Scoping Ecological and Off-Site Human Health Risk Assessment

Sierra Pacific Industries

Arcata Division Sawmill

Arcata, California

Prepared for:

Sierra Pacific Industries

September 8, 2004
(Revised September 1, 2006)
(Revised July 23, 2007)

Project No. 9329 Task 20

Geomatrix

Geomatrix

September 24, 2007
Project 9329

Executive Officer
California Regional Water Quality Control Board
North Coast Region
5550 Skylane Boulevard, Suite A
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Attention: Kasey Ashley

Subject: Revised Pages for the Scoping Ecological and Off-Site Human Health Risk Assessment
Sierra Pacific Industries
Arcata Division Sawmill
2593 New Navy Base Road
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Dear Ms. Ashley:

As we discussed on June 8, 2007, Geomatrix Consultants, Inc. (Geomatrix) has discovered two calculation errors that result in small changes to the calculated values of 2,3,7,8-tetrachloro-dibenzo-p-dioxin toxicity equivalents (2,3,7,8-TCDD TEQs) in the *Scoping Ecological and Off-Site Human Health Risk Assessment*[1] (Scoping Risk Assessment), dated September 8, 2004. We are providing updated replacement pages for the document and a revised PDF. The PDF incorporates previous changes dated September 1, 2006 as well as the current changes dated July 23, 2007.

The specific changes to the 2,3,7,8-TCDD TEQ calculations addressed by the attached replacement pages are as follows:

- For approximately 50 percent of the 122 shallow and deep sediment samples (primarily those from Humboldt Bay), the 2,3,7,8-TCDD TEQs presented in Appendix A of the Scoping Risk Assessment are inconsistent with and higher than values calculated in Appendix D. The values in Appendix D are correct, however the values in Appendix A were the values used in the subsequent ecological risk calculations. The magnitude of difference was less than 0.4 nanograms per kilogram (ng/kg) with five exceptions, for which the decrease ranged from 0.6 to 4.7 ng/kg. Because the data was considered in aggregate to calculate representative concentrations used in the risk evaluation, the change to the predicted hazard indexes for various species was not significant and did not change the overall conclusions of the report.

[1] Geomatrix Consultants, Inc., 2004, Scoping Ecological and Off-Site Human Health Risk Assessment September 8.

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Based on the revised data, statistical calculations of representative 2,3,7,8-TCDD TEQ concentrations (95 percent upper confidence limits) in sediment were revised using an updated version of the ProUCL software. In some cases, an alternative distribution for the data was identified by the updated software resulting in a different estimate of the 95 percent upper confidence limit. The table below presents the old and new values based on mammal toxicity equivalency factors (TEFs):

Sediment	Mean (ng/kg)	95 percent upper confidence limit (ng/kg)[2]	Maximum (ng/kg)
Humboldt Bay less than 1 foot below surface	3.5/3.29[1]	4.4/4.10	15.6/13.1
Humboldt Bay greater than 1 foot below surface	8.0/5.68	14/8.85	14.3/10.6
Mill Area less than 1 foot below surface	13/13.0	17/18.8	120/120
Mill Area greater than 1 foot below surface	37/37	50/62	117/117

Notes:
1. Value published in 2004/Revised value
2. 95 percent upper confidence limits (95% UCL) calculated using an updated version of ProUCL software published by U.S. EPA after 2004.

- All sediment and fish tissue TEQs calculated using the fish TEFs were revised based on a change to the toxicity equivalency factor for one furan congener. The TEF for 2,3,4,7,8-pentachlorodibenzofuran was incorrect. (0.05, rather than 0.5 [Appendix D]) resulting in an underestimate of the 2,3,7,8-TCDD TEQs. For sediment samples, 2,3,7,8-TCDD TEQs calculated using fish TEFs increased in general, but in some cases the increase was off-set by the revision to the sediment concentration (described above) resulting in a decrease in the final value. The changes in sediment concentrations ranged from a decrease of 3.28 ng/kg to an increase of 12.5 ng/kg with an average change of 1.1 ng/kg. For fish tissue samples, all 2,3,7,8-TCDD TEQs calculated using fish TEFs increased based on the revision of the TEF, ranging from 0.01 to 0.22 ng/kg. The average change for fish tissue samples was an increase of approximately 0.04 ng/kg. Only the ecological component of the risk assessment was affected because mammal TEFs are used for human receptors.

These revisions did not change the overall conclusions of the Scoping Risk Assessment. We have enclosed an entire copy of the text to reflect changes in pagination (content changes were made on pages 20, 53 to 57, 61, and 63 to 65); Tables 2-4, 3-14, 3-17, 3-18, and 4-1; Figures 2-5, 2-6, 3-21, and 3-23 to 3-27; and Appendixes A (Table A-5), D, E (Tables E-18 to E-38), and F (Tables F-8 to F-34). A revised compact disk with the ecological calculation tool (Appendix G) is also enclosed. Please keep these pages and compact disc with your copy of the document. We have also enclosed a revised PDF file of the Scoping Risk Assessment on a compact disc. Please replace previous versions of this report on your website with this PDF file.

Please contact the undersigned if you have any questions regarding this submittal.

Sincerely yours,
GEOMATRIX CONSULTANTS, INC.

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AM/EPC/RA/jd
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Enclosures

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Scoping Ecological and Off-Site Human Health Risk Assessment

Sierra Pacific Industries

Arcata Division Sawmill

Arcata, California

Prepared for:

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ACRONYMS AND ABBREVIATIONS

95% UCL	95 percent upper confidence limit
ADD	Average daily dose
BSAF	Biota-sediment accumulation factor
Cal-EPA	California Environmental Protection Agency
COPC	Chemical of potential concern
Cw	Concentration in water
DRO	Diesel-range organic
DTSC	Department of Toxic Substance Control
ED	Exposure duration
EF	Exposure frequency
EPC	Exposure point concentration
GRO	Gasoline-range organic
HI	Hazard index
HQ	Hazard quotient
IR	Ingestion rate
Kp	Partitioning coefficient
LADD	Lifetime average daily dose
LOAEL	Lowest-observable adverse effects level
MCL	Maximum contaminant level
mg/kg	Milligrams per kilogram
mg/kg-day	Milligram of chemical per kilogram body weight per day
mg/L	Milligrams per liter
NOAEL	No-observable adverse effects level
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PCP	Pentachlorophenol
RfC	Reference concentration
RfD	Reference dose
RME	Reasonable maximum exposure
RWQCB	Regional Water Quality Control Board
SF	Slope factor
SQG	Sediment Quality Guidelines
TCP	Tetrachlorophenol
TEF	Toxicity equivalency factor
TEQ	Toxicity equivalents
TRV	Toxicity Reference Value
µg/kg	micrograms per kilogram
UCL	Upper confidence limit
U.S. EPA	United States Environmental Protection Agency

SCOPING ECOLOGICAL AND
OFF-SITE HUMAN HEALTH
RISK ASSESSMENT
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

EXECUTIVE SUMMARY

Introduction

On behalf of Sierra Pacific Industries (SPI), Geomatrix Consultants, Inc. (Geomatrix), and MFG, Inc. (MFG), have prepared this scoping ecological and off-site human health risk assessment (the Scoping Risk Assessment) for the Arcata Division Sawmill (the sawmill) in Arcata, California. The Scoping Risk Assessment was prepared in response to two requirements. First, the California Regional Water Quality Control Board, North Coast Region (RWQCB) requested preparation and implementation of human health and ecological risk assessments in a letter dated June 4, 2002. Second, a consent decree with the Ecological Rights Foundation (May 22, 2003) required Sierra Pacific Industries to conduct human health and ecological risk assessments of the Mad River Slough adjacent to the sawmill.

The risk assessment process was initiated with preparation of the *Revised Work Plan for Performing a Human Health and Ecological Risk Assessment at the Sierra Pacific Industries, Arcata Division Sawmill, Arcata, California* (the Work Plan; ENVIRON, 2002), which described the risk assessment process in relatively general terms. The Work Plan was submitted in December 2002 to address the RWQCB request. Potential on-site human health risks identified in the Work Plan were evaluated in a separate report (Geomatrix, 2003a). This Scoping Risk Assessment was developed to implement the remaining components of the work plan: ecological and off-site human health risk.

The objective of this Scoping Risk Assessment is to assess ecological and human health risks to the extent possible using the available data collected by Sierra Pacific Industries, environmental groups, and the RWQCB. The results of the assessment will be used by SPI and RWQCB to identify risk management issues and additional data needs, if any. Although this risk assessment is referred to as a "scoping" document based on Department of Toxic Substances Control Ecological Risk Assessment Guidance (1996a and b), the document also includes quantitative evaluation of potential ecological and human health risks based on the available data.

Site Characterization

The Sierra Pacific Industries Arcata Division Sawmill is located at the northern end of Humboldt Bay, also referred to as Arcata Bay. Before it was developed as a lumber mill in approximately 1950, the landscape of the area consisted of sand dunes and mud flats. The sawmill began operations in approximately 1950. After initial construction, the sawmill property was expanded, including filling parts of Mad River Slough. Expansion continued into the 1960s, after which the property boundaries remained largely unchanged. The sawmill is currently operating. Wood surface protection operations using products containing chlorinated phenols, including pentachlorophenol (PCP) and tetrachlorophenol (TCP), began in the early to mid-1960s and were discontinued in 1987. These operations have resulted in accidental release of the wood treatment mixture, including PCP and dioxin/furan impurities, to soil and groundwater.

A conceptual site model was developed to identify sources, migration pathways, exposure pathways, and receptors for this assessment. Six potential sources of chemicals (including the former dip tank where wood surface protection chemicals were used) were identified based on previous site investigations and knowledge of site operations. Complete migration pathways for some of these sources may have resulted in chemical impact to sediments, surface water, and aquatic biota in Mad River Slough. Potentially complete exposure pathways for ecological receptors and human receptors were identified for evaluation.

Data from several sources were consolidated into a database for use in the risk assessment. Most of the data were from sampling summarized in the *Sampling and Analysis Work Plan, October 2002 Field Sampling in the Mad River Slough and Arcata Bay, California* (ENVIRON and EnviroNet, 2003). Data included surface and subsurface sediment samples, groundwater near drainage ditches, and biota tissue samples from fish, shellfish, and crustaceans. Sediment and tissue samples were analyzed for semi-volatile organic compounds (including PCP), pesticides, polychlorinated biphenyls, polycyclic aromatic hydrocarbons, dioxins/furans, metals, and petroleum-range organics. Sediments were also analyzed for sediment toxicity and bioaccumulation potential.

Based on evaluation of the data, site history, and chemical usage during normal sawmill operations, dioxins/furans and zinc were identified as the chemicals of potential concern

(COPCs) for the scoping risk assessment. Although PCP was not detected in any samples, laboratory reporting limits for PCP were not sufficiently low to allow for quantitative ecological or human health evaluation. Thus, PCP was not identified as a COPC, but is identified as a data gap in the conclusions and recommendations.

For the risk assessment, data were divided into three categories: Mad River Slough, Humboldt Bay, and Upland Mill Area. A mean concentration was used to represent average exposure, a 95% upper confidence limit on the average (95% UCL; calculated based on the statistical distribution of the data) was used to represent upperbound exposure, and the maximum concentration was used in screening-level analyses. Separate representative concentrations were developed for each type of biotic tissue, for each area category (e.g., Mad River Slough or Humboldt Bay), and for each horizon (surface or subsurface), as appropriate.

The data used in the risk assessment appear to represent a conservative (i.e., protective) estimate of exposure and risk for the site. The available data include sediment and aquatic biota samples from locations throughout the Mad River Slough and primarily the northern section of Humboldt Bay. Most samples in Mad River Slough were collected from locations adjacent to the sawmill, where effects of potential contaminants in storm water would be most likely. Therefore, the maximum concentrations potentially resulting from releases from the sawmill appear to be adequately represented in both sediment and biota. In addition, since most samples were collected near the sawmill, the mean and 95% UCL concentrations may overestimate the concentrations for the larger area of the Mad River Slough where exposures would occur. Sediment and biota samples from Humboldt Bay are from widely dispersed locations and probably reflect anthropogenically affected ambient conditions ("background") for Humboldt Bay. The ambient conditions are affected by many current and historic sources around the bay, including the sawmill, other mills and industrial dischargers, and atmospheric deposition from regional and global sources.

Biological tissue data are available from a broad range of functional groups and species including benthic organisms with small home ranges that are restricted to the sawmill area, and fish with much larger ranges that may be exposed to contamination outside of Mad River Slough that is due to other regional sources. Therefore, data appear to be representative of the range of concentrations that receptors encounter in abiotic media and in biota in the Mad River Slough and Humboldt Bay, including the exposure near the sawmill.

Scoping Ecological Risk Assessment

The scoping ecological risk assessment was conducted based on guidance from the Department of Toxic Substances Control (DTSC guidance, 1996). DTSC guidance outlines a four-step process, which includes scoping assessment, predictive assessment (Phase I), validation study (Phase II), and Impact Assessment (Phase III). Although described as a scoping assessment, the analyses reported here correspond (in part) to all four steps because of the extensive range of data available.

In order for effects to occur for ecological receptors, they must be exposed. A large number of species are potentially present in the habitats of Mad River Slough and Humboldt Bay, and the ERA could not address all species individually. Therefore, consistent with DTSC guidance, representative receptors were identified from functional groups and risk analyses focused on these species. The list of representative receptors was developed based on the species known to occur in the Humboldt Bay area, trophic structures, and habitats. Consideration was given to habitat usage and availability, state or federal status of a species, commercial and or recreational importance, availability of toxicological data, and availability of feeding and life history data. Representative species were identified for the following groups: macrophytes, sessile epifauna, mobile macroinvertebrates, pelagic fish, demersal fish, piscivorous fish, aerial searching birds, diving and searching birds, wading birds, surface searching shorebirds, and marine mammals. The benthic infauna was evaluated as a community.

A predictive assessment was conducted to estimate the magnitude of exposures for representative aquatic and wildlife receptors. Sediment and tissue residue concentrations were compared directly to appropriate toxicity reference values. Equations based on U.S. EPA guidelines (1993a) were used to assess intake of COPCs from food and sediment for mammalian and avian receptors where direct measurements were not available. Total intake was then compared with the appropriate toxicity reference value.

Average zinc concentrations in sediment are similar in Humboldt Bay and Mad River Slough, but the maximum concentration in Humboldt Bay (237 mg/kg) is higher than in Mad River Slough (111 mg/kg). Elevated concentrations were detected in upland ditch sediments at the sawmill, possibly resulting from runoff from the metal roofs of site buildings. Average zinc concentrations in both upland and Mad River Slough sediments are within the range of natural background for sediments (up to 100 mg/kg dry weight; WHO, 2001). Zinc risks to aquatic biota and mammals appear to be negligible, based on a low screening-level hazard quotients and lack of toxicity in sediment toxicity tests. For birds, screening-level hazard quotients exceed 1 for mallard, spotted sandpiper, and western snowy plover. This information suggests that the sawmill building roofs may be a minor source of zinc to Mad River Slough, but risks from zinc in the slough are similar to regional risks.

Concentrations of dioxins/furans are elevated in surface and subsurface sediments and some biota in the sawmill vicinity, but exposure and risks near the sawmill in Mad River Slough are not substantially different from risks in Humboldt Bay. Exposure calculated with maximum concentrations in relevant media are higher in Mad River Slough, but surface sediment 95% UCL concentrations that are more representative of 'high end' exposures are similar to Humboldt Bay. The highest concentrations of dioxins/furans are in subsurface sediments and not accessible to biota under baseline conditions making surface conditions consistent with Humboldt Bay. As a result, the risks that might be expected based on dioxin/furan concentrations in subsurface sediments are not observed because concentrations in biological tissues are not proportionately elevated.

Several sources of uncertainty were considered qualitatively in the ecological risk assessment. As discussed the reporting limits for PCP were not sufficiently low to be compared to sediment benchmarks. Given the former use of PCP at the sawmill, this is considered a significant data gap and is addressed in the recommendations.

Other sources of uncertainty (lack of surficial water data, estimates of dry-weight concentrations, and use of sediment quality guidelines for benthic invertebrates) were not considered significant. Surficial water quality data were not collected with sediment and biota data. This is most important for potential exposure to metals by aquatic receptors (e.g., zinc). However, because sediment concentrations of zinc in Mad River Slough were consistent with concentrations measured in Humboldt Bay and regional ambient concentrations, this is not considered to be a significant data gap. For some samples, estimates of dry-weight concentrations were made using average moisture content for all sediment samples when moisture content data were not available. The uncertainty introduced by this approach is small, much less than an order of magnitude. The use of sediment quality guidelines as the primary method for evaluating potential sediment toxicity to the benthic community has inherent uncertainty since the potential geochemical factors are not accounted for. However, toxicity tests and benthic community analyses were available to further evaluate risk to benthic invertebrates to reduce the uncertainty of comparing sediment chemical concentrations to the sediment quality guidelines. Unlike the benthic invertebrates, community data were not available for fish species evaluated. Because of the confounding factors associated with fish species (e.g., habitat preferences), the absence of these data are not expected to affect the overall risk analysis.

Scoping Human Health Risk Assessment

The purpose of the scoping human health risk assessment was to evaluate the potential for adverse human health effects associated with exposure to chemicals of potential concern in fish (fin fish and shellfish) from Mad River Slough adjacent to the sawmill. This scoping off-site human health risk assessment focuses on chemicals detected off site. However, the exposure of off-site receptors to chemicals from the sawmill has been incorporated into the overall risk characterization based on a previous evaluation of on-site risks (Geomatrix, 2003a).

It should also be noted that a detailed evaluation of potential exposure to dioxins/furans in oysters and mussels using the same data from Mad River Slough and Humboldt Bay as used here was conducted previously by EnviroNet and ENVIRON (2002 and 2003). These reports concluded that the levels of dioxins/furans in oysters and mussels:

- were well below U.S. Food and Drug Administration guidelines for levels presenting serious health effects (25 nanogram/kilogram),
- made a negligible contribution to a person's normal background exposure to dioxins/furans, and
- presented an incremental lifetime cancer risk that is less than the acceptable range used by the U.S. EPA and State of California.

Fin fish and shellfish concentrations are represented by the samples collected in or near Mad River Slough. However, as discussed in comments from the California EPA Office of Environmental Health Hazard Assessment dated June 10, 2003, the fish tissue samples were not collected in strict accordance with U.S. EPA guidance (U.S. EPA, 2000a). Upperbound and average concentrations in fish from Mad River Slough were used to represent potential concentrations in fish consumed by the receptors evaluated.

Potential exposure for two receptors was considered in the human health risk assessment: a resident who consumes an average amount of fin fish and shellfish and an angler who consumes an upperbound amount of fin fish and shellfish (also representative of a subsistence fisherman). Exposures were evaluated independently for shellfish (crabs, oysters, shrimp) and collectively for fin fish. Mussel consumption was not quantitatively evaluated because of the small sample size and low consumption rate.

The potential noncarcinogenic hazard quotients and hazard indexes associated with the resident's and angler's total exposure to the COPCs in fin fish and shellfish from Mad River Slough were 0.03 and 0.2, respectively. This indicates that exposure to chemicals in fin fish and shellfish should not result in unacceptable noncarcinogenic health effects under the conditions evaluated.

The estimated theoretical lifetime excess carcinogenic risks associated with a resident's exposure to the COPCs in fin fish and shellfish is 5×10^{-6}. The angler's estimated theoretical lifetime excess carcinogenic risks associated with exposure to the COPCs in fin fish and shellfish is 6×10^{-5}. Both results are within the acceptable risk range of 1×10^{-4} to 1×10^{-6} developed by U.S. EPA. Therefore, exposure to chemicals in fin fish and shellfish should not result in an unacceptable carcinogenic risk under the conditions evaluated for these receptors. The most significant contribution to risk is consumption of fin fish. As discussed previously and shown in Figure 4-1, concentrations of dioxins/furans are relatively consistent between fin fish in Mad River Slough and Humboldt Bay. As shown in Figure 4-2, concentrations of dioxins/furans in fin fish from Mad River Slough are consistent with concentrations in estuarine fin fish from elsewhere in the United States (U.S. EPA, 2000b).

Several sources of uncertainty were considered qualitatively in this human health risk assessment, including the elevated reporting limits for PCP; the less than ideal collection, preparation, and documentation of fish samples for the human health risk assessment; and the use of total fish consumption (including fin fish and shellfish) to represent fin fish consumption. In addition, toxicity criteria for dioxins/furans are currently being reevaluated by U.S. EPA (2000b). Currently proposed carcinogenic slope factors are higher than those used herein, which would result in higher carcinogenic risk than presented herein. U.S. EPA is not proposing to publish a reference dose for exposure because background human exposure is two to three orders of magnitude greater than a proposed reference dose based on animal bioassay data. Regardless of changes to the toxicity criteria, the conclusion that concentrations of dioxins/furans in fin fish tissue are consistent between Mad River Slough, Humboldt Bay and nationwide background concentrations would not change.

Conclusions and Recommendations

The risk assessment results do not indicate ecological or human health effects for which action is necessary to protect receptors. Risks exceeding benchmarks in Mad River Slough are largely driven by subsurface sediments where the highest concentrations of dioxins/furans were found. It is likely that these subsurface sediments have low bioaccessibility and will not contribute to human health or ecological exposure under current conditions. In addition, based on the time elapsed since the use of wood surface protection chemicals containing chlorinated phenols at the sawmill were discontinued (approximately 17 years ago), it is likely that the sediments have stabilized under both typical and high flow events.

The following additional work is recommended to fill data gaps identified during performance of this risk assessment.

- Collect sediment samples for analyses of chlorinated phenols using lower laboratory reporting limits than those achieved during previous sampling to identify whether PCP or its degradation products are present in the off-site environment. A work plan for sediment sample collection was submitted under separate cover.
- Collect limited fin fish tissue samples for dioxins/furans and chlorinated phenols (if detected in sediment) in accordance with the guidelines for sampling for human health risk assessment (U.S. EPA, 2000a) to confirm the conclusion that concentrations in fish in Humboldt Bay and Mad River Slough are consistent with those considered in this evaluation. A work plan for fin fish sample collection was submitted under separate cover.

SCOPING ECOLOGICAL AND OFF-SITE HUMAN HEALTH RISK ASSESSMENT

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

1.0 INTRODUCTION

On behalf of Sierra Pacific Industries, Geomatrix Consultants, Inc. (Geomatrix), and MFG, Inc. (MFG), have prepared this scoping ecological and off-site human health risk assessment for the Arcata Division Sawmill (the sawmill) in Arcata, California (Figures 1-1 and 1-2). Although this risk assessment is referred to as a "scoping" document based on Department of Toxic Substances Control Ecological Risk Assessment Guidance (1996a and b), the document also includes quantitative evaluation of potential ecological and human health risks based on the available data. The sawmill is located at 2593 New Navy Base Road in Arcata, California. The sawmill has been issued Cleanup and Abatement Orders No. R1-2001-0200 and No. R1-2003-127 by the California Regional Water Quality Control Board, North Coast Region (RWQCB) to address discharges to groundwater and surface water of pentachlorophenol, tetrachlorophenol, and dioxins/furans. These chemicals are constituents of wood surface protection chemicals used historically in the vicinity of the former green chain where new lumber was cut (Figure 1-3).

This scoping risk assessment was prepared to implement the work plan requested by the RWQCB in their letter dated June 4, 2002 (RWQCB, 2002). The RWQCB requested submittal of "a workplan for conducting a human health and ecological risk assessment of the Mad River Slough." In addition, a consent decree with the Ecological Rights Foundation (May 22, 2003) required Sierra Pacific Industries to conduct a human health risk assessment of the Mad River Slough adjacent to the Arcata Mill. A *Revised Work Plan for Performing a Human Health and Ecological Risk Assessment at the Sierra Pacific Industries, Arcata Division Sawmill, Arcata, California* (the work plan; ENVIRON, 2002) was submitted in December 2002 to address the RWQCB request. Potential on-site human health risks identified in the work plan were evaluated in a separate report (Geomatrix, 2003a). This scoping risk assessment was developed to implement the remaining components of the work plan, an ecological risk assessment and off-site human health risk assessment.

Written comments on the work plan were made by the California Environmental Protection Agency's [Cal-EPA's] Office of Environmental Health Hazard Assessment (Cal-EPA, 2003a), and the California Department of Fish and Game (ENVIRON, 2003). The following activities were undertaken to address the concerns of these agencies.

- A project kick-off meeting was held December 8, 2003, involving representatives of all agencies and of Geomatrix and MFG;
- Three interim deliverables were submitted, including: site conceptual model and chemicals of potential concern, data, and species list [Geomatrix, 2004a, b, and c, respectively]); and
- Three conference calls were held between agency representatives and project personnel from Geomatrix and MFG (December 22, 2003, and February 2 and 19, 2004).

1.1 OBJECTIVES

The purpose of this scoping risk assessment is to use available data to evaluate potential ecological and off-site human health risks related to discharges from the sawmill to Mad River Slough. Although this risk assessment is referred to as a "scoping" document based on Department of Toxic Substances Control Ecological Risk Assessment Guidance (1996a and b), the document also includes quantitative evaluation of potential ecological and human health risks based on the available data. The results will be used to evaluate whether off-site remedial action is necessary and to assess whether additional data could change the conclusions. If additional data would not change the evaluation of the decision options, no further data collection will be recommended. If additional data or analyses are recommended, identified data gaps would be filled and the new data incorporated into a predictive risk assessment.

1.2 SITE BACKGROUND

The Sierra Pacific Industries Arcata Division Sawmill sits at the northern end of Humboldt Bay (Figure 1-1), also referred to as Arcata Bay. Specifically, the sawmill is located along the west shore of Mad River Slough; the slough joins Humboldt Bay immediately south of the sawmill (Figure 1-2). As noted in the Remedial Investigation report (EnviroNet, 2003a), before it was developed as a lumber mill in approximately 1950, the site consisted of sand dunes and mud flats. The site began operations as an active mill in approximately 1950. After initial construction, the sawmill property was expanded, including filling parts of Mad River Slough, into the 1960s.

Wood surface protection operations using products containing pentachlorophenol (PCP) and tetrachlorophenol (TCP) began in the early to mid-1960s and were discontinued in 1987. The protection products were applied to small quantities of milled lumber to provide cosmetic protection against mold and sap stains. The wood surface protection solution was stored and used in a dip tank located at the former green chain (Figure 1-3) and in a nearby aboveground storage tank. The green chain was located south of the current sorter building and west of the current sawmill building. The area where the wood surface protection solutions were stored and used now is covered with concrete or asphalt and equipment.

The focus of this evaluation is on chemicals detected in Mad River Slough adjacent to the site. Four drainage ditches (ditches 1 through 4) and four outfalls (outfalls 1 through 4) discharge storm water from the operational area of the sawmill to Mad River Slough (Figure 1-2). These outfalls are the primary locations where chemicals associated with operations from the site historically may have discharged to Mad River Slough. A fifth outfall (outfall 5) discharges storm water and water used on the log deck to Mad River Slough through a vegetative pond. Chemical usage is not associated with activities at the log deck. The southwestern area of the facility (e.g., truck shop) drains to ditches 6 and 7, which drain to Arcata Bay. Currently, storm water discharges from the sawmill are managed under a Stormwater Pollution Prevention Plan (EnviroNet, 2003b).

1.3 REPORT ORGANIZATION

As stipulated in the work plan (ENVIRON, 2002), this scoping risk assessment was conducted in accordance with risk assessment methodologies described by the U.S. Environmental Protection Agency (U.S. EPA) and Cal-EPA, including but not limited to the following documents.

Ecological Risk

- *Guidance for Ecological Risk Assessment at Hazardous Waste Sites and Permitted Facilities, Part A: Overview, and Part B: Scoping Assessment: Department of Toxic Substances Control, 1996a and b.*

- *Guidelines for Ecological Risk Assessment: U.S. EPA, Risk Assessment Forum, 1998a.*

- *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments: U.S. EPA, 1997.*

Human Health Risk

- *Risk Assessment Guidance for Superfund (RAGS), Volume 1, Human Health Evaluation Manual, Part A:* U.S. EPA, 1989.
- *Supplemental Guidance for Human Health Multimedia Risk Assessments of Hazardous Waste Sites and Permitted Facilities:* Cal-EPA, 1996.
- *Preliminary Endangerment Assessment Guidance Manual:* Cal-EPA, 1999.

This scoping risk assessment is organized in the following sections.

Section 2: Site Characterization

Section 3: Scoping Ecological Risk Assessment

Section 4: Scoping Off-Site Human Health Risk Assessment

Section 5: Conclusions and Recommendations

Section 6: References

2.0 SITE CHARACTERIZATION

This section briefly summarizes the nature and extent of chemicals detected in each medium at the site in order to provide context to the risk assessment. Based on the information reviewed in this section, summary tables of the chemicals detected in each medium are provided.

2.1 CONCEPTUAL SITE MODEL

As described in U.S. EPA (1988), the purpose of a conceptual site model is to describe what is known about chemical sources, migration pathways, exposure routes, and possible exposure scenarios. Figure 2-1 presents the conceptual site model developed for the Arcata Division Sawmill and the adjacent Mad River Slough based on available data that describe primary sources of chemicals and release mechanisms.

Six primary sources of chemicals released to the environment have been identified at the site (Figures 1-3 and 2-1).

- former teepee burner,
- former underground storage tank and truck shop,
- former dip tank,
- former truck wash rack,
- former boiler discharge, and

- runoff from metal roofs.

These sources were identified based on a review of past operations and environmental investigations at the sawmill. These sources released or potentially released chemicals to the environment that may be present in environmental media at the sawmill and in the adjacent Mad River Slough. In this section each source and the relationships among the source, release mechanisms, and exposure medium are described. Specific exposure pathways and receptors are discussed as appropriate in the ecological (Section 3.0) and human health (Section 4.0) risk assessments.

The former teepee burner was located in the center of the operational area of the site southeast of the location of the former dip tank. The teepee burner was used to burn the wood waste materials generated at the sawmill (MFG, 2003c). Particulate emissions from wood burning could have been deposited on site soil as well as on off-site surface water and sediments.

The former underground storage tank and truck shop located in the southwest corner of the site historically were sources of volatile organic compounds and petroleum hydrocarbons to soil and groundwater through spills and/or leaks. Petroleum hydrocarbons stored in the underground storage tank and solvents used in the truck shop have been identified in on-site soil and groundwater. Based on data collected to date, however, chemicals associated with these sources do not appear to have migrated off site or to on-site sediments (MFG, 2003a and b, MFG and Geomatrix, 2004, and Geomatrix, 2004).

The former dip tank and nearby aboveground storage tank, located near the former green chain, contained wood surface protection chemicals. The surface protection formulation contained PCP and TCP. PCP formulations are known to contain dioxin/furan impurities. Based on data collected at the sawmill, there were releases of wood surface protection chemicals to on-site soil and groundwater (EnviroNet, 2003a). Surface water runoff could have carried these chemicals to off-site sediments, surface water, and biota. In addition, groundwater in this area rises to the surface during significant rain events and contributes to storm water runoff.

The former truck wash area was located in the southwestern area of the site near the shop retention pond. Petroleum hydrocarbons related to truck operations were released to the truck wash area and may have migrated along drainage ditches 6 and 7. Discharges and storm water runoff may have carried chemicals to off-site surface water, sediments, and aquatic biota.

The on-site boiler originally discharged directly to drainage ditch 1, which discharges to Mad River Slough near its confluence with Arcata Bay. Discharges and storm water runoff may have carried chemicals to off-site surface water, sediments, and aquatic biota.

Lastly, zinc, possibly originating from corrugated metal roofs, has been detected in sediment in on-site storm water drainage ditches. Storm water runoff may have carried zinc to off-site surface water, sediments, and aquatic biota.

With the exception of the corrugated metal roofs, the operations that were the source of chemicals at the site are no longer contributing chemicals to the environment.

2.2 OVERVIEW OF DATA COLLECTION

Data from several sources were consolidated into a database in order to assess the risks that chemicals used at the sawmill and released to the environment may pose to ecological and off-site human receptors. Most of these data (sources 1 to 4 below) were collected in accordance with the *Sampling and Analysis Work Plan, October 2002 Field Sampling in the Mad River Slough and Arcata Bay, California* (EnviroNet and ENVIRON, 2003c) (the February 2003 work plan). Additional data (sources 5 to 8 below) were collected at the sawmill and in off-site areas but not as part of the February 2003 work plan.

1. Evaluation of the Results of Dioxin and Other Chemical Testing of Commercial Oyster Beds in Humboldt Bay, California, from June and October, 2002: EnviroNet and ENVIRON (EnviroNet and ENVIRON, 2003b). (Data from ENVIRON, July 2002, were included in this report.)

2. Results of Dioxin and Other Chemical Testing of Sediments in the Mad River Slough and Arcata Bay, California, in October 2002: EnviroNet, 2003c, June 2. (EnviroNet, 2003c).

3. Analysis of the Benthic Infaunal Community, Sediment Toxicity, and Bioaccumulation Potential of Sediments from Arcata Bay, California: MEC Analytical Systems, 2003, May (MEC, 2003).

4. Transmittal of Dioxin and Other Chemical Testing Data for Fish and Shellfish Tissue in the Mad River Slough and Arcata Bay, California, in October 2002: EnviroNet, June 2, 2003 (EnviroNet, 2003d).

5. EnviroNet co-located samples with RWQCB, June 2001.

6. Memorandum from Mr. Dean Prat to Mr. Tuck Vath at the RWQCB regarding Inspection and Analytical Results, August 2, 2001. (RWQCB, 2001)

7. Potential and Likely Environmental and Human Health Risks from Off –Site Movement of Chemicals from the Sierra Pacific Industries Site at 2293 Samoa Road Arcata, California, Marc Lappe, no date (Lappe, no date).

8. Retention Pond, Ditches 6 and 7, and Truck Scale Sump Discharge Point Investigation Report: MFG and Geomatrix, 2003, October 21 (MFG and Geomatrix, 2003).

Sample locations characterizing Mad River Slough and some upland locations are presented on Figure 2-2. Sample locations characterizing Humboldt Bay are presented on Figure 2-3. Sample locations associated with Ditches 6 and 7 and the retention pond (upland locations) are shown on Figure 2-4. Table 2-1 shows the relationship of sample locations (station identifiers noted on Figures 2-2, 2-3 and 2-4) to identifiers for specific samples (e.g., shark, sole, sediment) collected and submitted for analysis. Chemical analytical data are summarized in Appendix A.

