bulls Head nr. Martinez	D6	BDAT	Suisun-Bulls Head	
SACRAMENTO R A HOOD	B9D82211312	DWR	Hood	
Sacramento River @ Greenes Landing	C3	BDAT	Greenes	
Sacramento River @ Hood	C3A	BDAT	Hood	SAC
Sacramento River at Greene's Ldg.	B9D82071327	DWR	Greenes	
Sacramento River at Hood	B9178000	DWR	Hood	
San Joaquin R. nr. Vernalis	B0702000	DWR	Vernalis	SJR
San Joaquin River near Vernalis	C10	BDAT	Vernalis	

Because water quality data for eastside tributaries (EST) (i.e., Mokelumne, Cosumnes, and Calaveras rivers) and within-Delta agricultural return water (AGR) were very limited, and because these source waters generally make up a small (i.e., < 10%) fraction of the water at most interior Delta locations, the screening analysis focused on data compiled for the three major source water locations (SAC, SJR, and BAY). Interior Delta sites were not considered, because modeling performed in support of the Environmental Consequences impact assessments assumed no new sources of water quality constituents and, therefore, water quality concerns are assumed to arise primarily through altered mixing of Delta source waters.

8C.1.1.2 Data QA/Aggregation

Several actions were taken to ensure accurate and consistent treatment of the data between databases.

- Ensured consistent analyte naming
    - Excluded analytes that were not water quality constituents
- Defined whether analyte was total, dissolved, etc.
- Distinguished between detects and non-detects. Used reporting limit for non-detect values Ensured accurate analyte naming and consistent measurement units
- When both field and lab measurements were made on the same sample (e.g., for conductance), then averaged such measurements later in the screening process

Duplicate data may exist in the aggregated dataset. If the number of data points for a given constituent was close to the qualitative/quantitative threshold, then those data points were examined to identify and remove duplicates, when present.

8C.1.2 Data Query

Because modeling performed in support of the Environmental Consequences impact assessments assumed no new sources of water quality constituents, water quality concerns arise primarily through altered mixing of Delta source waters. Thus, the purpose of this section is to analyze the aggregated data by individual source water locations. Therefore, the BDCP versions of the DWR and BDAT databases were queried by major source water locations (i.e., BAY, SAC, and SJR) to analyze and summarize water quality characteristics by source water. These analyses provide a convenient means to review data quality and trends and consist of three major elements: data review, summary statistics, and summary statistics for total criteria.

8C.1.2.1 Source Water Summary Data

For each source water, a summary was developed to aggregate fundamental statistical characteristics for each constituent measured at any of the source water locations. In addition, statistical, graphical, and raw data review were employed, as needed, for individual constituents. The source water summary statistics were used as inputs to the Screening Table spreadsheet and included the following items:

- Number of detects
- Number of non-detects
- Number of measurements
- Non-Detect minimum reporting limit
- Maximum detected value
- Overall average of detects
- Overall standard deviation of detects
- Maximum of source water average values

8C.1.2.2 Summary for Constituents Based on Sum Totals

Some applicable criteria are for the sum of individual constituents from an entire class of compounds (e.g., polyaromatic hydrocarbons, polychlorinated biphenyls, xylenes, trihalomethanes, and haloaceticacids), Thus, for each source water, a "Summary for Totals" analysis was performed. The Summary for Totals analysis aggregates fundamental statistical characteristics for criteria that represent constituent classes from the individual constituent measurements. These summary statistics are then to be carried forward to the Screening Table spreadsheet and included the following items:

- Number of detects
- Number of non-detects
- Number of measurements
- Non-Detect minimum reporting limit
- Maximum detected value
- Overall average of detects and reporting limit (if non-detect)

- Overall standard deviation of detects and reporting limit (if non-detect)
- Maximum of source water averages

Note that several analysis steps were taken in order to convert the raw data into the statistical summary bulleted above.

- For each sampling event:
  - A detect for any individual constituent counted as a detect for the class
  - All detected values were added together for the total class sum
  - Non-detect for all individual constituents was a non-detect for the class
  - The class minimum reporting was the minimum of the individual constituent reporting limits

8C.1.3 Screening Tables

8C.1.3.1.1 Overview of Screening Procedures

Constituents of concern that were carried forward for detailed assessment fell into three categories:

- Constituents that were measured in the representative data set and were detected at least once,
- Constituents that were monitored but were never detected in the representative data set, and
- Constituents that were never measured in the representative data set but were, nevertheless, considered for assessment because of public interest.

The procedures for determining whether a constituent in each of these categories was carried forward for detailed assessment are outlined in Table SA-2, Table SA-3, and Table SA-4.

Table SA-2. Constituents Measured in the Representative Data Set and Detected at Least Once

Analysis Question	Answer	Next Step
1. Does maximum concentration exceed State or Federal Water Quality Objectives/Water Quality Criteria?	Yes	Quantitative or Qualitative Assessment
	No	Continue to Question 2
2. Is it on State's U.S. EPA approved 2010 Section 303(d) list?	Yes	Quantitative or Qualitative Assessment
	No	Continue to Question 3
3. Is it bioaccumulative?	Yes	Quantitative or Qualitative Assessment
	No	Continue to Question 4
4. Is it of concern based on public scoping?	Yes	Quantitative or Qualitative Assessment
	No	Continue to Question 5
5. Is it of concern based on professional judgment?	Yes	Quantitative or Qualitative Assessment
	No	Continue to Question 6
6. Is it of concern because water quality varies substantially among sources and, thus, the potential for water quality degradation exists as source-fractions change?	Yes	Quantitative or Qualitative Assessment
	No	No Further Action

Table SA-3. Constituents Analyzed in the Representative Data Set, but Never Detected

Analysis Question	Answer	Next Step
1. Are data all non-detects and minimum reporting limit is below criteria?	Yes	Not of Concern: No Further Action
	No	Continue Screening in Table SA-2 at Question 2

Table SA-4. Constituents Never Measured in the Representative Data Set but Considered for Assessment

Analysis Question	Answer	Next Step
1. Is there knowledge about potential, relative source contributions for constituent (e.g., endocrine disrupting chemicals from wastewater treatment plant discharges)?	Yes	Qualitative Assessment
	No	Continue to Question 2
2. Is it of concern based on public scoping?	Yes	Qualitative Assessment
	No	Continue to Question 3
3. Is it of concern based on professional judgment?	Yes	Qualitative Assessment
	No	No Further Action

8C.1.3.1.2 Overview of Qualitative versus Quantitative Assessment Determination

For many constituents, lack of adequate, representative data precluded a quantitative assessment. Table SA-2 and Table SA-3 identify the types of constituents that were carried forward for detailed analysis and Table SA-4 identifies which constituents were automatically determined to be assessed qualitatively. For constituents for which at least one data point in the representative data set was a detected value (see Table SA-2), the assessment was either quantitative or qualitative, depending on three factors:

1. Adequacy of data to perform a quantitative assessment,
2. Adequacy of modeling tools, relative to the physical/chemical properties of the constituent, to perform a quantitative assessment, and
3. Professional judgment on the necessity of a quantitative assessment to determine the potential environmental impact.

Available tools were considered appropriate for modeling only those constituents that could be assumed to be conservative (i.e., not transformed into a new constituent or lost as water flows through the system). Constituents of concern that could not be analyzed through quantitative modeling, or for which it was determined that quantitative modeling was not necessary for an environmental impacts determination, were carried forward for qualitative analysis.

The following sub-sections provide greater detail on the steps performed in each table of constituent screening process.

8C.1.3.2 Summary of Source Water Data (Step 1)

Screening analysis Step 1 performs three functions: 1) presents summary data for all constituents at each of the three major source water locations; 2) screens constituents with detected values versus all non-detects; and 3) provides the data evaluation to determine whether a quantitative assessment can be performed.

8C.1.3.2.1 Summary Data

The summary data from each of the source water locations includes all constituents and classes of constituents (e.g., trihalomethanes) that have been analyzed in the dataset. In addition to the summary characteristics identified in Section 4.4.2.1 and Section 4.4.2.2, the following were determined across all source water locations.

- Lowest reporting limit
- Maximum detected value
- Maximum of the source water detected averages
- Whether there were any detects at any source water location
- Which step the constituent was carried forward to

8C.1.3.2.2 Screen Detects Versus Non-Detects

Constituents and constituent classes were initially screened and separated into two groups as follows.

- If any detects at any source water location, further screening in Screening Step 2.
- If all non-detects at all source water locations, further screening in Screening Step 3.

8C.1.3.2.3 Quantitative Versus Qualitative Determination

Additionally, to aid in determining whether a quantitative analysis can be performed, the following were determined for each constituent or class of constituents.

- Whether measured at all locations
- Whether there were at least 10 measurements at each location
- Whether there were at least 10 detects at any location
- What was the minimum number of measurements at any location

8C.1.3.3 Screen Detected Constituents (Step 2)

Detected constituents were carried forward from screening in Step 1 and evaluated against the following triggers for potential detailed assessment:

- If any of the following four conditions are true, send forward for an evaluation of quantitative versus qualitative assessment in Step 5.
- Determine if maximum detect exceeds minimum applicable criterion
- Determine if constituent is on the U.S. EPA approved 2010 303(d) list
- Determine if constituent is of concern based on professional judgment
- Determine if constituent is of concern based on public comment
- If none of the above are true, then no further consideration.

An additional evaluation was performed for potential water quality degradation (i.e., antidegradation concern) for constituents that do not exceed the criteria. This degradation evaluation conservatively ignores any potential background concentration that could diminish the effect of the source waters (i.e., assumes background concentration is zero). Potential water quality degradation was assessed as follows.

- If maximum detected value exceeds lowest applicable criterion, then the constituent is already being considered for detailed assessment. Thus, not screened for potential water quality degradation.
- If maximum detected value is less than 10% of the criterion, water quality degradation is not possible.
- If maximum detected value is 10% of the criterion, or greater (but less than or equal to the criterion), water quality degradation is possible.
- The same screening was also applied using averages instead of maximum detected values.

8C.1.3.4 Screen Non-detect Constituents (Step 3)

Non-detected constituents were carried forward from screening in Step 1 and evaluated against the following triggers for potential detailed assessment.

- If any of the following three conditions are true, send forward for detailed assessment in Step 6:
- Determine if constituents is on the U.S. EPA approved 2010 303(d) list
- Determine if constituent is of concern based on professional judgment
- Determine if constituent is of concern based on public comment
- If any of the last three are true, send forward for detailed assessment in Screening Step 6.
- If minimum reporting limit exceeds lowest applicable criterion (i.e., are all reporting limits above criteria), send constituent forward for further evaluation in Step 4.
- If none of the above are true, no further consideration.

8C.1.3.5 Further Screen Non-detects and Non-measured Constituents (Step 4)

Non-detect constituents carried forward from screening in Step 3 and additional constituents of concern not analyzed for in the dataset (e.g., pyrethroids and dioxins) were assessed against the following triggers for potential detailed assessment.

- If any of the following four conditions are true, send forward for detailed assessment in Step 6.
- Determine whether there is knowledge about potential, relative source contributions
- Determine if constituents is on the U.S. EPA approved 2010 303(d) list
- Determine if constituent is of concern based on professional judgment
- Determine if constituent is of concern based on public comment
- If none of the above are true, then no further consideration

Note that constituents screened from Step 2 have already been screened for the last three bullets.

8C.1.3.6 Determination of Quantitative versus Qualitative Assessment (Step 5)

Detected constituents carried forward from screening in Step 2 were evaluated to determine whether a quantitative assessment could be performed. If the following three conditions are all met, then the constituent is carried forward to Step 6 for quantitative assessment.

- Determine if data quantity is sufficient to perform a quantitative assessment
- Determine if adequate modeling tools, relative to the physical/chemical properties of the constituent, exist to perform a quantitative assessment in the Delta
- Determine if a quantitative assessment is necessary to determine the potential environmental impact (e.g., when all source water concentrations are similar, then the mixed condition is predictable without quantitative modeling)

If none of the above conditions are met, then the constituent is carried forward to Step 6 for qualitative assessment.

8C.1.3.7 Summary of Constituents for Detailed Assessment (Step 6)

All constituents carried forward from screening in Step 3, Step 4 and/or Step 5 are presented in Step 6 and are summarized by constituent, fraction, and qualitative or quantitative assessment.

- The need for quantitative determinations were made in Step 5.
- The need for qualitative determinations were made in Step 3, Step 4, and Step 5.

Step 6 also identifies which section of the Environmental Consequences chapter discusses each constituent.

8C.1.3.8 Screening Decisions Inputs

This section identifies information, other than source water data, that was used in the screening process to make decisions on the constituent assessments.

8C.1.3.8.1 Criteria Sheet

To screen constituents and evaluate potential water quality degradation, a table of criteria and objectives applicable to the Sacramento-San Joaquin Delta and source waters was developed from the following sources.

- U.S. EPA approved California 2010 303(d) list for constituents in the Delta
- California Toxics Rule
- Freshwater and/or saltwater aquatic life criteria
- Human health criteria
- Region 5 Basin Plan (Sacramento-San Joaquin River Basins) objectives applicable at boundary locations or in Delta.
- Region 2 Basin Plan (San Francisco Bay) objectives except for: Marine water criteria.
- California drinking water maximum contaminant levels.

From the table of criteria and objectives, the minimum applicable criterion was identified for each constituent.

8C.1.3.8.2 Other

The following tables of constituents were prepared to further assess constituents.

- Constituents of concern based on professional judgment
- Constituents of concern based on public scoping comments for the Bay-Delta Conservation Plan
- Constituents for which adequate Delta modeling tools were available
- Constituents for which quantitative modeling was not needed for impact assessments

8C.1.4 Data/Screening QC

The purpose of this section is to evaluate the accuracy and relevancy of the decisions and calculations performed during the Constituent Screening Analysis. This review is broken into the following sections.

- Data gathering
- Data compilations
- Screening process
- Sensitivity analysis
- Veracity check on screening results
- Constituent evaluations

8C.1.4.1 Data Gathering

For data gathering, the following items were performed.

- Evaluate decision on whether additional data/locations should be considered.
- Check that all data available at chosen stations was used.
- Make decisions about representativeness of datasets (e.g., eliminated old metals data with poor detection limit).

8C.1.4.2 Data Compilation

For data compilation, the following items were performed.

- Evaluate decisions on constituents to exclude, aggregation of constituent names, detects/non-detects, and determination of fraction.
- Evaluate whether measured values reported are likely to occur.

8C.1.4.3 Screening Process

For the screening process, the following items were performed.

- Ensure formulas are correct.
- Ensure most the up-to-date data has been carried through from databases through the screening process.
- Review accuracy and relevancy of:
    - Criteria (reviewed for drinking water source rules and added TOC)
    - Professional judgment concerns
    - Public scoping concerns
    - Adequate Delta modeling tools
    - Modeling needs for impact assessments

8C.1.4.4 Sensitivity Analysis

The sensitivity analysis was focused on the effect of the quantitative analysis parameters. Specifically whether the constituents that were chosen for quantitative analysis changed substantially when the screening parameters were increased or decreased for: 1) the minimum number of measurements required at each source water location; and 2) the minimum number of detects required at any source water location.

For all constituents that were detected, determination of quantitative/qualitative was initially determined based on whether there were greater than ten (>10) measurements at all three locations and whether there were greater than ten (>10) detects at a single location.

These numbers were varied from 6–10 to determine if additional constituents would have a possibility of being quantitative. The sensitivity analysis resulted in the following observations:

- Decreasing the thresholds to nine would trigger quantitative analysis of iron and manganese. Further threshold reductions to six would trigger chromium.
- Review of chromium data indicated very poor quality. For example all "detections" occurred for values at the reporting limit, which was always 5 or 10 µg/L.

8C.1.4.5 Veracity Check on Screening Results

As a check on the screening results, the following items were performed.

- For constituents carried forward to Step 6, reviewed data for outliers/aberrant data and reviewed applicable criteria
    - Reviewed ES/AE Section and added constituents, as needed, to professional judgment table to ensure constituents not analyzed, but of concern, were carried forward during Step 4
    - Reviewed results and evaluated whether additional data is needed or any changes to the process are needed

8C.1.4.6 Constituent Evaluations

For constituent evaluations, the following items were performed.

- Compare to ES/AE Section to determine if quantitative evaluation is warranted.
- Determine if both total and dissolved need to be evaluated for a given constituent.
- Made the following overriding findings:
- If qualitative assessment and criteria is for group, do not need to discuss individual constituents.
- If qualitative assessment and criteria are for individual constituents, discuss as group and individual constituents, as needed.

8C.1.5 Constituents Receiving Further Assessment in Screening Appendix

Some of the constituents in Step 6 that were determined, through the Screening Analysis, to warrant further assessment, are assessed in the sections below. For these constituents, specific factors (e.g., insufficient data characterizing source water concentrations) make a full, detailed alternative-

specific analysis within the Environmental Consequences section unnecessary. Nevertheless, these constituents did come through the initial screening analysis as requiring further assessment and thus are assessed below, relative to the assessment thresholds of significance. As discussed further below, none of these constituents are anticipated to exceed the assessment thresholds of significance, nor are there anticipated to be any water quality related adverse effects to beneficial uses of water bodies within the affected environment under any of the BDCP alternatives, relative to Existing Conditions or (for Alternatives 1A–9) the No Action Alternative.

8C.1.5.1 Asbestos, Chrysotile

Natural weathering of serpentine rock results in chrysotile asbestos fibers in surface waters originating in the western slopes of the Sierra Nevada and in the coastal mountains of California. Individual fibers are 0.03–0.04 µm in diameter, and typically 0.1 to 3.0 µm long (Bales et al. 1984:66). The primary MCL for chysotile asbestos is 7 million fibers per liter (MFL). The primary health concern is that some people who drink water containing asbestos in excess of the MCL over many years may have an increased risk of developing benign intestinal polyps (U.S. EPA 2012a). It is not clear whether levels in the three major source waters are substantially different. Although 14 data points existed for the Sacramento (average 794 MFL, standard deviation 882 MFL) and San Joaquin (average 1153 MFL, standard deviation 760 MFL) Rivers, there were only 2 data points for San Francisco Bay (240 MFL and 3490 MFL) (see Step 1, Table SA-6). Nevertheless, it is clear that all the source waters to the Delta contain chrysotile asbestos at levels far above the MCL, and that, given the variability in the data, at any given time, any of the major source waters may be contributing more asbestos to the Delta than the others. Drinking water treatment technologies, including coagulation/flocculation and filtration, are effective at removing asbestos from drinking water. In a study conducted in 1984, fiber removal in five California drinking water plants was >90% for plants whose influent levels of asbestos were above the MCL (i.e., average of between 500–600 MFL), and the average effluent level was below the MCL (Bales et al. 1984:73). The Delta is not 303(d) listed for chrysotile asbestos and thus no beneficial use impairment due to its current levels is occurring.

Given the lack of clear variability in asbestos levels among source waters to the Delta, it is not anticipated that levels of chrysotile asbestos will be substantially affected by the alternatives upstream of the Delta, within the Delta, or in the SWP and CVP Service Area, relative to Existing Conditions and (for Alternatives 1A–9) the No Action Alternative. Furthermore, given that drinking water treatment plants are effective at removing high levels of chrysotile asbestos with currently used technologies, any changes in asbestos levels that may occur in the water bodies of the affected environment under the alternatives would not be of frequency, magnitude and geographic extent that would adversely affect any beneficial uses or substantially degrade the quality of these water bodies on a long-term average basis, with regards to asbestos.

8C.1.5.2 Color

Color in water has a secondary MCL of 15 color units. Secondary MCLs are established only as guidelines to assist public water systems in managing their drinking water for aesthetic considerations. Color is not considered to present a risk to human health or aquatic life at or above the secondary MCL. Color in natural waters may be indicative of dissolved organic material, high disinfectant demand, and the potential for the production of excess amounts of disinfection byproducts. Inorganic contaminants such as metals are also common causes of color. To the degree that color as a constituent is indicative of other, constituent-specific concerns, such as dissolved

organic carbon and its potential to cause disinfection byproducts, or metals at high concentrations, these considerations are addressed under the Environmental Consequences assessments for these specific constituents. To the degree that color itself is a concern from an aesthetic standpoint, conventional drinking water treatment removes many of the constituents that cause high color levels in water. Coagulation/flocculation and filtration remove metals like iron, manganese and zinc. Aeration removes iron and manganese. Granular activated carbon removes most of the contaminants which cause color (U.S. EPA 2012b). Color in the three major source waters to the Delta does not vary considerably (see Step 1, Table SA-6). The average in the Sacramento River at Freeport/Greene's Landing is approximately 22 units, while San Francisco Bay at Martinez and San Joaquin River at Vernalis average approximately 30 units. The standard deviations at these locations are 22–37 units, indicating that substantial variability exists at all three locations, and no specific source waters is consistently highest in color. The Delta is not 303(d) listed for color and thus no beneficial use impairment due to its current levels is occurring.

Based on the discussion above, it is not anticipated that color levels will be substantially affected by the alternatives upstream of the Delta, within the Delta, or in the SWP and CVP Service Area, relative to Existing Conditions, and (for Alternatives 1A–9) the No Action Alternative. It is anticipated that any negligible changes in color that may occur in the water bodies of the affected environment under the alternatives would not be of frequency, magnitude and geographic extent that would adversely affect any beneficial uses or substantially degrade the quality of these water bodies on a long-term average basis, with regards to color.

8C.1.5.3 Dioxins and Furans

Dioxins and furans are a class of organic compounds composed of many congeners – compounds of similar chemical structure but slightly different chemical formula. There are hundreds of these compounds, which can be grouped as polychlorinated dibenzo-p-dioxins (PCDD) and polychlorinated dibenzofurans (PCDF) and generally termed dioxins and furans. The compound 2,3,7,8-tetrachlordibenzo-p-dioxin (TCDD) is the most toxic of these compounds, and consequently the toxicity of the many other related compounds are expressed as "TCDD equivalents." Dioxin and furan compounds are created unintentionally in chlorine-consuming manufacturing processes and through the combustion of chlorine containing organic compounds. Forest fires and volcanoes can contribute these compounds to the atmosphere as well as certain human activities (e.g., incineration of municipal solid waste, metal smelting, coal fired power plants, wood burning, and chlorine bleaching of wood pulp).

Dioxin and furan compounds are extremely persistent in the environment and once released to the environment can cycle through various phases including water, sediment, soil, air, and biota. Owing to their stability, lipophilicity (i.e., affinity for accumulation in the fats of animals), and slow biodegradation rates, dioxin and furan compounds can bioaccumulate in the tissues of exposed organisms. Although dioxin and furan concentrations in water may be very low, the process of bioaccumulation in organisms presents a human health concern, particularly for pregnant and nursing women that consume fish and shellfish that have concentrated dioxins and furans in their tissues.

Sensitive receptors that have the potential to be affected by dioxin and furan compounds are consumers of drinking water (i.e., the Municipal and Domestic Supply beneficial use), consumers of fish and shellfish (Commercial and Sport Fishing, Shellfish Harvesting), aquatic organisms (Cold, Warm, and Estuarine water fisheries), wildlife (Wildlife Habitat) and threatened and endangered

species. Consumption of drinking water or organisms contaminated with dioxins and furans are generally of greatest concern.

Applicable dioxin/furan objectives for the affected environment are as follows: California Toxics Rule: human health based on consumption of water and organisms (TCDD equivalents) of 0.000000013 µg/L, human health based on consumption of organisms only (TCDD equivalents) of 0.000000014 µg/L; drinking water MCL (TCDD equivalents) of 0.00003 µg/L. The entire San Francisco Bay was Clean Water Act Section 303(d) listed for dioxin and furan compounds in 1999, due to an OEHHA fish consumption advisory being issued in San Francisco Bay. The 303(d) listing was later extended into the Delta due to migration of striped bass and sturgeon through the Bay and into the Delta. Stormwater runoff is the primary source of dioxins and furans in the Bay. Because of roughly equivalent concentrations in runoff around the Bay, atmospheric deposition is believed to be the primary source. Direct atmospheric deposition onto water is the only other major source. A study conducted in 2000 showed that 50–80% of the dioxin TCDD in fish tissue of Bay is due to dioxin-like PCBs (U.S. EPA 2012c). PCBs are assessed under the PCBs section of this Screening Analysis. Because atmospheric deposition is the primary source of dioxins and furans and the magnitude of this source is not affected by the alternatives, and because the 303(d) listing in San Francisco Bay and the Delta is related to fish tissue concentrations and not water column dioxin and furan concentrations, construction, operations and maintenance, and habitat restoration actions associated with implementing the alternatives are not anticipated to substantially affect concentrations of dioxins and furans upstream of the Delta, within the Delta, or in the SWP and CVP Service Area, relative to Existing Conditions and (for Alternatives 1A–9) the No Action Alternative.

Segments of the Stockton Deep Water Ship Canal at the Port of Stockton also are Clean Water Act Section 303(d) listed for dioxin and furan compounds. These listings are associated with high dioxin and furan concentrations in sediment that were localized and were traced to a point source, a wood treatment facility (McCormick and Baxter) immediately south of Mormon Slough (Hayward 1996:30). The facility is now a Superfund site and has undergone substantial cleanup efforts. EPA completed Phase I of the sediment remedy (bank stabilization) in 2003 and completed Phase II (placement of a sand cap over the contaminated sediment) in 2006 (U.S. EPA 2012d). Because of these actions, it is unlikely that the contaminated sediment poses any risk to the Stockton Deep Water Ship Channel or the San Joaquin River any longer. Even if some risk still remained, actions associated with the alternatives are not anticipated to substantially affect sediment or water column concentrations of dioxins and furans within these water bodies, relative to Existing Conditions and (for Alternatives 1A–9) the No Action Alternative.

Any negligible changes in dioxin and furan concentrations that may occur in the water bodies of the affected environment under the alternatives would not be of frequency, magnitude and geographic extent that would adversely affect any beneficial uses or substantially degrade the quality of these water bodies on a long-term average basis, with regards to dioxins and furans, nor would the potential negligible changes in the Bay-Delta region that may occur under the alternatives make current 303(d) listed impairments measurably worse.

8C.1.5.4 Endocrine Disrupting Chemicals and Constituents of Emerging Concern

The World Health Organization (WHO) defines an endocrine disrupting compound (EDC) as "… an exogenous substance or mixture that alters function(s) of the endocrine system and consequently causes adverse health effects in an intact organism, or its progeny, or (sub)populations" (2002).

EDCs block, mimic, stimulate, or inhibit the production of natural hormones, disrupting the endocrine system's natural functions. Endocrine disruption may be described as a functional change that may lead to adverse effects to reproduction, metabolism, growth and development, and specific tissue functions, not necessarily a toxicological end-point.

Examples of EDCs include natural plant and animal steroid hormones, metals (e.g., arsenic, cadmium, lead, and mercury), dioxins, PAHs, pesticides, pharmaceuticals and personal care products (PPCPs), and PCBs. Sources of anthropogenic EDCs include wastewater treatment plants, private septic systems, urban stormwater runoff, industrial effluents, landfill leachates, discharges from fish hatcheries and dairy facilities, runoff from agricultural fields and livestock enclosures, and land amended with biosolids or manure. Constituents of emerging concern (CECs) include the following classes of chemicals: perfluoranated compounds (e.g., PFOS, PFOA), polybrominated diphenyl ethers (PBDEs), PPCPs, and phthalates. These chemicals are generally found in such low concentrations in the environment that only recently have analytical tools been developed to detect and quantify these concentrations.