2.2.1 Sediment Data

Most of the surficial sediment samples and core samples from the site and vicinity were collected by ENVIRON and EnviroNet in October 2002 (Figures 2-2 and 2-3). Table 2-2 lists the number of sediment samples collected, the general types of analyses performed on each sample, and the sample identifiers for surficial sediment and core samples. In June 2001, 18 surface sediment samples from upland locations and the Mad River Slough were collected and analyzed by the RWQCB, North Coast Region, and EnviroNet. In March 2002, three surface sediment samples were collected on behalf of Mark Lappe. In June 2002, four surficial sediment samples were collected in the vicinity of the nearby commercial oyster beds. In October 2002, 24 surficial sediment samples were collected, 10 of them in the vicinity of the commercial oyster beds. An additional 12 samples were collected in October 2002 for sediment toxicity testing. Lastly, in July 2003, 43 upland surface sediment samples were collected from ditches 6 and 7 and the retention pond at the sawmill.

Surficial sediment samples were collected either by directly scooping sediments into sample jars while sediments were exposed at low tide, or by bringing sample materials to the surface using an oyster rake and scooping them from the rake into sample jar. Details of the surficial sediment sampling, sample handling, and analyses for samples collected in October 2002 are described in the February 2003 work plan.

Surficial sediment samples were collected for the toxicity and bioaccumulation study (MEC, 2003) at 12 sites using a Van Veen grab sampler. Multiple drops of the grab sampler were conducted at each collection site to acquire adequate sediment volume (~10 gallons).

Sediments collected for this effort were composited, and a single sample for each collection site was submitted for analysis.

Surficial sediment samples were collected by the RWQCB and EnviroNet in March 2001 as part of a site reconnaissance. Sediment samples were collected from the zero to six inch surface horizon using a disposable scoop. Samples were collected from drainage ditches at the sawmill and at the outfalls immediately adjacent to the sawmill. EnviroNet personnel, accompanying RWQCB personnel, collected seven samples, some of which were co-located with RWQCB samples. Details of the sampling effort and the resulting data are presented in (EnviroNet, 2001 and RWQCB, 2001).

Marc Lappe collected sediment data in Mad River Slough in March 2002 (Lappe, no date). Surficial sediment samples (generally from within the top 10 inches) were collected at four locations, with one of the samples coming from a reference area. Samples were collected using a hand trowel. Only data included in Marc Lappe's report were included in this assessment. Although other samples are referenced in his report, no data for these samples was included. Sediment data for four sites, which were included in the report reviewed, were included in the database.

MFG collected surficial sediment samples in on-site ditches 6 and 7 to evaluate potential releases of chemicals from the truck wash and truck shop to these ditches. Twenty-four surficial sediment samples were collected in ditch 6, and 17 samples were collected in ditch 7. These samples were collected from the 0- to 6-inch soil horizon. Ten samples also were collected from two locations in the retention pond at 0.5-foot intervals to a depth of 2.5 feet. To follow-up on initial results, seven additional samples were collected from ditch 6 from the 0- to 6-inch and 6- to 12-inch horizon.

Core sampling was conducted at various sites in Mad River Slough and Humboldt Bay. Forty-eight core samples were collected, producing 64 samples (some cores provided more than one sample at more than one depth). Core samples were collected using a piston coring device with a 4-inch inside core tube diameter. Sediment coring was timed to be as close to low tide as possible. Cores were shipped intact to the laboratory, where intervals for analyses were partitioned. Most core intervals were 6 inches long, although some were longer. Details of the core sampling, sample handling, and core intervals selected for analyses are discussed in the February 2003 work plan.

2.2.2 Benthic Data

Benthic infaunal samples were collected during a two-day period in October 2002 at eight locations (Figures 2-2 and 2-3). Three replicate samples were collected at each site using a Van Veen grab sampler. Sediments were washed through a 1.0 millimeter sieve, and all retained organisms were preserved and submitted for counts and taxonomy. Raw counts for each sediment replicate sample are presented in Appendix B.

2.2.3 Tissue Data

Biological samples collected for analysis of tissue residues were collected at various sites, primarily during three studies. Most biological samples were collected during the ENVIRON and EnviroNet studies conducted in June and October 2002 (EnviroNet and ENVIRON, 2003b). Additional biological tissue data were collected by Marc Lappe in March 2002 (Lappe, no date). Locations for biological tissues sampling are shown on Figures 2-2 and 2-3. Table 2-3 lists the types of tissue data collected, analyses conducted, and the associated sample identification.

2.2.3.1 Oysters and Mussels

The June 2002 collection event (EnviroNet and ENVIRON, 2003b) focused on commercial oyster beds in Arcata Bay. Ten composite oyster samples from nine commercial beds were submitted for analyses. One mussel composite sample and one of the ten oysters samples submitted for analysis were collected in Mad River Slough. Oysters and mussels were colleted from long lines, bottom beds, or racks and bags. Approximately 12 to 24 unshucked mussels or oysters from each location were placed in storage bags and shipped to the laboratory for sample compositing and analyses.

October 2002 sampling revisited several of the same commercial oyster beds sampled in June 2002. Eleven composite samples from commercial oyster beds (10 oysters per sample) were submitted for analyses. Two composite samples were collected from Mad River Slough rack and bag operations—one composite sample consisted of 10 oysters and the second of approximately 50 oysters and mussels. Mussels from the larger sample were separated and used to create one composite mussel sample.

From each bag representing a commercial bed sample, oysters were selected randomly and shucked. About 200 grams of tissue was collected per sample. The composite tissue sample was then homogenized and stored at less than -20 °C until analyses were conducted.

2.2.3.2 Fish

In October 2002, fish samples were collected at several locations in Mad River Slough and Arcata Bay for the purpose of analyzing tissue residues. Otter trawls (large nets dragged along the sediment surface) were used to collect fish at 18 sampling locations. Trawls were conducted for, on average, 10 minutes per site, although conditions at each site affected trawl duration and speed. Once considered complete, the trawl was lifted to the surface such that the contents could be collected onto a large tray. Target fish species included those commonly caught by recreational fishermen (EnviroNet and ENVIRON, 2003c). Fish types caught and analyzed included perch (white), sculpin, shiner perch, brown smoothhound shark, and sole. Several shrimp samples also were retained, stored in bags, and shipped to the laboratory for analyses. Details on the methods used to collect fish samples are included in the February 2003 work plan. Table 2-3 summarizes analytical results of the samples from the trawls that were submitted to the laboratory.

Whole fish were shipped to the laboratory on ice. The laboratory determined the total weight of all fish of the same species from each trawl. A sample of about 200 grams was the target tissue weight for each location. The composite tissue sample was then homogenized and stored at less than -20 °C until analyses were conducted.

2.2.3.3 Crabs

In October 2002, crab traps were deployed at 10 sites (Figures 2-2 and 2-3). Traps were baited and deployed for an unspecified amount of time. Four traps located in Mad River Slough and six in Arcata Bay. Composite samples were collected from four trap locations in each area. As many as eight red rock crabs were retained from each location trap to be composited for tissue residue analyses. Crabs were placed whole into bags and shipped to the laboratory for analyses.

At the laboratory, crabs were selected randomly from each trap/location. Two types of crabs were collected at station location STAR 1 and analyzed separately. Tissues were derived from the carapace and primary claws until about 200 grams of tissue was collected. The composite tissue sample was then homogenized and stored at or below -20 °C until analyses were conducted. One sample (Sample DM-0034 from station STAR3) was also analyzed as a whole sample.

Four additional crab composites were collected in the Lappe Study (no date). Crabs for tissue analysis were collected by two different methods. Deep water crabs were collected using crab traps deployed form the Samoa Bridge. Traps were checked periodically for the presence of crabs and when present crabs were removed, wrapped in aluminum foil, placed in plastic bags, and labeled. The second method for crab collection was conducted by turning rocks in the upper and lower tidal zones. When found, crabs were collected, wrapped in aluminum foil, placed in plastic bags, and labeled. All samples were placed on ice for transport to the laboratory.

2.2.4 Toxicological Data

The report by MEC (2003) includes results of ambient sediment toxicity and bioaccumulation studies. Sediments used for toxicity and bioaccumulation testing were collected as described in Section 2.2.1.

2.2.4.1 Toxicity Testing

Toxicity testing was conducted on sediment samples from six sites, including locations designated C-6 Comp, C-4 Comp, USS Comp, DSS Comp, USS-2 Comp, and BC Comp. Two reference site samples also were tested: Arcata Bay Reference Comp and North Arcata Bay Reference Comp. Native control sediments containing the target organisms were collected. Two standard toxicity testing methods were conducted: solid-phase toxicity and bioaccumulation potential testing. In addition, two reference toxicity tests were conducted simultaneously with the toxicity tests, using cadmium chloride and ammonia chloride. Cadmium chloride was used to establish the sensitivity of the test organisms, and ammonia chloride was used to evaluate the potential influence of ammonia toxicity on the test sediments.

Solid-phase tests used two species, an amphipod (*Eohaustorius estuaries*) and a polychaete (*Neanthes arenaceodentata*), in 10-day static exposures. Exposures for each site sample, reference sample, and native control sample were conducted in replicate (n = 5), with 20 organisms per test chamber. Approximately 150 grams of sediments was used for each exposure chamber, along with 900 milliliters (ml) of overlying San Francisco Bay seawater (filtered and UV-sterilized).

Mortality and water quality conditions were monitored daily. On the final day of testing, sediments were sieved through a 0.5-millimeter (mm) sieve and the number of surviving organisms was recorded. Percent survival was the test endpoint. Details of the exposures are described in the report by MEC (2003).

2.2.4.2 Bioaccumulation Testing

Bioaccumulation potential was assessed using two test species, a mollusk (*Macoma nasuta*) and a polychaete (*Nereis virens*) in a 28-day exposure. Exposure chambers contained 5 liters

(L) of sediment and 10 L of San Francisco Bay seawater. Water was renewed at a rate of about 20 ml per minute. Five replicates per exposure were conducted, with 17 (*N. virens*) and 30 (*M. nasuta*) organisms per test. At the conclusion of the testing period, surviving organisms and sediments were screened through a 2.0-mm screen. Organisms retained from each test chamber were placed in sediment-free flow-through chambers in order for the organisms to purge their gut contents. Following the purging process, organisms from each exposure were placed into sample containers and frozen. Results of this testing are described in the MEC report (2003).

2.3 QUALITY ASSURANCE/QUALITY CONTROL

The purpose of quality assurance/quality control (QA/QC) procedures is to assess the quality of data by evaluating its accuracy and precision. It is essential that the data be accurate and reflective of actual conditions. To confirm that the quality of sampling data was acceptable for decision-making purposes, data relevant to this scoping risk assessment were reviewed. As discussed in this section and in more detail in Appendix C, this review identified limitations for the use of the data for decision-making purposes.

Quality control samples consisted of laboratory-analyzed method blanks, laboratory control sample/laboratory control sample duplicates, and matrix spike/matrix spike duplicate samples that assess internal quality control. The QA/QC results were evaluated in accordance with U.S. EPA guidelines for reviewing organic data (U.S. EPA, 1999); guidelines for reviewing inorganic data (U.S. EPA, 2002a); and guidelines for reviewing chlorinated dioxin/furan data (U.S. EPA, 2002b).

Geomatrix reviewed data for compliance with the following QA/QC project and/or method-prescribed criteria (described further in Appendix C).

- Holding time and preservation – the period between collection of a sample and preparation/analysis, along with acceptable temperature range of the sample upon receipt by the laboratory. Analyses performed for this project have method-prescribed holding times and temperature ranges.

- Blank samples – the preparation and analysis of reagent (contaminant-free) water or soil. Blank samples for this investigation included method blanks. Detection in a method blank would indicate possible laboratory contamination.

- Spiked samples – the preparation and analysis of an environmental sample or sample of reagent water spiked with a subset of target compounds at known concentrations. Results of the laboratory spike analysis indicate laboratory accuracy in the reagent sample, and results of the field spike sample measure potential interference from the matrix.

- Surrogate spikes—the addition of compounds similar to target compounds that are added to sample aliquots for organic analysis. Surrogate spikes measure possible interference of the sample matrix when analyzing for the target compounds.

- Mass spectrometer initial calibration—the objective of the initial calibration is to establish a linear range or curve, the mean relative responses, and the mean relative response factors for the instrument.

- Identification criteria—the primary objective is to unambiguously identify a gas chromatograph peak for a target analyte.

All qualified data can be used for decision-making purposes, with the exception of the sample data qualified as "R," which are summarized in Appendix C. (Data qualified as "R" appear as "Invalid" in data summary tables.) Limitations identified by the other applied qualifiers also should be considered when using the qualified data. Overall, the results of the QA/QC review indicate that the analytical results for samples collected at various times and locations on and near the site are valid and useable, except as noted in Appendix C.

2.4 CHEMICAL CHARACTERIZATION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN

A variety of chemicals have been analyzed in the drainage ditches and off-site sediment, and in biota, including metals, dioxins/furans, semi-volatile organic compounds, pesticides, PCBs, polycyclic aromatic hydrocarbons, and petroleum hydrocarbon mixtures. While available data are presented in this section, only chemicals associated with known mill sources were considered as chemicals of potential concern in this Scoping Risk Assessment. Because an aquatic environment such as Mad River Slough potentially is subject to chemical contributions from multiple sources, it is important to focus on the chemicals related to mill activities. A remedial investigation (EnviroNet, 2003a); several other investigations (MFG, 2003a, b, and c; MFG and Geomatrix, 2003 and 2004; and Geomatrix, 2004d); and on-going groundwater monitoring have been conducted to evaluate potential releases of chemicals from known sources at the site. The primary sources have been identified in the conceptual site model. In this section, the known sources of chemicals at the sawmill are discussed in conjunction with the results of sediment and biota sampling in Mad River Slough and Humboldt Bay to identify chemicals of potential concern that will be evaluated in this scoping risk assessment.

2.4.1 Semi-volatile Organic Compounds

Pentachlorophenol, tetrachlorophenols (2,3,5,6-; 2,3,4,6-; and 2,3,4,5), and trichlorophenols (2,3,4-; 2,4,5-; and 2,4,6-) have been detected in soil and/or groundwater at the sawmill near the former green chain. Pentachlorophenol was the primary ingredient in wood surface protection chemicals, and tetrachlorophenols and trichlorophenols were present as impurities in the pentachlorophenol. These chlorinated phenols were not detected in sediment or biota samples from Mad River Slough (Table A-1), so they cannot be evaluated quantitatively. For example, PCP sediment quality guidelines for benthic receptors are 0.360 and 0.690 mg/kg (Barrick et al. 1988), which are lower than the detection limit in sediments of 0.99 mg/kg. Further data collection may be required to quantitatively evaluate these chemicals.

Although no other semi-volatile organic compounds have been identified as related to mill operations, five other semi-volatile organic compounds have been identified in sediment and biota samples. Bis-2-ethylhexylphthalate (3 sediment samples at 1.1 to 2.6 milligrams per kilogram [mg/kg]); diethylphthalate (2 samples at 3 and 8.7 mg/kg); and di-n-butyl phthalate (7 samples at 0.99 to 17 mg/kg) are common laboratory contaminants associated with plastics and plasticizers. Many detections of di-n-butylphthalate were determined to be invalid based on detection of di-n-butylphthalate in laboratory blanks. As such, these compounds were not considered chemicals of potential concern. Phenol was detected in two crab samples (at 1.2 and 3.9 mg/kg), one from Humboldt Bay and one from Mad River Slough. Because phenol was not detected in sediments in Mad River Slough, it was not considered a chemical of potential concern. Pyridine was detected in 22 samples of sediment and biota (at 8.6 to 47 mg/kg). Pyridine is used in the manufacture of many products (for example, medicines and vitamins) and is a breakdown product from natural materials in the environment (Agency for Toxic Substance Disease Registry, 1995). As such, pyridine was not considered a chemical of potential concern.

2.4.2 Pesticides

Pesticide usage has not been identified as a significant activity at the sawmill. Results of all chemical analyses for pesticide (Table A-2) were less than detection limits in sediment and biota samples (less than 0.009 to less than 0.3 mg/kg). As such, no pesticides are considered chemicals of potential concern in this scoping risk assessment.

2.4.3 Polychlorinated Biphenyls

Sources of polychlorinated biphenyls have not been identified at the sawmill. Polychlorinated biphenyls were not detected in any sediment or biota samples (given detection limits of 0.02 to

0.36 mg/kg; Table A-3). As such, polychlorinated biphenyls are not considered chemicals of potential concern in this risk assessment.

2.4.4 Polycyclic Aromatic Hydrocarbons

Polycyclic aromatic hydrocarbons are associated with petroleum hydrocarbons, which are used in operating equipment at the site. Polycyclic aromatic hydrocarbons also are ubiquitous in the environment from natural (e.g., forest fires) and man-made (e.g., diesel combustion) sources.

Analytical results for polycyclic aromatic hydrocarbons are presented in Table A-4A and A-4B for sediment and tissue, and water, respectively. Low levels of six polycyclic aromatic hydrocarbons were detected in two of seven upland sediment samples collected from Ditch 6 (6 to 100 µg/kg). The remaining five samples were non-detect at an individual compound detection limit of 5 to 250 µg/kg. Ditch 6 is adjacent to a roadway and detections of polycyclic aromatic hydrocarbons could be related to other sources. The total concentrations of polycyclic aromatic hydrocarbons in Ditch 6, assuming values of one-half the detection limit for non-detects, are well below sediment quality guidelines for total polycyclic aromatic hydrocarbons of 4.02 to 44.8 mg/kg (Buchman, 1999). Polycyclic aromatic hydrocarbons were not detected in seven groundwater samples from Ditch 6 with a detection limit of 0.1 µg/l.

Concentrations of polycyclic aromatic hydrocarbons analyses at 12 sediment sample locations (23 samples) in Mad River Slough were below the detection limits, which generally was 0.99 mg/kg. Total concentrations of polycyclic aromatic hydrocarbons in Mad River Slough, using one-half the detection limit for non-detect values, would be less than 8.5 mg/kg, which is at the lower end of the range cited previously. Polycyclic aromatic hydrocarbons also were not detected in biota samples for Mad River Slough or Humboldt Bay. Select polycyclic aromatic hydrocarbons were detected in one of 28 sediment samples (DM-0087; LOC21) [fluoranthene at 6.6 mg/kg, pyrene at 3.9 mg/kg, and phenanthrene at 6.6 mg/kg] at the southern end of Arcata Bay more than 4 miles from the sawmill. As such, polycyclic aromatic hydrocarbons are not considered chemicals of potential concern in this scoping risk assessment.

2.4.5 Dioxins/Furans

Dioxins/furans, a known impurity in pentachlorophenol mixtures (World Health Organization, 1987), have been detected in soil and groundwater at the sawmill in the former green chain area. Dioxins/furans also are ubiquitous in the environment from natural (e.g., forest fires) and man-made (e.g., waste incineration) sources. Analytical results for dioxin/furans are presented in Table A-5. One or more dioxin/furan congeners were detected in all 123 sediment and 74 biota samples collected. Dioxins/furans are considered chemicals of potential concern in this scoping risk assessment.

2.4.6 Metals

In the human health risk assessment for soil and groundwater on site (Geomatrix, 2003a), metals results for soils were considered consistent with background concentrations (Kearny, 1996) and were not considered chemicals of potential concern. Analytical results for metals are presented in Table A-6. Sediment samples from ditches were consistent with the Kearny background concentrations, except for zinc reported in two samples from drainage ditch 1 (270 and 330 mg/kg). With the exception of zinc, the metals concentrations in ditch samples were also consistent with metal concentrations detected in soil in the truck shop area (MFG and Geomatrix, 2004). Based on information from other Sierra Pacific Industry operations, the zinc may be related to runoff from corrugated metal roofs and as such will be retained as a chemical of potential concern in this scoping risk assessment. Other metals are not considered chemicals of potential concern associated with the sawmill.

2.4.7 Petroleum-Range Organics

Petroleum-range organics are associated with gasoline and diesel-powered equipment, including vehicles, which are used at the sawmill. However, measurements of petroleum range organics are subject to interferences by organic material.

Analytical results for hydrocarbons and oil and grease are presented in Table A-7A and A-7B for sediment and water, respectively. Concentrations in Ditch 6 of diesel range organics range from less than 10 to 990 mg/kg and motor oil range organics range from less than 50 to 3,200 mg/kg following silica gel cleanup. Concentrations of diesel range and residual range organics detected in sediment in the Mad River Slough ranged from 36 to 1,100 mg/kg and from 86 and 1,700 mg/kg, respectively. Concentrations of diesel range and residual range organics in Humboldt Bay ranged from 41 to 150 and from 72 to 450 mg/kg, respectively. Diesel and residual range organics were not detected in groundwater samples adjacent to ditch 6. The sediment samples from Mad River Slough and Humboldt Bay were subsequently analyzed using silica gel cleanup, which removes some biogenic material that can interfere with the analysis. The results were lower as presented by EnviroNet Consulting (2003b), but are not reliable because the analyses were conducted one month beyond holding times. Oil and grease measurements after silica gel cleanup by the laboratory ranged from 380 to 2,000 mg/kg at the outfalls and were above the detection limits in Ditches 6 and 7, but these measurements also are subject to interferences from organic compounds, such as woody debris. Oil and grease measurements after silica gel cleanup to remove biogenic compounds ranged from 100 to 11,000 mg/kg in Ditches 6 and 7.

Polycyclic aromatic hydrocarbons are the typical toxic compounds associated with diesel and residual range organics. Since polycyclic aromatic hydrocarbons were not detected in sediment samples from Mad River Slough and were only detected at very low levels in Ditch 6, the petroleum-range organics were not included as chemicals of potential concern.

2.4.8 Volatile Organic Compounds

Volatile organic compounds associated with the plywood-covered ditch and the former waste oil underground storage tank in the truck shop area have not been demonstrated to have moved from the potential source areas to the adjacent Mad River Slough (MFG and Geomatrix, 2004). In addition, the possible migration pathway (via surface water runoff) would not likely result in significant concentrations of volatile chemicals moving off-site, because volatile chemicals are likely to partition to air during transport.

Analytical results for volatile organic compounds in sediment and groundwater are presented in Table A-6A and Table A-6B, respectively. Volatile organic chemicals were not detected in soil or groundwater samples collected from Ditch 6, the drainage ditch from the truck shop area to Arcata Bay. Samples of sediment and groundwater collected from Ditch 6 were below detection limits of 0.05 to 0.1 mg/kg for sediment and were below detection limits of 1 to 18 µg/l for groundwater. Volatile organic compounds were not analyzed in off-site sediment and biota samples. As such, volatile organic compounds are not considered chemicals of potential concern in this scoping risk assessment.

2.4.9 Summary of Chemicals of Potential Concern

Dioxins/furans and zinc are considered chemicals of potential concern for this scoping risk assessment.

2.5 REPRESENTATIVE CONCENTRATIONS

This section describes how representative concentrations of chemicals of potential concern were quantified for this scoping risk assessment. The representative concentration is the chemical concentration to which receptors are assumed to be exposed. Representative concentrations generally are estimated using concentrations measured in environmental media, or values estimated using models of chemical fate and transport. A single estimate is required for risk assessment calculations. The value must be representative of the average concentration to which a person would be exposed over the duration of exposure (U.S. EPA, 1989 and

2002d). Before representative concentrations were calculated, the concentrations of dioxin/furan congeners were used to estimate 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicity equivalents (2,3,7,8-TCDD TEQs).

2.5.1 Dioxin/Furan Toxicity Equivalents

The relative toxicity of dioxin/furan congeners that have chlorine molecules in the 2, 3, 7, and 8 positions has been studied extensively, and toxicity equivalency factors (TEFs) have been developed to quantify the relative toxicity of the congeners (Van den Berg et al., 1998). Separate toxicity equivalency factors have been developed for fish, mammals (including humans), and birds, and separate 2,3,7,8-TCDD TEQs[1] were calculated for each using the dioxin/furan data.

Dioxin/furan concentrations were converted to 2,3,7,8-TCDD TEQs as follows:

$$2,3,7,8\text{-TCDD TEQ} = \text{Congener}_1 * \text{TEF}_1 + \text{Congener}_2 * \text{TEF}_2 \ldots + \text{Congener}_n * \text{TEF}_n$$

The calculation of 2,3,7,8-TCDD TEQs is provided in Appendix D.

Detection of a dioxin/furan congener in some but not all samples suggests that the congener also may be present in samples reported as "not-detected," that is, not detected above the detection limit for that analytical method. Methods for estimating the concentration in non-detect samples include substitution methods, distributional methods, and robust statistical methods (U.S. EPA, 2002d). The current default position of the U.S. EPA (1989) is to substitute one-half the detection limit for all non-detect values. U.S. EPA (2002d) guidance indicates that substituting one-half the detection limit is adequate when the proportion of non-detects is small. If the fraction of non-detect values is large, then assuming that the value of each non-detect value is equal to one-half detection limit often results in a substantial overestimation of the mean of such data sets, with the degree of overestimation increasing with increasing proportions of non-detect values. One-half the detection limit was substituted for non-detect values when calculating 2,3,7,8-TCDD TEQs.

2.5.2 Calculating Representative Concentrations

Representative concentrations were calculated for each sample type (e.g., sediment, shark, oyster). Two 95% upper confidence limits (95% UCL) were calculated, one was calculated assuming a normal distribution and one was calculated based on the distribution of the data. Data sets containing fewer than five samples were not evaluated statistically. The maximum

[1] Also referred to as dioxin/furan concentrations in the text.

concentration for those data sets was also used as the upper-bound concentration (Table 2-4). One-half the detection limit was substituted for non-detect values when calculating the representative concentration. Data supporting calculation of representative concentrations are presented in Appendix E.

The distribution-specific 95% UCL was calculated using a statistical software package, ProUCL Version 2 (U.S. EPA, 2001), which evaluates the distribution of each data set and calculates representative upper-bound concentrations. ProUCL was developed to test normality or lognormality of a data distribution and to compute a conservative and stable upper confidence limit of the population mean (U.S. EPA, 2001). ProUCL provides recommendations for 95% UCLs for (1) normally distributed data sets, (2) lognormally distributed data sets, and (3) data sets that are neither normal nor lognormal (non-parametric data). The ProUCL calculations are consistent with recommendations in U.S. EPA (2002d) guidance for calculating exposure point concentrations at hazardous waste sites.

The ProUCL software was used to individually evaluate each data set containing five or more samples (e.g., zinc in sediment from Mad River Slough from samples collected less than 1 foot below ground surface). Based on the distribution defined by ProUCL, a 95% UCL was recommended in the output or selected from the appropriate options for non-parametric data sets. The 95% UCL was calculated for the various distributions, using the recommended method.

- For normally distributed data, the Student's t-statistic was used as recommended in the ProUCL output.
- For lognormally distributed data, Land's H statistic, the Chebychev inequality theorem plus the minimum variance unbiased estimate of the mean and standard deviation, or Student's t-statistic was used as recommended in the ProUCL output.
- For non-parametric data, the ProUCL program provides five options for calculating the 95% UCL. This evaluation utilized a Standard Bootstrap approach using repeated sampling of a subset of the population or Chebychev inequality theorem using the mean and standard deviation.

The resulting representative concentrations are presented in Table 2-4, and the ProUCL output is presented in Appendix F. If the 95% UCL exceeded the maximum detected value, the maximum value was used as the upperbound representative concentration, as noted in the table.

As appropriate to the sample type, up to three sets of representative concentrations were developed: Upland Mill Area (Figures 2-5 and 2-7), Mad River Slough (Figures 2-5 to 2-8), and Humboldt Bay. The specific samples are identified in Appendix E.

For the ecological risk assessment, the mean, upperbound representative concentration, and the maximum were used to assess potential exposure and risk. For the human health risk assessment, the 95% UCL or maximum value, whichever was lower (the upperbound concentration in Table 2-4) was used to represent potential upper-bound exposure based on U.S. EPA guidance for human health risk assessment (U.S. EPA, 2002d), and a mean concentration was used to represent potential average exposure.

2.5.2.1 Sediment

Exposure point concentrations for sediment were derived separately for two sediment depths (greater than and less than 1 foot below ground surface) and three designated areas (Humboldt Bay, Mad River Slough, and Upland Mill). Surface sediment, which represents the sediment that may be bioavailable was defined by sediment samples collected between 0 and 1 foot below ground surface. Subsurface sediment, representing sediment that is unlikely to be bioavailable, was defined by sediment samples collected more than 1 foot below ground surface (discussed in Section 3.2.2.1). Samples collected both above and below 1 foot (e.g., from 0.5 to 1.5 feet) were included in both statistical analyses.

Figure 2-5 presents dioxin/furan concentrations for Upland Mill samples (e.g., drainage ditches at the sawmill) and Mad River Slough samples less than 1 foot below surface. Figure 2-6 presents dioxin/furan concentrations for Mad River Slough samples greater than one foot below surface. Remaining samples were classified as Humboldt Bay. The specific samples and concentrations used to develop representative concentrations are identified in Appendix E.

Similarly, Figure 2-7 presents zinc concentrations for Upland Mill and Mad River Slough samples less than 1 foot below surface. Figure 2-8 presents zinc concentrations for Mad River Slough samples greater than 1 foot below surface. As presented in Appendix E, the samples were used to develop representative concentrations for the Upland Mill and Mad River Slough areas. The remaining samples were used to calculate representative concentrations in sediment for Humboldt Bay.

2.5.2.2 Tissue

Exposure point concentrations for tissues were derived from tissue sample results for mussels, oysters, shrimp, sole, perch, shark, shiner, crab, and sculpin. As with representative concentrations for sediment, representative concentrations for tissue samples were derived separately for two designated areas, Humboldt Bay and Mad River Slough.

3.0 SCOPING ECOLOGICAL RISK ASSESSMENT

This section presents a scoping ecological risk assessment (ERA) for Mad River Slough, which lies adjacent to the sawmill. This ERA is based on California Department of Toxic Substances Control guidance (DTSC guidance, 1996), which includes four steps,

- Scoping Assessment – Part B of the DTSC guidance is a scoping assessment intended to be the first step in the ERA process. The scoping assessment is intended to develop a conceptual site model for the site and evaluate whether ecological receptors may be exposed to releases from the site. If a release and potential exposure are confirmed, then additional risk analysis, as described in Part A of the guidance, may be necessary to further evaluate risks and determine whether risk management options are necessary.

- Phase I—Predictive Assessment – Phase I of the process described in Part A of DTSC (1996) is a predictive assessment in which data on chemical concentrations (measured or modeled) in abiotic and biotic media are used to estimate exposures of ecological receptors to site-related chemicals. The exposure estimates are compared to contaminant-specific toxicity data believed to be protective of ecological receptors. If exposures exceed toxicity criteria, then a Phase II—Validation Study may be needed.

- Phase II—Validation Study – Phase II consists of site-specific testing such as toxicity testing, verification of biotransfer factors (e.g., bioconcentration or bioaccumulation factors), chemical concentrations in loads in biotic tissues, or other site-specific analyses needed to verify or validate factors used in Phase I exposure estimations.

- Phase III—Impact Assessment – Phase III investigations are meant to verify the occurrence of the adverse effects predicted in Phase I/II and, if so, to characterize the extent and severity of those adverse effects. Phase III is focused on biological endpoints that are relevant to the site-specific chemical contaminants and are biologically meaningful for risk management purposes.

Although no formal scoping assessment was performed to determine whether a predictive assessment was needed for the site, the available information suggests that a predictive assessment would be required. In addition, Sierra Pacific Industries collected data on chemical concentrations in fish, shellfish, and sediment from Mad River Slough and Humboldt Bay to help evaluate ecological exposure and potential impacts related to the site. As a result, data available for the scoping risk assessment include the types of data required for the three phases described in DTSC (1996) (i.e., chemical concentrations, data to calculate biota transfer factors, toxicity testing [sediments], and impacts data [benthic invertebrate communities]). This document is intended to address the information needs of a scoping assessment, present exposure and risk calculations associated with a predictive assessment and a validation study, as well as review data on effects (e.g., toxicity testing, benthic invertebrate community analysis) for impact assessment. This approach resulted from discussions with the California Division of Fish and Game; California Regional Water Quality Control Board, North Coast Region; and Cal-EPA Office of Environmental Health Hazard Assessment. This ERA will include analyses of all the available data to evaluate potential risk and impacts, and will identify uncertainties and potential data gaps important to risk management decisions. As discussed in Section 2.0, the Scoping Risk Assessment focuses on the site-related chemicals of potential ecological concern that were detected in abiotic media (sediment or water) or biological tissues collected from Mad River Slough and Humboldt Bay.

Section 3.1 addresses the information required in DTSC (1996) for a scoping assessment. The content and format of tables and figures included in the report are intended to match the example tables and figures in DTSC (1996). Section 3.2 includes the exposure and risk calculations and other information associated with Phase I and II of the DTSC guidance. Information for Phase III is incorporated into the risk characterization discussion in Section 3.3. Section 3.4 discusses the uncertainties associated with the assessment and Section 3.5 presents the conclusions.

3.1 SCOPING ASSESSMENT INFORMATION

This section summarizes the information available to perform a scoping assessment following guidance in DTSC (1996).

3.1.1 Site Characterization

Humboldt Bay, one of California's largest coastal estuaries, is the only shipping harbor of major commercial importance between San Francisco Bay and Coos Bay, Oregon (Figure 1-1; Barnhart et al., 1992). Rumrill (2002) summarized the general attributes of Humboldt Bay in a 2002 presentation at the Humboldt Bay and Watershed Symposium. Following is an excerpt of that summary.

> Humboldt Bay is the second largest estuarine embayment in California, second only in size to San Francisco Bay. Located at the southern end of the Lower Columbia Biogeographic Region, the marine-dominated estuarine tidal basin is flooded on a semi-diurnal basis by seawater from the near shore Pacific Ocean. At high tide, the flooded area of Humboldt Bay encompasses about 63 km^2 where it provides the largest commercial shipping port and ecologically most important estuary on the northern California coast. Humboldt Bay receives relatively little freshwater input from its 580 km^2 drainage basin, and the shallow embayment is divided into three distinct sub-basins: 1) Entrance Bay, 2) Arcata Bay and 3) South Bay. The protected waters of Humboldt Bay contain a wide variety of habitats including rocky jetties, subtidal channels, floating docks and piers, sand flats, mudflats, eelgrass beds, commercial oyster reefs, salt marshes, and the estuary holds special

ecological importance as habitat for many species of invertebrates, fishes, birds and mammals. The natural resource values of Humboldt Bay also attract many recreational users.

Both South and Arcata bays consist of extensive mud flats interlaced with drainage channels. More than half the surface area of these two bays is exposed at low tide (Barnhart et al., 1992; Figure 3-1). Fresh water enters the bay from the point sources of Jacoby Creek, Elk River, Freshwater-Eureka Slough, McDaniel Slough, Mad River Slough, and other small sloughs and creeks (Costa, 1984). The fresh water influence is considered small for such a large basin. Of the fresh water entering the bay, 12 percent falls as precipitation and 85 percent is river drainage into Arcata and North Bay Channel (Elk River; Barnhart et al., 1992). Mad River apparently did not flow naturally into Humboldt Bay, although during floods, water enters the bay via a historical canal that connected the Mad River to Mad River Slough.