In general, by definition, CECs do not have state or federally adopted criteria of any kind (i.e., there are no CTR/NTR standards, Region 5 and Region 2 Basin Plan objectives, Bay-Delta Water Quality Control Plan objectives, State or Federal drinking water standards). In general, all EDCs for which adopted criteria exist (e.g., selected pesticides, metals, and PAHs) are analyzed in other sections of the water quality chapter. This section addresses CECs and those EDCs not covered elsewhere, and, therefore, within this section, there are no adopted criteria which can be used for the assessment. No water bodies in the affected environment are on the State's Clean Water Act Section 303(d) list as impaired by these constituents, since no adopted criteria exist. EDCs and CECs have a broad range of physical and chemical properties that dictate their fate and transport in the environment. Depending on the specific chemical, key properties such as degradation rates, solubility, and partitioning coefficients may vary from very low to very high.

Lavado et al. (2009:1) collected 101 samples from 16 locations throughout the Central Valley at areas impacted by agriculture, and analyzed the samples using bioassays that measure total estrogenic activity, as well as steroid hormones and nonionic detergents and their metabolites. There were infrequent detections of low concentrations of the trace organic compounds, and the concentrations of compounds frequently associated with feminization effects on fish were far below thresholds for feminization of sensitive species. Estrogenic activity was definitively detected and confirmed at two sampling sites, including the Sacramento River at Walnut Grove. These samples were subjected to fractionation to attempt to determine compounds responsible for the estrogenic activity, and fractions were analyzed for numerous pharmaceuticals, pesticides, and potential endocrine disruptors. However, none of the compounds analyzed for in the study could explain the estrogenic activity that was observed.

Very little other data exists to characterize concentrations of EDCs and CECs upstream of the Delta. However, it is anticipated that concentrations of EDCs and CECs in Shasta, Oroville, and Folsom Reservoirs are low because the sources (identified above) of the majority of these constituents are not widely found in the watersheds of these reservoirs. Some of the sources identified above are found with increasing distance downstream of the reservoirs, so selected EDCs and CECs are likely discharged to the Sacramento, Feather, and American Rivers, as well as the San Joaquin River. Altered reservoir release schedules under the Alternatives, relative to Existing Conditions and (for Alternatives 1A–9) the No Action Alternative may affect dilution of these constituents, but because projected flows are within the range of historic operations, long-term average concentrations of

EDCs and CECs are expected to change negligibly, if at all, due to dilution in rivers upstream of the Delta. Increasing development upstream of the Delta in the LLT may increase the mass of EDCs and CECs discharged from the sources identified above to the Sacramento, Feather, and American Rivers, relative to Existing Conditions. Although a small amount of data exist for CECs in Delta source waters (e.g., the Sacramento and San Joaquin Rivers), there is insufficient data to determine relative loading of CECs/EDCs among the primary source waters to the Delta.

Because data on EDC and CEC concentrations in rivers upstream of the Delta (Delta source waters) and the Delta are sparse or nonexistent, and because environmental and human health endpoints are not well defined, it is not possible to readily estimate with any certainty the magnitude of changes of EDC and CEC concentrations, and their associated environmental effects, due to increased development and altered SWP and CVP operations under the alternatives in the LLT, relative to Existing Conditions. Hence, no further assessment or effect determinations can be made for EDCs and CECs with regards to implementation of the BDCP alternatives.

8C.1.5.5 PAHs (Polycyclic aromatic hydrocarbons)

Polycyclic aromatic hydrocarbons (PAHs) are a class of organic compounds that occur in many natural products such as coal, tar, and oil or are incidentally formed as a combustion byproduct of fossil fuels and biomass. PAHs have limited industrial utility and as such largely enter the environment by natural means such as from volcanoes and forest fires, or incidental to other human related combustion activities such as wood and fossil fuel burning. Releases of PAH to the atmosphere from the combustion of fossil fuels and biomass can eventually settle to the ground throughout a watershed and ultimately enter waterways through stormwater runoff. Hundreds of PAH compounds exist, with naphthalene and benzo(a)pyrene being common.

Sensitive receptors that have the potential to be affected by PAHs are consumers of drinking water (i.e., the Municipal and Domestic Supply beneficial use), consumers of fish and shellfish (Commercial and Sport Fishing, Shellfish Harvesting), aquatic organisms (Cold, Warm, and Estuarine water fisheries), wildlife (Wildlife Habitat) and threatened and endangered species. Consumption of drinking water or organisms contaminated with PAHs is generally of greatest concern.

Applicable PAH objectives for the affected environment are as follows: California Toxics Rule: human health based on consumption of water and organisms for all regulated PAHs of 0.0044 µg/L, human health based on consumption of organisms only for all regulated PAHs of 0.0049 µg/L; drinking water MCL of 0.2 µg/L for benzo(a)pyrene and for the sum of all PAHs. None of the water bodies in the affected environment have been listed as impaired on the state's Clean Water Act section 303(d) list due to PAHs.

PAHs are of special concern due to their ability to bioaccumulate in some aquatic organisms of commercial interest, but this ability to bioaccumulate is organism and PAH specific. Due to their physical and chemical properties, PAHs in water tend to partition to sediments and suspended matter.

Data, both in the form of water concentrations and toxicity testing, is insufficient to draw conclusions of impact based on the water quality criteria for these compounds. Water column measurement data for PAHs in Sacramento, Bay, and San Joaquin source waters contain no detections above analytical reporting limits in the data used for the Screening Analysis, but trace level analytical reporting conducted by the San Francisco Estuary Institute (SFEI 2010) suggest that PAHs are present in the Sacramento and San Joaquin Rivers in the Delta. Data is insufficient to

conclude whether source waters contribute substantially different concentrations; however, because the major source of PAHs to waters of the affected environment is believed to be atmospheric deposition (both incident and via stormwater runoff), it is unlikely that the source waters contribute substantially different concentrations of PAHs, and therefore, that concentrations of PAHs will change substantially upstream of the Delta, within the Delta, or in the SWP and CVP Service Area under any of the alternatives relative to Existing Conditions and (for Alternatives 1A-9) the No Action Alternative.

Therefore, it is anticipated that any negligible changes in PAH concentrations that may occur in the water bodies of the affected environment would not be of frequency, magnitude and geographic extent that would adversely affect any beneficial uses or substantially degrade the quality of these water bodies, with regards to PAHs.

8C.1.5.6 PCBs (Polychlorinated biphenyls)

Polychlorinated biphenyls (PCBs) are a class of organic compounds composed of many congeners – compounds of similar chemical structure but slightly different chemical formula. As a congener class, there are 209 possible different PCBs. PCBs were used in numerous industrial applications, possibly most notably in transformers as electrical coolants and as hydraulic fluids. PCB manufacture in the United States was discontinued in 1979. Today, PCBs can enter the environment from a variety of sources such as leaking pre-1979 electrical transformers still in use, atmospheric deposition over connected watersheds, and industrial and municipal wastewater discharges.

Sensitive receptors that have the potential to be affected by PCBs are consumers of drinking water (i.e., the Municipal and Domestic Supply beneficial use), consumers of fish and shellfish (Commercial and Sport Fishing, Shellfish Harvesting), aquatic organisms (Cold, Warm, and Estuarine water fisheries), wildlife (Wildlife Habitat) and threatened and endangered species. Consumption of drinking water or organisms contaminated with PCBs is generally of greatest concern.

Applicable PCB objectives for the affected environment are as follows: California Toxics Rule (based on sum of 6 PCBs) freshwater chronic criterion of 0.014 µg/L, saltwater chronic criterion of 0.03 µg/L, and human health (based on consumption of water and organisms) of 0.00017 µg/L; federal and state MCLs based on the sum of PCBs of 0.5 µg/L. Segments of the Stockton Deep Water Ship Canal at the Port of Stockton as well the western portion and northern portion of the Delta are Clean Water Action Section 303(d) listed for PCBs. Within the affected environment, the California Office of Environmental Health Hazard Assessment (OEHHA) has issued a fish consumption health advisory for the entire Delta and portions of the Sacramento River and American River inhabited by striped bass and sturgeon based on residues of PCBs found in these fish species (OEHAA 2009).

PCBs are extremely stable, and once released to the environment can cycle through various phases including water, sediment, soil, air, and biota. Although sources of loading to the Delta have not been quantified, suspension and transport of contaminated sediments is likely a dominant process. Owing to their stability, lipophilicity (i.e., affinity for accumulation in the fats of animals), and slow biodegradation rates, PCBs can bioaccumulate in the tissues of exposed organisms. Although PCB concentrations in water may be very low, the process of bioaccumulation in organisms presents a human health concern, particularly for pregnant and nursing women that consume fish and shellfish.

A study by deVlaming (2008) indicated that while high concentrations of PCBs can be found in older, fattier fish (e.g., the Sacramento Sucker, which should not be considered an appropriate model for

other species because of its high lipid (i.e., fat) content and because it is unpopular for human consumption (p.1,2)) in specific regions of the Delta (north Delta, Sacramento, and Stockton), Delta PCB concentrations are generally below Office of Environmental Health Hazard Assessment (OEHHA) screening values, and generally, PCB levels in fish in the Delta are "neither extensive nor extreme" (p.2,3). The study also suggests that the results indicate that the north Delta may be eligible for 303(d) delisting (p.126).

Data, both in the form of water concentrations and toxicity testing, is insufficient to draw conclusions of impact based on the water quality criteria for these compounds. Water column measurement data for PCB compounds in Sacramento, Bay, and San Joaquin source waters contain no detections above analytical reporting limits in the data used for the Screening Analysis, but trace level analytical reporting conducted by the San Francisco Estuary Institute (SFEI 2010) that achieves extremely low detection limits suggests that PCBs are present in the Sacramento and San Joaquin Rivers in the Delta.

Leatherbarrow et al. (2005) found that PCB concentrations in Delta outflow at Mallard Island ranged from 200 to 6,700 pg/L during and after major storm events in 2002 and 2003. In their study PCB concentrations at Mallard Island fluctuated with tide, with highest PCB concentrations associated with flood tide (i.e., Bay water influenced). This observation was consistent with their hypothesis that legacy contaminants resuspended from the Bay and transported into the west Delta on a flood tide contain higher concentrations of PCBs than riverine suspended sediment being transported from the Delta into the Bay. Furthermore, the mixture of PCBs in riverine suspended sediment is indicative of stormwater runoff of relatively recent atmospherically deposited PCBs rather than resuspension of PCBs deposited in the Delta decades earlier.

It is not known whether sediment transported from the Bay into the Delta in this manner remains in the Delta, or if it is flushed back out into the Bay during storm events. It is also not possible at this time to accurately model sediment resuspension and subsequent transport in this area of the Bay-Delta. Even so, if these dynamics were to change under the alternatives, it is not possible to predict how bioaccumulation of PCBs in the Delta would be altered, if at all. Many of the larger fish that bioaccumulate PCBs to problematic levels migrate through the San Francisco Bay and the Delta, and therefore, would likely not experience substantially different bioaccumulation if distribution of sediment high in PCBs were to change somewhat under the alternatives. Finally, because PCBs are no longer in production, the 2008 TMDL for PCBs in San Francisco Bay states that PCBs are expected to attenuate naturally and be lost through outflow from the Golden Gate (SFBRWQCB 2008:A-2).

Based on the discussion above, any changes in PCB concentrations in water or sediment that may occur upstream of the Delta, within the Delta, or in the SWP and CVP Service Area would not be of frequency, magnitude and geographic extent that would adversely affect any beneficial uses or substantially degrade the quality of the water bodies within the affected environment, with regards to PCBs.

8C.1.5.7 pH

The pH scale measures how acidic or basic a substance is. It ranges from 0 to 14. A pH of 7 is neutral. A pH less than 7 is acidic, and a pH greater than 7 is basic. Each integer pH unit below 7 is ten times more acidic than the next higher value. The same holds true for pH values above 7, each of which is ten times more alkaline (basic) than the next lower whole value. Pure water is neutral, with a pH of 7.0. When chemicals are mixed with water, the mixture can become either acidic or basic.

Natural waters typically have a pH of between 6 and 9. Pure rain water has a pH of 5.6, because it contains carbonic acid as a result of carbon dioxide from the atmosphere. The Region 2 and Region 5 Basin Plans contain pH objectives that state that pH shall not be depressed below 6.5 or above 8.5.

Because pH is a fundamental property of water, it affects the chemistry of numerous other constituents within the water, and thus, in addition to having potential direct effects on beneficial uses (such as municipal and domestic water supply and aquatic organisms), can also affect beneficial uses indirectly by altering the chemistry and toxicity of other constituents in the water.

Within the affected environment, pH is typically between 6.5 and 8.5. The pH within the affected environment is controlled primarily by natural factors, such as alkalinity from natural weathering of minerals and carbon dioxide concentrations controlled by algae and bacterial respiration. Figure 8C-1 shows exceedance probabilities of historical pH data from 1975 to 2009 in the Sacramento River at Freeport/Greene's Landing, the San Joaquin River at Vernalis, and San Francisco Bay at Martinez. The data indicate that the Sacramento River and San Francisco Bay are within the Basin Blan objective range of 6.5 to 8.5 >95% of the time, while the San Joaquin River is between the limits >90% of the time. As water moves from these locations to areas within the Delta, pH changes as a result of natural factors, and therefore the pH at any given location within the Delta may have no correlation to the source waters that contribute water to that location. Given this, and given that the alternatives do not include components that would directly depress or elevate pH, it is not expected that pH would change substantially upstream of the Delta, within the Delta, or in the SWP and CVP Service Area under the alternatives, relative to Existing Conditions and (for Alternatives 1A–9) the No Action Alternative. Any negligible changes in pH that may occur in the water bodies of the affected environment would not be of frequency, magnitude and geographic extent that would adversely affect any beneficial uses or substantially degrade the quality of these water bodies, with regards to pH.

8C.1.5.8 Sulfate

Sulfate is an ion that is generally present at low concentrations in freshwater bodies; however, sulfate is a major anion in seawater at about 2,700 mg/L (Hem 1985:7). On a concentration basis, pure sea water has a ratio of sulfate to chloride that remains rather constant. Sources in the project area may also include atmospheric sources, natural weathering of rocks and soil, fertilizer runoff, wastewater effluent, and acid mine drainage.

The only numerical water quality objective is a recommended 250 mg/L as a secondary maximum contaminant level (SMCL) and human health standard contained in Title 22 of the California Code of Regulations, Section 64449. Section 64449 provides sulfate SMCL's as a range, with 250 mg/L recommended, 500 mg/L as an upper limit, and 600 mg/L as a temporary maximum limit. The secondary MCL for sulfate is incorporated by reference in the Region 2 and 5 Basin Plans, and is thus applicable to all surface waters in the affected environment that have the municipal and domestic supply beneficial use designation. None of the water bodies in the affected environment have been listed as impaired on the state's Clean Water Act section 303(d) list due to elevated sulfate. It should be noted, however, that the lower San Joaquin River is listed as impaired for salt and boron; sulfate has been estimated to comprise about 27% of the total ions contributing to salinity in the San Joaquin River at Vernalis, comparable to the contribution of chloride (23%) (Table 2-3 in CVRWQCB 2002b).

Because substantial sources of sulfate do not exist upstream of the Delta in the Sacramento River watershed, concentrations of sulfate in this region are low (Table SA-5). Consequently, modified reservoir operations to accommodate greater water demands are expected to have negligible, if any, effects on reservoir and river sulfate concentrations, upstream of the Delta in the Sacramento River. Concentrations of sulfate are considerably higher in the San Joaquin River watershed, but typically well below the lowest 250 mg/L recommended human health criterion. The highest monthly average sulfate concentration was 116 mg/L (February) and the highest monthly 99th percentile concentration was 246 mg/L (February) (Table SA-5). The long term average concentration was 82 mg/L (data from 1986–2009, DWR 2009). Given the discussion above, it is expected that any changes in sulfate concentrations that may occur in the water bodies of the affected environment located upstream of the Delta would not be of frequency, magnitude and geographic extent that would adversely affect any beneficial uses or substantially degrade the quality of these water bodies, with regards to sulfate.

Based on the discussion above and data shown in Table SA-5, the dominant mechanism by which the alternatives could increase sulfate concentrations to levels of concern is seawater intrusion. Increased contribution of water from San Francisco Bay at Delta locations could increase sulfate concentrations substantially. While sulfate concentrations in Bay water are up to approximately 5 times higher than other Delta source waters, chloride concentrations in Bay water are up to approximately 80 times higher than other Delta source waters. Because of this, if seawater intrusion into the Delta were to increase under the alternatives, chloride concentrations would increase to a far greater degree than sulfate concentrations. For surface waters within the Delta, the Bay-Delta WQCP contains chloride objectives for municipal water supply beneficial use protection. Because the municipal beneficial use is protected within the Delta via chloride objectives, and because the primary mechanism by which sulfate concentrations could increase under the alternatives is greater intrusion of seawater (where the ratio of chloride to sulfate is relatively constant), sulfate will not be separately assessed in greater detail within the Delta or downstream in the SWP and CVP Service Area, but rather, the detailed chloride assessment (see Environmental Consequences section of water quality chapter) adequately addresses additional considerations for sulfate as well.

Table SA-5. Source Water Concentrations for Sulfate (mg/L)

Source Water	Sacramento River	San Joaquin River [a]	San Francisco Bay [a]	East Side Tributaries	Agriculture within the Delta [a, b]
Mean (mg/L)	9	53–116	73–514	3	45–173
Minimum (mg/L)	2	8–47	1–36	0.1	1–16
Maximum (mg/L)	19	113–251	309–874	26	186–900
75th Percentile (mg/L)	10	60–159	72–725	4	42–216
99th Percentile (mg/L)	17	111–246	302–799	11	182–804
Data Source	DWR	DWR	DWR	USGS	DWR
Station(s)	Sac River at Greene's Landing	SJR at Vernalis	Sacramento River at Mallard Island	Mokelumne River and Cosumnes River	footnote
Date Range	1986–1998	1986–2009	1986–2008	1961–1994	1986–2004
ND Replaced with RL	No	No	Yes	Yes	Yes
Data Omitted	None	Zero values	None	Zero values and methods with detection limits > 100 µg/L	footnote
No. of Data Points	172	40–49	21–24	197	22–225

[a] Values reported as range of monthly values (minimum monthly–maximum monthly). Trends in monthly average sulfate at these locations suggested a seasonality to concentration.

[b] Values calculated from all agriculture drain data pooled together. All sulfate data from agricultural drains contained in the DWR Water Data Library were placed into a single database.

Table SA-6. Step 1: All constituents (totaling 182) measured at boundary stations, number of times analyzed and detected, and minimum and maximum vales reported in the data set

			SAC						SJR						BAY										
Constituent	Fraction	Units	# Detects	# Measured	Non-Detect Min RL	Max Detect	Average	Stdev	# Detects	# Measured	Non-Detect Min RL	Max Detect	Average	Stdev	# Detects	# Measured	Non-Detect Min RL	Max Detect	Average	Stdev	Lowest Min RL	Highest Max Detect	Max of Averages	Detected at any locations?	Carried Forward?
1,1,1,2-Tetrachloroethane	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
1,1,1-Trichloroethane	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
1,1,2,2-Tetrachloroethane	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
1,1,2-Trichloroethane	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
1,1-Dichloroethane	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
1,1-Dichloroethene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
1,1-Dichloropropene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
1,2,3-Trichlorobenzene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
1,2,3-Trichloropropane	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
1,2,4-Trichlorobenzene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
1,2,4-Trimethylbenzene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
1,2-Dibromo-3-chloropropane (DBCP)	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
1,2-Dibromoethane (EDB)	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
1,2-Dichlorobenzene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
1,2-Dichloroethane	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
1,2-Dichloropropane	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
1,3,5-Trimethylbenzene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
1,3-Dichlorobenzene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
1,3-Dichloropropane	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
1,4-Dichlorobenzene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
2,2-Dichloropropane	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
2,4-D	Total	µg/L	0	2	0.250	0	0.250	0	0	1	0.250	0	0.250	0	0	1	0.250	0	0.250	0	0.250	0	0.250	NO	Step 3
2-Chlorotoluene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
4-Chlorotoluene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
4-Isopropyltoluene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Alachlor	Total	µg/L	0	14	0.0500	0	0.0607	0.0213	0	1	0	0	0	0	0	12	0.0500	0	0.0542	0.0144	0.0500	0	0.0607	NO	Step 3
Aldrin	Total	µg/L	0	12	0.0100	0	0.0108	0.00289	0	0	0	0	0	0	0	12	0.0100	0	0.0108	0.00289	0.0100	0	0.0108	NO	Step 3
Alkalinity	Total	mg/L as CaCO3	175	175	0	86.0	58.6	10.9	0	0	0	0	0	0	266	266	0	105	69.6	12.6	0	105	69.6	YES	Step 2
Ammonia	Dissolved	mg/L as N	574	576	0.00822	0.860	0.256	0.164	499	581	0	1.40	0.0795	0.125	802	803	0.0822	0.260	0.0749	0.0476	0.00822	1.40	0.256	YES	Step 2
Ammonia	Total	mg/L as N	78	78	0	0.470	0.159	0.0979	62	62	0	0.770	0.172	0.183	89	89	0	0.610	0.0865	0.0890	0	0.770	0.172	YES	Step 2

Constituent	Fraction	Units	SAC						SJR						BAY						Lowest Min RL	Highest Max Detect	Max of Averages	Detected at any locations?	Carried Forward?
			# Detects	# Measured	Non-Detect Min RL	Max Detect	Average	Stdev	# Detects	# Measured	Non-Detect Min RL	Max Detect	Average	Stdev	# Detects	# Measured	Non-Detect Min RL	Max Detect	Average	Stdev					
Arsenic	Dissolved	µg/L	34	85	0	2.00	0.741	0.804	55	89	0	20.0	1.44	2.22	16	25	0	3.00	1.48	1.12	0	20.0	1.48	YES	Step 2
Arsenic	Total	µg/L	15	16	0	10.0	2.44	2.13	1	1	0	20.0	20.0	0	19	19	0	10.0	4.95	3.36	0	20.0	20.0	YES	Step 2
Asbestos, Chrysotile	None	MFL	14	14	0	3200	794	882	14	14	0	3300	1150	760	2	2	0	3490	1870	2300	0	3490	1870	YES	Step 2
Atra Simazine (Atrazine & Simazine together)	Total	µg/L	1	1	0	0.0600	0.0600	0	0	0	0	0	0	0	4	4	0	0.150	0.115	0.0451	0	0.150	0.115	YES	Step 2
Atrazine	Total	µg/L	0	14	0.0200	0	0.0329	0.0289	0	1	0.100	0	0.100	0	0	12	0.0200	0	0.0217	0.00577	0.0200	0	0.100	NO	Step 3
Barium	Dissolved	µg/L	0	0	0	0	0	0	0	37	1000	0	1000	0	0	0	0	0	0	0	1000	0	1000	NO	Step 3
Benzene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
BHC	Total	µg/L	0	48	0.0100	0	0.0108	0.00279	1	1	0	0.0200	0.0200	0	0	48	0.0100	0	0.0108	0.00279	0.0100	0.0200	0.0200	YES	Step 2
BHC-alpha	Total	µg/L	0	12	0.0100	0	0.0108	0.00289	0	0	0	0	0	0	0	12	0.0100	0	0.0108	0.00289	0.0100	0	0.0108	NO	Step 3
BHC-beta	Total	µg/L	0	12	0.0100	0	0.0108	0.00289	0	0	0	0	0	0	0	12	0.0100	0	0.0108	0.00289	0.0100	0	0.0108	NO	Step 3
BHC-delta	Total	µg/L	0	12	0.0100	0	0.0108	0.00289	0	0	0	0	0	0	0	12	0.0100	0	0.0108	0.00289	0.0100	0	0.0108	NO	Step 3
BHC-gamma (Lindane)	Total	µg/L	0	12	0.0100	0	0.0108	0.00289	0	0	0	0	0	0	0	12	0.0100	0	0.0108	0.00289	0.0100	0	0.0108	NO	Step 3
Biochemical Oxygen Demand (BOD)	Total	mg/L	36	36	0	2.60	1.53	0.423	0	0	0	0	0	0	71	71	0	2.80	1.23	0.459	0	2.80	1.53	YES	Step 2
Boron	Dissolved	µg/L	66	469	100	1900	106	92.9	469	483	100	1100	349	185	223	264	100	1600	517	409	100	1900	517	YES	Step 2
Bromacil	Total	µg/L	0	0	0	0	0	0	0	13	1.00	0	1.00	0	0	0	0	0	0	0	1.00	0	1.00	NO	Step 3
Bromide	Dissolved	µg/L	402	560	1.00	90.0	14.9	8.83	545	545	0	650	250	130	257	258	10.0	22600	6370	6100	1.00	22600	6370	YES	Step 2
Bromobenzene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Bromochloroacetic Acid (BCAA)	Total	µg/L	20	24	1.00	8.00	2.76	1.69	49	53	1.00	49.0	17.6	9.40	26	26	0	31.0	8.52	6.32	1.00	49.0	17.6	YES	Step 2
Bromochloromethane	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Bromodichloromethane	Total	µg/L	173	266	1.00	28.0	12.7	4.24	205	228	0.500	250	93.1	56.1	187	191	0.500	370	76.1	60.4	0.500	370	93.1	YES	Step 2
Bromoform	Total	µg/L	2	253	0.750	18.0	5.25	3.80	59	227	0.500	63.0	9.26	6.66	154	187	0.500	1400	362	266	0.500	1400	362	YES	Step 2
Bromomethane	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Cadmium	Dissolved	µg/L	11	12	5.00	5.00	5.00	0	0	0	0	0	0	0	14	14	0	10.0	5.71	1.82	5.00	10.0	5.71	YES	Step 2
Cadmium	Total	µg/L	12	13	5.00	5.00	5.00	0	1	1	0	10.0	10.0	0	18	18	0	20.0	7.22	3.92	5.00	20.0	10.0	YES	Step 2
Calcium	Dissolved	µg/L	190	190	0	17000	11700	2050	0	0	0	0	0	0	304	304	0	249000	51900	36700	0	249000	51900	YES	Step 2
Captafol	Total	µg/L	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0.0200	0.0200	0	0	0.0200	0.0200	YES	Step 2
Captan	Total	µg/L	0	14	0.0200	0	0.0614	0.128	0	1	0.100	0	0.100	0	0	12	0.0200	0	0.0217	0.00577	0.0200	0	0.100	NO	Step 3
Carbaryl	Total	µg/L	0	2	2.00	0	2.00	0	0	1	2.00	0	2.00	0	0	0	0	0	0	0	2.00	0	2.00	NO	Step 3
Carbofuran	Total	µg/L	0	2	0.500	0	0.500	0	0	1	0.500	0	0.500	0	0	1	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Carbon tetrachloride	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Chlordane	Total	µg/L	0	12	0.0500	0	0.0542	0.0144	0	0	0	0	0	0	0	12	0.0500	0	0.0542	0.0144	0.0500	0	0.0542	NO	Step 3
Chloride	Dissolved	µg/L	866	866	0	33000	6380	2690	844	844	0	221000	81400	43600	820	820	0	12600000	3750000	3380000	0	12600000	3750000	YES	Step 2
Chloride	Total	µg/L	85	85	0	18000	7680	3170	85	85	0	383000	134000	96800	173	173	0	14700000	5300000	4260000	0	14700000	5300000	YES	Step 2
Chlorobenzene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Chloroethane	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Chloroform	Total	µg/L	256	256	0	1100	228	124	205	228	0.500	1400	277	175	123	194	0.750	700	81.2	136	0.500	1400	277	YES	Step 2