The bay is a young marine system dominated by the Pacific Ocean and having a large tidal prism. About 44 percent of the bay empties in and out on the flood and ebb tides. In Arcata Bay, the high tide wet area is 62 km^2 (volume: 85 million m^3), and the low tide wet area is 28 km^2 (volume: 48 million m^3) (Rumrill, 2002). These tidal fluctuations, among other physical (hydrologic and morphologic) and biological (growth of aquatic macrophytes that trap sediments) factors result in a partitioning of sediment distribution throughout the bay (Figure 3-2).

3.1.1.1 Climate

The Humboldt Bay region has two distinct seasons. Fall/winter seasons are mild and wet, while spring/summer seasons are cool and dry. The monthly mean temperature varies by only 5.2 °C through the year, with the lowest temperatures occurring in January and the highest in August (Barnhart et al., 1992). High precipitation is associated with occasional storms, with 85 percent of the precipitation occurring from mid-October to mid-May. Mean annual precipitation is about 40 inches (101 cm) per year (Proctor et al., 1980). Dense coastal fogs in the region can occur any time of the year.

3.1.1.2 Land Use

Humboldt Bay has a long history of use, including extensive diking and filling to produce agricultural and industrial land, channel dredging to allow vessels to traverse the bay, and shoreline and harbor development. The bay is immediately surrounded by lowlands, formerly marshy extensions of the bay, which were diked and drained for agricultural use, primarily grazing, beginning in the 1880s (Barnhart et al., 1992). Two cites, Eureka and Arcata, and five smaller communities are located on or near the bay, representing a total population of about 70,000 for the bay area (Barnhart et al., 1992).

The Humboldt Bay area in its entirety includes 21 watersheds and/or subwatersheds. Watersheds within the northern part of Humboldt Bay (Mad River Slough and Arcata Bay) include Mad River Slough, Lower Jacoby Creek, and Fay Slough (Figure 3-3). The Mad River Slough watershed, measuring about 15,037 acres, is predominantly pasture (4,757 acres), followed by barren and wasteland (3,402 acres), residential (2,232 acres), and native vegetation (1,794 acres). The remaining acreage is made up primarily of commercial/industrial area, water surface, and agricultural lands other than pasture. Lower Jacoby Creek watershed (6,616 acres) is composed mostly of native vegetation (4,853 acres) and residential acreage (1,357 acres). The remaining acreage is made up of pastureland, with a small amount of barren wasteland and general agricultural acreage. Similarly, Fay Slough watershed is dominated by native vegetation (4,192 acres) and residential areas (2,576 acres), with limited amounts of surface water, industrial/commercial, and agricultural lands. Table 3-1 summarizes the land use summarized above. Figure 3-4 illustrates a more focused view of the surrounding land use for Arcata Bay.

The U.S. Army Corps of Engineers (U.S. ACE) annually dredges several deepwater channels in Humboldt Bay for commercial shipping navigation. The federal navigation channels include the Entrance Channel, Hookton Channel (a.k.a. Fields Landing Channel), Samoa Channel, and Eureka Channel (a.k.a. Inner Reach), located along Eureka's developed shoreline. No federal navigational channel dredging occurs in Arcata Bay (U.S. ACE, 2003b).

3.1.1.3 Habitats

Mad River Slough is the primary area of focus for this scoping risk assessment. Associated downgradient areas near the mouth of the slough in northern Arcata Bay will also be considered. Although several upland terrestrial habitat types are near the project area, however, the focus of this scoping risk assessment is on the water and wetland environments of the Mad River Slough and northern Humboldt Bay. Figure 3-5 shows the distribution of terrestrial and aquatic habitat types associated with the bay.

Humboldt Bay has several key natural plant and unvegetated habitats: salt marsh vegetation, extensive areas of unvegetated mud flats or channel bottoms, and the biologically important eelgrass meadow community. The National Wetlands Inventory map of the bay illustrates the diversity of its wetland habitats (Figure 3-6). Although salt marsh and mudflats support invertebrate and vertebrate animal species, eelgrass meadows are recognized as having a higher diversity of marine and estuarine animal life (U.S. ACE, 2003b).

Salt and Brackish Marshes

Barnhart et al. (1992) indicate that in Humboldt Bay, nearly 90 percent of the original salt marsh areas have been either diked or filled. Figure 3-7 shows the gains and losses in marsh habitats between 1944 and 1993. Only 393 hectares (971 acres) of the original estimated 2,833 hectares (7,000 acres) of salt marsh remain (Monroe, 1973; Shapiro and Associates, Inc., 1980). Currently, the salt marshes exist largely as remnants in a narrow perimeter around the bay. Notable exceptions include the large areas of salt marsh on low islands in the middle of Entrance Bay and islands included in Mad River Slough (Barnhart et al., 1992).

ENVIRON (2002) and Green (2002) provide descriptions of the wetland habitats in the vicinity of the site. Estuarine salt marsh wetlands are located on mainland and island areas in Mad River Slough and Humboldt Bay, with undisturbed salt marsh habitat located on the island patches along the side of the New Navy Base Road, south of Sierra Pacific Industries (ENVIRON, 2002). Green (2002) described the species composition as follows: "The primary vegetation layer is herbaceous. Salt grass (*Distichlis spicata*), pickleweed (*Salicornia virginica*), fleshy jaumea (*Jaumea carnosa*), and dense-flowered cord grass (*Spartina densiflora*) are dominant or important species. Less important but commonly occurring species included gumweed (*Grindelia stricta var. stricta*), western marsh-rosemary (*Limonium californica*), and arrow-grass (*Triglochin maritime*). Also known from salt marshes within the vicinity are two rare plant taxa: Point Reyes bird's-beak (*Cordylanthus maritimus palustris*) and Humboldt Bay owl's-clover (*Castilleja ambigua humboldtensis*).

In the 2003 Biological Assessment Report, EnviroNet (2003f) provided the following discussion of the ecological function and value of the estuarine salt marsh habitat.

> The ecological function of the estuarine salt marsh wetlands includes providing cover for the terrestrial mammals, amphibians, reptiles, terrestrial and aquatic invertebrates, and a variety of water birds, shore birds, wading birds, and song birds; providing food for terrestrial mammals, amphibians, reptiles, terrestrial and aquatic invertebrates, and a variety of water birds, shore birds, wading birds, song birds, and raptors; and providing habitat for a variety of plant species, including rare plant species. In addition, estuarine salt marsh wetlands provide nutrient cycling and nutrient availability for adjacent habitats, including intertidal mudflats. Estuarine salt marsh wetlands have a high ecological value based on the ecological functions and because this habitat is considered rare by the California Natural Diversity Database.

Coastal brackish marsh is suspected to occur at locations along the east side of Mad River Slough where freshwater run-off from grazing and agricultural lands flows into the slough (EnviroNet, 2003f). Barnhart et al. (1992) report three common plant associations in the brackish marshes: salt rush (*Juncus lesueeurii var. lesueeurii*), pacific silverweed (*Potentilla egedii grandis*), and water parsley (*Oenanthe sarmentosa*).

In its 2003 Biological Assessment Report, EnviroNet provided a discussion of the ecological function and value of the coastal brackish marsh habitat. The function and value of the coastal brackish marsh habitat were nearly identical to those reported above for estuarine salt marsh.

Intertidal Mudflats

Intertidal mudflats consist of high- and-low elevation mudflats that are inundated during flood tides. The low flats, dissected by numerous small tidal gullies, are the regions of the most luxuriant growth of eelgrass (*Zostera marina*) (Barnhart et al., 1992). Arcata and South Bay combined have 1,221 hectares (3,017 acres) of eelgrass beds with 435 hectares (1,075 acres) in Arcata Bay and 786 hectares (1,942 acres) in South Bay (Harding and Butler, 1979). These beds, which account for about 20 percent of the intertidal habitat in the bay, characteristically are found near the level of mean low water in Humboldt Bay (Barnhart et al., 1992). Eelgrass in Humboldt Bay grows in muddy to silty sediments and has a significant influence on the sedimentary regime in parts of the bay where growth is luxuriant (Barnhart et al., 1992). Figure 3-8 illustrates the relatively current distributions of eelgrass a well as historic distributions.

Eelgrass stabilizes bottom coastal sediments, thus preventing erosion (Phillips, 1984). Phillips (1984) recognized Humboldt Bay as having one of the three largest stands of eelgrass in the Pacific Northwest and suggests that the eelgrass beds of Humboldt Bay are unique. The eelgrass meadow provides direct and indirect food sources for marine food chains, provides habitat and protection, and acts as a nursery for many marine species (i.e., Pacific Herring).

In its 2003 Biological Assessment Report, EnviroNet provided the following discussion of the ecological function and value of the intertidal mudflats:

> The ecological function of the intertidal mudflats include providing cover for a variety of fish, benthic invertebrates (polycheates, crustaceans, and mollusks), marine mammals, and diving birds; providing food for terrestrial mammals, fish, aquatic invertebrates, crustaceans, marine mammals, water birds, shore birds, wading birds, diving birds, and raptors; and providing habitat for eelgrass and a variety of microscopic and macroscopic algae (Barnhart, 1992). Intertidal mudflats have a high ecological value based on the ecological functions.

Shallow and Deep Tidal Channels

The Humboldt Bay Harbor, Recreation, and Conservation District summarized information about several habitats in the bay. The following excerpt from the district's Web site (www.humboldtbay.cnrs.humboldt.edu) describes the shallow and deep tidal channels of the bays.

> Deep tidal channels are those areas within the Bay that are subject to maintenance dredging for navigation and commercial purposes. The depth of these channels varies from 12 to 47 feet below mean lower low water (MLLW) and is maintained by the Corps of Engineers. There is a total of 8.6 miles of these channels in the Bay with widths of 300 to 800 feet.
>
> Deep tidal channels are generally characterized by a dearth of macroscopic vegetation. This is due to both the depth, and subsequent lack of available light, and also the frequent disturbance associated with maintenance dredging activities. There is, however, considerable phytoplankton that occupies the water column in these deep channels (Harding, 1973). The upper limit of deep tidal channels is defined as -12 feet (MLLW).
>
> Shallow tidal channels are more shoal than deep tidal channels and do not undergo periodic maintenance dredging. Natural channels are distributed throughout the Bay and act to drain the mudflats as the tide ebbs. The upper limit of shallow tidal channels is defined as MLLW. The lack of disturbance and the shallow character of these channels allow a few plants to thrive. Eelgrass (*Zostera marina*) can be found along the edges or sometimes at the bottom of these channels. Some algal species, such as sea lettuce (*Ulva spp.*) or filamentous green algae, may also be present in these shallow channels.

3.1.1.4 Aquatic and Terrestrial Species

The inventory of aquatic and terrestrial animal species that utilize Humboldt Bay was adopted from Barnhart et al. (1992). Tables 3-2 to 3-5 list fish, bird, mammal, and invertebrate species known to inhabit the bay, respectively. The list for each group is relatively extensive. Plant species were not listed for this effort, although the plant community is recognized as providing valuable ecological functions in the bay system. The habitats these plant communities provide are described above under the habitat section. Reptile and amphibian species also were not included in this listing because Barnhart et al. (1992) did not include these two groups of animals as important components of the ecology of Humboldt Bay.

3.1.2 Threatened and Endangered Species

Table 3-6 presents current threatened, endangered, and state species of concern. Each species listed in this table is identified in Tables 3-2 through 3-5, with the exception of plant species, which are discussed below. Table 3-6 was developed based on a list supplied by the U.S. Fish and Wildlife Service (U.S. FWS) in response to a request from Sierra Pacific Industries.

Fish

Humboldt Bay is included in the critical habitat designations for coho salmon of the Southern Oregon Northern California Coasts (SONCC) and California coastal (CC) chinook salmon. The area was designated essential fish habitat (EFH) under the Magnuson-Stevens Fishery Conservation and Management Act, which covers waters and substrates necessary for fish to spawn, breed, feed, or grow to maturity.

SONCC coho salmon (*O. kisutch*), CC chinook salmon (*O. tshawytscha*), and Northern California (NC) steelhead (*O. mykiss irideus*) are listed under the Endangered Species Act (ESA) for Humboldt Bay as threatened. These listed salmonids occur seasonally in Humboldt Bay and utilize bay habitat for migration, feeding, and rearing. In August 2004, the California Fish and Game Commission approved new protections for coho salmon, adding them to the list of threatened and endangered species under the California Endangered Species Act. Coho salmon will be listed as “endangered” between San Francisco and Punta Gorda (Humboldt County), and “threatened” between Punta Gorda and the Oregon border. For Humboldt Bay, which is north of Punta Gorda, coho salmon will be in the threatened category.

The tidewater goby (*Eucyclogobius newberryi*) is listed as an endangered species and bocaccio (*Sebastes paucispinis*) is listed as a candidate species. Both of these species have been observed in Humboldt Bay.

Birds

Of the more than 250 bird species noted for Humboldt Bay (Table 3-3) by Barnhart et al. (1992), only five are listed as threatened or endangered by the U.S. FWS (Table 3-6): the California brown pelican (*Pelecanus occidentalis*), bald eagle (*Haliaeetus leucocephalus*), western snowy plover (*Charadrius alexandrinus*), marbeled murrelet (*Brachyramphus marmoratus*), and northern spotted owl (*Strix occidentalis caurina*). Of these, only brown pelicans commonly occur in the bay area. Bald eagle, western snowy plover, marbeled murrelet, and northern spotted owl are not expected to occur in the bay region with any commonality. Bald eagles are principally winter migrants to Humboldt Bay, with rare to occasional occurrences in the area, and the western snowy plover and marbeled murrelet were noted as rare to uncommon by Barnhart et al. (1992). The northern spotted owl was not noted for Humboldt Bay by Barnhart et al. (1992) and is generally restricted to the Redwood zone adjacent to the bay area.

Mammals

Of the mammal species listed in Table 3-4, only the northern sea lion (*Eumetopias jubatus*) is expected to occur in Humboldt Bay with any commonality. Northern sea lions currently are listed as threatened under the Endangered Species Act. Barnhart et al. (1992) considered northern sea lions to be seasonal migrants to Humboldt Bay. The Humboldt marten (*Martes americana humboldtensis*) is considered a species of special concern for the state of California. However, martens generally would be limited to the Redwood zone in adjacent upland areas of the region. This subspecies of the American Marten (*Martes americana americana*) has recently been presumed extinct. However, recent sightings have confirmed the possible existence of the marten variant. As yet, no genetic testing has been performed to confirm specific or sub-specific designation.

Plants

Beech layia (*Layia carnosa*), Humboldt Bay wallflower (*Erysimum menziesii eurekense*), and Western Lily (*Lilium occidentale*) are the only plant species currently listed under the Endangered Species Act (Table 3-6). These species are found in coastal dune and sandy coastal scrub communities; however, none of these species were observed in the site botanical survey (Green, 2002). Howell's montia (*Montia howellii*), pink sand-verbana (*Abronia umbellate breviflora*), and Siskiyou checkerbloom (*Sidalcea malviflora patula*) are listed as species of special concern by the State of California and representatives of the Humboldt Bay region. Howell's montia is a coniferous forest, meadows/vernal species, while pink sand-verbena is a coastal dune representative. Siskiyou checkerbloom seems to be restricted to coastal prairie and coniferous forest habitat. Known from salt marshes within the vicinity are two rare plant taxa: Point Reyes bird's-beak (*Cordylanthus maritimus palustris*) and the endemic Humboldt Bay owl's-clover (*Castilleja ambigua humboldtensis*). These plant species are designated as species of special concern by the State of California, but were not observed at the site during the botanical survey (Green, 2002).

3.1.3 Trophic Structure (Food Web)

Figure 3-9, which was modified from Barnhart et al. (1992), depicts a generalized food web for Mad River Slough and Humboldt Bay. Barnhart et al. (1992) added eelgrass to the food web originally proposed by Simenstad (1983) for estuarine channels of the Pacific Northwest Coast. The model presented here has added a tertiary fish consumer to the web, based on the anticipated exposure pathway for chemicals of potential concern to piscivorous fish. A preliminary list of potential receptors was developed based on the species list described above and the trophic structures presented in Figure 3-9. Table 3-7 presents a preliminary list of species for consideration as receptors of concern and how these species fit within the food web.

3.1.4 Representative Receptors

Representative receptors are species or groups of species that represent ecological functional groups for which risk will be evaluated in the ERA. Potential representative receptors were matched to the general food web categories presented in Figure 3-9. Based on the primary habitat types described in Barnhart et al. (1992) and as described above, a summary of habitat types was developed. Potential receptors were fit to the habitat types based on reported occurrence in these habitat types. Table 3-8 shows these receptors and their habitat associations.

In addition to considering the food web and how potential representative species fit within it, as well as the occurrence of these species in the primary identified habitats, the following factors were considered in arriving at a final representative list of receptors.

- State or federal status of a species (i.e., state species of concern and/or federal listing as a threatened, endangered, or candidate species);
- Commercial and or recreational importance;
- Availability of toxicological data; and
- Availability of feeding and life history data.

Macrophytes

Among the habitat types in the estuarine system of Mad River Slough and Humboldt Bay, are deep water channels, shallow water bays, intertidal mud flats, salt marshes, and wetlands. Each habitat type provides important ecological functions within the estuarine system. Barnhart et al. (1992) indicated that salt marshes generally are perimeter features for the larger Humboldt Bay, except in the Mad River Slough. Dominant salt marsh species include pickleweed, Humboldt cordgrass, and salt grass. The eelgrass bed is an important marine habitat type in Humboldt Bay, Arcata Bay, and South Bay, accounting for about 20 percent of the intertidal habitat of the bay (Barnhart et al., 1992).

For this scoping risk assessment, salt marsh and eelgrass bed habitat types have been selected as representative receptors to assess potential contaminant risks to the ecological community. In this scenario, plant populations and communities are important ecological resources that serve as valuable habitat for higher-level receptors. Thus, plant communities, rather than specific plant species, were identified as important representative receptors playing a critical role in the ecological function of this estuarine system. Limited data are available for developing species-specific risk estimates for particular plant species in this setting. However, it is expected that risks to these community types may be made on a more qualitative scale. If data are available on the quality of the habitat types, then characteristics such as size, density, productivity, and ability to support a diversity of species will be considered important characteristics to define habitat quality.

Pelagic and Epibenthic Zooplankton, Benthic Infauna, and Sessile Epifauna

The diverse benthic macroinvertebrate and zooplankton communities of the Humboldt Bay estuarine environment occupy various habitats, including those associated closely with bottom sediments, salt marshes, eelgrass beds, and other structure in the bay system, as well as the open water. Organisms included in these broad community categories range from free-swimming zooplankton to zooplankton and other invertebrates that live on the surface of or within the bottom sediments.

Because these organisms live and feed largely in the sediment environment, they potentially are exposed to chemicals in the sediments. For this scoping risk assessment, the benthic community (epibenthic zooplankton, benthic infauna) has been selected as a representative receptor. Toxicity data in the form of sediment quality guidelines for marine benthic invertebrates are available for many chemicals to assess their potential toxicity to benthic organisms.

For this scoping risk assessment, sessile epifauna are represented by the bivalves. Among filter feeders, bivalves are the dominant group in sediments of Humboldt bay (Barnhart et al., 1992), with commercial oyster beds covering 324 to 365 hectares (800 to 902 acres) of North Bay (Shapiro and Associates, Inc., 1980). Although several species of bivalves are or could be present in the bay, more abundant bivalves such as the common oyster (*Ostrea lurida*) and Bay mussel (*Mytilus edulis*) typically will be the primary representative receptors. Figure 3-10 shows the distribution of native oyster and clam beds in the bay. Commercial operations for oysters and the locations of those beds are not illustrated on this figure.

Mobile Macroinvertebrates

Mobile macroinvertebrates include secondary consumers such as starfish, crabs, and predatory snails, among others. Dungeness (*Cancer magister*) and rock crabs (*Cancer antennarius* and *Cancer productus*) are common decapods that are commercially important in the bay system. The bay is an important nursery area for juvenile Dungeness crabs, and a small commercial fishery has developed for rock crabs. As secondary consumers, crabs potentially are exposed to contaminants through trophic transfer (consumption of prey) as well as through intimate contact with the sediment and aqueous environment. Depending on the availability of data, either the Dungeness or rock crab species will be used as a representative receptor in this scoping risk assessment.

Pelagic Fish

This category includes free-swimming fish that occupy the water column and feed primarily on open-water species. Two important species are recognized as part of this group, Pacific herring (*Clupea harengus pallasi*) and northern anchovies (*Engraulis mordax*). Humboldt Bay is an important spawning and nursery area for Pacific herring, with eelgrass beds supporting a large percentage of the regional spawning habitat (Barnhart et al., 1992). Because herring feed on pelagic copepods they utilize a food resource not directly evaluated in the scoping risk assessment. Because of its commercial importance and its importance as a forage fish to tertiary consumers, Pacific herring are selected as a representative receptor for pelagic fish. Although no field data were collected for Pacific herring (i.e., this species was not collected in the trawls conducted by EnviroNet), other schooling fish species, that feed in part, on similar prey items were collected including shiner perch, which will be used as a surrogate for Pacific herring in this analysis. Shiner perch are similarly prey items for higher level consumers.

Demersal Fish

Demersal, or bottom-dwelling fish species, are abundant in Humboldt Bay. Species include several species of sharks, rays, surfperches, rockfishes, greenlings, and flatfishes, among others. Other than the speckled sand dab, the English sole is the most common flatfish in Humboldt Bay. English sole are a commercially important species in the bay, which they utilize extensively as a nursery area. English sole and speckled sand dab are two significant predators on benthic infauna and epifauna of the bay, with juvenile English sole concentrating their feeding activities primarily on animals buried in the sediments and later on those on the sediments (Barnhart et al., 1992). Their habitat and feeding strategy represent a different pathway for potential contaminant exposure than the pelagic fish experience. Given their intimate contact with sediments and their feeding habitats, the English sole is selected as an appropriate representative receptor of demersal fish.

Pelagic or Demersal Fish (*piscivores*)

A piscivorous fish species is anticipated to be an important component in the food web and because of its feeding strategy may cause it to bioaccumulate chemicals of potential concern. Chinook salmon were selected to represent this category of fish because of their status as an endangered species as well as their commercial and recreational importance to the local fishery. Adult chinook salmon are primarily piscivores, and thus may be exposed to contaminants through consumption of prey. Expected endpoints for a piscivorous species as a top predator in this scoping risk assessment are tissue residues that could affect individual mortality and growth.

Aerial Searching Bird

Several species of raptors utilize the Arcata Bay area as feeding and nesting grounds. These species include the osprey (*Pandion haliaetus*), American kestrel (*Falco sparverious*), and red-tailed hawk (*Buteo jamaicensis*). The osprey, which is primarily a piscivore, was selected as a receptor for this scoping risk assessment to represent potential exposures to aerial searching birds. The osprey was selected because of their feeding habits and abundance in the Arcata Bay area, as well as the availability of exposure factor information (U.S. EPA, 1993b).

Diving and Searching Bird

Arcata Bay provides important habitat for many species of waterfowl and diving birds. The bay serves as both a stopover point for migratory species and as a permanent habitat for many resident species and individuals. The various marsh and intertidal habitats found in the area provide nesting, feeding, and resting grounds for large numbers of birds.

Two receptors were selected for use in the ecological risk assessment to represent two feeding methods of diving and searching birds within the bay. The brown pelican (*Pelicanus occidentalis*), a common resident throughout much of the year, feeds primarily on pelagic fish in areas of deeper water throughout the bay. The pelican will be used to represent the larger group of piscivorous birds that includes the double-breasted cormorant and other species. The pelican was selected as a receptor because of its common presence in the bay as well as its feeding habits and the availability of data on exposure factors (Cal-EPA, 2004).

The second receptor selected to represent diving and searching birds is the mallard (*Anas platyrhynchos*). The mallard is a common and abundant species in the bay throughout the year. Many individuals migrate through the area, but there is also a large population of nesting mallards that utilize the bay as well. Mallards are opportunistic omnivores that feed on a variety of vegetative matter and benthic macroinvertebrates. This species utilizes the marshy fringe habitats in and above the bay's intertidal zone (Figure 3-11). Mallards will be used to represent the risks to the large number of waterfowl that utilize the bay during some part of the year. They are selected as representative receptors because of their omnivorous feeding habits and abundance in the bay, long with the availability of large amounts of exposure parameter information (U.S. EPA, 1993b, and Cal-EPA, 2004).

Wading Bird

Large populations of wading birds utilize the bay for feeding and nesting. Common resident species include the black-crowed night heron (*Nycticorax nycticorax*), great egret (*Casmerodious albus*), and great blue heron (*Ardea herodias*). Wading birds stalk prey in the intertidal mudflats, feeding on a variety of fish and invertebrates. The great blue heron was selected as the representative receptor for this group of predatory bird species because of its abundance in the bay, its feeding habits that are representative of the general feeding group, and the availability of exposure factor data (U.S. EPA, 1993b).

Surface Searching Shorebird

Arcata Bay provides important habitats for shorebirds. Large numbers of birds migrate through the area in the spring and fall, with smaller populations remaining behind during the summer months. Shorebirds utilize a wide variety of habitats, from marshes to mudflats, typically feeding on small invertebrates and crustaceans.

Although many species of shorebirds may be found in the bay, the spotted sandpiper (*Actitus macularia*) was selected as the receptor representative of this group of species. The spotted sandpiper, while not common in the bay throughout the year, is representative of the feeding habits of the larger group of shorebirds that utilize the bay's habitats. In addition, although exposure factor data are not readily available for many species of shorebird, U.S. EPA (1993b) provides a good source of exposure factor data for the spotted sandpiper. Therefore, the spotted sandpiper can serve as an effective representative species for the group of shorebirds that inhabit the bay.

The western snowy plover (*Charadrius alexandrinus nivosus)* also was selected as a representative receptor in the surface searching shorebird group. The snowy plover was selected because of its potential presence in the study area and its federally threatened status. Plovers forage primarily on invertebrates in the wet sand within the intertidal zone; in dry, sandy areas above the high tide; on salt pans; and along the edges of salt marshes, salt ponds, and lagoons. Exposure factor data were available for this species (Cal-EPA, 2004).

Marine Mammal

The harbor seal (*Phoca vitulina*) is the most abundant marine mammal in the bay. Several hundred individuals use the bay habitat for feeding and breeding areas throughout the year (Barnhart et al., 1992). Figure 3-12 shows areas in the bay where seal activity has been recorded. Harbor seals, which are primarily piscivores, were selected as the representative receptor for the marine mammals group based on their abundance in the bay, feeding habits, and availability of exposure factor data (U.S. EPA, 1993b).

The harbor porpoise (*Phocoena phocoena*) is another predatory marine mammal commonly sighted in the bay. Very few exposure factor data for the harbor porpoise were found, but given the similarities in diet between the porpoise and harbor seal, the porpoise will not be directly evaluated in this document. The river otter (*Lutra canadensis*) was selected as a second marine mammalian receptor. Otters generally are found in the tributaries to the bay, but are also in the intertidal areas. Otters were selected as a representative receptor based on their abundance in the bay, feeding habits, and availability of exposure factor data (U.S. EPA, 1993b).

3.1.5 Conceptual Site Model for Exposure of Ecological Receptors

The conceptual site model for this scoping risk assessment was presented as Figure 2-1 and described in Section 2.1. Potential routes of exposure to contaminants in exposure media (i.e., sediments or food) are indicated for terrestrial and aquatic receptor classes (Figure 2-1). Biota may be exposed to sediment through direct and indirect pathways. Direct pathways include internal (i.e., ingestion) or external (i.e., dermal) contact with contaminated sediments. Direct exposure is most relevant for species that have frequent and/or long-duration contact with sediments such as benthic infauna and epifauna, and some demersal fishes. Some wildlife species may also have direct contact through incidental ingestion of sediments while feeding or burrowing. Indirect exposure refers to pathways in which sediment contaminants are transferred to prey or forage species, and then are ingested by upper level consumers. Indirect pathways are most important for bioaccumulative compounds that may accumulate in prey or forage species.

Potentially Complete Exposure Pathways

The conceptual site model illustrates potentially complete and incomplete pathways for exposure to ecological receptors. Broad-based functional groups are illustrated in the conceptual site model. Table 3-9 illustrates a habitat and species evaluation of potentially complete exposure pathways. Note that the primary mechanism for exposure is sediment and/or prey ingestion. Bioaccumulative contaminants will be evaluated largely through potential food chain effects, either from modeling doses presented by ingestion of contaminated media or through tissue residue concentrations.

The surface water pathway is potentially complete for avian, mammalian, and aquatic receptors; however, as noted in the CSM, ingestion of saltwater by avian and mammalian receptors is incidental since these receptors do not drink saltwater. Therefore, the surface water pathway as an exposure route of COPCs to avian and terrestrial receptors will not be quantitatively evaluated.

Dioxins and furans are hydrophobic constituents which partition and sorb to sediments, thus the water pathway is not considered an important exposure pathway. Zinc, the other COPC being evaluated, is not hydrophobic and exposure through the surface water pathway is likely complete. The source of zinc is probably runoff from metal roofing at the site. Such runoff would be restricted to discrete storm events which would have temporary effects on water quality. Exposure of aquatic biota to zinc in surface waters was not evaluated because of the emphermal nature of the potential exposure. Direct exposure to zinc in sediments was quantitatively evaluated.

3.2 PHASE I—PREDICTIVE ASSESSMENT

As noted previously, the initial evaluation of data suggested that a Predictive Assessment would be required for the site. This section presents the Assessment Endpoints and the methods used to estimate exposure and risk. Data were available from previous sampling efforts and were used to estimate exposures.

3.2.1 Assessment Endpoints

Assessment endpoints were identified based on the criteria and examples provided in DTSC (1996, Part A). Assessment endpoints correspond to ecological functional groups based on trophic level and position in the food web. As described in the DTSC guidance, representative receptors were then identified for use in exposure and risk calculations based on availability of data from the site for the species (or reasonable surrogate species), toxicological information on exposure levels considered protective of the representative species and assessment endpoint, and societal factors. Assessment endpoints are presented in Table 3-10, which corresponds to Example Table 1 from the DTSC guidance, Part A.

Wildlife species (birds and mammals) representing the assessment endpoints were identified based on information about the ecology of Humboldt Bay (Barnhart et al. 1992). Species that live in the water, or are primarily aquatic-feeding, were identified and representative species selected for inclusion in the exposure and risk calculations of the predictive assessment. Note that in some cases a representative species is included in multiple assessment endpoints (e.g., brown pelican). Consistent with the DTSC guidance, reproductive success was the primary attribute on which risk to wildlife receptors was evaluated.

Aquatic species (fish and invertebrates) representing the assessment endpoints were also identified based on information on the ecology of Humboldt Bay (Barnhart et al. 1992). Oysters, crabs, and benthic invertebrates are invertebrates that represent various levels of biological organization. Specific tissue data are available for oysters, mussels, and crabs to assess potential effects to these organisms and the feeding guilds they represent. Flatfishes, specifically sole, were identified as a demersal carnivore and tissue data for this species are also available to assess potential diet effects as well as effects due to proximity to the sediments. No data specific to salmon or herring were available. These species were selected because they represent two distinct habitat and feeding strategies. Collectively, the fish species collected, represent, at various life stages, some of the attributes of the two assessment endpoint species, such that collectively, effects to these species could be considered to cause effects to these assessment endpoint species.

These species are also considered representative of the overall assessment endpoints. In assessment endpoint 3, a general category called benthic invertebrate community is included because the aggregate community is an important overall component of ecosystem function, and is often used in freshwater and marine aquatic assessments to assess impacts from sediment or water quality.

3.2.2 Exposure Assessment Methods

Exposure results from contact between a representative receptor and one or more contaminants in environmental media. In the exposure assessment part of a risk assessment, the magnitude of exposures is estimated for representative receptors. For exposure to occur, a potentially complete exposure pathway must be present, including a release to an environmental medium and a point where receptors could contact the affected medium. The conceptual site model (Figure 2-1) and the information in Tables 3-7 through 3-10 indicate that complete exposure pathways exist. Therefore, an exposure assessment is needed to assess potential risk to representative receptors.

As noted in Section 2.0, the chemicals of potential concern evaluated for the site are dioxins/furans and zinc. PCP is also a site-related contaminant of potential concern for ecological receptors in Mad River Slough and Humboldt Bay. PCP was not detected in any sediment or biological tissue samples collected from the site. In sediments, the PCP analytical detection limit was 0.99 mg/kg. However, PCP detection limits were not sufficiently low to conclude that risk to benthos fish, or wildlife receptors was acceptable. For example, PCP sediment quality guidelines for benthic receptors are 0.360 and 0.690 mg/kg (Barrick et al.

1988). Therefore, additional PCP data may be needed to support risk management decisions for the site.

The first step in characterizing exposure is estimating the representative/exposure point concentrations (EPCs) for chemicals of potential concern in the environmental media which receptors may contact. Analytical results from sediment and biological tissue samples were used to estimate EPCs. Section 2.5 describes the derivation of EPCs for this scoping risk assessment.

3.2.2.1 Methods for Analysis of Aquatic Exposure

Organization of the data to estimate EPCs is described below. Maximum, mean, and 95% UCL of the mean concentrations were calculated to represent a range of EPCs for the site in Mad River Slough and in Humboldt Bay for each contaminant of interest (See Figures 2-2 and 2-3). Mill area EPCs represent the larger extent of contaminant migration away from the sawmill and includes Mad River Slough and the mouth into Arcata Bay. The Humboldt Bay EPCs, which were scattered throughout the bay, include influences from multiple other current and historic sources and may represent the regional anthropogenic ambient conditions. Although COPCs from the sawmill may have migrated to areas outside of that considered to be the affected by the sawmill, the larger Humboldt Bay area is also affected by several other sources of COPCs due to land use and development as well as watershed scale runoff from the different sub-watersheds that enter the bay.

Sediment sample data for each COPC and assessment area were summarized by depth intervals below the sediment surface:

- surface sediment (less than 1 foot below ground surface), and
- subsurface sediment (greater than 1 foot below ground surface).

Selection of these intervals was based primarily on assumptions that the upper foot of sediment represents the biologically active zone, and the potential effects of bioturbation would largely occur in this zone. Bioturbation is caused by sediment burrowing, deposit feeding, and redistributing activities of many infaunal invertebrate species. Chemicals of potential concern found deeper within the sediment layers may be made available through soluble chemical release to pore water and biochemical processes, as well as redistribution of deeper sediments to upper sediment layers.

The relative depth and vertical distribution of sediment contaminants is important in assessing risk to ecological (and human) receptors. The biologically most active zone of sediments is generally surficial layers where the biomass of infauna and epifauna is concentrated. Bioturbation in this area mixes sediments and generally homogenizes concentrations. The depth of this layer can vary among ecosystems, but the US Army Corps of Engineers (ACOE) generally considers the depth of the fully mixed zone to be up to 15 cm (~6 inches)(Clark et al. 2001). Based on measurements on the Palos Verde shelf offshore of Los Angeles, Swift et al. (1996) found that the fully mixed layer ranged from 5 cm to a maximum of almost 30 cm below (approximately 1 foot) the sediment surface.

The density of biota, and bioturbation, decreases with depth in the sediment. As a result, the potential mixing and redistribution of sediment contaminants due to bioturbation also decreases. The depth and extent of bioturbation is important because the extent of mixing affects the rate at which buried contaminated sediments can be redistributed to surface materials, making contaminants available to the bulk of the benthic community, and potentially to organisms that feed on the benthos. Because of the relatively low biotic activity, and resulting lower level of mixing of deeper sediments with shallower sediments, deeply buried contaminants do not generally contribute to surface and food web exposures, but may be important for exposure of deep-burrowing organisms such as some ghost shrimp species.

General biological surveys of Humboldt Bay (Rumrill 2002; Barnhart 1992) indicate the potential presence of benthic species that may burrow below the 30-cm surface layer of sediments. In an overview of the Humboldt Bay ecosystem, Rumrill (2002) listed ghost shrimp (Neotrypaea californiensis) and mud shrimp *(Upogebia pugettensis)* as part of the local benthic infaunal community. Barnhart (1992) listed two additional ghost shrimp species, bay ghost shrimp (*Callianassa (now Neotrypaea) californiensis)* and giant ghost shrimp (*C. gigas)*, as species found in Humboldt Bay. These species tend to burrow deeper than the 30-cm surficial layer, and ghost shrimp are often found at depths of 40-50 cm. The bivalves Pacific gaper (*Tresus nuttali*), and fat gaper (*T. capax*) are known to burrow to depths up to 50-60 cm below the mud surface and are reported for Humboldt Bay (Barnhart 1992). Most polychaetes (marine annelids) that inhabit the Bay live within surface sediments, but some species some species are known to burrow as deep as 30 cm. The MEC Analytical report dated May 2003 that presented results of infaunal community surveys at 8 sites in Mad River Slough and Humboldt Bay found no ghost or mud shrimp in their samples. However, the sampling method (van Veen dredge) was focused on the epibenthic and shallow (30-40 cm) infaunal communities, and may have missed deeply buried species such as ghost shrimp. Therefore, although the site-specific data have not demonstrated their presence, the potential exposure of such species was incorporated in the ERA.

As noted above, data on sediment contaminant concentrations were divided into two depth categories. Surface sediment, which contributes to the exposure of benthos in the fully mixed layers and to food web exposures, was assumed to be the upper 1 foot (30 cm) of sediment. This includes samples taken from the surface, cores taken from entirely within the 0-1 foot zone, and cores samples for which the shallow end was within the 0-1 foot zone, but that extended to depths deeper than 1 foot. This is a conservative representation of the layer with the most concentrated biological activity, and that contributes most to exposures. The second category included samples taken from depths greater than 1 foot. These samples were used to assess potential risk to organisms that burrow deeper than the surface sediments.

The laboratory reports provide data for dioxins/furans in sediments as dry weight concentrations. Zinc data were reported as wet weight concentrations. Not all samples included the percent moisture value needed to convert wet weight samples to dry weight samples. Where zinc concentration data and percent moisture data were paired for a sample, dry weight zinc concentrations for that sample were derived. Where percent moisture data were absent for a specific sample, the mean percent moisture for all zinc samples was used to derive a dry weight concentration.

Fish and invertebrate tissues, collected from several locations, were divided based on the locations where the samples were collected (Figures 2-2 and 2-3). All data on chemical concentrations in fish and invertebrate tissue were utilized in this assessment as wet weight data.

For zinc concentrations in sediments and tissues, the data were similarly organized as discussed above. Maximum, mean, and 95% UCL of the mean concentrations were derived for zinc in sediments and tissues, then compared to media-specific toxicity reference values.

Maximum and 95% UCL concentrations for sediments and tissue data were then used to assess potential exposure to dioxins/furans and zinc by comparing these values to sediment and fish tissue toxicity reference values. In some instances the 95% UCL was greater than the maximum value. When this occurred, the maximum value was used in place of the 95% UCL.

3.2.2.2 General Methods of Estimating Wildlife Exposure

Exposure results from contact between a receptor and one or more contaminants in an environmental medium. For exposure to occur, a release must occur to an environmental medium, and an ecological receptor (or other receptor of concern) must have a point of potential contact with that medium. The potential for receptor contact and identification of exposure routes are shown in the conceptual site model (Figure 2-1). For birds and mammals, the magnitude, duration, frequency, and route of exposure are all factors that affect exposure to chemicals of potential concern. It is important to note, especially for exposures through the food chain, that all chemicals are assumed not to be transformed or degraded during the period of exposure (i.e., the concentration in the medium of concern or prey item remains relatively constant). This is a reasonable assumption for metals and persistent organic compounds such as dioxins/furans because they are not rapidly metabolized or chemically degraded.

The following paragraphs provide an overview of the methods used to estimate exposure of wildlife based on intake of the chemicals of concern identified for the sawmill in food and from the incidental ingestion of sediment while foraging. The intake equations presented below are based on equations presented in U.S. EPA (1993b). Assumptions used in the exposure assessment are shown in Table 3-11.

Chemicals of potential concern identified in the screening steps (Section 2.4) were evaluated for the representative wildlife receptors discussed in Section 3.1.4. Specifically, chemicals of potential concern in sediment were used for the food chain models. The primary exposure pathways for avian and mammalian omnivores, predators, and herbivores are the ingestion of surface sediment, and prey tissues (plant, vertebrate or invertebrate) that may have bioaccumulated chemicals of potential concern from sediments. As stated previously, surface water will not be quantitatively evaluated as a pathway for exposure to mammals and avian receptors. Other potential exposure pathways (e.g., inhalation and dermal exposures) usually are not evaluated due to a lack of scientific information necessary for their inclusion in the risk calculations, and generally contribute relatively little to overall intake (U.S. EPA, 2003). The total daily intake resulting from exposure via these pathways for terrestrial receptors is the sum of the intakes from the different pathways, with the total average daily intake ($Intake_{total}$) of a specific chemical is calculated as:

$$Intake_{total} = Intake_{food} + Intake_{sediment}$$

where:

$Intake_{food}$ = average daily intake from ingestion of prey items (vegetation and animal tissues); and

$Intake_{sediment}$ = average daily intake from incidental ingestion of sediment

The specific exposure factors used in the calculation of intake are described in the following subsections.

Calculation of Intake_{food}

The diet of mammals and birds may include both plants and animals (invertebrate and/or vertebrate). The following equation was used to calculate the quantity of individual chemicals of potential concern that a wildlife receptor could obtain from the ingestion of animal tissue and plant tissue.

$$\text{Intake}_{\text{food}} = AUF * \sum_{i=1}^{m} (IR_f * P_i) * C_i * AF_i$$

where:

Intake_{food}	=	amount of specific chemical ingested per day via ingestion of prey tissues (milligram/kilogram body weight/day);
m	=	total number of ingested prey types**;**
IR_f	=	total ingestion rate of food (kilogram/kilogram body weight/day);
P_i	=	fraction of diet as prey type i;
C_i	=	concentration of chemical in prey type i (milligram/kilogram);
AF_i	=	bioavailability factor of chemical in prey type i (AF_i = 1); and
AUF	=	area use factor or fraction of food/soil/water derived from the site.

For food for which no tissue data were available (i.e., macrophytic vegetation) the C_i was estimated from the concentration of the chemical in sediment. In this case, a biota-sediment accumulation factor (BSAF) was used to estimate the Ci term. The BSAF is multiplied by the concentration of the chemical in sediment to provide an estimate of the concentration in the plant. For dioxin, a BSAF equal to 0.0056 from USEPA (1999b) was used to estimate the concentration term in plants. For zinc, a BSAF equal to 1.82, or the 90^{th} percentile value provided in ORNL (1998) was used in the intake calculations.

Calculation of $\text{Intake}_{sediment}$

In addition to the ingestion of chemicals accumulated in food items, wildlife receptors may also be exposed to chemicals through the inadvertent ingestion of sediment while foraging. The following equation was used to calculate the amount of a chemical of potential concern that a wildlife receptor could obtain from the ingestion of sediment.

$$\text{Intake}_{sediment} = AUF * (IR_f * P_s * C_s * AF_s)$$

where:

$\text{Intake}_{sediment}$	=	amount of specific chemical ingested per day via the incidental ingestion in sediment (milligram/kilogram body weight/day);
IR_f	=	total ingestion rate of food (kilogram/kilogram body weight/day);
P_s	=	proportion of total food ingestion as sediment;
C_s	=	concentration of chemical in sediment (milligram/kilogram);
AF_s	=	bioavailability factor of chemical in sediment (assumed to equal 1.0); and
AUF	=	area use factor or fraction of sediment derived from the site (assumed to equal 1.0).

Daily rates for intake of forage, prey, and sediments were obtained for representative species from U.S. EPA (1993), or information such as the California EPA species database (Cal-EPA, 2002) if data were more representative of the selected receptors. For this scoping risk assessment, the assimilation efficiency or bioavailability of all COPCs in ingested sediments or biota was conservatively assumed to be 1.0 (100 percent). This is a conservative estimate since the bioavailability of most COPCs is less, especially directly from incidentally ingested sediments or gut content of prey items. Calculation of total intake also assumed that animals were obtaining 100 percent of their food from areas under evaluation (i.e., AUF = 100 percent).

3.2.3 Toxicity Data used in Risk Calculations

3.2.3.1 Aquatic Toxicity Reference Values

Toxicity reference values selected for use to assess potential risks to the aquatic community are presented in Tables 3-12 and 3-13. Toxicity reference values, obtained from the scientific literature, include values for sediments, fish, and fish and invertebrate tissues residues.

Sediment

Toxicity reference values used in this scoping risk assessment to assess potential effects to sediment-dwelling organisms or fish are presented in Table 3-12. For zinc, the sediment quality guidelines from Long et al. (1995) were used. Derivation of these values is the result of a large compilation of biological and chemical sediment data from marine systems by staff of the National Oceanographic and Atmospheric Administration. Effects range low (ER-L) values are based on the 10^{th} percentile of adverse effects and represent concentrations below which adverse effects rarely occur. Effects range median (ER-M) values are based on the 50th percentile of adverse effects and represent concentrations above which effects frequently occur. These values were not intended to serve as standards or criteria, nor are they toxicity thresholds, but serve as a guideline for interpreting chemical data in sediments.

The Canadian sediment quality guidelines (CCME, 2001a) were selected for evaluating results for dioxins/furans. Similar to the sediment quality guidelines for zinc, a two-value guideline is presented. The Canadian guidelines provide an interim guideline and a probable effects level derived from freshwater sediment studies because there is a paucity of applicable effects data for the marine environment. These freshwater values were adopted by Canada until such time adequate marine sediment effects data for dioxins/furans are developed. Presently, the Canadian sediment quality guidelines for marine systems and freshwater systems have a safety factor of 10 applied to the values in response to concerns that the lower, unmodified guideline did not meet its objective, presence of a high proportion of sediment quality data below the threshold effects level, and bioaccumulation pathways may not be adequately addressed by sediment quality guidelines. Despite the safety factor, the values presented in CCME (2001a) were utilized as recommended for this scoping risk assessment.

U.S. EPA (1993a) derived low and high risk toxicity reference values based on available data. To translate fish tissue concentrations to sediment concentrations, a biota-sediment accumulation factor of 0.3 was used, because as far as is known, some sensitive fish may be at the high end of the accumulation range. The low risk value corresponds to the highest concentration that is unlikely to cause effects to sensitive organisms, whereas the high-risk value is the lowest concentrations that will likely cause severe effects. These tissue-based toxicity reference values were used in this assessment to evaluate potential risks of dioxins/furans in sediments using 2,3,7,8-TCDD TEQs (2,3,7,8-TCDD toxicity equivalents) to a general fish receptor.

Fish and Invertebrate Tissue Residues

Fish and invertebrate organisms were collected from a number of locations in the Mad River Slough and Arcata Bay. Concentrations of COPCs in tissues from a variety of fish and invertebrate species were available to assess residues that may pose a risk due to bioaccumulative COPCs such as dioxins/furans. Because two primary groups of tissue residue data were available from the field studies, two toxicity reference values were selected for this analysis. U.S. EPA (1993a) derived low- and high-risk toxicity reference values for concentrations of dioxins/furans in fish. These values were normalized to 8 percent lipids. Based on the data presented in U.S. EPA (1993a), it appears that the low- and high-risk toxicity reference values were derived from a variety of biological tissue residues from a number of different life stages, or at least that these ranges of values would be protective of a variety of species and life stages. For this reason, toxicity reference values from this study were utilized to derive hazard quotients for dioxin/furan toxicity equivalents for invertebrate tissues.

Fisk et al. (1997) derived a lowest observed effects concentration (LOEC) and no observed effects concentration (no observable effects concentration) for juvenile rainbow trout growth in 30-day exposures. Growth is an appropriately sensitive indicator of effects due to contaminant exposure. Further, because sensitive salmonid species are known to utilize the bay, tissues-based toxicity reference values for a salmonid seemed appropriate and representative to use as a basis for comparison for all fish tissue residues. Therefore, the no observable effects concentration (NOEC) and LOEC from Fisk et al. (1997) were selected as toxicity reference values for dioxins/furans in fish tissue.

Zinc is not particularly bioaccumulative. In fact, many organisms are capable or regulating zinc concentrations in their bodies via metabolic processes, even when external or prey concentrations are elevated. In general, zinc does not biomagnify in the food chain, but it can concentrate in aquatic flora and fauna. Data on zinc concentrations in tissues were available from the field studies; therefore, zinc tissue residue concentrations were used to estimate EPCs in this assessment. Table 3-13 shows the tissue residue data compiled for zinc. Secondary data sources included Jarvinen and Ankley (1999) and the environmental residue effects database (U.S. ACE, 2003a) which compiled information from primary data sources. For fish, four studies were cited that evaluated growth as an endpoint and included a no observable effects concentration. From these studies, the lowest and highest no observable effects concentration tissue residues for flagfish and salmon were selected as toxicity reference values for this scoping risk assessment.

Zebra mussel zinc tissue residue data were compiled from U.S. ACE (2003a). Although growth effects were considered an appropriate endpoint for this screening-level assessment, no bivalve growth data were found. Mortality was not considered a sensitive enough endpoint. Filtration rate, reported in the database, was considered a good surrogate for growth as a sub lethal indicator of effects. Toxicity reference values selected for zinc in bivalves were the zebra mussel no observable effects concentration and LOEC as indicators of filtration rate effects.

Crab and shrimp tissue data were available for assessing potential risks zinc might pose to these invertebrates. For reasons mentioned above, however, limited tissue residue data were available for these organisms. Tissue residue data for zinc in shrimp and sea urchins were located in U.S. ACE (2003a). Given its grazing omnivorous feeding behavior, sea urchins were considered a suitable surrogate for zinc residues in crabs. No observable effects concentration and LOEC thresholds based on larval development were used as the toxicity reference values for zinc tissue residues to evaluate the crab data.

Zinc tissue residue data for a marine amphipod were used as the toxicity reference value for comparison with site-collected shrimp tissue data. While growth was the endpoint for this test organisms, only a LOEC was reported. Thus the tissue residue toxicity reference value for shrimp data was a growth LOEC. Numerous amphipod studies were available, but all of these were freshwater studies and mortality was the endpoint for the test.

3.2.3.2 Toxicity Reference Values for Wildlife

In Section 3.2.2, exposure of wildlife was estimated for representative species of functional groups based on taxonomy and feeding behavior. The daily rate of intake of chemical was estimated for each COPC and receptor. Estimated intakes must then be compared to laboratory-based intake rates to characterize potential risk. The laboratory-based intake rates, termed toxicity reference values, are of two basic types. The no-observable adverse effects levels (NOAEL) are intake rates below which no adverse ecotoxicological effects are expected. NOAEL toxicity reference values typically are used in screening-level risk assessments to eliminate COPCs that have no potential to cause risk to the representative receptors. The lowest-observable adverse effects level (LOAEL) toxicity reference value is a concentration above which the potential for some adverse effect may be elevated. NOAEL and LOAEL toxicity reference values for both avian and mammalian species were obtained from Sample et al. (1996) which includes a database of widely accepted toxicity reference values for a variety of COPCs. Toxicity reference values presented in Sample et al. (1996) generally were selected as representing high-quality studies that present ecologically relevant endpoints such as growth and reproduction.

2,3,7,8 TCDD

Both avian and mammalian toxicity reference values were identified for dioxins/furans. The avian toxicity reference values, derived from a study by Nosek et al. (1992), represent a reproductive endpoint. Ring-necked pheasants were dosed with 2,3,7,8-TCDD at three concentrations for a period of 10 weeks during reproduction. Rates of egg production and egg hatchability were observed during the dosing period. No effects were noted at the two lowest dose levels, resulting in a NOAEL toxicity reference value equal to 0.00001 milligrams per kilogram per day (mg/kg/day). Decreases in egg production rates were noted at the highest dose level, which Sample et al. (1996) defined as the LOAEL (0.0001 mg/kg/day).

The mammalian toxicity reference values, derived from a study by Murray et al. (1979), are also a reproductive endpoint. Rats were fed varying doses of 2,3,7,8 TCDD in their three generations. Measurements of fertility and neonatal survival noted no effects at the lowest dose level. Sample et al. (1996) proposed using 0.000001 mg/kg/day as the NOAEL toxicity reference value. Because some reproductive effects were noted at the second lowest dose level, it was recommended as the LOAEL toxicity reference value (0.00001 mg/kg/day).

In addition to the intake-based toxicity reference values, risk analyses were also conducted by comparing the tissue residue guidelines from CCME (2001b) to the concentrations in biological tissue samples from Mad River Slough and Humboldt Bay. The CCME (2001b) tissue residue guidelines are intended to represent concentrations in food sources that are not expected to result in adverse effects to sensitive species (Environment Canada, 2000). In the case of dioxins/furans, the criteria are 0.71 nanogram TEQ/kg (wet weight basis) for mammals and 4.75 nanogram TEQ/kg (wet weight basis) for birds. The tissue residue guidelines were calculated for the most exposed and sensitive mammal (mink) and bird (storm petrel) species included in Environment Canada's toxicological surveys. The guidelines were calculated using the midpoint between the NOAEL and LOAEL for the representative toxicological studies, and the maximum food ingestion rate/body weight ratio for mammal (female mink) and bird (storm petrel) species. In addition, the final tissue residue guidelines incorporate a tenfold safety factor from the initial calculations. As a result, the tissue residue guidelines for birds and mammals represent conservative screening that minimizes the chances of underestimating risk.

Zinc

Stahl et al. (1990) fed white-leghorn chickens zinc sulfate at several concentrations for a period of 44 weeks. Reproductive endpoints, such as egg production and hatchability, were measured. No adverse effects were noted at the 14.5 mg/kg day dose, which was recommended by Sample et al. (1996) as a NOAEL toxicity reference value. A 20-percent reduction of egg hatchability was noted at the 131 mg/kg day dose, which was recommended as the LOAEL toxicity reference value.

The mammalian toxicity reference values were derived from a study by Schlicker and Cox (1968), in which where female rats were dosed with zinc oxide during the first 16 days of gestation. Effects on fetal resorption and reduced fetal growth weights were noted at higher doses. Sample et al. (1996) recommends using the 160 mg/kg/day dose as a NOAEL toxicity reference value because no effects were noted at that dose. The LOAEL toxicity reference value suggested by Sample et al. (1996) is the 320 mg/kg/day dose.

3.3 RISK CHARACTERIZATION

The risk characterization phase of the risk assessment process is the point at which information on nature and extent of contamination, the exposure assessment, and the effects assessment are integrated to characterize risks to identified endpoints (U.S. EPA, 1997, 1998a). In this section, estimates of exposure are compared to toxicity reference values to estimate the potential for adverse effects for each of the chemical contaminants. In addition, direct measures of the biological communities at the site are examined to assess whether adverse effects are observable and to assess correlation of effects with trends in chemical concentrations. These two lines of evidence are then integrated to evaluate the potential for adverse effects near the site, the likelihood that the effects result from site-specific releases or conditions, and the primary conditions contributing to effects and/or risk.

Estimating risk based on exposure is conducted by comparing exposure point concentrations (or doses) derived in the analysis step with the media and or receptor-specific toxicity reference values. Results are expressed as Hazard Quotients (U.S. EPA, 1997).

$$HQ = \text{Exposure Point Concentration} \div TRV$$

If the hazard quotient is less than 1.0 (indicating the exposure concentration or dose is less than the toxicity reference value), the occurrence of adverse effects is unlikely. If the Hazard Quotient is equal to or greater than 1.0 (indicating the exposure is equal to or greater than the toxicity reference value), there is a potential for adverse effects (U.S. EPA, 1997). However, there is no clear consensus from either U.S. EPA guidance or the scientific literature concerning the significance of the level of departure from 1.0. One further complicating issue is that a hazard quotient greater than 1.0 by itself does not indicate the magnitude of effect nor provide a measure of potential population-level effects (Menzie et al., 1992). Appendix G includes a calculation tool that was used to estimate exposures and hazard quotients and presents the values for each input parameter.

3.3.1 Risk Characterization for Aquatic Species

3.3.1.1 Aquatic Macrophyte Community

Although salt marsh and mudflats support invertebrate and vertebrate animal species, eelgrass meadows are recognized as having higher diversity of marine and estuarine animal life (U.S. ACE, 2003b). As indicated in the previous discussion of habitat (Section 3.1), the eelgrass community is of particular importance in Humboldt Bay. Figure 3-8 illustrates the approximate locations of eelgrass beds observed in 1980 compared to the most current 1997 data. A more recent survey was conducted by the University of California and state agencies. A description of their efforts, provided at the university's Web site: (www.cehumboldt.ucdavis.edu/Marine_Science- Sea_Grant/Eelgrass_Survey.htm), is summarized below.

> The primary natural resource of interest for the Humboldt Bay Natural Resource Management Plan is eelgrass, *Zostera marina*. This prolific angiosperm is found throughout the intertidal and shallow subtidal habitats of Humboldt Bay interspersed with several species of green algae. Three independent attempts to quantify the distribution and abundance of eelgrass from digitized aerial photographs failed. The technology of the GIS software could not distinguish between *Z. marina* and the green algae. Marine Advisor Susan McBride and colleagues from the Humboldt Bay Harbor, Recreation, and Conservation District and the California Department of Fish and Game completed field work to determine the biomass and plant density of eelgrass at 15 sites in the summer of 2001. Biomass ranged from 0.31 to 0.84 kg fresh weight/m^2 and plant densities were between 31 and 198 plants/m^2. Areas with low biomass or low plant density either contained a narrow band of eelgrass or uneven terrain divided by multiple small channels and bare mud, accounting for the lower values. Areas with high biomass and plant density tended to have a more consistent elevation.

Comparison of eelgrass bed mapping from 1980 to 1997 reveals an apparent increase in number and extent of beds in Humboldt Bay (Figure 3-8). However, as noted above, there may be high levels of uncertainty in quantifying the aerial coverage of eelgrass beds. More importantly, there are a host of physical factors such as elevation relative to the tide, sedimentation, oyster harvesting, and dredging that have been demonstrated to have major effects on eelgrass beds.

SPI reviewed phytotoxicity benchmarks available for assessing risk to eel grass and other marine aquatic plant species. A search of the available literature did not reveal phytotoxicity benchmarks in sediment specific to eel grass, or for assessing potential risk from sediment to aquatic plants in general. Benchmarks are available for bulk soils, such as the values cited in Efroymson et al. (1997), but application of these to saturated conditions of the salt marsh is questionable. As an alternative, a discussion of benchmarks for zinc and dioxins/furans relative to pore water concentration is provided below.

Zinc: Kabata-Pendias and Pendias (1992) cite six values for "maximum acceptable concentrations" ranging from 70 to 400 mg/kg. However, the best available benchmarks for zinc were developed by Paschke et al. (2000) and are based on soluble zinc from sandy soils.

The mean threshold value for overall plant growth from 5 grass species was 159 milligrams per liter (mg/L) (range 84 to 222 mg/L) soluble zinc. We currently do not have the necessary data to assess the soluble zinc in sediment from the Mad River Slough. We would either need direct measure of pore water concentration, or data on the acid volatile sulfide (AVS) concentration, organic carbon content, and pH to generate an acceptable estimate of pore water zinc concentrations.

Although we do not have accurate measurements of zinc in porewater, a useful comparison may be made using the conservative assumption of 100 percent solubility of zinc from the sediment matrix. This is a highly conservative assumption since less than 100 percent of the zinc would be dissolved, especially if zinc is part of the solid sediment matrix, rather than in adsorbed forms. This assumption was used in combination with conservative assumptions about zinc concentrations and sediment porosity to provide a screening-level estimate of zinc concentration in sediment pore water to which plant roots may be exposed.

For the calculation, the maximum zinc concentration detected in sediment in Mad River Slough (111 mg/kg) was assumed. Calculations are also shown for the 95 percent upper confidence limit of the mean (95% UCL) zinc concentration (93 mg/kg) in Mad River Slough. In addition, two potential sediment porosity values were assumed, 0.4 and 0.8. The porosity represents the relative proportion of a sediment/water mixture that is void space and, under saturated conditions, is filled with water. The porosity of 0.4 is the most conservative since it assumes the lower volume of water into which the zinc would be dissolved. The resulting calculations corresponding to the two sediment porosity estimates are as follows:

Porosity of Sediment	Sediment Density (Kg/L)	Sediment Mass (Kg)	Zn Conc (mg/kg dry)	Zinc Mass (mg)	Proportion of Zinc Dissolved	Water Volume (L)	Zn Conc. in Pore water (mg/L)
0.4	1.6	0.96	111	106.56	100%	0.4	266.4
0.8	1.6	0.32	111	35.52	100%	0.8	44.4
0.4	1.6	0.96	93	89.28.	100%	0.4	223.2
0.8	1.6	0.32	93	29.76	100%	0.8	37.2

The estimate of zinc pore water concentration is approximately 266 mg/L for the most conservative scenario of maximum sediment zinc concentration, assuming 100 percent of the zinc is dissolved, and a sediment porosity of 0.4. This value is about 16% higher than the upper-end of the threshold values reported by Paschke et al. (222 mg/L). The pore water concentration corresponding to a porosity of 0.8 (44 mg/L) is nearly one half of the minimum threshold from Paschke et al. (84 mg/L). These estimates of pore water zinc concentrations almost certainly overestimate actual concentrations because (1) it is highly unlikely that 100 percent of the zinc would dissolve into pore water, and (2) the maximum concentration is not representative of the exposure concentrations throughout Mad River Slough. The estimate corresponding to the 95% UCL zinc concentration are more representative of the concentrations in Mad River Slough, but these estimates are still very conservative due to the assumption that the zinc in the sediment matrix is totally soluble. The concentration corresponding to the 95% UCL and the 0.4 porosity (223 mg/L) is approximately equal to the upper threshold value from Pascke et al., the lower value (37.2 mg/L) is well below the lower threshold. Unless eel grass is substantially more sensitive to zinc than the grass species tested by Paschke et al., these screening-level results indicate that zinc concentrations in the sediments are probably not toxic to grass species.

Dioxins/furans: Research did not reveal specific phytotoxicity benchmark values for 2,3,7,8-TCDD as a representative of toxicity of all dioxin/furan congeners. However, Efroymson reports values from Hulzebos et al. (1993) for total furans on growth of lettuce in two types of soil (12 and 24% clay) and solutions made with the same soils. The calculated threshold values for growth in the soils were 617 mg/kg total furans for 12% clay, and greater than 1,000 mg/kg total furans for 24% clay. For soil solutions, the corresponding values were 130 and 135 mg/L for 12 and 24% clay, respectively. The maximum concentration detected in sediment at any depth at the Mad River Slough was 0.000120 mg/kg 2,3,7,8-TCDD TEQ, suggesting little or no risk to aquatic vegetation.

3.3.1.2 Risk Estimates for Benthic Invertebrates and Fish Based on Sediment Toxicity Reference Values

Unlike data for other assessment endpoints, data for assessing risk to the benthic community include direct measurement of effects through sediment toxicity testing and characterization of benthic community composition. Therefore, the analysis presented below includes elements of the predictive assessment and the impact assessment (DTSC, 1996). Elements of a predictive assessment are the comparison of site-specific exposure estimates to toxicity reference values. Elements of an impact assessment are the measurement of toxicity in standard tests and the evaluation of benthic community.

Zinc: Table 3-14 summarizes hazard quotients for benthic invertebrates potentially exposed to sediments that may pose a risk to this community. The maximum zinc concentration (111 mg/kg) in surface sediments (e.g., <1 foot below ground surface) from Mad River Slough was less than the lower toxicity reference value (150 mg/kg), resulting in a hazard quotient of less than 1.0. The maximum zinc concentration in Humboldt Bay surface sediments (237 mg/kg) was greater than the lower toxicity reference value, resulting in a hazard quotient of 1.6. Mean and 95% UCL zinc concentrations in surface sediments of Mad River Slough and Humboldt Bay were less than the lower toxicity reference value, resulting in hazard quotients of less than 1.0. For this Scoping Risk Assessment, the 95% UCLs are the exposure point concentrations expected to be representative of exposure. For both Mad River Slough and Humboldt Bay, hazard quotients of less than 1.0 for zinc in surface sediments indicates a negligible risk to the benthic community due to zinc in sediments.

Subsurface sediments (e.g., >1 foot below ground surface) also were evaluated given the potential that buried contaminants might become uncovered and provide an exposure pathway to receptors. The maximum zinc concentration (106 mg/kg) in subsurface sediments (e.g., >1 foot below ground surface) from Mad River Slough was less than the lower toxicity reference value (150 mg/kg), resulting in a hazard quotient of less than 1.0. The Humboldt Bay maximum zinc concentration (96 mg/kg) in subsurface sediments was also less than the lower toxicity reference value, resulting in a hazard quotient of less than 1.0. Mean and 95% UCL zinc concentrations in subsurface sediments of Mad River Slough and Humboldt Bay were less than the lower toxicity reference value, resulting in hazard quotients of less than 1.0. For this Scoping Risk Assessment, the 95% UCL are the exposure point concentrations expected to be representative of exposure. For both Mad River Slough and Humboldt Bay, hazard quotients of less than 1.0 for zinc in subsurface sediments indicate a negligible risk to the benthic community under baseline conditions or under potential future conditions when subsurface sediment may be exposed.

Zinc risks were also calculated for sediments in the ditches and upland sites. The maximum zinc concentration (811 mg/kg), measured in ditch 7, results in lower and upper hazard quotients for zinc of 5.4 and 2, respectively. Based on the 95% UCL, hazard quotients for the upland sample group were 1.6 and 0.6 based on the lower and upper toxicity reference values, respectively. For these ditches risks were evaluated to benthic invertebrates because, based on review of the data reports, it appeared as though the ditches were frequently, although not continuously, wet, and that they are directly open to Mad River Slough. It was anticipated that during certain periods, these ditches could provide short-term exposures to more mobile benthic organisms. Based on the 95% UCL, potential risks to benthic invertebrates that may move in and out of the ditches are low. Furthermore, exposure durations may be limited, which may further reduce risk potentials. Because Mad River Slough hazard quotients for zinc are also low, it is not expected that high levels of the identified chemical of concern (zinc) are transported in sediments via the ditches.

Dioxins/furans: Toxicity equivalents of 2,3,7,8, TCDD for 17 dioxin/furan congeners were used to estimate exposure. Summary statistics for the Mad River Slough and Humboldt Bay area were used to compare sediment concentrations based on toxicity equivalents for fish to toxicity reference values based on toxicity equivalents. The maximum dioxin/furan toxicity equivalent concentration (59.5 nanogram/kilogram) in surface sediments (i.e., less than 1 foot below ground surface) from Mad River Slough exceeded the lower toxicity reference value (0.85 nanogram/kilogram), resulting in a hazard quotient of 70. The Humboldt Bay maximum concentration of dioxin/furan toxicity equivalents (11.7 nanogram/kilogram) in surface sediments was greater than the lower toxicity reference value, resulting in a hazard quotient of 14. Mean and 95% UCL concentrations of dioxin/furan toxicity equivalents (7.64 and 13.6 nanogram/kilogram, respectively) in surface sediments of Mad River Slough exceeded the lower toxicity reference value, resulting in hazard quotients of 9.0 and 16, respectively. For Humboldt Bay, this same comparison (i.e., mean of 2.63 nanogram/kilogram and 95% UCL of 3.28 nanogram/kilogram) resulted in hazard quotients of 3.1 and 3.9, respectively.

Compared to the upper toxicity reference value (21.5 nanogram/kilogram), the maximum Mad River Slough dioxin/furan toxicity equivalent concentration (59.5 nanogram/kilogram) resulted in a hazard quotient of 2.8, while the same comparison for Humboldt Bay resulted in a hazard quotient of less than 1.0. Mean and 95% UCL (7.64 and 13.6 nanogram/kilogram, respectively) dioxin/furan toxicity equivalent concentrations in surface sediments of Mad River Slough were less than the upper toxicity reference value, resulting in hazard quotients of less than 1.0. For Humboldt Bay, this same comparison (mean of 2.63 nanogram/kilogram and 95% UCL of 3.28 nanogram/kilogram) also resulted in hazard quotients of less than 1.0.

Hazard quotients based on the literature-based lower toxicity reference value exceed 1.0 in Mad River Slough and Humboldt Bay for dioxins/furans, suggesting that surface sediment concentrations of dioxins/furans in Mad River Slough and Humboldt Bay may pose a risk to benthic receptors. Because concentrations of dioxins/furans in sediments of Mad River Slough are higher than those of Humboldt Bay, the risks due to exposure to this chemical in the slough may be higher. However, two important lines of evidence suggest that these hazard quotients may overestimate risk:

- MEC (2003) concluded that the differences observed in infaunal community metrics between the eight sampling stations (distributed in Mad River Slough and Humboldt Bay) appear to be related to differences in habitat (See Section 3.3.1.6). Community metrics tended to be highest (best) in the open bay and lowest in the upper part of Mad River Slough, with intermediate values for the area near the sawmill at the junction of Arcata Bay and Mad River Slough. MEC (2003) cites that these differences (gradients) could be related to many factors including natural causes such as salinity and grain size, but could also be explained by contaminants. The report goes on to state, however, that the infauna community near the sawmill is relatively abundant and diverse.