Constituent	Fraction	Units	SAC						SJR						BAY						Lowest Min RL	Highest Max Detect	Max of Averages	Detected at any locations?	Carried Forward?
			# Detects	# Measured	Non-Detect Min RL	Max Detect	Average	Stdev	# Detects	# Measured	Non-Detect Min RL	Max Detect	Average	Stdev	# Detects	# Measured	Non-Detect Min RL	Max Detect	Average	Stdev					
Chloromethane	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Chlorophyll a	Total	µg/L	609	610	0.0500	38.6	2.63	3.08	471	471	0	499	31.1	51.4	963	964	0.0500	49.4	4.14	5.92	0.0500	499	31.1	YES	Step 2
Chlorothalonil	Total	µg/L	0	10	0.0100	0	0.0110	0.00316	0	0	0	0	0	0	0	10	0.0100	0	0.0110	0.00316	0.0100	0	0.0110	NO	Step 3
Chlorpropham	Total	µg/L	0	10	0.0200	0	0.0220	0.00632	0	0	0	0	0	0	0	10	0.0200	0	0.0220	0.00632	0.0200	0	0.0220	NO	Step 3
Chlorpyrifos	Total	µg/L	0	12	0.0100	0	0.0108	0.00289	0	13	0.0100	0	0.0100	0	0	12	0.0100	0	0.0108	0.00289	0.0100	0	0.0108	NO	Step 3
Chromium	Dissolved	µg/L	12	13	5.00	10.0	5.77	1.88	0	0	0	0	0	0	15	15	0	10.0	6.33	2.29	5.00	10.0	6.33	YES	Step 2
Chromium	Total	µg/L	17	18	5.00	10.0	6.67	2.43	6	6	0	10.0	10.0	0	27	27	0	30.0	11.0	7.44	5.00	30.0	11.0	YES	Step 2
cis-1,2-Dichloroethene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
cis-1,3-Dichloropropene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Clostridium perfringens	Total	CFU/ 100ml	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NO	Step 3
Color	Total	Color Units	195	200	5.00	150	21.8	24.7	152	153	5.00	406	30.0	37.0	151	151	0	150	30.0	21.7	5.00	406	30.0	YES	Step 2
Conductance (EC)	None	µS/cm	748	748	0	1230	157	59.3	666	666	0	1550	650	274	313	313	0	18500	6210	5110	0	18500	6210	YES	Step 2
Copper	Dissolved	µg/L	28	79	1.00	10.0	5.13	2.07	51	121	1.00	20.0	4.52	2.41	26	27	1.00	149	14.6	27.5	1.00	149	14.6	YES	Step 2
Copper	Total	µg/L	32	32	0	30.0	11.6	7.87	7	7	0	40.0	15.7	11.3	40	40	0	478	27.7	74.2	0	478	27.7	YES	Step 2
Cryptosporidium	None	Cysts/100L	0	11	10.0	0	10.0	0	0	11	10.0	0	10.0	0	0	0	0	0	0	0	10.0	0	10.0	NO	Step 3
Dacthal (DCPA)	Total	µg/L	0	14	0.0100	0	0.0236	0.0325	1	1	0	0.480	0.480	0	0	13	0.0100	0	0.0177	0.0249	0.0100	0.480	0.480	YES	Step 2
Diazinon	Total	µg/L	0	2	0.100	0	0.300	0.283	0	14	0.0100	0	0.0450	0.131	0	0	0	0	0	0	0.0100	0	0.300	NO	Step 3
Dibromoacetic Acid (DBAA)	Total	µg/L	0	24	1.00	0	1.00	0	21	53	1.00	23.0	5.25	6.26	15	26	1.00	110	31.4	32.8	1.00	110	31.4	YES	Step 2
Dibromochloromethane	Total	µg/L	6	258	0.500	13.0	6.73	3.49	163	225	0.500	180	46.0	36.3	164	197	0.500	590	189	125	0.500	590	189	YES	Step 2
Dibromomethane	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Dichloran	Total	µg/L	0	10	0.0100	0	0.0110	0.00316	0	0	0	0	0	0	0	10	0.0100	0	0.0110	0.00316	0.0100	0	0.0110	NO	Step 3
Dichloroacetic Acid (DCAA)	Total	µg/L	24	24	0	54.0	26.6	11.5	53	53	0	140	49.6	26.0	25	26	1.00	130	21.8	28.0	1.00	140	49.6	YES	Step 2
Dichlorodifluoromethane	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Dicofol	Total	µg/L	0	12	0.0100	0	0.0150	0.0117	0	0	0	0	0	0	0	12	0.0100	0	0.0175	0.0154	0.0100	0	0.0175	NO	Step 3
Dieldrin	Total	µg/L	0	12	0.0100	0	0.0108	0.00289	0	0	0	0	0	0	0	12	0.0100	0	0.0108	0.00289	0.0100	0	0.0108	NO	Step 3
Diuron	Total	µg/L	0	11	0.0500	0	0.0545	0.0151	0	0	0	0	0	0	0	11	0.0500	0	0.0573	0.0168	0.0500	0	0.0573	NO	Step 3
Endosulfan (mixed isomers)	Total	µg/L	0	12	0.0100	0	0.0125	0.00452	0	0	0	0	0	0	0	12	0.0100	0	0.0125	0.00452	0.0100	0	0.0125	NO	Step 3
Endosulfan-I	Total	µg/L	0	24	0.0100	0	0.0108	0.00282	0	0	0	0	0	0	0	24	0.0100	0	0.0108	0.00282	0.0100	0	0.0108	NO	Step 3
Endosulfan-II	Total	µg/L	0	12	0.0100	0	0.0108	0.00289	0	0	0	0	0	0	0	12	0.0100	0	0.0108	0.00289	0.0100	0	0.0108	NO	Step 3
Endrin	Total	µg/L	0	24	0.0100	0	0.0108	0.00282	0	0	0	0	0	0	0	24	0.0100	0	0.0108	0.00282	0.0100	0	0.0108	NO	Step 3
Endrin aldehyde	Total	µg/L	0	12	0.0100	0	0.0108	0.00289	0	0	0	0	0	0	0	12	0.0100	0	0.0108	0.00289	0.0100	0	0.0108	NO	Step 3
Escherichia coli	Total	MPN/ 100ml	8	14	1.00	50.4	10.3	14.1	11	17	1.00	3440	402	919	11	11	0	78.2	18.2	20.9	1.00	3440	402	YES	Step 2
Ethyl benzene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Fecal Coliform	Total	MPN	0	5	1.00	0	1.00	0	0	5	1.00	0	1.00	0	0	0	0	0	0	0	1.00	0	1.00	NO	Step 3
Fluorescence	Total	Fluoresence Uni	11	11	0	4.38	0.257	0.826	0	0	0	0	0	0	182	182	0	56.7	14.3	15.3	0	56.7	14.3	YES	Step 2

Constituent	Fraction	Units	SAC						SJR						BAY						Lowest Min RL	Highest Max Detect	Max of Averages	Detected at any locations?	Carried Forward?
			# Detects	# Measured	Non-Detect Min RL	Max Detect	Average	Stdev	# Detects	# Measured	Non-Detect Min RL	Max Detect	Average	Stdev	# Detects	# Measured	Non-Detect Min RL	Max Detect	Average	Stdev					
Giardia lamblia	Total	Cysts/ 100L	0	11	10.0	0	10.0	0	0	11	10.0	0	10.0	0	0	0	0	0	0	0	10.0	0	10.0	NO	Step 3
Hardness	Dissolved	mg/L as CaCO3	0	0	0	0	0	0	146	146	0	247	133	51.8	70	70	0	1710	586	520	0	1710	586	YES	Step 2
Hardness	Total	mg/L as CaCO3	189	189	0	84.0	56.2	11.3	372	372	0	347	147	61.3	234	234	0	2520	719	578	0	2520	719	YES	Step 2
Heptachlor	Total	µg/L	0	12	0.0100	0	0.0108	0.00289	0	0	0	0	0	0	0	12	0.0100	0	0.0108	0.00289	0.0100	0	0.0108	NO	Step 3
Hexachlorobutadiene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Iron	Dissolved	µg/L	39	39	0	110	31.5	21.3	9	9	0	50.0	25.6	15.1	37	37	0	100	21.3	24.8	0	110	31.5	YES	Step 2
Iron	Total	µg/L	42	42	0	3700	849	656	9	9	0	8400	3690	2520	49	49	0	3200	997	705	0	8400	3690	YES	Step 2
Isopropylbenzene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Kjeldahl Nitrogen	Total	mg/L as N	629	630	0.100	1.50	0.502	0.210	608	611	0.100	3.40	0.837	0.429	927	927	0	2.10	0.422	0.176	0.100	3.40	0.837	YES	Step 2
Lead	Dissolved	µg/L	13	14	5.00	10.0	5.71	1.82	1	1	0	10.0	10.0	0	12	12	0	12.0	5.58	2.02	5.00	12.0	10.0	YES	Step 2
Lead	Total	µg/L	17	18	5.00	10.0	6.39	2.30	1	1	0	10.0	10.0	0	16	16	0	270	27.7	67.6	5.00	270	27.7	YES	Step 2
m + p Xylene	Total	µg/L	0	0	0	0	0	0	0	1	0.500	0	0.500	0	0	0	0	0	0	0	0.500	0	0.500	NO	Step 3
Magnesium	Dissolved	µg/L	190	190	0	10000	6530	1560	517	517	0	40000	16100	7100	304	304	0	461000	136000	116000	0	461000	136000	YES	Step 2
Malathion	Total	µg/L	0	0	0	0	0	0	0	13	0.0100	0	0.0100	0	0	0	0	0	0	0	0.0100	0	0.0100	NO	Step 3
Manganese	Dissolved	µg/L	28	28	0	29.0	11.7	5.45	9	9	0	710	158	213	25	25	0	32.0	9.72	6.17	0	710	158	YES	Step 2
Manganese	Total	µg/L	42	42	0	80.0	27.7	13.1	9	9	0	950	297	290	48	48	0	100	31.0	18.3	0	950	297	YES	Step 2
MCPA	Total	µg/L	0	1	50.0	0	50.0	0	0	0	0	0	0	0	0	1	50.0	0	50.0	0	50.0	0	50.0	NO	Step 3
Mercury	Dissolved	µg/L	0	1	1.00	0	1.00	0	0	2	1.00	0	1.00	0	0	0	0	0	0	0	1.00	0	1.00	NO	Step 3
Mercury	Total	µg/L	14	15	1.00	1.00	0.773	0.392	5	5	0	0.200	0.120	0.0447	20	20	0	1.00	0.650	0.441	1.00	1.00	0.773	YES	Step 2
Methamidophos	Total	µg/L	0	1	1.00	0	1.00	0	0	0	0	0	0	0	0	1	1.00	0	1.00	0	1.00	0	1.00	NO	Step 3
Methoxychlor	Total	µg/L	1	13	0.0100	0.0900	0.0208	0.0236	0	0	0	0	0	0	0	12	0.0100	0	0.0175	0.0154	0.0100	0.0900	0.0208	YES	Step 2
Methyl tert-butyl ether (MTBE)	Total	µg/L	4	13	1.00	5.00	1.52	1.22	3	207	0.500	2.80	1.01	0.141	0	50	0.500	0	0.980	0.0990	0.500	5.00	1.52	YES	Step 2
Methylene chloride	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Molinate	Total	µg/L	0	1	0.500	0	0.500	0	0	0	0	0	0	0	0	1	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Monobromoacetic Acid (MBAA)	Total	µg/L	2	24	1.00	1.10	1.00	0.0204	9	53	1.00	2.80	1.21	0.461	13	26	1.00	6.50	2.43	1.84	1.00	6.50	2.43	YES	Step 2
Monochloroacetic Acid (MCAA)	Total	µg/L	0	24	1.00	0	1.00	0	0	53	1.00	0	1.11	0.375	0	25	1.00	0	1.04	0.200	1.00	0	1.11	NO	Step 3
m-Xylene	Total	µg/L	0	6	0.500	0	0.500	0	0	32	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Naphthalene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
n-Butylbenzene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Nickel	Dissolved	µg/L	0	0	0	0	0	0	1	39	5.00	10.0	5.13	0.801	0	0	0	0	0	0	5.00	10.0	5.13	YES	Step 2
Nitrate	Dissolved	mg/L as N	365	366	0.0226	2.80	0.188	0.271	392	392	0	9.79	1.49	0.797	165	165	0	1.85	0.419	0.206	0.0226	9.79	1.49	YES	Step 2
Nitrite	Dissolved	mg/L as N	629	637	0.0100	0.790	0.144	0.0871	626	628	0.0100	4.60	1.33	0.697	944	946	0.0100	1.60	0.333	0.153	0.0100	4.60	1.33	YES	Step 2
Nitrite + Nitrate	Dissolved	mg/L as N	629	637	0.0100	0.790	0.144	0.0871	608	610	0.0100	4.60	1.36	0.669	936	938	0.0100	1.60	0.336	0.150	0.0100	4.60	1.36	YES	Step 2
n-Propylbenzene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3