- Site-specific toxicity test data indicated that surface sediments from Mad River Slough near the sawmill were not toxic when compared to reference sites and control samples, nor were sediments from Humboldt Bay (Figure 3-16) (See Section 3.3.1.5). Samples for dioxins and furans in sediment were analyzed in sediments collected for toxicity testing and for core samples. Samples for toxicity testing, particularly those adjacent to the sawmill were composited for Site C-04 from two locations approximately 60 meters apart (shown on the map as the approximate midpoint of those two stations). Using the database coordinates, a search of all stations centered about this location was conducted to assess if the toxicity data generated from this composite was representative of the conditions of elevated exposure. Within 50 meters of location C-04 the following locations were found: C-03, C-31, C-32, and Lappe_OF2. In the less than 1-foot depth interval, sediment TEQs (based on fish toxicity equivalency factors) ranged from 7.89 nanogram/kilogram to 59.5 nanogram/kilogram and included the highest TEQ_{fish} concentrations found detected in shallow sediment. The same is true of the greater than 1-foot depth interval. Given the proximity of the toxicity test sediments to these other samples, and the fact that these samples contained some of the highest surficial and at depth dioxin and furan concentrations measured, the toxicity test data (particularly for site C-04) provides confirmation that the sediments tested for toxicity were collected in a locale that is representative of the surficial dioxin and furan concentrations where higher levels of exposure would occur.

Sediment data are typically highly variable, both horizontally and vertically. But the range of concentrations of dioxins and furans in sediments in and around the locale where the toxicity test sediments were collected suggest that the range of exposure conditions has been represented. Furthermore, while localized hotspots occur, the use of the maximum and upper 95% representative concentration to estimate risk potentials for both depth intervals using a no effects (lower toxicity reference value) and probable effects (upper toxicity reference value) thresholds demonstrates that potential risks have been thoroughly characterized and are low compared to the probable effects threshold for both depth intervals. It is important to note that both the effects thresholds were used as cited by CCME (2001) and have a safety factor of 10 applied (e.g., the thresholds are ten times lower tan originally derived) based on CCME (2001). Thus, the lack of measurable toxicity, good benthic community diversity, and relatively low hazard quotients (with safety factor added to the toxicity reference value) suggest that risk in sediments to benthic invertebrates from dioxin and furans is low.

Concentrations of dioxins/furans in subsurface sediments (i.e., greater than 1 foot below ground surface) also were evaluated. The maximum dioxin/furan toxicity equivalent concentration (69.1 nanogram/kilogram) in subsurface sediments from Mad River Slough was greater than the lower toxicity reference value (0.85 nanogram/kilogram), resulting in a hazard quotient of 81. The Humboldt Bay maximum dioxin/furan toxicity equivalent concentration (10.6 nanogram/kilogram) in subsurface sediments was also greater than the lower toxicity reference value, resulting in a hazard quotient of 12. Mean and 95% UCL dioxin/furan toxicity equivalent concentrations in subsurface sediments of Mad River Slough (21.4 and 34.5 nanogram/kilogram, respectively) were also greater than the lower toxicity reference value, resulting in hazard quotients of 25 and 41, respectively. Mean and 95% UCL dioxin/furan toxicity equivalent concentrations in subsurface sediments of Humboldt Bay (5.68 and 8.85 nanogram/kilogram, respectively) were also greater than the lower toxicity reference value, resulting in hazard quotients of 6.7 and 10.4, respectively.

Compared to the upper toxicity reference value (21.5 nanogram/kilogram), maximum dioxin/furan toxicity equivalent concentration (69.1 nanogram/kilogram) in subsurface sediments in Mad River Slough resulted in a hazard quotient of 3.2, while the same comparison for Humboldt Bay resulted in a hazard quotient of less than 1.0. Mean and 95% UCL (21.4 and 34.5 nanogram/kilogram, respectively) dioxin/furan toxicity equivalent concentrations in subsurface sediments of Mad River Slough were equal to 1.0 for the mean and was 1.6 for the 95% UCL. For Humboldt Bay, this same comparison for subsurface sediments resulted in hazard quotients of less than 1.0 when compared to the upper toxicity reference value.

Subsurface sediment concentrations of dioxins/furans were elevated, resulting in hazard quotients that suggest possible risks to benthic invertebrates. Although no toxicity test data are available for these deeper sediments, concentrations of dioxins/furans in subsurface sediments are similar to those in surface sediments. Therefore, there is little expectation that these subsurface sediments would be toxic to benthic invertebrates.

3.3.1.3 Risk Estimates for Fish and Invertebrates Based on Tissue Residues

Zinc: Potential zinc risks to aquatic receptors were also estimated by comparing tissue residue-based toxicity reference values to site-specific tissue data from fish and invertebrates. Table 3-14 summarizes hazard quotients for fish receptors potentially exposed to sediments or that potentially ingest prey that may pose a risk to this community. Figure 3-13 illustrates the hazard quotients derived from this effort. Zinc tissue residues for mussel, sculpin, shiner, sole, and shark did not exceed tissue residue effects levels (i.e., all hazard quotients were less than 1). In oyster tissues, lower and upper hazard quotients derived using the 95% UCL for Humboldt Bay were 2.41 and 0.9, respectively, while in Mad River Slough 95% UCL hazard quotients were 2.2 and 0.8. Concentrations of zinc in oyster tissues from both areas were similar and pose low risks. Crab tissue hazard quotients exceeded 1, but by a very small margin, with 95% UCL hazard quotients based on lowest observable effects levels for Humboldt Bay equaling 1.2, and equaling 1.1 for Mad River Slough. For both of these organisms, zinc concentrations in tissues from Humboldt Bay and Mad River Slough were similar, resulting in similar hazard quotients, suggesting that zinc in tissues of these organisms does not pose a risk due to the sawmill.

Perch tissue samples were collected only in Humboldt Bay. For these samples, the 95% UCL hazard quotients were 1.18 and 0.67 based on lower and upper toxicity reference values, respectively. The zinc concentration measured in perch (40 milligram/kilogram wet weight) was only slightly higher than the no observable effects concentration toxicity reference value for growth (34 mg/kg wet weight).

Dioxins/Furans: Tissue residues of dioxins/furans from fish and invertebrates were compared to tissue toxicity reference values to estimate potential risks. For both Mad River Slough and Humboldt Bay, 95% UCL concentrations of dioxins/furans in oyster, crab, mussel, sculpin, perch, shiner, sole, shrimp, and shark tissue samples were all less than the no observable effects concentration, resulting in hazard quotients less than 1 (Figure 3-14), and indicating negligible risk.

An alternative toxicity reference value for dioxins and furans was suggested by CDFG based on research by Giesy et al. (2002). The study involved long-term exposure of female rainbow trout. The study evaluated adult female fish that were exposed for up to 320 days to experimental diets containing environmentally relevant concentrations 2,3,7,8-TCDD, generally thought to be the most toxic form of dioxins and furans. Tritium-labeled TCDD and non-labeled TCDD were added to commercial fish food to create diets with nominal TCDD concentrations of 0 (control), 1.8, 18, an 90 nanogram/kilogram (moist weight). The paper concluded that the diet containing 1.8 nanogram/kilogram TCDD TEQ was equivalent to the LOAEL (based on the most sensitive endpoint, mortality) for diet, and that the whole-body TCDD LOAEL was a concentration of 1 nanogram/kilogram in fish tissues. However, in analyzing the uncertainty of their results, the authors point out that the control diet contained up to 2.3 nanogram/kilogram TCDD-TEQ as TCDD and co-planar PCBs, and that since the control diet had no effect on fish, the authors suggest the TCDD in the control diet may be considered close to the NOAEL, and that the LOAEL could be around 4.1 nanogram/kilogram (i.e., 1.8 nanogram/kilogram in the nominal diet and 2.3 nanogram/kilogram in control diet to which the TCDD was added).

Uncertainties about the result data prevent final conclusions as to the absolute accuracy of the LOAEL (or NOAEL) estimates, and more studies including long-term exposure are necessary to make such conclusions. However, in the context of data from the Mad River Slough, the maximum 2,3,7,8-TCDD TEQ concentration in aquatic species, which are the potential diet of carnivorous fish, was 2.29 nanogram/kilogram (crab; See Table 2-4). This is approximately equal to the 2,3,7,8-TCDD TEQ concentration found in the control diet from the Giesy et al. paper, and about 17 percent higher than the nominal dietary LOAEL (1.8 nanogram/kilogram) cited by Giesy, et al. The maximum concentration in other species was 2.24 nanogram/kilogram, and the remaining species tested were under 1.0 nanogram/kilogram. These data suggest that the maximum exposure of fish to dioxins and furans is approximately equal to the threshold toxicity (i.e., between the NOAEL and LOAEL) for highly sensitive fish taxa such as salmonids. Thus, some highly sensitive species that reside in Mad River Slough for long periods may experience effects. However, more migratory species that spend less time there, or less sensitive species may not be exposed to unacceptable exposures.

Protective guidelines for sediment have been developed based on bioaccumulation factors and fish tissue (U.S. EPA, 1993a). These guidelines also were used to help assess whether sediment concentrations of dioxins/furans might pose a risk to fish. Two horizons (<1 and >1 foot below ground surface) were evaluated for Mad River Slough and Humboldt Bay sediments. Exposure concentrations for dioxins/furans based on the 95% UCL for sediments in each of these horizons, for each area were all less than the low risk threshold (60 nanogram/kilogram dry; U.S. EPA, 1993a) resulting in hazard quotients less than 1.0, with the exception of sediment in Mad River Slough greater than 1 foot bgs (hazard quotient of 1.2),. The concentration in sediment in Mad River Slough greater than 1 foot bgs was slightly grater than 60 ng/kg (69.1 ng/kg), but less than the upper toxicity reference value of 100 ng/kg. Thus, dioxins/furans in biological tissues of organisms in Humboldt Bay and Mad River Slough are not predicted to pose a risk to aquatic organisms.

Although all hazard quotients for dioxins/furans in fish and invertebrate tissues were less than 1.0, invertebrates tended to have higher dioxin/furan toxicity equivalents. Figure 3-15 compares the mean plus the standard deviation of the mean of the invertebrate and fish tissue data from Mad River Slough to Humboldt Bay. Figure 3-15 illustrates that (1) invertebrate tissues in both Mad River Slough and Humboldt Bay tend to have higher dioxin/furan toxicity equivalents than vertebrates, and (2) both invertebrate and fish tissues from Humboldt Bay tended to have higher dioxin/furan toxicity equivalents than those measured for Mad River Slough. These differences probably are not statistically different given the variability among taxa and sampling locations. For oysters, mussels, and crabs, which tend to be more localized to a given area, however, higher dioxins/furans in biological tissues from Humboldt Bay may also be due to a larger sample size (particularly for oysters). For fish, the difference in analytical results between Mad River Slough and Humboldt Bay is less substantial and may be affected by fish movement between the two areas.

3.3.1.5 Testing for Benthic Invertebrate Toxicity and Bioaccumulation

Toxicity Testing

Based on the results reported by MEC (2003), survival of the amphipod *Eohaustorius estaurius* and the polychaete worm *Neanthes arenaceodentata* were not statistically different for any of the Mad River Slough sediments collected from near the sawmill in comparison to the reference sediments. Control survival for *E. estuaries* and *N. arenaceodentata* was measured at 97 and 92 percent, respectively, falling within the 90-percent minimum acceptable control survival criterion. Survivability within the test sediments ranged from 85 to 91 percent for *E. estuaries*, with survival for reference sites measured at 80 percent for Arcata Bay and 86 percent for North Arcata Bay. *Neathes arenaceodentata* had 88 percent survival for both reference area sediments, while test sediments showed 92 to 100 percent survival (Figure 3-16). These results indicate that sediments near Mad River Slough are not more toxic than reference or control sediments, and that there is no apparent effect associated with sediments potentially most affected by the sawmill.

Testing for Bioaccumulation Potential

Tissue analysis was not performed for the *Macoma nasuta* tests (MEC, 2003), as reference and control results were outside recommended survivability guideline (U.S. EPA, 1993a). Mean percent survival for the bivalve *M. nasuta* was poor in control and site sediments, ranging from 25 to 59 percent. Survival in reference sediments ranged from 37 to 58 percent, while survival in control tests was 53 percent, indicating 47 percent mortality, well above the mortality guidelines (<30%) for control and reference sediments (U.S. EPA, 1993a).

MEC (2003) presented the results of tissue analysis for the bioaccumulation tests using *Nereis virens*. Toxicity equivalency units were calculated for dioxin/furan congeners using toxicity equivalency factors for fish (Environment Canada, 2000). The zero-time, lipid-normalized values for all congeners were greater than values reported for the two reference areas (Arcata Bay and North Arcata Bay). The zero-time lipid-normalized toxicity equivalent was 0.615 nanogram/kilogram. Arcata Bay reference toxicity equivalent values ranged from 0.239 to 472 nanogram/kilogram (mean of 0.333 nanogram/kilogram), while the North Arcata Bay toxicity equivalent values ranged from 0.304 to 0.455 nanogram/kilogram (mean of 0.361

nanogram/kilogram). The toxicity equivalent values for Mad River Slough near the sawmill ranged from 0.225 to 0.684 nanogram/kilogram, with mean values ranging from 0.347 to 0.504 nanogram/kilogram. Again, the zero time toxicity equivalents exceeded the highest toxicity equivalents for all Mad River Slough mill area sediments, except for sample C-4, indicating that low levels of dioxins/furans were present in the tissues prior to analysis (MEC, 2003).

Biota-sediment accumulation factors were derived using data from MEC (2003); however, given the tissue concentrations of dioxins/furans in tissues of the test organisms at time zero, the reliability of these biota-sediment accumulation factors is questionable. Biota-sediment accumulation factors derived by MEC (2003) were not used to estimate tissue residue concentrations in organisms for this assessment. Instead, measured tissue residues from fish and invertebrate species collected in Mad River Slough and Humboldt Bay were used to assess whether tissue residue thresholds were exceeded.

3.3.1.6 Benthic Infaunal Assessment

MEC (2003) presented results of benthic infaunal sampling from 8 locations conducted over a two-day period in October 2002. Figure 2-2 and 2-3 show the locations of where samples for benthic invertebrates were collected. Appendix B presents the species lists and counts for each replicate sample. The eight (8) sampling stations (numbered 1 through 8) included upper back waters of Mad River Slough (stations 3 and 4), intertidal mudflats of the slough adjacent to the sawmill (station 2), main channel of Mad River Slough adjacent to the sawmill (station 5), the main channel area at the confluence of Mad River Slough and Arcata Bay (station 1), main channel in northwest portion of Arcata Bay (station 6), main channel in central Arcata Bay (station 7), and near Eureka (station 8).

One hundred and ten unique taxa represented by 22,996 individuals were found within the 24 benthic infauna samples. On average there were 958 individuals per sample or 9,580 individuals per m^2 represented by an average of 33 taxa per sample. Polychaete worms had the greatest diversity with over 55 representative taxa (≈50.0% of the overall taxa) and total abundance of 16,458 individuals (71.6% of the total individuals). Even with comparatively low abundance crustaceans accounted for the next highest diversity (25 taxa equivalent to 22% of the overall taxa and total abundance of 1,059 individuals equivalent to 4.6% of the total individuals). Mollusks accounted for 19% of the taxa (22 taxa) and 8.2% of the total abundance (1889 individuals). Echinoderms were represented by two immature bristlestars collected in a single replicate at station 6. Due to 3024 individual phoronids (*Phoronopsis viridis*) collected at station 8, minor phyla (e.g., hydroids, nemerteans, nemotodes, flatworms, and phoronids) showed unusually high abundance, accounting for 15.6% of the total abundance.

Again due to the high numbers of phoronids and polycheates, station 8 near Eureka had the greatest total abundance (7,139 individuals), followed by stations 6 (3,706 individuals) and 7 (3,924 individuals). Stations 1 (2,458 individuals) and 5 (2,622 individuals) had the next highest abundance, followed by station 2 (1,433 individuals). The upper backwater areas in Mad River Slough stations 3 and 4 had the lowest abundance, with 579 and 1,135 individuals, respectively. On the contrary, station 7 had the highest number of species (62 taxa), followed by station 2 (58 taxa), station 6 (51 taxa) and station 8 (50 taxa). Upper Mad River Slough stations 3 and 4 had the lowest number of species with, 36 and 25 taxa, respectively. Forty-three and 44 species were collected from stations 1 and 5, respectively. Biomass was highest at station 8 (178.9 grams, due to the phoronids), followed by station 2 (29 grams), station 3 (24.3 grams), station 6 (22.7 grams), and station 7 (16.6 grams). Stations 1 and 4 had the lowest biomass, with 6.7 and 7.3 grams, respectively. Diversity indices (Shannon-Wiener diversity index, Margalef diversity index, Dominance index, and Evenness) were highest at station 2. As stated by MEC (2003), the Shannon-Wiener diversity index, Dominance, and Evenness measures are more sensitive to the equitability of the distribution of individuals among species, while the Margalef diversity index is more sensitive to the number of species. Thus station 2 showed a high number of species with relatively evenly distributed numbers of individuals amongst the given taxa. The central Arcata bay reference location (station 7) had the next highest diversity index and equitability measures. Stations 8 and 4 had the lowest diversity index measures. Figures 3-17 through 3-20 show graphical comparison of community measures for 7 of the sampling stations. Due to fauna and habitat dissimilarities between the Eureka sample location (station 8) and the other seven sample location in Arcata Bay and Mad River Slough, data for station 8 was not included in Figures 3-17 to 3-20. Table 3-15 presents summaries of the infaunal community measures based on the sum of the three replicate samples at each station. Similarly, Table 3-16 presents summaries of the average (mean of the three replicate samples) community measures for each station.

MEC (2003) also presented the results of a cluster analysis conducted to determine which station were most similar based on observed species and abundances. The cluster analysis showed the Mad River Slough main channel stations 1 and 5 to be most similar to the Arcata Bay main channel reference stations 6 and 7. Station 2 was found to be most similar to the up-gradient Mad River Slough stations 3 and 4. While station 8 near Eureka was representative of different habitat, with a unique assemblage of species.

MEC (2003) concluded that the differences observed in infaunal community between the eight sampling station appear related to differences in habitat. These differences are most likely due to salinity concentrations, sediment grain size, and macrophyte presence/absence and coverage. Overall, sample stations directly adjacent to and or downgradient of the sawmill, were not devoid of infaunal species, and the intertidal mudflat (station 2) in front of the sawmill demonstrated the highest diversity of all the stations sampled.

3.3.2 Risk Characterization for Wildlife Species

Information available for assessing risk to representative wildlife receptors includes data on COPC concentrations in sediments and biological tissues of various species collected from the site. These data were used in two ways. First, the rate at which representative receptors ingest COPCs was estimated and compared to intake-rate based toxicity reference values. Second, the concentrations of dioxins/furans in tissues of aquatic prey species were compared to TRGs developed by Environment Canada (2000) for assessing ecological risk.

Evaluation of risk using intake-based toxicity reference values was conducted using a screening-level step in which the maximum site exposures were compared to NOAEL-based toxicity reference values (U.S. EPA 1997). NOAEL-based toxicity reference values represent exposures below which adverse effects are unlikely to occur. If maximum exposures for a site do not exceed the NOAEL for a given receptor/COPC pair (i.e., the hazard quotient <1), then risk is considered *de minimus* and no further analysis is generally necessary (provided data adequately represent maximum exposures [EPA 1997]. Comparison of the maximum to the NOAEL is a conservative scenario that minimizes the chance of overestimating risk because it assumes that the receptor spends all of its time in areas of maximum concentrations.

A NOAEL-based hazard quotient that exceeds 1 does not necessarily indicate unacceptable risk, but that additional analysis with more realistic assumptions about exposure and toxicity is necessary in the risk characterization. In this Scoping Risk Assessment, the additional analyses for bird and mammals consisted of comparing the 95% UCL for each exposure medium to the NOAEL and LOAEL-based toxicity reference values. The 95% UCL is the generally accepted metric for such comparisons in risk assessments because it represents a reasonable ‘high end’ estimate of exposure (U.S. EPA 1997, 1998). In addition to the intake-based exposure analysis, data from the dioxin/furan analysis of various biota types was compared to the Environment Canada TRGs. As described above, TRGs are meant for comparison to concentrations in aquatic biota for purposes of evaluating risks to wildlife consuming the aquatic biota. Environment Canada developed the TRGs to represent concentrations below which adverse effects are not expected for the birds and mammals. Inclusion of this analysis provides additional context for evaluating risk from dioxins and furans.

Results are presented separately for avian and mammalian representative receptors.

Avian Receptors

Zinc: For zinc, screening-level hazard quotients exceeded 1.0 for mallard, spotted sandpiper, and western snowy plover, with the maximum screening-level hazard quotient of 4.9 for spotted sandpiper in Humboldt Bay (Table 3-17). None of the maximum exposure estimates exceeded the LOAEL-based toxicity reference values for any bird species. The 95% UCL-based exposures exceeded the NOAEL-based toxicity reference values for each of three avian receptors mentioned above in both Mad River Slough and Humboldt Bay, but did not exceed the LOAEL-based toxicity reference values for any receptor (Table 3-17). In general, hazard quotients from Humboldt Bay locations exceeded those from Mad River Slough by a small margin.

Although a formal determination of ambient zinc concentrations in sediment and biota has not been conducted, natural zinc concentrations in sediments along coastal areas of the Pacific Northwest tend to be up to 100 mg/kg (NOAA 1994). Maximum and 95% UCL zinc concentrations in Mad River Slough sediments were 111 and 93 mg/kg (respectively), and appear to be within the range of ambient conditions. The 95% UCL concentration in Humboldt Bay was similar (94 mg/kg), but the maximum concentration was higher (237 mg/kg). Therefore, sediments in Mad River Slough do not appear to contain significantly elevated levels of zinc. In addition, zinc in Mad River Slough sediments appears to be lower than sediments from Humboldt Bay, suggesting that sources other than the sawmill and Mad River Slough are most important in determining zinc levels in Humboldt Bay.

Dioxins/furans: Screening-level evaluation results for dioxins/furans (i.e., maximum intake estimates vs. NOAEL-based toxicity reference values) indicated that maximum exposures in Mad River Slough and Humboldt Bay do not exceed the NOAEL-based toxicity reference values for any of the avian receptors, with the exception of spotted sandpiper which had a NOAEL-based hazard quotient of 1.5 for Mad River Slough (Table 3-17, Figure 3-21). The maximum concentration in Mad River Slough did not exceed the LOAEL-based toxicity reference values for spotted sandpiper (Figure 3-22). Note that since these screening-level exposure calculations assume that birds obtain all of their food from either Mad River Slough or Humboldt Bay (i.e., AUF = 1), the result is highly conservative for many species such as osprey, great blue heron, brown pelican, and mallard because these species are likely to feed over a larger area than Mad River Slough. This result indicates that birds feeding in the vicinity of the sawmill, or in Humboldt Bay do not appear to be at risk of toxic exposure to dioxins/furans.

Comparison of Environment Canada TRGs to dioxin and furan concentrations in potential aquatic prey species results in a similar conclusion. Maximum dioxin and furan concentrations in fish and invertebrate tissues from Humboldt Bay and Mad River Slough did not exceed the TRG for birds (Figure 3-23). Based on these data, birds feeding in Humboldt Bay or Mad River Slough would not be at risk of toxic exposure to dioxins/furans even if they fed exclusively on species with the maximum detected concentrations of the contaminant.

Surface searching shore birds typically consume a wide variety of invertebrates including epibenthic and infaunal species. Generally, shorebird diets consist of polychaete and oligochaete worms, insect larva, and aquatic insects such as water boatmen. Other food items include amphipods, copepods, crustaceans, and mollusks (UFWS Migratory bird web site [http://migratorybirds.fws.gov/shrbird/shrbird.html]). Page et al. (1995) provide an anecdotal list of terrestrial or aquatic invertebrates in plover diets from sandy beaches of Santa Barbara County including small clams, various polychaetes , mole crabs (Emerita analoga), young shore crabs (Pachygrapsus crassipes), amphipods (Megalorchestia spp.), kelp flies (Coelopa), and various beetles.

Crabs were the only invertebrate species for which tissue data were available from the site. Although crabs are a component of shorebird diets, other types of invertebrates are also included. To assess the potential exposure from prey types other than crabs, literature-based biota-sediment accumulation factors (BSAFs) for marine invertebrates were used to estimate the chemical concentrations in invertebrate tissue. A range of BSAFs corresponding to the minimum, mean, and maximum for marine invertebrates were compiled from the USACE (2003) BSAF database. This range of BSAFs was used with the 95% UCL and maximum surface sediment concentrations to estimate dietary concentrations under the range of assumptions. The results of this analysis are presented in Figures 3-24 through 3-27 and in Table 3-18.

For spotted sandpiper, the screening-level evaluation for dioxins/furans (i.e., maximum intake estimates vs. NOAEL-based toxicity reference values) using maximum BSAFs resulted in hazard quotients of 21.8 and 5.3 for Mad River Slough and Humboldt Bay, respectively. For snowy plover, under similar screening conditions, the hazard quotients were similar, with hazard quotients of 21 and 5.1 for Mad River Slough and Humboldt Bay, respectively. However, using the 95% UCL sediment values for Humboldt Bay and Mad River Slough and a mean BSAF results in NOAEL hazard quotients of less than 1 for both species. While not used due to apparent background contamination, derived BSAFs from MEC (2003) averaged only slightly higher than the mean BSAF used for this analysis. All LOAEL based hazard quotients using the 95% UCL and mean BSAF were less than 1.0.

Mammalian Receptors:

Zinc: Screening-level hazard quotients (i.e., maximum intake estimates vs. NOAEL-based toxicity reference values) for zinc were less than 0.03 for both species in Humboldt Bay and in Mad River Slough (Table 3-17; Figure 3-28). Therefore, risk from zinc to aquatic-feeding mammals appears to be *de minimus*, and no further analysis is recommended. Comments were raised about the use of the NOAEL toxicity reference value. California Department of Fish and Game indicated that they support the use of USEPA Region 9 Biological Technical Assistance Group (BTAG) toxicity reference values. For zinc, this NOAEL value for wildlife is 9.6 mg/kg/day, which is significantly lower than the value used to estimate the risk estimates above. Because of the difference in this screening value, additional risk analyses were run to estimate potential risks to mammals due to zinc exposures. Screening level hazard quotients (i.e., maximum intake estimates vs. NOAEL-based toxicity reference values) for zinc were less than 0.5 for both species in Humboldt Bay and in Mad River Slough.

Dioxins/furans: Screening-level hazard quotients (i.e., maximum intake estimates vs. NOAEL-based toxicity reference values) for dioxins and furans were less than or equal to 0.4 for both species in Humboldt Bay and in Mad River Slough (Table 3-17, Figure 3-28). Therefore, risk from dioxins and furans to aquatic-feeding mammals appears to be *de minimus*, and no further analysis is recommended.

Figure 3-23 shows comparison of Environment Canada TRGs to dioxin and furan concentrations (expressed as TEQs) in aquatic prey of otters and harbor seals. Maximum and 95% UCL concentrations in crabs and sculpin from Humboldt Bay exceed the mammal TRG; as did the maximum and mean concentration in oysters. For Mad River Slough, maximum and 95% UCL concentrations in crabs, mussels and oysters exceeded the TRG, but no fish species contained dioxins/furans that exceed the mammal TRG.

The results of this comparison must be evaluated in the context of a mixed-species diet. The diet of otters and harbor seals include multiple species, with fish making up most of the diet for both species (Table 3-11). Although dioxin and furan concentrations in some invertebrates exceed the mammal TRG, concentrations in fish species from Mad River Slough do not (Figure 3-23). In Humboldt Bay, maximum concentrations in sculpin exceed the TRG, but not other species. These results suggest that mammals that feed primarily on crabs or oysters may experience dioxin and furan exposures exceeding the TRG but primarily piscivorous species may be at minimal risk. Results also indicate that dioxin and furan concentrations, and therefore exposures, in Mad River Slough are similar to Humboldt Bay, suggesting that the sawmill may not be a currently important source of dioxin and furan migration into Mad River Slough.

3.4 UNCERTAINTY ANALYSIS

Risk assessments (ecological and human) require assumptions and extrapolations within each step of the analysis. These assumptions lead to uncertainty in predicted risks. The uncertainties generally limit the parameterization of exposure and risk models and their applicability to a given site. Accordingly, the key assumptions and uncertainties judged to have the greatest influence on the ecological risks predicted for this Scoping Risk Assessment are summarized and discussed below.

In risk analysis, uncertainty stems from many sources. Some of the more common forms are listed below:

- Sampling uncertainty and dap gaps (i.e., uncertainty about spatial distribution of contamination as a consequence of limitations in sampling a site).
- Uncertainty in the selection of COPCs.
- Uncertainty in risk characterization using laboratory-based toxicity values and the hazard quotient approach.
- Uncertainty in models and parameters used to estimate risk potentials.
- Uncertainty in the natural (seasonal and/or annual) variability in the species, populations, communities, and ecosystems in question, as well as uncertainty regarding individual sensitivity to COPCs.

The uncertainties listed above are discussed in the following subsections. In addition, the discussion will focus on how the uncertainty may affect the risk estimates presented herein.

3.4.1 Sampling and Data Gaps

The primary data gaps identified in the conduct of this Scoping Risk Assessment were the lack of surficial water quality data collected simultaneously with sediment data, and the lack of percent moisture analyses for all sediment samples submitted for analyses.

No surficial water quality data were collected during the primary sampling event (October 2002) that comprises the bulk of the data used for this analysis. For metals, water exposure can be an important pathway for aquatic organisms. Hydrophobic organic compounds tend to partition to sediments, diminishing the importance of water as an exposure pathway. For the sawmill, zinc was the metal of potential concern. The source of zinc is probably runoff from metal roofing at the site. Such runoff would be restricted to discrete storm events which would have temporary effects on water quality. For terrestrial and avian receptors, the water exposure pathway is likely less significant, but the absence of water data for this assessment required an assumptions of zero in the dose calculations for water intake.

For sediment analyses, dioxins/furans were all reported as dry weight and these data typically originated from a single laboratory. Analyses for other parameters and biota samples from several different efforts were most often reported as wet weight concentrations. Some dry weight sample data were available, but these data were often for the dioxin/furan analyses. For samples collected at these locations and submitted to another laboratory, the intent may have been to use percent moisture from the dioxin/furan samples to represent the moisture content for each sample location. However, it appears that while collected at the same location, samples submitted for metals, SVOC, pesticide, and other analyses were shipped to a separate laboratory and these samples did not have percent moisture reported for each sample. Where zinc concentration data and percent moisture data were paired for a sample, dry weight zinc concentrations for that sample were derived. Where percent moisture data were absent for a specific sample, the mean percent moisture for all zinc samples was used to derive a dry weight concentration.

3.4.2 Selection of COPCs

Selection of COPCs was presented in Section 2.4. The effort was focused on those chemicals associated with known Mill sources. Samples of off-site sediment and biota, included analyses for metals, dioxins/furans, semi-volatile organic compounds, pesticides, PCBs, polycyclic aromatic hydrocarbons, and petroleum hydrocarbon mixtures. Many of the analyses for these chemicals reported concentrations as less than detection. Of these, analytical detection limits for PCP which is a semi-volatile organic component of wood surface protection chemicals used at the sawmill, and polycyclic aromatic hydrocarbons which may have come from petroleum products (i.e., diesel fuels) used at the sawmill were high and may have been too high to accurately suggest that no risk is present. It is clear from the assessment of the data that PCP analytical detection limits (1 mg/kg) are greater than PCP benchmarks for sediments (0.36 and 0.69 mg/kg; Barrick et al., 1988). PCP detection limits were addressed as a potential data gap in Section 2.4.1.

Polycyclic aromatic hydrocarbon analytical detection limits were 0.99 mg/kg. Even assuming that the individual polycyclic aromatic hydrocarbons are present at one-half the detection limit (approximately 0.5 mg/kg) would yield a sum total polycyclic aromatic hydrocarbon concentration of approximately 8 mg/kg, which would exceed the lower sediment quality guideline for total polycyclic aromatic hydrocarbons (4.022 mg/kg), however, this approximate concentration is well below the upper sediment quality guideline (44.8 mg/kg) (sediment quality guideline from Buchman, 1999). Given the estimated concentration of total polycyclic aromatic hydrocarbons and the wide range of lower and upper sediment quality guidelines, and the fact that polycyclic aromatic hydrocarbons can be elevated in the environment due to natural and wide-spread anthropogenic sources (e.g., combustion of fossil fuels) it is likely that polycyclic aromatic hydrocarbons are not a risk concern due to the sawmill.

3.4.3 Selection of Toxicity Reference Values

The ability of the sediment quality guidelines to correctly predict toxicity of co-varying substances is unknown. Because sediment quality guidelines are based on dry weight, they do not account for the potential effects of geochemical factors in sediments that affect bioavailability. Sediment quality guidelines are not intended as toxicological thresholds and there is no certainty that the sediment quality guidelines will always correctly predict or not predict toxicity. Because of these limitations, the sediment quality guidelines are best applied when accompanied by measured of effects such as laboratory toxicity tests and or benthic community analyses, and or bioaccumulation tests which lead to the preparation of a weight of evidence (NOAA, 1999).

As observed in the Scoping Risk Assessment, risk to benthic invertebrates are predicted for dioxins/furans, however, site-specific toxicity data shows no apparent toxicity to two test species exposed to Mad River Slough sediments in the vicinity of the sawmill where some of the higher concentrations of dioxins/furans were collected. More importantly, benthic infaunal analysis suggests that the benthic community near the sawmill is not substantially different than the benthic community from other locations. Using non site-specific toxicity reference values is an uncertain process, and site-specific toxicity and community data provide the most representative assessment of the condition benthic community and exposure to COPCs.

Potential phytotoxicity of COPCs to eelgrass was evaluated indirectly using phytotoxicity benchmarks for terrestrial plants and modeling the potential quantity of COPC in pore water. This process involved a number of assumptions, some of which included estimation of pore water concentrations of COPCs and using terrestrial plant toxicity reference values for estuarine plants.

3.4.4 Species, Populations, and Community Variability

There is typically variability in natural populations and communities. Likewise, data gathered to assess differences in communities between impacted versus areas without impact can also be variable. For this Scoping Risk Assessment, benthic invertebrate community data were collected at several locations. At this level of the evaluation process, an assessment of the benthic community variability from site to site was not deemed appropriate. Assessment of the community using traditional ecological indices was instead the process used to evaluate community dynamics. While the approach used is believe to be appropriate at this level of the Scoping Risk Assessment process, potential uncertainties associated with community differences may be needed if subsequently more sophisticated risk analyses are required.