Constituent	Fraction	Units	SAC						SJR						BAY						Lowest Min RL	Highest Max Detect	Max of Averages	Detected at any locations?	Carried Forward?
			# Detects	# Measured	Non-Detect Min RL	Max Detect	Average	Stdev	# Detects	# Measured	Non-Detect Min RL	Max Detect	Average	Stdev	# Detects	# Measured	Non-Detect Min RL	Max Detect	Average	Stdev					
Organic Carbon	Dissolved	mg/L as C	753	755	0.100	7.90	2.02	0.737	568	568	0	11.4	3.49	1.30	268	268	0	11.0	2.55	1.05	0.100	11.4	3.49	YES	Step 2
Organic Carbon	Total	mg/L as C	562	564	0.100	11.0	2.33	1.13	452	452	0	14.9	4.39	1.77	152	152	0	6.60	2.68	1.04	0.100	14.9	4.39	YES	Step 2
Organic Nitrogen	Dissolved	mg/L as N	488	503	0.100	1.00	0.200	0.132	483	483	0	1.80	0.370	0.193	822	824	0.100	1.40	0.238	0.106	0.100	1.80	0.370	YES	Step 2
Organic Nitrogen	Total	mg/L as N	78	78	0	1.39	0.262	0.164	79	79	0	2.00	0.928	0.444	142	142	0	1.20	0.333	0.174	0	2.00	0.928	YES	Step 2
Oxygen	Dissolved	mg/L	955	955	0	834	9.73	26.6	479	479	0	22.3	8.93	2.35	937	937	0	11.3	8.26	2.07	0	834	9.73	YES	Step 2
o-Xylene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
p,p'-DDD	Total	µg/L	0	12	0.0100	0	0.0108	0.00289	0	0	0	0	0	0	0	12	0.0100	0	0.0108	0.00289	0.0100	0	0.0108	NO	Step 3
p,p'-DDE	Total	µg/L	0	12	0.0100	0	0.0108	0.00289	0	0	0	0	0	0	0	12	0.0100	0	0.0108	0.00289	0.0100	0	0.0108	NO	Step 3
p,p'-DDT	Total	µg/L	0	12	0.0100	0	0.0108	0.00289	0	0	0	0	0	0	0	12	0.0100	0	0.0108	0.00289	0.0100	0	0.0108	NO	Step 3
Parathion (Ethyl)	Total	µg/L	0	2	0.100	0	0.300	0.283	0	14	0.0100	0	0.0450	0.131	0	0	0	0	0	0	0.0100	0	0.300	NO	Step 3
Parathion, Methyl	Total	µg/L	0	2	0.100	0	0.300	0.283	0	14	0.0100	0	0.0450	0.131	0	1	0.500	0	0.500	0	0.0100	0	0.500	NO	Step 3
PCB-1016	Total	µg/L	0	12	0.100	0	0.108	0.0289	0	0	0	0	0	0	0	12	0.100	0	0.108	0.0289	0.100	0	0.108	NO	Step 3
PCB-1221	Total	µg/L	0	12	0.100	0	0.108	0.0289	0	0	0	0	0	0	0	12	0.100	0	0.108	0.0289	0.100	0	0.108	NO	Step 3
PCB-1232	Total	µg/L	0	12	0.100	0	0.108	0.0289	0	0	0	0	0	0	0	12	0.100	0	0.108	0.0289	0.100	0	0.108	NO	Step 3
PCB-1242	Total	µg/L	0	12	0.100	0	0.108	0.0289	0	0	0	0	0	0	0	12	0.100	0	0.108	0.0289	0.100	0	0.108	NO	Step 3
PCB-1248	Total	µg/L	0	12	0.100	0	0.108	0.0289	0	0	0	0	0	0	0	12	0.100	0	0.108	0.0289	0.100	0	0.108	NO	Step 3
PCB-1254	Total	µg/L	0	12	0.100	0	0.108	0.0289	0	0	0	0	0	0	0	12	0.100	0	0.108	0.0289	0.100	0	0.108	NO	Step 3
PCB-1260	Total	µg/L	0	12	0.100	0	0.108	0.0289	0	0	0	0	0	0	0	12	0.100	0	0.108	0.0289	0.100	0	0.108	NO	Step 3
Pentachloronitrobenzene (PCNB)	Total	µg/L	0	12	0.0100	0	0.0108	0.00289	0	0	0	0	0	0	0	12	0.0100	0	0.0108	0.00289	0.0100	0	0.0108	NO	Step 3
pH	None	pH Units	809	809	0	8.50	7.29	0.427	795	795	0	10.7	7.61	0.559	830	830	0	8.60	7.76	0.348	0	369	7.76	YES	Step 2
Pheophytin a	Total	µg/L	607	610	0.0100	10.8	1.71	1.39	471	471	0	168	11.9	15.3	954	957	0	27.0	2.46	2.81	0.0100	168	11.9	YES	Step 2
Phosphorus	Dissolved	µg/L as P	523	523	0	6.52	0.0803	0.284	502	502	0	0.450	0.106	0.0553	738	738	0	0.210	0.0788	0.0296	0	6.52	0.106	YES	Step 2
Phosphorus	Total	µg/L as P	537	537	0	330	109	45.2	515	515	0	970	233	117	756	756	0	1400	142	77.7	0	1400	233	YES	Step 2
Potassium	Dissolved	µg/L	187	187	0	3900	1400	382	0	0	0	0	0	0	282	282	0	134000	37800	35100	0	134000	37800	YES	Step 2
Propanil	Total	µg/L	0	2	0.100	0	0.300	0.283	0	0	0	0	0	0	0	0	0	0	0	0	0.100	0	0.300	NO	Step 3
Propham	Total	µg/L	0	2	2.00	0	2.00	0	0	0	0	0	0	0	0	0	0	0	0	0	2.00	0	2.00	NO	Step 3
p-Xylene	Total	µg/L	0	6	0.500	0	0.500	0	0	32	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
sec-Butylbenzene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Secchi	Total	cm	501	501	0	300	75.1	37.7	95	95	0	76.0	26.0	20.7	972	972	0	208	48.8	24.8	0	300	75.1	YES	Step 2
Selenium	Dissolved	µg/L	2	75	1.00	1.00	1.00	0	163	217	1.00	7.00	2.00	1.36	0	15	1.00	0	1.00	0	1.00	7.00	2.00	YES	Step 2
Selenium	Total	µg/L as P	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	NO	Step 3
Silica (SiO2)	Dissolved	mg/L	515	515	0	23.6	17.1	2.06	485	485	0	28.0	15.1	3.09	858	858	0	23.3	11.3	3.50	0	28.0	17.1	YES	Step 2
Simazine	Total	µg/L	0	12	0.0200	0	0.0217	0.00577	0	0	0	0	0	0	0	12	0.0200	0	0.0217	0.00577	0.0200	0	0.0217	NO	Step 3
Sodium	Dissolved	µg/L	224	224	0	19000	10000	3130	0	0	0	0	0	0	313	313	0	3320000	1060000	917000	0	3320000	1060000	YES	Step 2
Total Dissolved Solids	Total Dissolved	mg/L	889	889	0	414	99.0	23.7	871	871	0	1150	379	183	943	943	0	25300	7620	6730	0	25300	7620	YES	Step 2
Total Suspended Solids	Total Suspended	mg/L	515	515	0	264	22.7	29.5	487	487	0	296	63.7	41.0	860	860	0	569	35.9	33.4	0	569	63.7	YES	Step 2

Constituent	Fraction	Units	SAC						SJR						BAY						Lowest Min RL	Highest Max Detect	Max of Averages	Detected at any locations?	Carried Forward?
			# Detects	# Measured	Non-Detect Min RL	Max Detect	Average	Stdev	# Detects	# Measured	Non-Detect Min RL	Max Detect	Average	Stdev	# Detects	# Measured	Non-Detect Min RL	Max Detect	Average	Stdev					
Volatile Suspended Solids	Volatile Suspended	mg/L	485	492	1.00	22.0	3.25	2.66	487	487	0	31.0	8.56	5.19	842	847	1.00	46.0	5.06	3.46	1.00	46.0	8.56	YES	Step 2
Styrene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Sulfate	Dissolved	µg/L	172	172	0	19000	8590	3260	517	517	0	251000	82400	42700	263	264	1000	874000	250000	230000	1000	874000	250000	YES	Step 2
tert-Butylbenzene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Tetrachloroethene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Thiobencarb	Total	µg/L	0	12	0.0200	0	0.102	0.186	0	1	0.500	0	0.500	0	0	11	0.0200	0	0.0655	0.144	0.0200	0	0.500	NO	Step 3
Toluene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Total Coliform	None	MPN	0	5	1.00	0	1.00	0	0	5	1.00	0	1.00	0	0	0	0	0	0	0	1.00	0	1.00	NO	Step 3
Toxaphene	Total	µg/L	0	12	0.200	0	0.217	0.0577	0	0	0	0	0	0	0	12	0.200	0	0.217	0.0577	0.200	0	0.217	NO	Step 3
trans-1,2-Dichloroethene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
trans-1,3-Dichloropropene	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Trichloroacetic Acid (TCAA)	Total	µg/L	24	24	0	88.0	28.3	21.3	53	53	0	190	58.1	42.2	21	26	1.00	160	22.9	33.9	1.00	190	58.1	YES	Step 2
Trichloroethene	Total	µg/L	0	4	0.500	0	0.500	0	0	32	0.500	0	0.500	0	0	5	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Trichlorofluoromethane	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Turbidity	None	NTU	1239	1239	0	194	15.9	19.1	1105	1105	0	196	22.8	15.5	1229	1229	0	360	21.4	18.7	0	360	22.8	YES	Step 2
Unknown hydrocarbon	Total	µg/L	4	4	0	0.0300	0.0200	0.00816	2	2	0	0.110	0.0800	0.0424	1	1	0	0.220	0.220	0	0	0.220	0.220	YES	Step 2
UV Absorbance @254nm	None	absorbance/cm	230	230	0	0.219	0.0591	0.0295	0	0	0	0	0	0	258	258	0	0.295	0.0842	0.0391	0	0.295	0.0842	YES	Step 2
Vinyl chloride	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
Water Temperature	None	°C	973	973	0	34.6	16.3	5.14	486	486	0	28.0	17.8	5.44	979	979	0	24.0	16.8	4.36	0	34.6	17.8	YES	Step 2
Yttrium	Dissolved	µg/L	0	0	0	0	0	0	0	0	0	0	0	0	0	5	100	0	860	767	100	0	860	NO	Step 3
Zinc	Dissolved	µg/L	23	23	0	12.0	8.78	2.26	34	43	5.00	120	15.7	20.0	26	26	0	163	15.2	30.4	5.00	163	15.7	YES	Step 2
Zinc	Total	µg/L	35	35	0	30.0	11.7	5.73	9	9	0	60.0	25.6	18.1	40	40	0	590	30.2	91.7	0	590	30.2	YES	Step 2
Totals																									
PCBs (Polychlorinated biphenyls)	Total	µg/L	0	12	0.100	0	0.108	0.0289	0	0	0	0	0	0	0	12	0.100	0	0.108	0.0289	0.100	0	0.108	NO	Step 3
Haloacetic acids	Total	µg/L	24	24	1.00	144	57.5	32.5	53	53	1.00	330	113	63.7	26	26	1.00	141	61.4	26.7	1.00	330	113	YES	Step 2
Total Trihalomethanes	Total	µg/L	253	256	0.500	1110	236	129	205	206	0.500	1470	462	176	188	188	0.500	1640	518	212	0.500	1640	518	YES	Step 2
Xylenes	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3
PAHs	Total	µg/L	0	6	0.500	0	0.500	0	0	33	0.500	0	0.500	0	0	8	0.500	0	0.500	0	0.500	0	0.500	NO	Step 3

Table SA-7. Step 2: All Constituents (Totaling 65) that were Detected at Least Once at a Source Water Monitoring Location

Detected Constituents	Fraction	Units	Criteria	Maximum Detect	Exceeds Water Quality Objective or Criteria	2010 303(d) listed	Concern Based on Professional Judgment	Concern Based on Public Scoping	Carried Forward?	Altered Water Quality (e.g., degradation) Possible
Alkalinity	Total	mg/L as CaCO3	None	105					NO	
Ammonia	Dissolved	mg/L as N	25	1.40			X	X	Step 5	NO
Ammonia	Total	mg/L as N	25	0.770			X	X	Step 5	NO
Arsenic	Dissolved	µg/L	10	20.0	X		X		Step 5	YES
Arsenic	Total	µg/L	10	20.0	X		X		Step 5	YES
Asbestos, Chrysotile	None	MFL	7	3,490	X				Step 5	
Atra Simazine (Atrazine & Simazine together)	Total	µg/L	None	0.150					NO	
BHC	Total	µg/L	None	0.0200		X			Step 5	
Biochemical Oxygen Demand (BOD)	Total	mg/L	None	2.80					NO	
Boron	Dissolved	µg/L	800	1,900	X	X	X	X	Step 5	YES
Bromide	Dissolved	µg/L	None	22,600			X	X	Step 5	
Bromochloroacetic Acid (BCAA)	Total	µg/L	None	49.0					NO	
Bromodichloromethane	Total	µg/L	0.56	370	X				Step 5	
Bromoform	Total	µg/L	4.3	1,400	X				Step 5	
Cadmium	Dissolved	µg/L	1.1	10.0	X		X	X	Step 5	
Cadmium	Total	µg/L	1.1	20.0	X		X	X	Step 5	
Calcium	Dissolved	µg/L	None	249,000					NO	
Captafol	Total	µg/L	None	0.0200					NO	
Chloride	Dissolved	µg/L	250,000	12,600,000	X	X	X		Step 5	
Chloride	Total	µg/L	250,000	14,700,000	X	X	X		Step 5	
Chloroform	Total	µg/L	None	1,400					NO	
Chlorophyll a	Total	µg/L	None	499					NO	

Detected Constituents	Fraction	Units	Criteria	Maximum Detect	Exceeds Water Quality Objective or Criteria	2010 303(d) listed	Concern Based on Professional Judgment	Concern Based on Public Scoping	Carried Forward?	Altered Water Quality (e.g., degradation) Possible
Chromium	Dissolved	µg/L	50	10.0					NO	YES
Chromium	Total	µg/L	50	30.0					NO	YES
Color	Total	Color Units	15	406	X				Step 5	
Conductance (EC)	None	µS/cm	900	18,500	X	X	X		Step 5	
Copper	Dissolved	µg/L	3.1	149	X	X	X		Step 5	
Copper	Total	µg/L	3.1	478	X	X	X		Step 5	
Dacthal (DCPA)	Total	µg/L	None	0.480					NO	
Dibromoacetic Acid (DBAA)	Total	µg/L	60	110	X				Step 5	YES
Dibromochloromethane	Total	µg/L	0.401	590	X				Step 5	
Dichloroacetic Acid (DCAA)	Total	µg/L	60	140	X				Step 5	YES
Escherichia coli	Total	MPN/ 100ml	None	3,440		X	X		Step 5	
Fluorescence	Total	Fluoresence Uni	None	56.7					NO	
Hardness	Dissolved	mg/L as CaCO3	None	1,710					NO	
Hardness	Total	mg/L as CaCO3	None	2,520					NO	
Iron	Dissolved	µg/L	300	110					NO	YES
Iron	Total	µg/L	300	8,400	X				Step 5	YES
Kjeldahl Nitrogen	Total	mg/L as N	None	3.40					NO	
Lead	Dissolved	µg/L	2.5	12.0	X		X		Step 5	
Lead	Total	µg/L	2.5	270	X		X		Step 5	
Magnesium	Dissolved	µg/L	None	461,000					NO	
Manganese	Dissolved	µg/L	50	710	X				Step 5	
Manganese	Total	µg/L	50	950	X				Step 5	