Similar community level data for fish in Mad River Slough and Humboldt Bay were either not collected or not provided with the data compiled for this Scoping Risk Assessment. Because fish are transient, these types of data would likely not be as powerful as the benthic infaunal assessment data. While these data are lacking, there are too many confounding factors, such as habitat, species preferences for habitat, and or other physical or chemical qualities that would affect a reasonable assessment of the fish community differences. Uncertainties due to the lack of these data are believed to not affect the overall risk analysis presented here.

Habitat in the form of eelgrass beds was qualitatively discussed due to the lack of toxicological data to assess potential effects of COPCs to this receptor. Historic and relatively current distribution of these beds was presented. However, as discussed previously, there is uncertainty as to the accuracy of both the historic and current data.

3.5 CONCLUSIONS

As noted in Section 1, the ERA was performed to assess risks related to releases from the sawmill. Source control actions at the site have significantly reduced or eliminated further release of PCP and associated contaminants, as well as petroleum-related contaminants. Based on the rationale presented in Section 2, the ERA focused on dioxins/furans and zinc as COPCs. Other site-related contaminants were not detected in off-site media and, therefore, were not included in the risk assessment. PCP is an exception. Although PCP was not detected in abiotic or biotic samples, detection limits were not adequately low to conclude that released PCP was absent from sediments and biota, or that it is present at non-toxic concentrations.

The ERA was performed using data from several sources that were discussed in Section 2. The data include sediment and aquatic biota samples from locations immediately adjacent to the sawmill, where effects of potential contaminants in storm water would be most likely. In addition, samples from other locations from Mad River Slough with intermediate levels of contamination, and locations throughout Humboldt Bay were also available. Chemical analysis of tissues was available for several species of biota, as well as surface and subsurface sediments from most locations. Data appear to be representative of the range of concentrations that receptors encounter in abiotic media and biological samples in Mad River Slough and Humboldt Bay, including the potential maximum exposure to site-related materials near the sawmill. Since sampling in Humboldt Bay was not focused on specific source areas, the resulting data may be representative of anthropogenically affected ambient conditions for the northern section of the bay.

Average zinc concentrations are similar in Humboldt Bay and Mad River Slough, but the maximum concentration in Humboldt Bay (237 mg/kg) is higher than in Mad River Slough (111 mg/kg). Elevated concentrations were detected in ditch sediments on the sawmill, probably resulting from runoff from the metal roofs of site buildings. Average zinc concentrations in both upland and Mad River Slough sediments are within the range of natural background for sediments (up to 100 mg/kg dry weight; WHO, 2001). Zinc risks to aquatic biota and mammals appear to be negligible, based on low screening-level hazard quotients, and lack of toxicity in sediment toxicity tests. For birds, screening-level hazard quotients exceed 1 for the mallard, spotted sandpiper, and western snowy plover. This information suggests that the sawmill building roofs may be a minor source of zinc to Mad River Slough, but risks from zinc in the slough do not appear to exceed regional background values.

Concentrations of dioxins/furans are elevated in surface and subsurface sediments and some biota in the sawmill vicinity, but exposure and risks near the sawmill in Mad River Slough are not substantially different from risks in Humboldt Bay. Exposures calculated with maximum concentrations in relevant media are higher in Mad River Slough, but surface sediment 95% UCL concentrations that are more representative of ‘high end’ exposures are similar to Humboldt Bay. This may be due the fact that the highest concentrations of dioxins/furans are in subsurface sediments and not accessible to biota under baseline conditions. As a result, the risks that might be expected based on dioxin/furan concentrations in subsurface sediments are not observed because concentrations in biological tissues are not proportionately elevated.

As noted previously, PCP was an important component of historical releases from the site, but it was not detected in environmental media from Mad River Slough. PCP was analyzed using standard EPA methods (Method 8270), but the resulting detection limits for sediment samples were greater than the available sediment quality guidelines. Therefore, although sediment toxicity tests showed no toxicity to benthos, data on PCP distribution may not be adequate to conclude that ecological risk from this COPC is acceptable.

Since the main sources of PCP onsite have been addressed, it is possible that PCP concentrations in surface sediments in biota may have declined due to natural degradation processes. Experimental estimates of PCP half-life in natural estuarine sediments ranges from approximately 21 to 290 days (Brooks, 1998). However, PCP degradation rates may be lower in buried sediments, and half-life may range from months to years. The biological half-life of PCP is much shorter, ranging from a few hours to 7 days (Brooks, 1998). The relatively rapid degradation rate for PCP may affect the data needs for addressing data gaps for this ERA.

4.0 SCOPING OFF-SITE HUMAN HEALTH RISK ASSESSMENT

The purpose of this scoping human health risk assessment is to evaluate the potential for adverse human health effects associated with exposure to chemicals of potential concern in fish (fin and shellfish) from Mad River Slough adjacent to the Arcata Division Sawmill. A separate human health risk assessment was performed for chemicals detected in on-site soil and groundwater (Geomatrix, 2003a). This scoping off-site human health risk assessment focuses on chemicals detected off site. However, the contribution to off-site receptors by chemicals on site has been incorporated into the overall risk characterization.

It should also be noted that a detailed evaluation of potential exposure to dioxins/furans in oysters and mussels using the same data from Mad River Slough and Humboldt Bay as used here previously was conducted by EnviroNet and ENVIRON (2002 and 2003). These reports concluded that the levels of dioxins/furans in oysters and mussels:

- were well below U.S. Food and Drug Administration guidelines for levels presenting serious health effects (25 nanogram/per kilogram),
- made a negligible contribution to a person's normal background exposure to dioxins/furans, and
- presented an incremental lifetime cancer risk that is below the range of risk considered acceptable by the U.S. EPA and State of California.

This scoping human health risk assessment is organized in a manner consistent with the guidance documents referenced in Section 1.0. The remaining sections of the assessment are as follows.

- Section 4.1 – Data Evaluation – presents an evaluation of the data available for the human health risk assessment.
- Section 4.2 – Exposure Assessment – presents the analysis of the mechanisms by which human receptors may be exposed to chemicals potentially related to the site and the quantitative process by which they were evaluated.
- Section 4.3 – Toxicity Assessment – presents the quantitative criteria developed by the U.S. EPA to evaluate the potential adverse health effects of the chemicals of potential concern.
- Section 4.4 – Risk Characterization – presents the results of the quantitative analysis of potential carcinogenic and noncarcinogenic risks to human health and a description of the uncertainty associated with those estimates.

4.1 DATA EVALUATION

Data evaluation is the process of analyzing site characteristics and analytical data to identify chemicals of potential concern to be evaluated in a risk assessment. Chemicals of potential concern for this scoping human health risk assessment were identified in Section 2.4. This section of the report discusses the quality of data used for the human health risk assessment and summarizes the chemical characterization of each environmental medium.

4.1.1 Data Quality

The quality assurance/quality control review discussed in Section 2.3 addressed potential quality issues related to the laboratory analyses. Based on this review, data were revised as noted in Appendix A to be considered representative of the conditions sampled.

As discussed in comments from the Cal-EPA Office of Environmental Health Hazard Assessment dated June 10, 2003, the fish tissue samples were not collected in strict accordance with U.S. EPA guidance (U.S. EPA, 2000a). For fin fish data, only the number of fish in each sample was recorded, rather than the weight/size of each individual fish. No information was available regarding the relative sizes of individual fish composited in the samples analyzed. Lastly, in general, whole fish samples were analyzed rather than the filets typical of human consumption. For shellfish data, the number and general size (based on a photograph with a scale) for some of the oysters sampled were available, but not for the crab, shrimp, or mussel samples. With the exception of one sample, for which an entire crab was analyzed, only edible portions of the shellfish were analyzed.

4.1.2 Chemical Characterization

As part of evaluating potential human health risks, numbers of samples and representative chemical concentrations detected in each fish species are summarized in Table 4-1. As shown, mean concentrations of dioxins/furans and zinc generally were higher in shellfish (with the exception of shrimp) than in fin fish for samples from both Humboldt Bay and Mad River Slough. Mean concentrations of dioxins/furans and zinc generally differed by less than a factor of two between Humboldt Bay and Mad River Slough samples. The higher mean concentration for each species did not occur consistently in Humboldt Bay or Mad River Slough, but depended on the species.

The highest upper-bound concentrations of dioxins/furans were detected in oysters and crabs in Mad River Slough; however, the concentrations were less than 50 percent higher than the concentrations in Humboldt Bay. The highest upper-bound concentration of zinc was detected in oysters, but concentrations were comparable between Humboldt Bay and Mad River Slough.

Concentrations of zinc and dioxins/furans in fish samples collected from Mad River Slough and its near vicinity will be used in this assessment (Figure 1-2).

4.2 EXPOSURE ASSESSMENT

Exposure assessment is the process of describing, measuring, or estimating the intensity, frequency, and duration of potential human exposure to chemicals of potential concern (COPCs) in environmental media (soil, water, and air) at a site. This section of the report discusses the mechanisms by which people (receptors) might come in contact with COPCs in biota from Mad River Slough. The exposure assessment follows the recommendations provided in U.S. EPA (1989), and the more recent guidance in U.S. EPA (1992a) and associated guidance. Based on U.S. EPA (1989), an exposure assessment consists of three basic steps:

- characterization of the exposure setting (physical environment and potential receptors);
- identification of exposure pathways (potential sources, points of release, and exposure routes); and
- quantification of pathway-specific exposures (exposure point concentrations and intake [dose] assumptions).

The purpose of the first step is to characterize salient site features that might influence current or future human exposure to COPCs and to identify potential receptors. Potential pathways of human exposure are identified in the second step by characterizing the sources of COPCs released to the environment, points of release, and potential exposure routes. In the third step, the qualitative information from the first two steps is integrated with estimates of exposure concentrations and intake assumptions to quantitatively estimate exposure (dose).

The conceptual site model discussed in Section 2.1 and presented in Figure 2-1 presents the sources, migration pathways, exposure media, and receptors evaluated in this assessment.

4.2.1 Exposure Setting

The sawmill is located adjacent to Mad River Slough at its confluence with Arcata Bay (the northern part of Humboldt Bay) north of the bridge crossing for New Navy Base Road. The bridge provides a location for fishing in Mad River Slough or Arcata Bay. Discussions with Sierra Pacific Industries personnel indicated that fishing in the vicinity of the sawmill is observed frequently (at least once per week). However, access for boats to Mad River Slough is limited by the clearance of the bridge.

As shown on Figure 3-10, clam beds are scattered throughout Mad River Slough and into Arcata Bay. These areas also provide habitat for mussels and oysters.

Traditionally, sports anglers in Humboldt Bay have pursued several species of fish, including perch, leopard sharks, jacksmelt, California halibut, bat rays, and salmon (Humboldt Bay Harbor Recreation and Conservation District, 2004). Of these species, perch tissue samples were collected during the field investigation.

4.2.2 Exposure Pathways and Receptors

For the purpose of this off-site scoping human health risk assessment, exposure to COPCs in fish via consumption is the only exposure pathway evaluated. For this assessment, two receptors are evaluated. A resident scenario will be evaluated to represent typical or average fish consumption, and an angler scenario will be evaluated to represent high-end fish consumption. The angler scenario also represents possible subsistence fishermen who may rely on fish from Mad River Slough as a significant food source.

4.2.3 Quantification of Exposure

Potential exposure to COPCs in fin fish and shellfish was evaluated for resident and angler scenarios. The key variables in quantifying exposure via fish consumption are the exposure point concentration in the fish and the consumption rate. Other exposure assumptions based on default values from regulatory guidance are presented in Tables 4-2 and 4-3 for the resident and the angler, respectively.

4.2.3.1 Representative Concentrations

Because the concentrations of dioxins/furans and zinc were higher in shellfish than in fin fish, separate exposure point concentrations were developed for each of these types of organism. For shellfish, exposure point concentrations were developed for each individual species (e.g., oyster, crab, and shrimp). Because only one mussel was collected and consumption of mussels is much lower than oysters (U.S. EPA, 2002c), mussel consumption was not evaluated separately from other shellfish consumption. For fin fish, given the limitations of the data (e.g., sample collection and preparation), the representative concentration for all fin fish was based on the highest concentration appropriate to the exposure scenario among the fish sampled in Mad River Slough. This approach is conservative in that it assumes all fin fish exposure is represented by the highest fin fish representative concentration. Average dioxin/furan concentrations in fin fish in Mad River Slough are compared with those for fin fish in Humboldt Bay in Figure 4-1. As shown, the concentrations are similar, although concentrations for many species are higher in Humboldt Bay fish.

For the resident scenario, the mean concentration for each species was used as the representative concentration. For the angler scenario, the upper-bound representative concentration for each species was used as the representative concentration.

4.2.3.2 Rates of Fish Consumption

Rates of consumption were developed separately for shellfish and fin fish. For fin fish, consumption rates are based on data reported in Cal-EPA (2001). When site-specific data are not available, this report recommends using data collected from the Santa Monica Bay Seafood Consumption Study in Southern California. As discussed with Robert Brodberg at the Cal-EPA Office of Environmental Health Hazard Assessment (personal communication, March 25, 2004), the median consumption rate of 21 grams per day (g/day) was used for the resident scenario, and the 95th percentile consumption rate of 161 grams per day was used as the upper-bound estimate of fish consumption for the angler scenario. These values represent the consumption rates of both marine and freshwater sources of sport fish and shellfish in California (Cal-EPA, 2001). To be conservative, these consumption rates were used as if all fish consumed by the resident or angler came from the Mad River Slough.

To address shellfish consumption, rates published by U.S. EPA's Office of Water (U.S. EPA, 2002c) were reviewed. This report presents consumption rates applicable to the residential receptor, but not the angler receptor. Consumption rates for adults (18 and over) for fish prior to cooking were used for the resident scenario [crab (0.30 g/day), oysters (0.17 g/day), and shrimp (2.6 g/day)]. Consumption rates for anglers were estimated based on the ratio of fin fish consumption for the angler to the residential receptor (approximately 8). Therefore, the resident consumption rates for shellfish from U.S. EPA's study were multiplied by 8 for use in the angler scenario. This approach to consumption results in counting shellfish consumption twice, as the study used for fin fish consumption included both fin fish and shellfish consumption.

4.3 TOXICITY ASSESSMENT

The purpose of a toxicity assessment is twofold (U.S. EPA, 1989).

1. Hazard identification – evaluates available information regarding the potential for a chemical to cause adverse health effects in exposed individuals.

2. Dose-response assessment – estimates the relationship between the extent of exposure and the increased likelihood (probability or chance) and/or severity of adverse effects.

Hazard identification entails evaluating whether a chemical can cause an increase in a particular adverse effect (e.g., cancer) and the likelihood that the adverse effect will occur in humans. The result of hazard identification is a profile of the available toxicological information and its relevance to human exposure under conditions present in the environment. This process has been completed by either the U.S. EPA or the Cal-EPA Office of Environmental Health Hazard Assessment for the chemicals of potential concern evaluated in this assessment.

Dose-response assessment entails quantifying the relationship between the dose of a chemical and the incidence of adverse effects in the exposed population. The dose-response assessment produces toxicity criteria that are used in the risk characterization to estimate the likelihood of adverse effects occurring in humans given different exposure levels. The toxicity criteria used to evaluate noncarcinogenic and carcinogenic health risks commonly are referred to as reference doses and slope factors, respectively. The basis for these criteria is described briefly below.

4.3.1 Toxicity Criteria for Noncarcinogenic Health Risk

Observable adverse noncarcinogenic effects of chemicals occur only after a threshold dose is reached. For the purposes of establishing health criteria, this threshold dose usually is estimated from the no-observed adverse effect level (NOAEL) or the lowest-observed adverse effect level (LOAEL) determined in studies of chronic animal exposure. The NOAEL is defined as the highest dose at which no adverse effects occur, whereas the LOAEL is defined as the lowest dose at which adverse effects begin to occur. NOAELs and LOAELs derived from animal studies are used by the Cal-EPA, U.S. EPA, and other regulatory agencies to establish reference doses to evaluate human intake of noncarcinogenic compounds. Reference doses, which are expressed in terms of milligrams/kilogram-day, represent the dose of a chemical that is not expected to cause adverse health effects over a lifetime of daily exposure, even in sensitive individuals, with a substantial margin of safety.

In establishing reference doses, uncertainty factors are used in an attempt to account for limitations in the quality or quantity of available toxicity data. Most reference doses include an uncertainty factor of 100, which comprises a factor of 10 to account for potential uncertainties in extrapolating animal data to human health effects, and another factor of 10 to account for possible differences in sensitivity within the human population. Furthermore, if the available database is incomplete and an LOAEL is used to establish a reference dose, or if a chemical is persistent or bioaccumulative, then an additional tenfold factor of safety may be applied.

The duration of exposure is considered in developing reference doses. Exposure duration is divided into three categories for purposes of risk assessment (U.S. EPA, 1989).

- Acute refers to exposures for short durations measured in seconds, minutes, or hours and to effects that appear promptly after exposure.
- Subchronic refers to exposures of intermediate duration, from 2 weeks to 7 years.
- Chronic refers to prolonged or repeated exposures and effects that develop only after exposures from 7 years to a lifetime.

The exposure durations for complete exposure pathways in this risk assessment include only chronic exposures. Therefore, chronic reference doses have been used.

4.3.2 Toxicity Criteria for Carcinogenic Health Risks

Regulatory guidance assumes that chemicals that are carcinogenic should be treated as if they have no thresholds (U.S. EPA, 1989). This approach assumes that the dose-response curve for carcinogens allows only for zero risk at zero dose (i.e., some risk is assumed for any dose). Various mathematical models are used to estimate theoretically plausible responses at these low doses. The accuracy of the projected risk depends on how well the model predicts the true relationship between dose and risk at dose levels for which the relationship cannot feasibly be measured. The accuracy of these models currently is unknown, but they are believed not to underestimate the true risk.

Health risks for exposure to carcinogens are defined in terms of probabilities that quantify the likelihood of a carcinogenic response in an individual receiving a given dose of a particular compound. The slope factor, which is expressed in units of $(mg/kg\text{-}day)^{-1}$, is defined as the 95% UCL of the probability of a carcinogenic response per unit daily intake of a chemical throughout 70 years. By using the 95% UCL, the estimate of carcinogenic response will be conservative and will purposefully overestimate the actual risk posed by the chemical.

4.3.3 Toxicity Criteria Used in Health Risk Assessment

The Cal-EPA Office of Environmental Health Hazard Assessment or the U.S. EPA have completed toxicity assessments for the chemicals of potential concern identified in this scoping health risk assessment. The associated toxicity criteria for the chemicals of potential concern evaluated in this health risk assessment are presented in Table 4-4. These criteria were selected according to the following hierarchy.

1. Cal-EPA, 2004, Office of Environmental Health Hazard Assessment, on-line databases for Acute Reference Exposure Levels, Chronic Reference Exposure Levels, and Cancer Potency Factors: < http://oehha.ca.gov/air/hot_spots/index.html>.
2. Cal-EPA, 2003b, Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments: Office of Environmental Health Hazard Assessment..
3. U.S. EPA Integrated Risk Information System (IRIS) on-line database for toxicity criteria: <http://www.epa.gov/iris/index.html>.

4.4 RISK CHARACTERIZATION

Risk characterization represents the final step in the risk assessment process. In this step, the results of the exposure and toxicity assessments are integrated into quantitative or qualitative estimates of potential health risks. Potential noncarcinogenic and carcinogenic health risks are characterized separately. Contributions to noncarcinogenic and carcinogenic health effects for off-site receptors from chemicals in on-site soil and/or groundwater (Geomatrix, 2003a) have been added to the overall summary of risk.

4.4.1 Noncarcinogenic Health Effects

Potential adverse noncarcinogenic health effects were evaluated using the hazard index approach, as recommended by U.S. EPA (1989). The first step in this approach is to compare the average daily dose for each chemical to the appropriate reference dose. This comparison is expressed in terms of a “hazard quotient” which is calculated as follows:

$$\text{Hazard Quotient}_i = \frac{\text{AADD}_i}{\text{RfD}_i}$$

where: AADD = average adult daily dose, and
RfD = reference dose.

A hazard quotient less than or equal to 1 indicates that the predicted exposure to that chemical should not result in an adverse noncarcinogenic health effect (U.S. EPA, 1989). In cases where individual chemicals potentially act on the same organs or result in the same health endpoint (e.g., respiratory irritants), potential additive effects may be addressed by calculating a hazard index as follows:

$$\text{Hazard Index} = \sum_{i=1}^{n} \text{Hazard Quotient}_i$$

A hazard index of less than or equal to 1 indicates acceptable levels of exposure for chemicals having an additive effect. In this Scoping Risk Assessment, a screening-level hazard index was calculated by summing the hazard quotient for both chemicals of potential concern, regardless of toxic endpoint, as recommended by agency guidance (U.S. EPA, 1989). This approach generally is believed to overestimate the potential for noncarcinogenic health effects due to simultaneous exposure to multiple chemicals, because it does not account for different toxic endpoints (U.S. EPA, 1989; National Research Council, 1988; Presidential/Congressional Commission of Risk, 1997; Seed et al., 1995). However, it can be used as a screening tool to rapidly identify those exposure scenarios for which exposure to multiple chemicals does not pose a noncarcinogenic health risk.

It should be noted that hazard quotients or hazard indexes greater than 1 do not necessarily mean that adverse health effects will be observed. As shown in Table 4-4, a margin of safety was incorporated into the reference dose for zinc. Therefore, adverse health effects may not be observed even if the hazard quotient or hazard index is much greater than 1. If the screening hazard index is greater than 1, an organ-specific hazard index may be calculated to more accurately assess the potential for noncarcinogenic effects to specific target organs.

The following subsections summarize the results of the noncarcinogenic risk characterization for the two receptors evaluated (resident and angler). The summary hazard indexes for noncarcinogenic adverse health effects are presented in Table 4-5; the calculations supporting these values are presented in Appendix H.

Resident Scenario

The potential noncarcinogenic hazard index associated with the resident's exposure to the COPCs in fish and shellfish is 0.03, indicating that exposure to chemicals in fin fish and shellfish should not result in unacceptable noncarcinogenic health effects under the conditions evaluated.

Angler Scenario

The potential noncarcinogenic hazard index associated with the angler's exposure to the COPCs in fish and shellfish is 0.2, indicating that exposure to chemicals in fin fish and shellfish should not result in unacceptable noncarcinogenic health effects under the conditions evaluated.

4.4.2 Carcinogenic Effects

Carcinogenic health risks are defined in terms of the increased probability of an individual developing cancer as the result of exposure to a given chemical at a given concentration. As required by the Cal-EPA (1996) and U.S. EPA (1989), lifetime excess cancer risks are estimated as follows:

$$\text{Lifetime Excess Cancer Risk}_i = \text{LADD}_i \times \text{SF}_i$$

where: LADD = lifetime average daily dose, and
SF = slope factor

As with hazard indexes, the estimated excess cancer risks for each chemical and exposure route are summed regardless of toxic endpoint to estimate the total excess cancer risk for the exposed individual.

Regulatory agencies such as the Cal-EPA and U.S. EPA have defined what is considered an acceptable level of risk in similar, although slightly different, ways. The U.S. EPA considers 1×10^{-6} to 1×10^{-4} to be the target range for acceptable risks at sites where remediation is considered (U.S. EPA, 1990a and b). Estimates of lifetime excess cancer risk associated with exposure to chemicals of less than one-in-one-million (1×10^{-6}) are considered to be so low as to warrant no further investigation or analysis (U.S. EPA, 1990a). Within California, Cal-EPA tends to work within the same target range for acceptable risks. Pursuant to the California Safe Drinking Water & Toxic Enforcement Act of 1986, the Office of Environmental Health Hazard Assessment has established a no significant risk level of 1×10^{-5} (California Code of Regulations Division 21.5, Title 22, Section 12703). Many air management districts consider

1 x 10^{-5} to be an acceptable risk level for managing air emissions under the Toxics Hot Spots program.

It should be noted that cancer risks beyond the 1 x 10^{-6} to 1 x 10^{-4} range do not necessarily mean that adverse health effects will be observed. Current methods for estimating the carcinogenic potential of chemicals is believed to not underestimate the true risk, but could overestimate the true risk by a considerable degree. In fact, the range of possible risks includes zero.

The following sections summarize the results of the carcinogenic risk characterizations for the receptors evaluated. The total estimated lifetime excess carcinogenic risks are summarized in Table 4-6; the calculations supporting these values are presented in Appendix H.

Resident Scenario

The estimated theoretical lifetime excess carcinogenic risks associated with a resident's exposure to the COPCs in fin fish and shellfish is 5 x 10^{-6}, which is at the lower end of the acceptable risk range of 1 x 10^{-4} to 1 x 10^{-6}. Therefore, exposure to chemicals in fin fish and shellfish should not result in an unacceptable carcinogenic risk under the conditions evaluated for this receptor. The most significant contribution to risk is consumption of fin fish. As discussed previously and shown in Figure 4-1, concentrations of dioxins/furans are relatively consistent between fin fish in Mad River Slough and Humboldt Bay. As shown in Figure 4-2, concentrations of dioxins/furans in fin fish from Mad River Slough are consistent with concentrations in estuarine fin fish from elsewhere in the United States (U.S. EPA, 2000b).

Angler Scenario

For the angler, the estimated theoretical lifetime excess carcinogenic risks associated with exposure to the COPCs in fin fish and shellfish is 6 x 10^{-5}, which is within the acceptable risk range of 1 x 10^{-4} to 1 x 10^{-6}. Therefore, exposure to chemicals in fin fish and shellfish should not result in an unacceptable carcinogenic risk under the conditions evaluated for this receptor. The most significant contribution to risk is consumption of fin fish. As discussed previously and shown in Figure 4-1, concentrations of dioxins/furans are relatively consistent between fin fish in Mad River Slough and Humboldt Bay. As shown in Figure 4-2, concentrations of dioxins/furans in fin fish are consistent with concentrations in estuarine fin fish from elsewhere in the United States (U.S. EPA, 2000b).

4.5 UNCERTAINTY ANALYSIS

Uncertainty is inherent in many aspects of any risk assessment process, generally arising from a lack of knowledge of (1) site conditions, (2) toxicity and dose-response of the chemicals of potential concern (COPCs), and (3) the extent to which an individual will be exposed to those chemicals. This lack of knowledge means that assumptions must be made based on information presented in the scientific literature or on professional judgment. Although some assumptions have significant scientific basis, others have much less. The assumptions that introduce the greatest amount of uncertainty in the noncarcinogenic and carcinogenic risk estimates are discussed below. This discussion generally is qualitative in nature, reflecting the difficulty in quantifying the uncertainty in specific assumptions. In general, assumptions were selected in a manner that purposefully biases the process toward health conservatism.

4.5.1 Data Evaluation and Selection of Chemicals of Potential Concern

The factors that contribute to the uncertainties associated with identifying COPCs are inherent in the data collection and evaluation processes, including whether sample locations are appropriate, whether sample quantities are adequate, whether laboratory analyses are performed correctly, whether data are validated, and how validated dated are processed. The selection of site-related COPCs was based on the historical use of chemicals at the Arcata Division Sawmill and considered the results of sampling of sediments and biota in Mad River Slough.

The predominant sources of uncertainty and potential bias associated with site characterization are based on the procedures used for site investigation (including design of the sampling plan and the methods used for sample collection, handling, and analysis) and on the methods used for data evaluation. A comprehensive sampling program was implemented to screen for more than 100 chemicals, most of which were not associated with site history or activities. Based on this program, it is reasonably expected that the chemicals of concern were adequately identified with the possible exception of PCP as noted.

Collection, preparation, and documentation methods for fish samples were not ideal for the purposes of performing a human health risk assessment. It is unclear whether the methods used would result in overestimation or underestimation of potential human health risk, or indeed whether they had any effect at all.

4.5.2 Exposure Assessment

4.5.2.1 Exposure Point Concentrations

For dioxin/furan congeners that were not detected in individual samples, it was assumed that one-half the sample quantitation limit was representative of the concentration that may be present in sediment or biota. This value was used in calculating the arithmetic average and 95% UCL concentrations of the congeners (Section 2.5.1). This assumption is consistent with the current default position of the U.S. EPA (1989) to substitute one-half the sample quantitation limit for all non-detects if a chemical was detected one or more times. Typically, this substitution did not have a significant effect on the 2,3,7,8-TCDD toxicity equivalent for the sample.

4.5.2.2 Exposure Scenarios

Both exposure scenarios focused on potential adult exposure to chemicals of potential concern in fin fish and shellfish. It is not expected that fish consumption by children adjusted for body weight would not be significantly different from adults.

4.5.2.3 Exposure Assumptions and Parameters

The exposure assessment considers a reasonable maximum exposure scenario (the angler), which is defined by the U.S. EPA (1989) as the highest exposure that could reasonably be expected to occur for a given exposure pathway at a site. To achieve this goal, the angler scenario was based on highly conservative exposure assumptions. For example, the evaluation assumes that an angler obtains their entire supply of fish and shellfish from Humboldt Bay. In addition, the rate of shellfish consumption was considered to be additive to that of fin fish consumption, although the basis for the consumption rates were separate studies and the basis for the fin fish consumption included shellfish. Both the resident and angler receptors are assumed to reside locally for 350 days per year for 30 years. These and other upper-bound estimates of exposure most likely overestimate the potential health risks associated with exposure to the COPCs in fish and shellfish.

4.5.3 Toxicity Assessment

One of the largest sources of uncertainty in any risk assessment is associated with the scientific community's limited understanding of the toxicity of most chemicals in humans following exposure to the low concentrations generally encountered in the environment. Most available toxicity data are derived from animal studies, which are then extrapolated using mathematical models or multiple uncertainty factors to predict what might occur in humans. Sources of conservatism in the toxicity criteria used in this evaluation include the following.

- The use of conservative methods and assumptions to extrapolate from high-dose animal studies to predict the possible response in humans at exposure levels far below those administered to animals.
- The assumption that chemicals considered to be carcinogens do not have thresholds (i.e., for all doses greater than zero, some risk is assumed to be present).

- The fact that epidemiological studies (human exposure studies) are limited and are not generally considered in a quantitative manner in deriving toxicity values.

The toxicity criteria used in this Scoping Risk Assessment are based on an evaluation of non-carcinogenic and carcinogenic health risks developed using different methods. The non-carcinogenic criteria (oral reference doses) incorporate multiple uncertainty factors to account for limitations in the quality or quantity of available data (e.g., animal data in lieu of human data).

The carcinogenic toxicity criteria (oral slope factors) also were developed using techniques that purposefully bias the criteria toward health conservatism. For example, most slope factors are based on the premise that cancer data from high-dose animal studies will predict cancer response in humans at dose levels thousands of times lower. The process also assumes that the carcinogenicity of a chemical in an animal model is representative of the response in humans. Finally, the statistical techniques used by regulatory agencies to extrapolate data from animals to human exposures generally assume that the dose-response curve is linear and that the 95% UCL of the slope is representative of the chemical's carcinogenic potency. In aggregate, these assumptions overestimate the actual risk such that it is unlikely to be higher, but could be considerably lower and, in fact, could be non-existent.

Currently, the cancer potency factor for dioxins/furans is undergoing review by the U.S. EPA. The newly proposed value is 10 times higher than that currently used by the Cal-EPA. If adopted, this potency factor would result in a higher predicted risk, but would not change the conclusion that concentrations of dioxins/furans in Humboldt Bay and Mad River Slough are similar to each other and to nationwide concentrations in fish. The U.S. EPA is not proposing to publish a reference dose for exposure because background human exposure is 2 to 3 orders of magnitude greater than a reference dose based on animal bioassay data.

4.5.4 Risk Characterization

One source of uncertainty unique to risk characterization is the assumption that the total risk associated with exposure to multiple chemicals is equal to the sum of the individual risks for each chemical (i.e., the risks are additive). Other possible interactions include synergism, in which the total risk is higher than the sum of the individual risks, and antagonism, in which the total risk is lower than the sum of the individual risks. Relatively few data are available regarding potential chemical interactions from environmental exposure to chemical mixtures. Some studies have been carried out in rodents given simultaneous doses of multiple chemicals. In these studies no interactive effects were observed in response to mixtures of chemicals affecting different organs (i.e., each chemical acted independently), but antagonism was observed in response to mixtures of chemicals affecting the same organ, but by different mechanisms (Risk Commission, 1997).

Although there are no data on chemical interactions in humans exposed to chemical mixtures at the dose levels typically observed in environmental exposures, animal studies suggest that synergistic effects will not occur at levels of exposure below their individual effect levels (Seed et al., 1995). As exposure levels approach the individual effect levels, a variety of interactions may occur, including additive, synergistic, and antagonistic (Seed et al., 1995).

Current U.S. EPA guidance for risk assessment of chemical mixtures (U.S. EPA, 1989) recommends assuming an additive effect following exposure to multiple chemicals. Subsequent recommendations by other parties, such as the National Academy of Sciences, National Research Council (NRC, 1988) and the Presidential/Congressional Commission on Risk Assessment and Risk Management (1997), also have advocated a default assumption of additivity. As currently practiced, risk assessments of chemical mixtures generally add carcinogenic risks regardless of tumor type and sum noncarcinogenic hazard indexes regardless of toxic endpoint or mode of action. Given the available experimental data, this approach likely overestimates potential risks associated with simultaneous exposure to multiple chemicals.

4.5.5 Summary of Uncertainty Analysis

In summary, the above and other assumptions contribute to the overall uncertainty in the development of ecological and human health risk assessments. Given that the greatest sources of uncertainty generally result in overestimates of exposure or risk, however, it is believed that results presented in this document are based on conservative estimates.

5.0 CONCLUSIONS AND RECOMMENDATIONS

A Scoping Ecological and Human Health Risk Assessment was conducted for the Sierra Pacific Industries, Arcata Division Sawmill based on off-site sediment and biota data. The risk analysis was conducted using data available from several sources, including the California Regional Water Quality Control Board, North Coast Region, environmental advocacy groups, and Sierra Pacific Industries, to support initial risk evaluations. Together, these sources represent a substantial amount of data from a wide variety of locations and species. The objective of this document was to evaluate ecological and human health risks to the extent possible using these data, develop conclusions based on the results, and evaluate whether additional data are needed to support risk management decisions for the sawmill.

The structure and approach for the risk analyses was based on federal and state guidance including the U.S. EPA Risk Assessment Guidance for Superfund and specific guidance from the Department of Toxic Substances Control. The major conclusions from the analyses are presented below.