Detected Constituents	Fraction	Units	Criteria	Maximum Detect	Exceeds Water Quality Objective or Criteria	2010 303(d) listed	Concern Based on Professional Judgment	Concern Based on Public Scoping	Carried Forward?	Altered Water Quality (e.g., degradation) Possible
Mercury	Total	µg/L	0.025	1.00	X	X	X		Step 5	
Methoxychlor	Total	µg/L	30	0.0900					NO	NO
Methyl tert-butyl ether (MTBE)	Total	µg/L	5	5.00					NO	YES
Monobromoacetic Acid (MBAA)	Total	µg/L	60	6.50					NO	NO
Nickel	Dissolved	µg/L	8.2	10.0	X	X	X	X	Step 5	YES
Nitrate	Dissolved	mg/L as N	10	9.79			X	X	Step 5	YES
Nitrite	Dissolved	mg/L as N	1	4.60	X				Step 5	
Nitrite + Nitrate	Dissolved	mg/L as N	10	4.60			X	X	Step 5	YES
Organic Carbon	Dissolved	mg/L as C	2	11.4	X		X	X	Step 5	
Organic Carbon	Total	mg/L as C	2	14.9	X		X	X	Step 5	
Organic Nitrogen	Dissolved	mg/L as N	None	1.80					NO	
Organic Nitrogen	Total	mg/L as N	None	2.00					NO	
Oxygen	Dissolved	mg/L	7	834	X	X		X	Step 5	
pH	None	pH Units	6.5	10.7	X				Step 5	
Pheophytin a	Total	µg/L	None	168					NO	
Phosphorus	Dissolved	µg/L as P	None	6.52			X	X	Step 5	
Phosphorus	Total	µg/L as P	None	1400			X	X	Step 5	
Potassium	Dissolved	µg/L	None	134,000					NO	
Secchi	Total	cm	None	300					NO	
Selenium	Dissolved	µg/L	4	7.00	X	X	X	X	Step 5	YES
Silica (SiO2)	Dissolved	mg/L	None	28.0					NO	
Sodium	Dissolved	µg/L	None	3,320,000					NO	
Total Dissolved Solids	Total Dissolved	mg/L	500	25,300	X	X	X		Step 5	

Detected Constituents	Fraction	Units	Criteria	Maximum Detect	Exceeds Water Quality Objective or Criteria	2010 303(d) listed	Concern Based on Professional Judgment	Concern Based on Public Scoping	Carried Forward?	Altered Water Quality (e.g., degradation) Possible
Total Suspended Solids	Total Suspended	mg/L	None	569			X		Step 5	
Volatile Suspended Solids	Volatile Suspended	mg/L	None	46.0			X		Step 5	
Sulfate	Dissolved	µg/L	250,000	874,000	X				Step 5	
Trichloroacetic Acid (TCAA)	Total	µg/L	60	190	X				Step 5	YES
Turbidity	None	NTU	5	360	X		X	X	Step 5	
Unknown hydrocarbon	Total	µg/L	None	0.220					NO	
UV Absorbance @254nm	None	absorbance/ cm	None	0.295					NO	
Water Temperature	None	°C	None	34.6			X	X	Step 5	
Zinc	Dissolved	µg/L	81	163	X	X	X		Step 5	YES
Zinc	Total	µg/L	81	590	X	X	X		Step 5	YES
Haloacetic acids	Total	µg/L	60	330	X		X		Step 5	
Total Trihalomethanes	Total	µg/L	80	1,640	X		X		Step 5	

1

1 **Table SA-8. Step 3: Constituents Analyzed but Never Detected (Totaling 119) at a Source Water Monitoring Location**

Non-Detected Constituents	Fraction	Units	Criteria	Minimum RL	All RL's are Above Criteria?	2010 303(d) listed	Concern Based on Professional Judgment	Concern Based on Public Scoping	Carried Forward for Detailed Assessment
1,1,1,2-Tetrachloroethane	Total	µg/L	None	0.5					NO
1,1,1-Trichloroethane	Total	µg/L	200	0.5					NO
1,1,2,2-Tetrachloroethane	Total	µg/L	0.17	0.5	X				Step 4
1,1,2-Trichloroethane	Total	µg/L	0.6	0.5					NO
1,1-Dichloroethane	Total	µg/L	5	0.5					NO
1,1-Dichloroethene	Total	µg/L	0.057	0.5	X				Step 4
1,1-Dichloropropene	Total	µg/L	None	0.5					NO
1,2,3-Trichlorobenzene	Total	µg/L	None	0.5					NO
1,2,3-Trichloropropane	Total	µg/L	None	0.5					NO
1,2,4-Trichlorobenzene	Total	µg/L	5	0.5					NO
1,2,4-Trimethylbenzene	Total	µg/L	None	0.5					NO
1,2-Dibromo-3-chloropropane (DBCP)	Total	µg/L	0.2	0.5	X				Step 4
1,2-Dibromoethane (EDB)	Total	µg/L	0.05	0.5	X				Step 4
1,2-Dichlorobenzene	Total	µg/L	600	0.5					NO
1,2-Dichloroethane	Total	µg/L	0.38	0.5	X				Step 4
1,2-Dichloropropane	Total	µg/L	0.52	0.5					NO
1,3,5-Trimethylbenzene	Total	µg/L	None	0.5					NO
1,3-Dichlorobenzene	Total	µg/L	400	0.5					NO
1,3-Dichloropropane	Total	µg/L	None	0.5					NO
1,4-Dichlorobenzene	Total	µg/L	5	0.5					NO
2,2-Dichloropropane	Total	µg/L	None	0.5					NO
2,4-D	Total	µg/L	70	0.25					NO
2-Chlorotoluene	Total	µg/L	None	0.5					NO

Non-Detected Constituents	Fraction	Units	Criteria	Minimum RL	All RL's are Above Criteria?	2010 303(d) listed	Concern Based on Professional Judgment	Concern Based on Public Scoping	Carried Forward for Detailed Assessment
4-Chlorotoluene	Total	µg/L	None	0.5					NO
4-Isopropyltoluene	Total	µg/L	None	0.5					NO
Alachlor	Total	µg/L	2	0.05					NO
Aldrin	Total	µg/L	0.00013	0.01	X	X	X		Step 6
Atrazine	Total	µg/L	1	0.02					NO
Barium	Dissolved	µg/L	100	1000	X				Step 4
Benzene	Total	µg/L	1	0.5					NO
BHC-alpha	Total	µg/L	0.0039	0.01	X	X	X		Step 6
BHC-beta	Total	µg/L	0.014	0.01		X	X		Step 6
BHC-delta	Total	µg/L	None	0.01		X	X		Step 6
BHC-gamma (Lindane)	Total	µg/L	0.019	0.01		X	X		Step 6
Bromacil	Total	µg/L	None	1					NO
Bromobenzene	Total	µg/L	None	0.5					NO
Bromochloromethane	Total	µg/L	None	0.5					NO
Bromomethane	Total	µg/L	48	0.5					NO
Captan	Total	µg/L	None	0.02					NO
Carbaryl	Total	µg/L	None	2					NO
Carbofuran	Total	µg/L	18	0.5					NO
Carbon tetrachloride	Total	µg/L	0.25	0.5	X				Step 4
Chlordane	Total	µg/L	0.00057	0.05	X	X	X		Step 6
Chlorobenzene	Total	µg/L	70	0.5					NO
Chloroethane	Total	µg/L	None	0.5					NO
Chloromethane	Total	µg/L	None	0.5					NO
Chlorothalonil	Total	µg/L	None	0.01					NO

Non-Detected Constituents	Fraction	Units	Criteria	Minimum RL	All RL's are Above Criteria?	2010 303(d) listed	Concern Based on Professional Judgment	Concern Based on Public Scoping	Carried Forward for Detailed Assessment
Chlorpropham	Total	µg/L	None	0.02					NO
Chlorpyrifos	Total	µg/L	0.015	0.01		X	X		Step 6
cis-1,2-Dichloroethene	Total	µg/L	6	0.5					NO
cis-1,3-Dichloropropene	Total	µg/L	None	0.5					NO
Clostridium perfringens	Total	CFU/100ml	None	0					NO
Cryptosporidium	None	Cysts/100L	None	10		X			Step 6
Diazinon	Total	µg/L	0.1	0.01		X	X		Step 6
Dibromomethane	Total	µg/L	None	0.5					NO
Dichloran	Total	µg/L	None	0.01					NO
Dichlorodifluoromethane	Total	µg/L	None	0.5					NO
Dicofol	Total	µg/L	None	0.01					NO
Dieldrin	Total	µg/L	0.00014	0.01	X	X	X		Step 6
Diuron	Total	µg/L	None	0.05					NO
Endosulfan (mixed isomers)	Total	µg/L	None	0.01		X	X		Step 6
Endosulfan-I	Total	µg/L	0.0087	0.01	X	X	X		Step 6
Endosulfan-II	Total	µg/L	0.0087	0.01	X	X	X		Step 6
Endrin	Total	µg/L	0.0023	0.01	X	X	X		Step 6
Endrin aldehyde	Total	µg/L	0.76	0.01					NO
Ethyl benzene	Total	µg/L	300	0.5					NO
Fecal Coliform	Total	MPN	None	1					NO
Giardia lamblia	Total	Cysts/100L	None	10					NO
Heptachlor	Total	µg/L	0.00021	0.01	X	X			Step 6
Hexachlorobutadiene	Total	µg/L	0.44	0.5	X				Step 4
Isopropylbenzene	Total	µg/L	None	0.5					NO

Non-Detected Constituents	Fraction	Units	Criteria	Minimum RL	All RL's are Above Criteria?	2010 303(d) listed	Concern Based on Professional Judgment	Concern Based on Public Scoping	Carried Forward for Detailed Assessment
m + p Xylene	Total	µg/L	1750	0.5					NO
Malathion	Total	µg/L	None	0.01					NO
MCPA	Total	µg/L	None	50					NO
Mercury	Dissolved	µg/L	0.025	1	X	X	X		Step 6
Methamidophos	Total	µg/L	None	1					NO
Methylene chloride	Total	µg/L	4.7	0.5					NO
Molinate	Total	µg/L	20	0.5					NO
Monochloroacetic Acid (MCAA)	Total	µg/L	60	1					NO
m-Xylene	Total	µg/L	1750	0.5					NO
Naphthalene	Total	µg/L	None	0.5					NO
n-Butylbenzene	Total	µg/L	None	0.5					NO
n-Propylbenzene	Total	µg/L	None	0.5					NO
o-Xylene	Total	µg/L	1750	0.5					NO
p,p'-DDD	Total	µg/L	0.00083	0.01	X		X		Step 6
p,p'-DDE	Total	µg/L	0.00059	0.01	X		X		Step 6
p,p'-DDT	Total	µg/L	0.00059	0.01	X	X	X		Step 6
Parathion (Ethyl)	Total	µg/L	None	0.01					NO
Parathion, Methyl	Total	µg/L	None	0.01					NO
PCB-1016	Total	µg/L	0.00017	0.1	X	X			Step 6
PCB-1221	Total	µg/L	0.00017	0.1	X	X			Step 6
PCB-1232	Total	µg/L	0.00017	0.1	X	X			Step 6
PCB-1242	Total	µg/L	0.00017	0.1	X	X			Step 6
PCB-1248	Total	µg/L	0.00017	0.1	X	X			Step 6
PCB-1254	Total	µg/L	0.00017	0.1	X	X			Step 6

Non-Detected Constituents	Fraction	Units	Criteria	Minimum RL	All RL's are Above Criteria?	2010 303(d) listed	Concern Based on Professional Judgment	Concern Based on Public Scoping	Carried Forward for Detailed Assessment
PCB-1260	Total	µg/L	0.00017	0.1	X	X			Step 6
Pentachloronitrobenzene (PCNB)	Total	µg/L	None	0.01					NO
Propanil	Total	µg/L	None	0.1					NO
Propham	Total	µg/L	None	2					NO
p-Xylene	Total	µg/L	1750	0.5					NO
sec-Butylbenzene	Total	µg/L	None	0.5					NO
Selenium	Total	µg/L as P	4	1		X	X	X	Step 6
Simazine	Total	µg/L	4	0.02					NO
Styrene	Total	µg/L	100	0.5					NO
tert-Butylbenzene	Total	µg/L	None	0.5					NO
Tetrachloroethene	Total	µg/L	0.8	0.5					NO
Thiobencarb	Total	µg/L	1	0.02					NO
Toluene	Total	µg/L	150	0.5					NO
Total Coliform	None	MPN	None	1					NO
Toxaphene	Total	µg/L	0.0002	0.2	X	X			Step 6
trans-1,2-Dichloroethene	Total	µg/L	10	0.5					NO
trans-1,3-Dichloropropene	Total	µg/L	None	0.5					NO
Trichloroethene	Total	µg/L	2.7	0.5					NO
Trichlorofluoromethane	Total	µg/L	150	0.5					NO
Vinyl chloride	Total	µg/L	0.5	0.5					NO
Yttrium	Dissolved	µg/L	None	100					NO
PCBs (Polychlorinated biphenyls)	Total	µg/L	0.00017	0.1	X	X	X		Step 6
Xylenes	Total	µg/L	1750	0.5					NO
PAHs	Total	µg/L	None	0.5			X		Step 6

Table SA-9. Step 4: Constituents analyzed but not detected which have reporting limits above minimum applicable criteria and constituents never analyzed but still considered for detailed assessment (totaling 13).