Data Evaluation

The available data include sediment and aquatic biota samples from locations throughout the Mad River Slough and primarily the northern section of Humboldt Bay. Most samples in Mad River Slough were collected from locations adjacent to the sawmill, where effects of potential contaminants in storm water runoff would be most likely. Therefore, the maximum concentrations potentially resulting from releases from the sawmill appear to be adequately represented in both sediment and biota. However, because most samples were collected near the sawmill, the mean and 95% upper confidence limit concentrations may overestimate the concentrations for the larger area of the Mad River Slough over which exposures would occur. Sediment and biota samples from Humboldt Bay are from widely dispersed locations and probably reflect anthropogenically-affected ambient conditions for Humboldt Bay. The ambient conditions are affected by many current and historic sources around the bay, including the sawmill, other mills, and atmospheric deposition from regional and global sources.

Biological tissue data are available from a broad range of functional groups and species including benthic organisms with small home ranges that are restricted to the sawmill area, and fish with much larger ranges that may be exposed to contamination outside of Mad River Slough that is due to other regional sources. Sediment data are available from a variety of locations and include surface and subsurface horizons adjacent to the sawmill. Therefore, data appear to be representative of the range of concentrations that receptors encounter in abiotic media and biota in the Mad River Slough and Humboldt Bay, including exposure near the sawmill.

As noted previously, pentachlorophenol (PCP) was an important component of historical releases from the site, but was not detected in environmental media from the Mad River Slough. PCP was analyzed using a standard U.S. EPA method (Method 8270), but the resulting laboratory reporting limits for sediment samples were greater than the available sediment quality guidelines. Therefore, although sediment toxicity tests showed no toxicity to benthos, data on PCP distribution may not be adequate to conclude that ecological risk from PCP is acceptable.

Since the source of PCP on the sawmill has been addressed, it is possible that PCP concentrations in surface sediments and biota may have declined due to natural degradation processes. Experimental estimates of PCP half-life in natural estuarine sediments range from approximately 21 to 290 days (Brooks, 1998). However, PCP degradation rates may be lower in buried sediments, and its half-life may range from months to years. The biological half-life of PCP is much shorter, ranging from a few hours to 7 days (Brooks, 1998). The relatively rapid degradation rate for PCP will be considered when addressing the PCP data gap identified in this risk assessment. A work plan proposing additional PCP data collection was submitted under separate cover (Geomatrix, 2004e).

Ecological Risk Assessment

The site-related COPCs identified in Section 2.0 have potentially ecotoxic effects if exposures are high enough. Exposures were evaluated for aquatic organisms (fish, aquatic invertebrates) and wildlife (birds and mammals). Exposures were estimated separately for Mad River Slough and Humboldt Bay to help determine whether risks in the Mad River Slough were greater than risks in the bay, which is likely to be affected by more sources.

Risks were characterized by comparing estimated exposures to toxicity reference values, or toxicologically based benchmarks of exposure. Toxicity reference values were identified for two levels. No-observable adverse effects levels (NOAELs) are intended to represent exposures below which risk is clearly negligible. Lowest-observable adverse effects levels (LOAELs) are intended to represent exposures at which adverse effects may be observed in a relatively small proportion of an exposed population. Hazard quotients [ratio of estimated exposure to toxicity reference value] were used to characterize the comparisons.

Benthic Invertebrate Community:

- ***Risk from Zinc:*** Zinc concentrations in sediments do not exceed NOAEL sediment quality benchmarks (hazard quotient <1) in Mad River Slough, suggesting that zinc concentrations near the sawmill are unlikely to be toxic.

- ***Risk from Dioxins/Furans:*** Dioxins/furans in sediments exceed NOAEL- and LOAEL-based criteria in Mad River Slough and, to a lesser degree, in Humboldt Bay (hazard quotients >1). However, results of sediment toxicity testing and analysis of the benthic community indicate no detectable effects of elevated concentrations. Sediment toxicity results for sediments collected at a variety of sites (including locations near the sawmill where elevated dioxin/furan concentrations were encountered) indicate no discernable differences in survival of test organisms exposed to sediments. The lack of effects may be due, in part, to the apparent isolation of dioxins/furans in subsurface sediments or complexation of dioxins/furans to organic materials.

Fish and Invertebrates:

- ***Risk from Zinc:*** Zinc is not considered a persistent bioaccumulative substance, and many organisms regulate internal zinc levels, even when exposure to elevated levels in their surrounding environment exists. Zinc tissue residues for mussel, sculpin, shiner, sole, shrimp, and shark did not exceed tissue residue effects levels (i.e., all hazard quotients <1). In oyster and crab tissues, concentrations of zinc in both Mad River Slough and Humboldt Bay samples were very similar among species and the risks are low. Overall, Humboldt Bay and Mad River Slough zinc concentrations in tissues were similar resulting in very similar hazard quotients, suggesting that zinc in tissues of these organisms does not pose a risk of effects due to zinc from the sawmill.

- ***Risk from Dioxins/Furans:*** Concentrations of dioxins/furans in fish and invertebrate tissues of several species did not exceed NOAEL-based criteria, suggesting that risk to fish and invertebrate species due to uptake through the food chain is negligible.

Birds:

- ***Risk from Zinc***: NOAEL-based hazard quotients corresponding to maximum and 95% upper confidence limit exposures exceed 1 for locations in Mad River Slough and Humboldt Bay for mallard, spotted sandpiper, and western snowy plover. However, no exposures for these species exceed the LOAEL concentrations. Hazard quotients are greater for Humboldt Bay than for Mad River Slough, suggesting that exposure and risks near the sawmill do not exceed regional background levels.

- ***Risk from Dioxins/ Furans***: Hazard quotients associated with the maximum exposures and NOAELs were less than 1, except for spotted sandpiper which had a hazard quotient of 1.5. All LOAEL-based hazard quotients were less than 1 indicating that exposure of birds to dioxins/furans does not exceed toxic levels.

Mammals:

- ***Risk from Zinc***: Hazard quotients associated with the maximum exposures and NOAELs were less than 1, indicating that exposure of mammals to zinc does not exceed toxic levels.

- ***Risk from Dioxins/ Furans***: Hazard quotients associated with the maximum exposures and NOAELs were less than 1, indicating that exposure of mammals to dioxins and furans does not exceed toxic levels.

Human Health Evaluation

- Concentrations of zinc and dioxins/furans in fin fish and shell fish result in potential exposure that is below acceptable levels for noncarcinogenic health risks for the resident and the angler.

- Potential carcinogenic risk to residents for exposure to dioxins/furans in fin fish is estimated to be $5x10^{-6}$. Potential carcinogenic risk for anglers for exposure to dioxins/furans in fish is estimated to be $6x10^{-5}$. Both results are within the acceptable risk range of $1x10^{-6}$ to $1x10^{-4}$ established by U.S. EPA. Concentrations in fin fish in Mad River Slough are lower than concentrations representing ambient dioxin/furan concentrations estimated by U.S. EPA (2000b).

- Concentrations of dioxins/furans in fin fish contribute to approximately 90 percent of the estimated risk for the resident and angler. However, fin fish tissue collection methods were not consistent with guidance for collecting samples for human health risk assessment resulting in one source of uncertainty in the overall assessment.

Recommendations

- Collect sediment samples for analyses of chlorinated phenols using lower laboratory reporting limits than those achieved during previous sampling to identify whether PCP or its degradation products are present in the off-site environment. A work plan for sediment sample collection was submitted under separate cover (Geomatrix, 2004e).

- Collect limited fin fish tissue samples for dioxins/furans and chlorinated phenols (if detected in sediment) in accordance with the guidelines for sampling for human health risk assessment (U.S. EPA, 2000a) to confirm the conclusion that concentrations in fish in Humboldt Bay and Mad River Slough are consistent with those considered in this evaluation. A work plan for fin fish sample collection was submitted under separate cover (Geomatrix, 2004e).

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TABLES

Geomatrix

TABLE 2-1

STATION AND FIELD SAMPLE IDENTIFIERS

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Station Identifier	Sample Identifiers						
Arcata Bay Ref	Arcata Bay Ref						
BC	BC Comp						
C-01	C1-0.0-0.5	C1-0.5-1.0					
C-02	C2-0.0-0.5	C2-1.0-1.5	C2-1.5-2.3				
C-03	C3-0.0-0.5	C3-1.0-1.5	C3-1.5-2.0				
C-04	C-4 Comp	C4-0.0-0.5	C4-1.0-1.8				
C-05	C5-0.0-0.5	C5-1.0-1.5	C5-1.5-2.0				
C-06	C-6 Comp	C6-0-0.5	C6-1.0-1.5				
C-07	C7-0.0-0.9						
C-08	C8-0.0-0.5	C8-0.5-1.4					
C-09	C9-1-0.0-0.8	C9-2 0.0-0.8					
C-10	C10-0.0-0.5	C10-1.0-1.5					
C-11	C11-0.0-0.5						
C-12	C12-0.-0.5						
C-13	C13-0.0-0.5						
C-14	C14-0.0-0.5						
C-15	C15-0.0-0.5	C15-1.0-1.5					
C-16	C16-0-0.5	C16-1.0-1.5					
C-17	C17-0-0.5	C17-1.0-1.5					
C-18	C18-0.0-0.5	C18-1.0-1.5	C18-1.5-2.1				
C-19	C19-0.0-0.5	C19-0.5-1.2					
C-20	C20-0.0-0.3						
C-21	C21-0-0.5						
C-22	C22-0.0-0.5						
C-23	C23-0-0.5	C23-1.0-1.5					
C-24	C24-0.0-0.5	C24-1.0-1.5					
C-25-1	C25-1-0.0-0.5	C25-2-0.0-0.5	C25-2-0.5-1.3				
C-26	C26-0.0-0.8						
C-27-1	C27-1-0.0-0.5	C27-1-1.0-1.5					
C-27-2	C27-0.0-0.5						
C-28	C28-0.0-0.5	C28-1.0-1.8					
C-29	C29-0-0.5						
C-30	C30-0-0.5						
C-31	C31-0.0-0.5	C31-0.5-1.0					
C-32	C32-0.0-0.5	C32-0.5-1.0					
C-33	C33-0-0.5	C33-1.0-1.5					
C-34	C34-0-0.5						
C-35	C35-0-0.5						
C-36	C36-0-0.5						
C-37	C37-0.0-0.3						
C-38	C38-0-0.5						
C-39	C39-0-0.5						
C-40-2	C40-2-0-0.5	C40-2-1.5-2.0					
C-41	C41-0-0.5	C41-1.5-2.0					
C-42	C42-0-0.5	C42-1.0-1.8					
C-43	C43-0-0.5	C43-1.0-1.5					
C-44	C44-0-0.5	C44-1.5-2.0					
Channel 1	Channel 1 Comp						
Channel 2	Channel 2 Comp						
D6-1	D6-1-0.0-0.5						
D6-10	D6-10-0.0-0.5						
D6-10B	D6-10B	D6-10B-0.5	D6-10B-1.0				
D6-11	D6-11-0.0-0.5						
D6-12	D6-12-0.0-0.5						
D6-13	D6-13-0.0-0.5						
D6-14	D6-14-0.0-0.5						
D6-15	D6-15-0.0-0.5						
D6-15B	D6-15B	D6-15B-0.5	D6-15B-1.0				
D6-16	D6-16-0.0-0.5						
D6-17	D6-17-0.0-0.5						
D6-18	D6-18-0.0-0.5						
D6-19	D6-19-0.0-0.5						

TABLE 2-1

STATION AND FIELD SAMPLE IDENTIFIERS
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Station Identifier	Sample Identifiers						
D6-2	D6-2-0.0-0.5						
D6-2B	D6-2B	D6-2B-0.5	D6-2B-1.0				
D6-20	D6-20-0.0-0.5						
D6-21	D6-21-0.0-0.5						
D6-22	D6-22-0.0-0.5						
D6-23	D6-23-0.0-0.5						
D6-23B	D6-23B	D6-23B-0.5	D6-23B-1.0				
D6-24	D6-24-0.0-0.5						
D6-25B	D6-25B	D6-25B-0.5	D6-25B-1.0				
D6-3	D6-3-0.0-0.5						
D6-4	D6-4-0.0-0.5						
D6-5	D6-5-0.0-0.5						
D6-6	D6-6-0.0-0.5						
D6-6B	D6-6B	D6-6B-0.5	D6-6B-1.0				
D6-8	D6-8-0.0-0.5						
D6-9	D6-9-0.0-0.5						
D7-1	D7-1-0.0-0.5						
D7-10	D7-10-0.0-0.5						
D7-11	D7-11-0.0-0.5						
D7-12	D7-12-0.0-0.5						
D7-13	D7-13-0.0-0.5						
D7-14	D7-14-0.0-0.5						
D7-15	D7-15-0.0-0.5						
D7-16	D7-16-0.0-0.5						
D7-17	D7-17-0.0-0.5						
D7-2	D7-2-0.0-0.5						
D7-3	D7-3-0.0-0.5						
D7-4	D7-4-0.0-0.5						
D7-5	D7-5-0.0-0.5						
D7-6	D7-6-0.0-0.5						
D7-7	D7-7-0.0-0.5						
D7-8	D7-8-0.0-0.5						
D7-9	D7-9-0.0-0.5						
Ditch-1 East	Ditch-1 @ East Entry						
Ditch-1 Pipe	Ditch 1 @ Dry Shed						
Ditch-1 Pipe	Ditch-1 @ Dry Shed Pipe						
Ditch-1 West	Ditch-1 West of Dry Shed Pipe						
Ditch-4	Ditch 4 @ Crossing						
Ditch-4	Ditch-4						
Ditch-4-1	Ditch 4, 80 Feet West of Crossing						
Ditch-4-2	Ditch 4, 150 Feet West of Crossing						
Ditch-4-3	Ditch 4, 250 Feet West of Crossing						
DSA	Dry Shed Area						
DSS	DSS Comp						
FGCA	Former Green Chain Area						
Lappe_HS-1	S031445032402						
Lappe_HS-2	12M031415034202						
Lappe_HS-2	14H0031415032402						
Lappe_LB	S021850032402						
Lappe_Mill	1R011015032402	31M011700032402	3RC011230032402	41H0011700032402			
Lappe_OF2	2S011800032402						
Lappe_OF2	2S01800032402						
Lappe_OF4	4S01735032402						
LOC 1	020621-EBAY-6-2	DM-0003	DM-0004				
LOC 10a	DM-0007	DM-0008					
LOC 10b	020621-BIS	DM-0009	DM-0010				
LOC 11	DM-0026						
LOC 12	DM-0027						
LOC 13	DM-0028						
LOC 14	DM-0029						
LOC 15	DM-0081						
LOC 16	DM-0082						

TABLE 2-1

STATION AND FIELD SAMPLE IDENTIFIERS
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Station Identifier	Sample Identifiers						
LOC 17	DM-0083						
LOC 18	DM-0084						
LOC 19	DM-0085						
LOC 2	020621-EBAY-1-2	DM-0001	DM-0002				
LOC 20	DM-0086						
LOC 21	DM-0087						
LOC 22	DM-0088						
LOC 3	020621-NBSC	DM-0015a	DM-0015b	DM-0016			
LOC 4	020621-NBSC 02	020621-NBSCM	DM-0021	DM-0022	DM-0023	DM-0024	DM-0025
LOC 5	020621-MR-7-1	DM-0017	DM-0018				
LOC 6	020621-MR-7-2	DM-0019	DM-0020				
LOC 7	020621-SIN	DM-0013	DM-0014				
LOC 8	020621-SIN-1-2	DM-0011	DM-0012				
LOC 9	020621-BIN	DM-0005	DM-0006				
North Arcata Bay	North Arcata Bay Ref						
Old Eureka Wharf	Old Eureka Wharf Comp						
Outfall-1	Outfall 1, Road Entrance	Outfall-1					
Outfall-2	Outfall 2	Outfall-2					
Outfall-2 DI	Outfall #2 D.I.	Outfall 2, DI					
Outfall-3	Outfall-3						
Outfall-3A	Outfall 3A						
Outfall-4	Outfall 4	Outfall-4					
RP-1	RP-1-0.0-0.5	RP-1-0.5-1.0	RP-1-1.0-1.5	RP-1-1.5-2.0	RP-1-2.0-2.5		
RP-2	RP-2-0.0-0.5	RP-2-0.5-1.0	RP-2-1.0-1.5	RP-2-1.5-2.0	RP-2-2.0-2.5		
SDP-1	SDP-1-0.0-0.5	SDP-1-2.0-2.5					
SDP-1B	SDP-1B	SDP-1B-0.5	SDP-1B-1.0				
STAR 1	DM-0031	DM-0032					
STAR 10	DM-0074						
STAR 2	DM-0033						
STAR 3	DM-0034	DM-0034 (Whole)					
STAR 4	DM-0035						
STAR 5	DM-0036						
STAR 6	DM-0061						
STAR 7	DM-0059						
STAR 8	DM-0058						
TRAWL 10/11	DM-0053	DM-0054	DM-0055	DM-0056			
TRAWL 13	DM-0057	DM-0060	DM-0080				
TRAWL 15	DM-0062	DM-0068	DM-0063	DM-0069	DM-0064	DM-0066	DM-0067
TRAWL 16	DM-0065						
TRAWL 17	DM-0070	DM-0072	DM-0071	DM-0073			
TRAWL 18	DM-0075	DM-0076	DM-0077	DM-0078	DM-0079		
TRAWL 2	DM-0037	DM-0038	DM-0040	DM-0039	DM-0041		
TRAWL 4	DM-0042	DM-0043	DM-0044	DM-0045			
TRAWL 5	DM-0046	DM-0047	DM-0048				
TRAWL 6	DM-0049	DM-0050					
TRAWL 7/8	DM-0051	DM-0052					
Unknown_01	DM-0089						
Unknown_02	DM-0090						
USS	USS Comp						
USS-2	USS-2 Comp						
USS-3	USS-3 Comp						

TABLE 2-2

SUMMARY OF SURFICIAL SEDIMENT AND CORE SAMPLES COLLECTED

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

No. of Samples	Date	Dioxins & Furans	OCDD (only)	SVOC	Metals	PCBs	Pesticide	Diesel Range Organics	VOCs	Sample Identifiers
Surficial Sediment Samples										
Commercial Oyster Beds in Arcata Bay (North Humboldt Bay)										
10	10/21/2002	X		X	X	X	X			DM-0004, DM-0002, DM-0016, DM-0018, DM-0020, DM-0014, DM-0012, DM-0006, DM-0008, DM-0010
Lower Reach of Mad River Slough above the Mill										
6	10/21-22/2002	X		X	X	X	X	X		DM-0022, DM-0024, DM-0026, DM-0027, DM-0028, DM-0029,
Arcata Bay										
8	10/23-25/02	X		X	X	X	X			DM-0081, DM-0082, DM-0083, DM-0084, DM-0085, DM-0086, DM-0087, DM-0088
Sediment Toxicity Data										
12	10/22-24/02	X	X							Arcata Bay Ref, N Arcata Bay Ref, C-6 Comp, C-4 Comp, USS Comp, DSS Comp, USS-2 Comp, BC Comp, Channel 1 Comp, Channel 2 Comp, Old Eureka Wharf Comp, USS-3 Comp
Lappe Data										
4	3/24/02	X	X							S031445032402, S021850032402, 2S011800032402, 4S01735032402
EnviroNet										
10	6/14/01	1		8						Outfall 1, Road Entrance; Outfall 2; Outfall #2 D.I.; Outfall-3; Outfall-4; Ditch 1 @ Dry Shed; Ditch 4 @ Crossing; Ditch 4, 80 Feet West of Crossing; Ditch 4, 150 Feet West of Crossing; Ditch 4, 250 Feet West of Crossing;
RWQCB										
10	6/14/01	X	X	X	X			X		Ditch 1@Dry Shed Pipe; Ditch 1 West of Dry Shed Pipe; Ditch 1@East Entry; Ditch 4; Dry Shed Area; Former Green Chain Area; Outfall 1; Outfall 2 ; Outfall 3A; Outfall 4
MFG Data Ditch 6 and 7										
53	7/03			X	X			X		D6-1 through 24; D7-1 through 17; RP-1 and RP-2; and SDP-1
14	6/04			X				X	X	D6-2B, D6-6B, D6-10B, D6-15B, D6-23B, D6-25B, SDP-1B
Piston Core Sediment Samples										
Below the Samoa Bridge at the Confluence of Mad River Slough and Arcata Bay										
6	10/22-23/02	X	X	X	X	X	X	X		C33, C34, C35, C36, C37, C38
Lower Reach of Mad River Slough above the Mill										
35	10/22-24/02	X	X	X	X	X	X	X		C1, C2, C3, C4, C5, C6, C7, C8, C9-1, C9-2, C10, C11, C12, C13, C14, C15, C16, C17, C18, C19, C20, C21, C22, C23, C24, C25-1, C25-2, C26, C27-1, C27-2, C28, C29, C30, C31, C32
Arcata Bay (Northern Humboldt Bay)										
7	10/24/2002	X		X	X	X	X	X		C39, C40-1, C40-2, C41, C42, C43, C44

Abbreviations:
OCDD = Octachlorodibenzo-p-dioxin
VOCs = Volatile organic compounds
SVOC = Semi-volatile organic compound
PCB = Polychlorinated biphenyls

Geomatrix

TABLE 2-3

SUMMARY OF BIOLOGICAL SAMPLES COLLECTED FOR TISSUE RESIDUE ANALYSES

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Biological Samples for Tissue Residue							
Type of samples	Date	Dioxins & Furans	SVOC	Metals	PCBs	Pesticide	Sample IDs
Arcata Bay and Mad River Slough							
10 Oyster composites	6/21/2002	10					20621-Ebay-6-2, 020261-Ebay-1-2, 020261-NBSC, 020261-NBSCO2, 020621-MR-7-1, 020621-MR-7-2, 020621-SIN, 020261-SIN-1-2, 020621-BIN, 020621-BIS
1 Mussel composite	6/21/2002	1					020261-NBSCM
13 Oyster composites	10/21/2002	13	13	13	13	13	DM-001, DM-003, DM-005, DM-007, DM-009, DM-0011, DM-0013, DM-0015a, DM-0015b, DM-0017, DM-0019, DM-0021, DM-0025,
1 Mussel composite	10/21/2002	1	1	1	1	1	DM-0023
3 White Perch samples	10/25/2002	3	1	1	1	1	DM-0044, DM-0066, DM-0079
1 Shark sample	10/25/2002	1	1	1	1	1	DM-0060
5 Shrimp samples	10/25/2002	5		1			DM-0041, DM-0045, DM-0048, DM-0052, DM-0056
6 Sculpin samples	10/24-25/02	6	1	1	1	1	DM-0036, DM-0037, DM-0054, DM-0071, DM-0078, DM-0080
5 Shiner samples	10/24-25/02	5	4	4	4	4	DM-0039, DM-0055, DM-0065, DM-0073, DM-0075
13 Sole samples	10/24-25/02	13	6	6	6	6	DM-0038/DM-0040, DM-0042/DM-0043, DM-0046, DM-0047, DM-0049, DM-0050, DM-0051, DM-0053, DM-0057, DM-0062/ DM-0068 , DM-0063/DM-0069, DM-0070/ DM-0072, DM-0076/DM-0077
10 Crab Composites	10/24-25/02	10	8	8	8	8	DM-0031, DM-0034, DM-0034(whole), DM-0032, DM-0033, DM-0035, DM-0058, DM-0059, DM-0061, DM-0074
Lappe Data							
2 mussel composites 4 crab composites	3/24/2002	6					31M011700032402, 41H0011700032402, 1R011015032402, 12M031415034202, 14H0031415032402, 3RC011230032402

Abbreviations:
SVOC = Semi-volatile organic compound
PCB = Polychlorinated biphenyls

TABLE 2-4

SUMMARY STATISTICS AND REPRESENTATIVE CONCENTRATIONS FOR CHEMICALS OF POTENTIAL CONCERN
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Geomatrix

Chemical	Medium	Sample Basis	Area	Site History	Units	Count	Number of Detects	Minimum Detection	Maximum Detection	Minimum Detection Limit	Maximum Detection Limit	Mean	Standard Deviation	95% Student-T UCL	Pro-UCL Distribution[1]	Rationale for Upperbound Representative Concentration[1]	Upperbound Representative Concentration[1]
Zinc	Sediment	Wet	Humboldt Bay (<1 ' bgs)	Wastewater discharge	mg/kg	23	23	23	120	--	--	44	20	51	Lognormal	H-UCL	50.6
Zinc	Sediment	Wet	Humboldt Bay (>1 ' bgs)	Wastewater discharge	mg/kg	5	5	41	62	--	--	51	9.4	60	Lognormal	Maximum	62.0
Zinc	Sediment	Wet	Mad River Slough (<1' bgs)	Wastewater discharge	mg/kg	22	22	29	63	--	--	47	9.0	50	Lognormal	H-UCL	50.7
Zinc	Sediment	Wet	Mad River Slough (>1' bgs)	Wastewater discharge	mg/kg	6	6	46	56	--	--	51	3.6	54	Lognormal	Student's-t UCL	53.6
Zinc	Sediment	Wet	Upland	Wastewater discharge	mg/kg	56	56	14	460	--	--	106	94	127	Lognormal	H-UCL	139
Zinc	Sediment	Dry	Humboldt Bay (<1 ' bgs)	Wastewater discharge	mg/kg	23	23	46	237	--	--	81	37	95	Non-parametric	Boot-strap	93.6
Zinc	Sediment	Dry	Humboldt Bay (>1 ' bgs)	Wastewater discharge	mg/kg	5	5	51	96	--	--	74	17	90	Lognormal	Maximum	96.0
Zinc	Sediment	Dry	Mad River Slough (<1' bgs)	Wastewater discharge	mg/kg	22	22	51	111	--	--	86	15	92	Lognormal	Student T or H-UCL	92.8
Zinc	Sediment	Dry	Mad River Slough (>1' bgs)	Wastewater discharge	mg/kg	6	6	78	106	--	--	94	9.9	102	Lognormal	Student T or H-UCL	103
Zinc	Sediment	Dry	Upland	Wastewater discharge	mg/kg	56	56	25	811	--	--	187	166	224	Lognormal	H-UCL	245
2,3,7,8-TCDD TEQ (Fish TEFs)	Sediment	Dry	Humboldt Bay (<1 ' bgs)	Wood surface protection	ng/kg	28	28	0.825	11.7	--	--	2.63	2.24	3.35	Gamma	Approximate Gamma UCL	3.28
2,3,7,8-TCDD TEQ (Mammal TEFs)	Sediment	Dry	Humboldt Bay (<1 ' bgs)	Wood surface protection	ng/kg	28	28	0.98	13.1	--	--	3.29	2.75	4.17	Gamma	Approximate Gamma UCL	4.10
2,3,7,8-TCDD TEQ (Bird TEFs)	Sediment	Dry	Humboldt Bay (<1 ' bgs)	Wood surface protection	ng/kg	28	28	1.23	19.2	--	--	3.88	3.50	5.01	Lognormal	H-UCL	4.75
2,3,7,8-TCDD TEQ (Fish TEFs)	Sediment	Dry	Humboldt Bay (>1' bgs)	Wood surface protection	ng/kg	5	5	1.27	10.6	--	--	5.68	3.32	8.85	Normal	Student's-t UCL	8.85
2,3,7,8-TCDD TEQ (Mammal TEFs)	Sediment	Dry	Humboldt Bay (>1' bgs)	Wood surface protection	ng/kg	5	5	1.29	14.3	--	--	7.87	4.84	12.5	Normal	Student's-t UCL	12.5
2,3,7,8-TCDD TEQ (Bird TEFs)	Sediment	Dry	Humboldt Bay (>1' bgs)	Wood surface protection	ng/kg	5	5	2.41	13.1	--	--	8.07	4.07	12.0	Normal	Student's-t UCL	12.0
2,3,7,8-TCDD TEQ (Fish TEFs)	Sediment	Dry	Mad River Slough (<1' bgs)	Wood surface protection	ng/kg	66	66	0.00049	59.5	--	--	7.64	11.2	9.94	Non-parametric	95% Chebyshev (Mean, Sd) UCL	13.6
2,3,7,8-TCDD TEQ (Mammal TEFs)	Sediment	Dry	Mad River Slough (<1' bgs)	Wood surface protection	ng/kg	66	66	0.00049	120	--	--	13.2	21.1	17.5	Gamma	Adjusted Gamma UCL	18.8
2,3,7,8-TCDD TEQ (Bird TEFs)	Sediment	Dry	Mad River Slough (<1' bgs)	Wood surface protection	ng/kg	66	66	0.00049	79.2	--	--	10.0	14.0	12.9	Non-parametric	99% Chebyshev (Mean, Sd) UCL	26.9
2,3,7,8-TCDD TEQ (Fish TEFs)	Sediment	Dry	Mad River Slough (>1' bgs)	Wood surface protection	ng/kg	22	22	0.200	69.1	--	--	21.4	21.2	29.2	Gamma	Approximate Gamma UCL	34.5
2,3,7,8-TCDD TEQ (Mammal TEFs)	Sediment	Dry	Mad River Slough (>1' bgs)	Wood surface protection	ng/kg	22	22	0.200	117	--	--	37.0	38.5	51.2	Gamma	Approximate Gamma UCL	62.1
2,3,7,8-TCDD TEQ (Bird TEFs)	Sediment	Dry	Mad River Slough (>1' bgs)	Wood surface protection	ng/kg	22	22	0.420	87.2	--	--	26.9	26.7	36.7	Gamma	Approximate Gamma UCL	42.6
2,3,7,8-TCDD TEQ (Fish TEFs)	Sediment	Dry	Upland	Wood surface protection	ng/kg	1	1	13.7	13.7	--	--	13.7	--	--	--	Maximum	13.7
2,3,7,8-TCDD TEQ (Mammal TEFs)	Sediment	Dry	Upland	Wood surface protection	ng/kg	1	1	24.9	24.9	--	--	24.9	--	--	--	Maximum	24.9
2,3,7,8-TCDD TEQ (Bird TEFs)	Sediment	Dry	Upland	Wood surface protection	ng/kg	1	1	15.1	15.1	--	--	15.1	--	--	--	Maximum	15.1
Zinc	Oyster	Wet	Humboldt Bay	Wastewater discharge	mg/kg	11	11	58	140	--	--	98	30	114	Lognormal	H-UCL	121
Zinc	Oyster	Wet	Mad River Slough	Wastewater discharge	mg/kg	2	2	78	110	--	--	94	23	195	--	Maximum	110
2,3,7,8-TCDD TEQ (Fish TEFs)	Oyster	Wet	Humboldt Bay	Wood surface protection	ng/kg	20	20	0.148	4.31	--	--	0.886	1.04	1.29	Non-parametric	99% Chebyshev (Mean, Sd) UCL	3.19
2,3,7,8-TCDD TEQ (Mammal TEFs)	Oyster	Wet	Humboldt Bay	Wood surface protection	ng/kg	20	20	0.160	4.32	--	--	0.886	1.03	1.28	Non-parametric	99% Chebyshev (Mean, Sd) UCL	3.18
2,3,7,8-TCDD TEQ (Bird TEFs)	Oyster	Wet	Humboldt Bay	Wood surface protection	ng/kg	20	20	0.290	4.66	--	--	1.09	1.05	1.50	Non-parametric	95% Chebychev (mean, Std.) UCL	2.12
2,3,7,8-TCDD TEQ (Fish TEFs)	Oyster	Wet	Mad River Slough	Wood surface protection	ng/kg	3	3	0.108	2.24	--	--	0.861	--	--	--	Maximum	2.24
2,3,7,8-TCDD TEQ (Mammal TEFs)	Oyster	Wet	Mad River Slough	Wood surface protection	ng/kg	3	3	0.120	2.22	--	--	0.850	--	--	--	Maximum	2.22
2,3,7,8-TCDD TEQ (Bird TEFs)	Oyster	Wet	Mad River Slough	Wood surface protection	ng/kg	3	3	0.240	2.44	--	--	1.02	--	--	--	Maximum	2.44
Zinc	Crab	Wet	Humboldt Bay	Wastewater discharge	mg/kg	3	3	29	43	--	--	38	7.6	50	--	Maximum	43.0
Zinc	Crab	Wet	Mad River Slough	Wastewater discharge	mg/kg	5	5	25	45	--	--	32	7.9	40	Lognormal	H-UCL	41.9
2,3,7,8-TCDD TEQ (Fish TEFs)	Crab	Wet	Humboldt Bay	Wood surface protection	ng/kg	5	5	0.142	2.93	--	--	1.04	1.17	2.16	Normal	Student's-t UCL	2.16
2,3,7,8-TCDD TEQ (Mammal TEFs)	Crab	Wet	Humboldt Bay	Wood surface protection	ng/kg	5	5	0.160	1.25	--	--	0.652	0.481	1.11	Normal	Student's-t UCL	1.11
2,3,7,8-TCDD TEQ (Bird TEFs)	Crab	Wet	Humboldt Bay	Wood surface protection	ng/kg	5	5	0.430	1.52	--	--	0.882	0.425	1.29	Normal	Student's-t UCL	1.29
2,3,7,8-TCDD TEQ (Fish TEFs)	Crab	Wet	Mad River Slough	Wood surface protection	ng/kg	9	9	0.109	2.29	--	--	0.527	0.701	0.961	Gamma	Approximate Gamma UCL	1.12
2,3,7,8-TCDD TEQ (Mammal TEFs)	Crab	Wet	Mad River Slough	Wood surface protection	ng/kg	9	9	0.120	4.03	--	--	0.778	1.26	1.56	Lognormal	95% Chebychev (MVUE) UCL	1.76
2,3,7,8-TCDD TEQ (Bird TEFs)	Crab	Wet	Mad River Slough	Wood surface protection	ng/kg	9	9	0.160	3.22	--	--	0.728	0.966	1.327	Lognormal	H-UCL	1.84
Zinc	Mussel	Wet	Mad River Slough	Wastewater discharge	mg/kg	1	1	12	12	--	--	--	--	--	--	Maximum	12.0
2,3,7,8-TCDD TEQ (Fish TEFs)	Mussel	Wet	Humboldt Bay	Wood surface protection	ng/kg	1	1	0.436	0.436	--	--	0.436	--	--	--	Maximum	0.436
2,3,7,8-TCDD TEQ (Mammal TEFs)	Mussel	Wet	Humboldt Bay	Wood surface protection	ng/kg	1	1	0.390	0.390	--	--	0.390	--	--	--	Maximum	0.390
2,3,7,8-TCDD TEQ (Bird TEFs)	Mussel	Wet	Humboldt Bay	Wood surface protection	ng/kg	1	1	0.480	0.480	--	--	0.480	--	--	--	Maximum	0.480
2,3,7,8-TCDD TEQ (Fish TEFs)	Mussel	Wet	Mad River Slough	Wood surface protection	ng/kg	3	3	0.0892	0.985	--	--	0.586	--	--	--	Maximum	0.985
2,3,7,8-TCDD TEQ (Mammal TEFs)	Mussel	Wet	Mad River Slough	Wood surface protection	ng/kg	3	3	0.100	0.960	--	--	0.580	--	--	--	Maximum	0.960
2,3,7,8-TCDD TEQ (Bird TEFs)	Mussel	Wet	Mad River Slough	Wood surface protection	ng/kg	3	3	0.150	1.06	--	--	0.663	--	--	--	Maximum	1.06
Zinc	Sculpin	Wet	Humboldt Bay	Wastewater discharge	mg/kg	1	1	11	11	--	--	--	--	--	--	Maximum	11.0
2,3,7,8-TCDD TEQ (Fish TEFs)	Sculpin	Wet	Humboldt Bay	Wood surface protection	ng/kg	4	4	0.194	1.28	--	--	0.499	--	--	--	Maximum	1.28
2,3,7,8-TCDD TEQ (Mammal TEFs)	Sculpin	Wet	Humboldt Bay	Wood surface protection	ng/kg	4	4	0.200	1.20	--	--	0.475	--	--	--	Maximum	1.20
2,3,7,8-TCDD TEQ (Bird TEFs)	Sculpin	Wet	Humboldt Bay	Wood surface protection	ng/kg	4	4	0.360	1.90	--	--	0.770	--	--	--	Maximum	1.90
2,3,7,8-TCDD TEQ (Fish TEFs)	Sculpin	Wet	Mad River Slough	Wood surface protection	ng/kg	2	2	0.150	0.380	--	--	0.265	--	--	--	Maximum	0.380
2,3,7,8-TCDD TEQ (Mammal TEFs)	Sculpin	Wet	Mad River Slough	Wood surface protection	ng/kg	2	2	0.150	0.360	--	--	0.255	--	--	--	Maximum	0.360
2,3,7,8-TCDD TEQ (Bird TEFs)	Sculpin	Wet	Mad River Slough	Wood surface protection	ng/kg	2	2	0.280	0.500	--	--	0.390	--	--	--	Maximum	0.500
Zinc	Perch	Wet	Humboldt Bay	Wastewater discharge	mg/kg	1	1	40	40	--	--	--	--	--	--	Maximum	40.0
2,3,7,8-TCDD TEQ (Fish TEFs)	Perch	Wet	Humboldt Bay	Wood surface protection	ng/kg	3	3	0.119	0.305	--	--	0.227	--	--	--	Maximum	0.305
2,3,7,8-TCDD TEQ (Mammal TEFs)	Perch	Wet	Humboldt Bay	Wood surface protection	ng/kg	3	3	0.130	0.290	--	--	0.223	--	--	--	Maximum	0.290