Non-Detect Constituents and Constituents not in database considered for assessment	Fraction	Knowledge about potential, relative source contributions?	2010 303(d) listed	Concern Based on Professional Judgment	Concern Based on Public Scoping	Carried Forward for Detailed Assessment
1,1,2,2-Tetrachloroethane	Total					NO
1,1-Dichloroethene	Total					NO
1,2-Dibromo-3-chloropropane (DBCP)	Total					NO
1,2-Dibromoethane (EDB)	Total					NO
1,2-Dichloroethane	Total					NO
Barium	Dissolved					NO
Carbon tetrachloride	Total					NO
Hexachlorobutadiene	Total					NO
Other Constituents						
Endocrine Disruptors and CECs	Total	X		X		Step 6
Pyrethroids	Total	X		X		Step 6
Aluminum	Total	X		X		Step 6
Silver	Total	X		X		Step 6
Dioxins/Furans	Total	X		X		Step 6

Table SA-10. Step 5: Determination of whether constituents detected at least once at a source water monitoring location (totaling 39) will be assessed quantitatively.

Detected Constituents of Concern	Measured at all locations	# Measured Exceeds Threshold at Each Location [1]	# Detects Exceeds Threshold at Each Location [2]	Adequate Delta Modeling Tools	Modeling Needed for Impact Assessment	Type of Assessment
Ammonia	X	X	X			Qualitative
Arsenic	X	X	X	X		Qualitative
Asbestos, Chrysotile	X					Qualitative
BHC	X					Qualitative
Boron	X	X	X	X	X	Quantitative
Bromide	X	X	X	X	X	Quantitative
Bromodichloromethane	X	X	X			Qualitative
Bromoform	X	X				Qualitative
Cadmium	X			X		Qualitative
Chloride	X	X	X	X	X	Quantitative
Color	X	X	X			Qualitative
Conductance (EC)	X	X	X	X	X	Quantitative
Copper	X	X	X	X		Qualitative
Dibromoacetic Acid (DBAA)	X	X				Qualitative
Dibromochloromethane	X	X				Qualitative
Dichloroacetic Acid (DCAA)	X	X	X			Qualitative
Escherichia coli	X	X				Qualitative
Lead	X			X		Qualitative
Manganese	X			X		Qualitative
Mercury	X			X	X	Qualitative
Nickel				X		Qualitative
Nitrate	X	X	X			Qualitative
Nitrite	X	X	X			Qualitative
Nitrite + Nitrate	X	X	X			Qualitative
Organic Carbon	X	X	X	X	X	Quantitative
Oxygen	X	X	X			Qualitative
pH	X	X	X			Qualitative
Phosphorus	X	X	X			Qualitative
Selenium	X	X	X [3]	X	X	Quantitative
Total Dissolved Solids	X	X	X	X	X	Quantitative
Total Suspended Solids	X	X	X			Qualitative
Volatile Suspended Solids	X	X	X			Qualitative
Sulfate	X	X	X	X		Qualitative
Trichloroacetic Acid (TCAA)	X	X	X			Qualitative
Turbidity	X	X	X			Qualitative
Water Temperature	X	X	X	X		Qualitative
Zinc	X	X	X	X		Qualitative
Haloacetic acids	X	X	X			Qualitative
Total Trihalomethanes	X	X	X			Qualitative

[1] Threshold was at least 10 measurements at each location.

[2] Threshold was at least 10 detects at a single location.

[3] Additional data not included in the original Screening Analysis database allowed for a quantitative assessment for selenium

Table SA-11. Step 6 Water quality constituents (totaling 72) for which detailed assessments were performed

Constituents Carried Forward for Further Analysis	Quantitative	Qualitative	Location of Assessment
Ammonia		X	Ammonia
Boron	X		Boron
Bromide	X		Bromide
Chloride	X		Chloride
Oxygen		X	Dissolved Oxygen
Conductance (EC)	X		Electrical Conductivity (EC)/TDS
Total Dissolved Solids	X		Electrical Conductivity (EC)/TDS
Mercury	X		Mercury
Nitrate	X	X	Nitrate
Nitrite		X	Nitrate
Nitrite + Nitrate		X	Nitrate
Bromodichloromethane		X	Organic Carbon (DOC/TOC)
Bromoform		X	Organic Carbon (DOC/TOC)
Dibromoacetic Acid (DBAA)		X	Organic Carbon (DOC/TOC)
Dibromochloromethane		X	Organic Carbon (DOC/TOC)
Dichloroacetic Acid (DCAA)		X	Organic Carbon (DOC/TOC)
Organic Carbon	X		Organic Carbon (DOC/TOC)
Trichloroacetic Acid (TCAA)		X	Organic Carbon (DOC/TOC)
Haloacetic acids		X	Organic Carbon (DOC/TOC)
Total Trihalomethanes		X	Organic Carbon (DOC/TOC)
Cryptosporidium		X	Pathogens
Escherichia coli		X	Pathogens
Aldrin		X	Pesticides and Herbicides
BHC		X	Pesticides and Herbicides
BHC-alpha		X	Pesticides and Herbicides
BHC-beta		X	Pesticides and Herbicides
BHC-delta		X	Pesticides and Herbicides
BHC-gamma (Lindane)		X	Pesticides and Herbicides
Chlordane		X	Pesticides and Herbicides
Chlorpyrifos		X	Pesticides and Herbicides
Diazinon		X	Pesticides and Herbicides
Dieldrin		X	Pesticides and Herbicides
Endosulfan (mixed isomers)		X	Pesticides and Herbicides
Endosulfan-I		X	Pesticides and Herbicides
Endosulfan-II		X	Pesticides and Herbicides
Endrin		X	Pesticides and Herbicides
Heptachlor		X	Pesticides and Herbicides

Constituents Carried Forward for Further Analysis	Quantitative	Qualitative	Location of Assessment
p,p'-DDD		X	Pesticides and Herbicides
p,p'-DDE		X	Pesticides and Herbicides
p,p'-DDT		X	Pesticides and Herbicides
Toxaphene		X	Pesticides and Herbicides
Pyrethroids		X	Pesticides and Herbicides
Phosphorus		X	Phosphorus
Selenium	X		Selenium
Arsenic		X	Trace Metals
Cadmium		X	Trace Metals
Copper		X	Trace Metals
Lead		X	Trace Metals
Manganese		X	Trace Metals
Nickel		X	Trace Metals
Zinc		X	Trace Metals
Aluminum		X	Trace Metals
Silver		X	Trace Metals
Total Suspended Solids		X	Turbidity and TSS
Volatile Suspended Solids		X	Turbidity and TSS
Turbidity		X	Turbidity and TSS
Water Temperature		X	Fisheries and Aquatic Resources
Asbestos, Chrysotile		X	Screening Analysis
Color		X	Screening Analysis
Dioxins/Furans		X	Screening Analysis
Endocrine Disruptors and CECs		X	Screening Analysis
PAHs		X	Screening Analysis
PCB-1016		X	Screening Analysis
PCB-1221		X	Screening Analysis
PCB-1232		X	Screening Analysis
PCB-1242		X	Screening Analysis
PCB-1248		X	Screening Analysis
PCB-1254		X	Screening Analysis
PCB-1260		X	Screening Analysis
PCBs (Polychlorinated biphenyls)		X	Screening Analysis
pH		X	Screening Analysis
Sulfate		X	Screening Analysis

8C.2 References

Bales, R. C., D. D. Newkirk and S. B. Hayward. Chrysotile Asbestos in California Surface Waters: from Upstream Rivers through Water Treatment. Journal of American Water Works Association, 76: 66-74,1984.

BDAT (Bay Delta and Tributaries Project). 2009. Bay Delta and Tributaries Project. Site accessed March 2, 2009. URL = http://bdat.ca.gov/index.html.

CVRWQCB (Central Valley Regional Water Quality Control Board). 2002b. Amendment to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for Bacteria, Staff Report and Functional Equivalent Document, Final Report. Prepared by the Regional Water Quality Control Board, Central Valley Region. September.

deVlaming, V. 2008. Organochlorine Pesticides and Polychlorinated Biphenyls (PCB) Concentrations in Muscle Tissue of Fish Collected from the San Joaquin River and Sacramento River Watersheds and Delta During 2005. March. Davis, CA. Prepared for Central Valley Regional Water Quality Control Board, Rancho Cordova, CA.

DWR (California Department of Water Resources). 2009. Water Data Library. Site accessed March 3, 2009. URL = www.wdl.water.ca.gov.

Hayward, D., M. Petreas, J. Visita, M. McKinney, and R. Stephens. 1996. Investigation of a Wood Treatment Facility: Impact on an Aquatic Ecosystem in the San Joaquin River, Stockton, California. *Environmental Contamination and Toxicology*. Volume 30(1996): 30–39.

Hem, J. 1985. Study and Interpretation of the Chemical Characteristics of Natural Water. Third Edition. United State Geological Survey Water-Supply Paper 2254. Reprinted in 1986 and 1989.

Lavado, R., J. E. Loyo-Rosales, E. Floyd, E. P. Kolodziej, S. A. Snyder, D. L. Sedlak, and D. Schlenk. 2009. Site-Specific Profiles of Estrogenic Activity in Agricultural Areas of California's Inland Waters. Environmental Science and Technology 43(24):9110–9116.

Leatherbarrow, J. E., L. J. McKee, D. H. Schoellhamer, N. K. Ganju, and A. R. Flegal. 2005. Concentrations and loads of organic contaminants and mercury associated with suspended sediment discharged to San Francisco Bay from the Sacramento-San Joaquin River Delta, California RMP Technical Report. SFEI Contribution 405. San Francisco Estuary Institute. Oakland, CA.

OEHHA. 2009. 2009 update of California sport fish advisories. March 2009.

SFBRWQCB. 2008. Order No. R2-2008-0012. Amending the Water Quality Control Plan for the San Francisco Bay Region to Establish a Total Maximum Daily Load and Implementation Plan for PCBs in the San Francisco Bay.

SFEI (San Francisco Estuary Institute). 2010. San Francisco Estuary Institute. Site accessed April 13, 2010. URL = http://www.sfei.org/RMP/report.

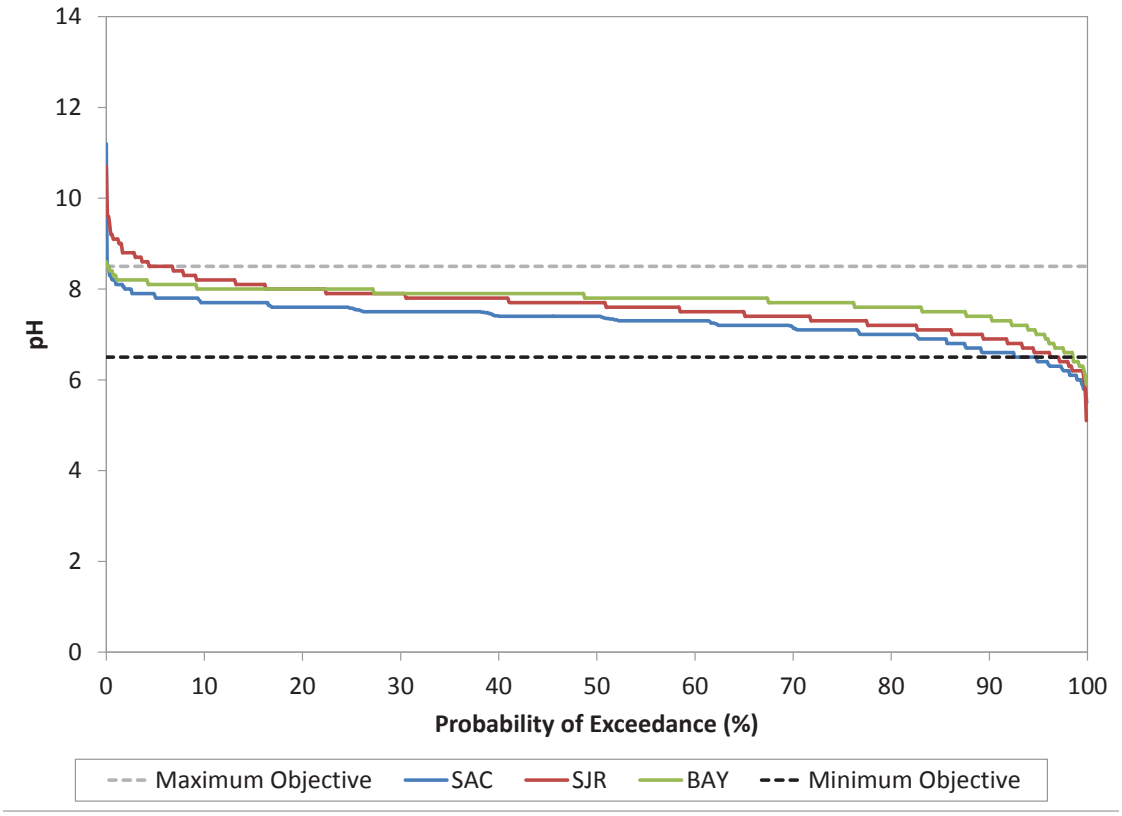
USEPA. 2012a. Basic Information about Asbestos in Drinking Water. Site accessed February 8, 2012. URL = http://water.epa.gov/drink/contaminants/basicinformation/asbestos.cfm.

USEPA. 2012b. Secondary Drinking Water Regulations: Guidance for Nuisance Chemicals. Site accessed February 8, 2012. URL = http://water.epa.gov/drink/contaminants/secondarystandards.cfm

USEPA. 2012b. Dioxins in San Francisco Bay: Questions and Answers. Site accessed February 8, 2012. EPA 2012c http://www.epa.gov/region9/water/dioxin/sfbay.html

USEPA. 2012d. Region 9 Superfund; McCormick and Baxter Creosoting Co. Site accessed February 8, 2012. URL = http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/vwsoalphabetic/McCormick+&+Baxter+Creosoting+Co.

World Health Organization. 2002. Global Assessment of the State-of-the-Sciences of Endocrine Disruptors. International Programme on Chemical Safety.



Source: Figure 3.1, p. 3-4 (DWR 11-30-2010).

App_8C-1_Prob_Exceedance (September 25, 2013 3:28 PM) SS

Figure 8C-1
Probability of Exceedance for pH for Sacramento River at Freeport/Greene's Landing, San Joaquin River at Vernalis, and San Francisco Bay at Martinez for 1975–2009