TABLE 2-4

SUMMARY STATISTICS AND REPRESENTATIVE CONCENTRATIONS FOR CHEMICALS OF POTENTIAL CONCERN

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Geomatrix

Chemical	Medium	Sample Basis	Area	Site History	Units	Count	Number of Detects	Minimum Detection	Maximum Detection	Minimum Detection Limit	Maximum Detection Limit	Mean	Standard Deviation	95% Student-T UCL	Pro-UCL Distribution[1]	Rationale for Upperbound Representative Concentration[1]	Upperbound Representative Concentration[1]
2,3,7,8-TCDD TEQ (Bird TEFs)	Perch	Wet	Humboldt Bay	Wood surface protection	ng/kg	3	3	0.280	0.590	--	--	0.460	--	--	--	Maximum	0.590
Zinc	Shiner	Wet	Humboldt Bay	Wastewater discharge	mg/kg	4	4	11	27	--	--	19	6.6	26	--	Maximum	27.0
2,3,7,8-TCDD TEQ (Fish TEFs)	Shiner	Wet	Humboldt Bay	Wood surface protection	ng/kg	4	4	0.0616	0.622	--	--	0.401	--	--	--	Maximum	0.622
2,3,7,8-TCDD TEQ (Mammal TEFs)	Shiner	Wet	Humboldt Bay	Wood surface protection	ng/kg	4	4	0.0600	0.640	--	--	0.395	--	--	--	Maximum	0.640
2,3,7,8-TCDD TEQ (Bird TEFs)	Shiner	Wet	Humboldt Bay	Wood surface protection	ng/kg	4	4	0.120	1.47	--	--	0.823	--	--	--	Maximum	1.47
2,3,7,8-TCDD TEQ (Fish TEFs)	Shiner	Wet	Mad River Slough	Wood surface protection	ng/kg	1	1	0.406	0.406	--	--	0.406	--	--	--	Maximum	0.406
2,3,7,8-TCDD TEQ (Mammal TEFs)	Shiner	Wet	Mad River Slough	Wood surface protection	ng/kg	1	1	0.380	0.380	--	--	0.380	--	--	--	Maximum	0.380
2,3,7,8-TCDD TEQ (Bird TEFs)	Shiner	Wet	Mad River Slough	Wood surface protection	ng/kg	1	1	0.540	0.540	--	--	0.540	--	--	--	Maximum	0.540
Zinc	Sole	Wet	Humboldt Bay	Wastewater discharge	mg/kg	4	4	11	17	--	--	13	2.8	16	--	Maximum	17.0
Zinc	Sole	Wet	Mad River Slough	Wastewater discharge	mg/kg	2	2	13	15	--	--	14	1.4	20	--	Maximum	15.0
2,3,7,8-TCDD TEQ (Fish TEFs)	Sole	Wet	Humboldt Bay	Wood surface protection	ng/kg	6	6	0.0573	0.260	--	--	0.154	0.0993	0.235	Gamma	Approximate Gamma UCL	0.306
2,3,7,8-TCDD TEQ (Mammal TEFs)	Sole	Wet	Humboldt Bay	Wood surface protection	ng/kg	6	6	0.0600	0.240	--	--	0.148	0.0904	0.223	Gamma	Maximum	0.240
2,3,7,8-TCDD TEQ (Bird TEFs)	Sole	Wet	Humboldt Bay	Wood surface protection	ng/kg	6	6	0.130	0.360	--	--	0.237	0.111	0.328	Gamma	Maximum	0.360
2,3,7,8-TCDD TEQ (Fish TEFs)	Sole	Wet	Mad River Slough	Wood surface protection	ng/kg	7	7	0.102	0.360	--	--	0.194	0.079	0.252	Lognormal	H-UCL	0.273
2,3,7,8-TCDD TEQ (Mammal TEFs)	Sole	Wet	Mad River Slough	Wood surface protection	ng/kg	7	7	0.110	0.390	--	--	0.213	0.086	0.276	Normal	Student's-t UCL	0.276
2,3,7,8-TCDD TEQ (Bird TEFs)	Sole	Wet	Mad River Slough	Wood surface protection	ng/kg	7	7	0.200	0.680	--	--	0.379	0.150	0.489	Normal	Student's-t UCL	0.489
Zinc	Shrimp	Wet	Mad River Slough	Wastewater discharge	mg/kg	1	1	11	11	--	--	--	--	--	--	Maximum	11.0
2,3,7,8-TCDD TEQ (Fish TEFs)	Shrimp	Wet	Humboldt Bay	Wood surface protection	ng/kg	2	2	0.132	0.681	--	--	0.406	--	--	--	Maximum	0.681
2,3,7,8-TCDD TEQ (Mammal TEFs)	Shrimp	Wet	Humboldt Bay	Wood surface protection	ng/kg	2	2	0.140	0.700	--	--	0.420	--	--	--	Maximum	0.700
2,3,7,8-TCDD TEQ (Bird TEFs)	Shrimp	Wet	Humboldt Bay	Wood surface protection	ng/kg	2	2	0.280	1.68	--	--	0.980	--	--	--	Maximum	1.68
2,3,7,8-TCDD TEQ (Fish TEFs)	Shrimp	Wet	Mad River Slough	Wood surface protection	ng/kg	3	3	0.0817	0.256	--	--	0.153	--	--	--	Maximum	0.256
2,3,7,8-TCDD TEQ (Mammal TEFs)	Shrimp	Wet	Mad River Slough	Wood surface protection	ng/kg	3	3	0.0900	0.250	--	--	0.150	--	--	--	Maximum	0.250
2,3,7,8-TCDD TEQ (Bird TEFs)	Shrimp	Wet	Mad River Slough	Wood surface protection	ng/kg	3	3	0.150	0.370	--	--	0.233	--	--	--	Maximum	0.370
Zinc	Shark	Wet	Mad River Slough	Wastewater discharge	mg/kg	1	1	4	4	--	--	--	--	--	--	Maximum	4.00
2,3,7,8-TCDD TEQ (Fish TEFs)	Shark	Wet	Mad River Slough	Wood surface protection	ng/kg	1	1	0.0632	0.0632	--	--	0.063	--	--	--	Maximum	0.0632
2,3,7,8-TCDD TEQ (Mammal TEFs)	Shark	Wet	Mad River Slough	Wood surface protection	ng/kg	1	1	0.0650	0.0650	--	--	0.065	--	--	--	Maximum	0.0650
2,3,7,8-TCDD TEQ (Bird TEFs)	Shark	Wet	Mad River Slough	Wood surface protection	ng/kg	1	1	0.160	0.160	--	--	0.160	--	--	--	Maximum	0.160

Notes:

1. A detailed presentation of the distribution analysis is presented in Appendix E.

Abbreviations:

2,3,7,8-TCDD TEQs (Fish TEFs) = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicity equivalents using toxicity equivalency factors for fish.
2,3,7,8-TCDD TEQs (Mammals TEFs) = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicity equivalents using toxicity equivalency factors for mammals.
2,3,7,8-TCDD TEQs (Bird TEFs) = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicity equivalents using toxicity equivalency factors for birds.
95% Chebychev (mean, std) UCL = Uses two-sided Chebychev theorem and sample mean and standard deviation to calculate the 95% upper confidence limit
95% Chebychev (MVUE) UCL = Uses two-sided Chebychev theorem and minimum variance unbiased estimates of mean and standard deviation to calculate the 95% upper confidence limit
99% Chebychev (mean, std) UCL = Uses two-sided Chebychev theorem and sample mean and standard deviation to calculate the 99% upper confidence limit
Approximate Gamma UCL = calculated for gamma distributions
Adjusted Gamma UCL = calculated for gamma distributions
Bootstrap = Uses repeated sampling of subset of population to calculate the 95% upper confidence limit
H-UCL = Uses Land's H-statistic to calculate the 95% upper confidence limit
Maximum = Maximum value was higher than statistical 95% upper confidence limit or insufficient data to analyze distribution
Student's-t UCL= Uses student's t-statistic to calculate the 95% upper confidence limit
-- = Small number of samples; statistics not applied.

TABLE 3-1

1996 LAND USE STATISTICS

Sierra Pacific Industries
Aracata Division Sawmill
Arcata, California

Watershed	Landuse	Frequency	Acres
Cloney Gulch	Pasture	7	302.92
Cloney Gulch	Native Vegetation	4	6025.79
Cloney Gulch	Water Surface	1	15.44
Cloney Gulch	Semiagricultural & Incidental To Agriculture	3	12.42
Cloney Gulch	Commercial	2	21.46
Cloney Gulch	Residential	17	305.28
Fay Slough	Grain And Hay Crops	2	33.00
Fay Slough	Pasture	17	224.88
Fay Slough	Barren And Wasteland	3	130.65
Fay Slough	Riparian Vegetation	5	111.11
Fay Slough	Native Vegetation	19	4191.57
Fay Slough	Water Surface	20	339.51
Fay Slough	Semiagricultural & Incidental To Agriculture	3	11.19
Fay Slough	Commercial	9	146.59
Fay Slough	Industrial	4	127.48
Fay Slough	Urban Landscape	2	11.45
Fay Slough	Residential	19	2575.63
Fay Slough	Vacant	1	75.56
Fields Landing	Pasture	14	982.30
Fields Landing	Native Vegetation	3	2357.66
Fields Landing	Water Surface	19	108.05
Fields Landing	Semiagricultural & Incidental To Agriculture	4	29.20
Fields Landing	Commercial	3	162.59
Fields Landing	Residential	8	110.42
Fields Landing	Vacant	1	13.07
Humboldt Bay	Pasture	10	3.32
Humboldt Bay	Barren And Wasteland	77	63.40
Humboldt Bay	Riparian Vegetation	14	355.69
Humboldt Bay	Native Vegetation	39	12.36
Humboldt Bay	Water Surface	4	15553.98
Humboldt Bay	Urban	2	0.93
Humboldt Bay	Commercial	6	3.09
Humboldt Bay	Industrial	22	12.93
Humboldt Bay	Residential	20	27.12
Humboldt Bay	Vacant	4	0.50
Humboldt Bay	Outside	1	35.05
Jolly Giant Creek	Pasture	5	53.77
Jolly Giant Creek	Native Vegetation	10	1607.74
Jolly Giant Creek	Water Surface	1	5.13
Jolly Giant Creek	Semiagricultural & Incidental To Agriculture	3	6.95
Jolly Giant Creek	Commercial	9	49.70
Jolly Giant Creek	Industrial	7	110.09
Jolly Giant Creek	Residential	13	228.55
Jolly Giant Creek	Vacant	2	19.48
Little Freshwater Creek	Pasture	1	0.02
Little Freshwater Creek	Native Vegetation	3	5752.39

TABLE 3-1

Geomatrix

1996 LAND USE STATISTICS

Sierra Pacific Industries
Aracata Division Sawmill
Arcata, California

Watershed	Landuse	Frequency	Acres
Little Freshwater Creek	Residential	2	11.06
Lower Elk River	Grain And Hay Crops	3	274.72
Lower Elk River	Idle	5	194.52
Lower Elk River	Pasture	18	776.17
Lower Elk River	Barren And Wasteland	1	80.23
Lower Elk River	Native Vegetation	11	4089.15
Lower Elk River	Water Surface	14	57.25
Lower Elk River	Semiagricultural & Incidental To Agriculture	7	56.62
Lower Elk River	Commercial	2	45.61
Lower Elk River	Residential	17	646.21
Lower Jacoby Creek	Pasture	9	335.33
Lower Jacoby Creek	Barren And Wasteland	1	54.85
Lower Jacoby Creek	Native Vegetation	9	4853.20
Lower Jacoby Creek	Water Surface	7	0.17
Lower Jacoby Creek	Semiagricultural & Incidental To Agriculture	5	15.70
Lower Jacoby Creek	Residential	14	1356.95
Lower N. Fork Elk River	Idle	1	5.90
Lower N. Fork Elk River	Pasture	2	5.60
Lower N. Fork Elk River	Native Vegetation	3	9036.35
Lower N. Fork Elk River	Semiagricultural & Incidental To Agriculture	1	23.82
Lower S. Fork Elk River	Pasture	2	66.84
Lower S. Fork Elk River	Native Vegetation	2	5614.67
Lower S. Fork Elk River	Semiagricultural & Incidental To Agriculture	1	7.35
Lower Salmon Creek	Grain And Hay Crops	1	13.71
Lower Salmon Creek	Idle	5	66.67
Lower Salmon Creek	Pasture	23	1201.05
Lower Salmon Creek	Native Vegetation	2	3701.12
Lower Salmon Creek	Water Surface	2	117.44
Lower Salmon Creek	Semiagricultural & Incidental To Agriculture	2	13.37
Lower Salmon Creek	Industrial	1	6.07
Lower Salmon Creek	Residential	9	47.65
Mad River Slough	Deciduous Fruits And Nuts	1	3.02
Mad River Slough	Field Crops	8	105.52
Mad River Slough	Grain And Hay Crops	3	24.46
Mad River Slough	Idle	8	76.11
Mad River Slough	Pasture	125	4757.31
Mad River Slough	Truck	8	85.81
Mad River Slough	Barren And Wasteland	3	3402.45
Mad River Slough	Riparian Vegetation	3	127.79
Mad River Slough	Native Vegetation	24	1794.05
Mad River Slough	Water Surface	66	541.92
Mad River Slough	Semiagricultural & Incidental To Agriculture	52	157.41
Mad River Slough	Urban	2	43.46
Mad River Slough	Commercial	18	630.23
Mad River Slough	Industrial	19	904.67
Mad River Slough	Residential	41	2231.98

TABLE 3-1

1996 LAND USE STATISTICS

Sierra Pacific Industries
Aracata Division Sawmill
Arcata, California

Watershed	Landuse	Frequency	Acres
Mad River Slough	Vacant	7	126.45
Mad River Slough	Outside	30	25.20
Martin Slough	Pasture	2	67.51
Martin Slough	Native Vegetation	9	1342.85
Martin Slough	Water Surface	1	0.23
Martin Slough	Commercial	5	19.37
Martin Slough	Urban Landscape	2	253.18
Martin Slough	Residential	6	1740.81
Middle Salmon Creek	Pasture	3	21.82
Middle Salmon Creek	Native Vegetation	2	4783.25
Middle Salmon Creek	Residential	1	7.20
Pine Hill	Native Vegetation	1	71.51
Pine Hill	Industrial	2	5.41
Pine Hill	Urban Landscape	1	64.05
Pine Hill	Residential	2	89.52
Ryan Slough	Pasture	2	23.41
Ryan Slough	Native Vegetation	6	8704.43
Ryan Slough	Water Surface	1	2.91
Ryan Slough	Semiagricultural & Incidental To Agriculture	1	1.57
Ryan Slough	Commercial	4	35.08
Ryan Slough	Residential	12	638.85
Ryan Slough	Vacant	2	25.57
South Spit	Grain And Hay Crops	1	0.75
South Spit	Idle	1	22.01
South Spit	Pasture	3	30.72
South Spit	Barren And Wasteland	3	919.81
South Spit	Native Vegetation	5	359.34
South Spit	Water Surface	32	4.88
South Spit	Residential	2	30.98
South Spit	Outside	17	8.65
Upper Freshwater Creek	Native Vegetation	4	7229.84
Upper Jacoby Creek	Native Vegetation	7	6337.45
Upper Jacoby Creek	Residential	8	69.77
Upper N. Fork Elk River	Native Vegetation	2	5355.20
Upper S. Fork Elk River	Native Vegetation	2	7487.75
Upper Salmon Creek	Native Vegetation	2	3016.61
W. Side Eureka	Barren And Wasteland	1	2.58
W. Side Eureka	Riparian Vegetation	2	68.87
W. Side Eureka	Native Vegetation	4	30.59
W. Side Eureka	Water Surface	15	25.09
W. Side Eureka	Commercial	1	22.00
W. Side Eureka	Industrial	4	579.35
W. Side Eureka	Urban Landscape	2	49.22
W. Side Eureka	Residential	1	1417.29

TABLE 3-2

FISH SPECIES POTENTIALLY PRESENT IN MAD RIVER SLOUGH AND ARCATA BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Common Name (Species)	Status	Feeding Guild	Food Web Category
Sharks and Rays			
Leopard shark (Triakis semifasciata)		predator	pelagic or demersal piscivore
Soupfin shark (Galeorhinus zyopterus)		predator	pelagic or demersal piscivore
Spiny dogfish (Squalis acanthius)		predator	pelagic or demersal piscivore
Big skate (Raja binoculata)		predator	pelagic or demersal piscivore
Round stingray (Urolophus halleri)		predator	pelagic or demersal piscivore
Sevengill shark (Notorynchus maculatus)		predator	pelagic or demersal piscivore
Brown smoothhound (Mustelus henlei)		predator	pelagic or demersal piscivore
Bat ray (Myliobatis californica)		predator	pelagic or demersal piscivore
Spotted ratfish (Hydrolagus colliei)		predator	pelagic or demersal piscivore
Herrings, Anchovies, and Shads			
Northern anchovy (Engraulis mordax)		planktivore	pelagic fish
Pacific herring (Clupea harengus pallasi)		ominvore	pelagic fish
American shad (Alosa sapidissima)		ominvore	pelagic fish
Threadfin shad (Dorosoma petenense)		ominvore	pelagic fish
Salmonids			
Coho salmon (Oncorhynchus kisutch)	T,ST	predator	pelagic fish
Chinook salmon (Oncorhynchus tshawytscha)	T	predator	pelagic fish
Cutthroat trout (Oncorhychus clarki)		predator	pelagic fish
N. California Steelhead (Oncorhynchus mykiss)	T	predator	pelagic fish
Smelts			
Whitebait smelt (Allosmerus elongatus)		predator	pelagic fish
Surf smelt (Hypomesus pretiosus)		predator	pelagic fish
Night smelt (Spirinchus starksi)		predator	pelagic fish
Longfin smelt (Spirinchus thaleichtys)		predator	pelagic fish
Topsmelt (Atherinops affinis)		predator	pelagic fish
Jacksmelt (Atherinopsis californiensis)		predator	pelagic fish
Surfperches			
Calico surfperch (Amphistichus koelzi)		predator	demersal fish
Redtail surfperch (Amphistichus rhodoterus)		predator	demersal fish
Shiner perch (Cymatogaster aggregata)		predator	demersal fish
Striped seaperch (Embiotoca lateralis)		predator	demersal fish
Spotfin surfperch (Hyperprosopon anale)		predator	demersal fish
Walleye surfperch (Hyperprosopon argenteum)		predator	demersal fish
Silver surfperch (Hyperprosopon ellipticum)		predator	demersal fish
White seaperch (Phanerodon furcatus)		predator	demersal fish
Pile perch (Phacochilus vacca)		predator	demersal fish
Rockfishes and Greenlings			
Cabezon (Scorpaenichthys marmoratus)		predator	demersal fish
Black rockfish (Sebastes melanops)		ominvore	pelagic fish
Blue rockfish (Sebastes mystinus)		ominvore	pelagic fish
Bocaccio (Sebastes paucispinis)	C	predator/planktivore	demersal fish

TABLE 3-2

FISH SPECIES POTENTIALLY PRESENT IN MAD RIVER SLOUGH AND ARCATA BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Common Name (Species)	Status	Feeding Guild	Food Web Category
Brown rockfish (Sebastes auriculatus)		predator	demersal fish
Copper rockfish (Sebastes caurinus)		predator	demersal fish
Grass rockfish (Sebastes rastrelliger)		predator	demersal fish
Vermillion rockfish (Sebastes miniatus)		predator	demersal fish
Yellowtail rockfish (Sebastes flavidus)		predator/planktivore	demersal fish
Rock greenling (Hexagrammos lagocephalus)		predator	demersal fish
Painted greenling (Oxylebius pictus)		predator	demersal fish
Kelp greenling (Hexagrammos decagrammus)		predator	demersal fish
Lingcod (Ophiodon elongatus)		predator	demersal fish
Flatfish			
Butter sole (Isopsetta isolepis)		predator	demersal fish
Dover sole (Microstomus pacificus)		predator	demersal fish
English sole (Parophrys vetulus)		predator	demersal fish
Pacific sanddab (Citharichthys sordidus)		predator	demersal fish
Sand sole (Psettichthys melanostrictus)		predator	demersal fish
Starry flounder (Platichthys stellatus)		predator	demersal fish
Speckled sanddab (Citharichthys stigmaeus)		predator	demersal fish
California Halibut (Paralichthys californicus)		predator	demersal fish
C-O sole (Pleuronichthys coenosus)		predator	demersal fish
Curlfin sole (Pleuronichthys decurrens)		predator	demersal fish
Other Fishes			
Pacific lamprey (Lampetra tridentata)		predator	pelagic or demersal piscivore
Green sturgeon (Acipenser medirostris)		predator	pelagic or demersal piscivore
Yellow snake eel (Ophichthus zophochir)		predator	pelagic or demersal piscivore
Eulachon (Thaleichthys pacificus)		predator	pelagic fish
Benttooth bristlemouth (Cyclothone acclinideus)		predator	pelagic fish
Northern lampfish (Stenobrachius leucopsarus)		predator	pelagic fish
Blue lanternfish (Tarletonbeania crenularis)		predator	pelagic fish
Pacific tomcod (Microgadus proximus)		predator	pelagic fish
Spotted cusk-eel (Chilara taylori)		predator	pelagic fish
King-of-the-salmon (Trachipterus altivelis)		predator	pelagic fish
Tube-snout (Aulorhynchus flavidus)		predator	demersal fish
Threespine stickleback (Gasterosteus aculeatus)		predator	demersal fish
Bay pipefish (Syngnathus leptorhyhchus)		predator	demersal fish
Striped bass (Morone saxatilis)		predator	pelagic fish
Giant sea bass (Stereolepis gigas)		predator	pelagic fish
White seabass (Atractoscion nobilis)		predator	demersal fish
White croaker (Genyonemus lineatus)		predator	demersal fish
Pacific sandfish (Trichodon trichodon)		predator	demersal fish
High cockscomb (Anoplarchus purpurescens)		predator	demersal fish
Monkeyface prickleback (Cebidichthys violaceus)		predator	demersal fish
Decorated warbonnet (Chirolophis decoratus)		predator	demersal fish

TABLE 3-2

FISH SPECIES POTENTIALLY PRESENT IN MAD RIVER SLOUGH AND ARCATA BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Common Name (Species)	Status	Feeding Guild	Food Web Category
Snake prickleback (Lumpensus sagitta)		predator	demersal fish
Penpoint gunnel (Apodichthys flavidus)		predator	demersal fish
Saddleback gunnel (Pholis ornata)		predator	demersal fish
Wolf-eel (Anarrhichthys ocellatus)		predator	demersal fish
Giant wrymouth (Delolepis gigantea)		predator	demersal fish
Pacific sand lance (Ammodytes hexapterus)		predator	demersal fish
Arrow goby (Clevelandia ios)		predator	demersal fish
Blackeye goby (Coryphopterus nicholsi)		predator	demersal fish
Tidewater goby (Eucyclogobius newberryi)	E	predator	demersal fish
Bay goby (Lepdiogobius lepidus)		predator	demersal fish
Louvar (Luvarus imperialis)		predator	demersal fish
Medusafish (Icichthys lockingtoni)		predator	demersal fish
Pacific pompano (Peprilus simillimus)		predator	pelagic fish
Padded sculpin (Artedius fenestralis)		predator	demersal fish
Scalyhead sculpin (Artedius harringtoni)		predator	demersal fish
Bonehead sculpin (Artedius notospilotus)		predator	demersal fish
Rosylip sculpin (Ascelichthys rhodorus)		predator	demersal fish
Silverspotted sculpin (Blepsias cirrhosus)		predator	demersal fish
Sharpnose sculpin (Clinocottus acuticeps)		predator	demersal fish
Coastrange sculpin (Cottus aleuticus)		predator	demersal fish
Prickly sculpin (Cottus asper)		predator	demersal fish
Buffalo sculpin (Enophrys bison)		predator	demersal fish
Red Irish Lord (Hemilepidotus hemilepidotus)		predator	demersal fish
Brown Irish Lord (Hemilepidotus spinosus)		predator	demersal fish
Pacific staghorn sculpin (Leptocottus armatus)		predator	demersal fish
Sailfin sculpin (Nautichthys oculofasciatus)		predator	demersal fish
Fluffy sculpin (Oligocottus synderi)		predator	demersal fish
Pygmy poacher (Odontopyxis trispinosa)		predator	demersal fish
Tubenose poacher (Pallasina barbata)		predator	demersal fish
Pricklebreast poacher (Stelerina xyosterna)		predator	demersal fish
Slipskin snailfish (Liparis fucensis)		predator	demersal fish
Showy snailfish (Liparis pulchellus)		predator	demersal fish
Ringtail snailfish (Liparis rutteri)		predator	demersal fish
California tonguefish (Symphurus atricauda)		predator	demersal fish
Ocean sunfish (Mola mola)		predator	pelagic fish

Abbreviations:
C = Federal candidate species
E = Federal endangered species
SC = State species of special concern
SE = State endangered species
ST = State threatened species
T = Federal threatened species

TABLE 3-3

BIRD SPECIES POTENTIALLY PRESENT IN MAD RIVER SLOUGH AND ARCATA BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Common Name (Species)	Status	Feeding Guilds	Food Web Category
Omnivorous Birds			
American woodcock (Scolopax minor)		omnivore	surface searching shorebird
Wood duck (Aix sponsa)		omnivore	diving and surface water bird
Mallard (Anas platyrhynchos)		omnivore	diving and surface water bird
American wigeon (Anas americana)		omnivore	diving and surface water bird
Eurasian wigeon (Anas penelope)		omnivore	diving and surface water bird
Greater scaup (Aythya marila)		omnivore	diving and surface water bird
Lesser scaup (Aythya affinis)		omnivore	diving and surface water bird
Bufflehead (Bucephala albeola)		omnivore	diving and surface water bird
Green-winged teal (Anas crecca carolinensis)		omnivore	diving and surface water bird
Blue-winged teal (Anas discors)		omnivore	diving and surface water bird
Cinnamon teal (Anas cyanoptera)		omnivore	diving and surface water bird
Northern shoveler (Anas clypeata)		omnivore	diving and surface water bird
California quail (Callipepla californica)		omnivore	terrestrial/upland bird
Sora (Porzana carolina)		omnivore	aerial searching bird
Laughing gull (Larus atricilla)	SC	omnivore	aerial searching bird
Franklin's gull (Larus pipixcan)		omnivore	aerial searching bird
Little gull (Larus minutus)		omnivore	aerial searching bird
Common black-headed gull (Larus ridibundus)		omnivore	aerial searching bird
Bonaparte's gull (Larus philadelphia)		omnivore	aerial searching bird
Heermann's gull (Larus heermanni)		omnivore	aerial searching bird
Mew gull (Larus canus)		omnivore	aerial searching bird
Ring-billed gull (Larus delawarensis)		omnivore	aerial searching bird
California gull (Larus californicus)		omnivore	aerial searching bird
Herring gull (Larus argentatus)		omnivore	aerial searching bird
Thayer's gull (Larus thayeri)		omnivore	aerial searching bird
Western gull (Larus occidentalis)		omnivore	aerial searching bird
Glaucous gull (Larus hyperboreus)		omnivore	aerial searching bird
Glaucous-winged gull (Larus glaucescens)		omnivore	aerial searching bird
Black-legged kittiwake (Rissa tridactyla)		omnivore	aerial searching bird
Sabine's gull (Xema sabini)		omnivore	aerial searching bird
Horned lark (Eremophila alpestris)		omnivore	aerial searching bird
American crow (Corvus brachyryhnynchos)		omnivore	terrestrial/upland bird
Common raven (Corvus corax)		omnivore	terrestrial/upland bird
Chestnut-backed Chickadee		omnivore	terrestrial/upland bird
Bushtit (Psaltriparus minumus)		omnivore	terrestrial/upland bird
Brown creeper (Certhia americana)		omnivore	terrestrial/upland bird
Bewick's wren (Thryothorus ludovicianus)		omnivore	terrestrial/upland bird
Winter wren (Troglodytes aedon)		omnivore	terrestrial/upland bird
House wren (Troglodytes troglodytes)		omnivore	terrestrial/upland bird
Marsh wren (Cistothorus palustris)		omnivore	terrestrial/upland bird
Ruby-crowned kinglet (Regulus calendula)		omnivore	terrestrial/upland bird
Golden-crowned kinglet (Regulus satrapa)		omnivore	terrestrial/upland bird
Hermit thrush (Catharus guttatus)		omnivore	terrestrial/upland bird

TABLE 3-3

BIRD SPECIES POTENTIALLY PRESENT IN MAD RIVER SLOUGH AND ARCATA BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Common Name (Species)	Status	Feeding Guilds	Food Web Category
Swainson's thrush (Catharus ustulatus)		omnivore	terrestrial/upland bird
American robin (Turdus migratorius)		omnivore	terrestrial/upland bird
Wrentit (Chamaea fasciata)		omnivore	terrestrial/upland bird
Water pipit (Anthus spinoletta)		omnivore	terrestrial/upland bird
Cedar waxwing (Bombycilla garrulus)		omnivore	terrestrial/upland bird
Northern shrike (Lanius excubitor)		omnivore	terrestrial/upland bird
Loggerhead shrike (Lanius ludovicianus)		omnivore	terrestrial/upland bird
European starling (Sturnus vulgaris)		omnivore	terrestrial/upland bird
Solitary vireo (Vireo solitarius)		omnivore	terrestrial/upland bird
Hutton's vireo (Vireo huttoni)		omnivore	terrestrial/upland bird
Warbling vireo (Vireo gilvus)		omnivore	terrestrial/upland bird
Dark-eyed junco (Junco hyemalis)		omnivore	terrestrial/upland bird
Lapland longspur (Calcarius lapponicus)		omnivore	terrestrial/upland bird
Bobolink (Dolichonyx oryzivorus)		omnivore	terrestrial/upland bird
Red-winged blackbird (Agelaius phoeniceus)		omnivore	or less)
Western meadowlark (Sturnella neglecta)		omnivore	or less)
Brewer's blackbird (Euphagus cyanocephalus)		omnivore	or less)
Rusty blackbird (Euphagus carolinus)		omnivore	or less)
Brown-headed cowbird (Molothrus ater)		omnivore	terrestrial/upland (more or less)
Yellow-headed cowbird (Xanthocephalus xanthocephalus)		omnivore	terrestrial/upland (more or less)
Herbivorous Birds			
Tundra Swan (Cygnus columbianus)		herbivore	diving and surface water bird
Greater White-fronted goose (Anser albifrons frontalis)		herbivore	diving and surface water bird
Lesser snow goose (Chen c. caerulescens)		herbivore	diving and surface water bird
Ross' goose (Chen rossi)		herbivore	diving and surface water bird
Emperor goose (Chen canagica)		herbivore	diving and surface water bird
Aleutian Canadian goose (Branta canadenis)		herbivore	diving and surface water bird
Black brant (Branta bernicla nigricans)		herbivore	diving and surface water bird
Gadwall (Anas strepera)		herbivore	diving and surface water bird
Canvasback (Aythya valisineria)		herbivore	diving and surface water bird
Redhead (Aythya americana)		herbivore	diving and surface water bird
Ring-necked duck (Aythya collaris)		herbivore	diving and surface water bird
Tufted duck (Aythya fuligula)		herbivore	diving and surface water bird
Pintail (Anas acuta)		herbivore	diving and surface water bird
Ruddy duck (Oxyura jamaicensis)		herbivore	diving and surface water bird
Rock dove (Columba livia)		herbivore	terrestrial/upland bird
Mourning dove (Zenaida macroura)		herbivore	terrestrial/upland bird
Anna's hummingbird (Calypte anna)		herbivore	terrestrial/upland bird
Allen's hummingbird (Selasphorus sasin)		herbivore	terrestrial/upland bird
Red-breasted sapsucker (Sphyrapicus ruber)		herbivore	terrestrial/upland bird
Western tanager (Piranga ludoviciana)		herbivore	terrestrial/upland bird
Black-headed grosbeak (Pheucticus melanocephalus)		herbivore	terrestrial/upland bird
Rufous-sided towhee (Pipilo erythrophthalmus)		herbivore	terrestrial/upland bird
Chipping sparrow (Spizella passarina)		herbivore	terrestrial/upland bird

TABLE 3-3

BIRD SPECIES POTENTIALLY PRESENT IN MAD RIVER SLOUGH AND ARCATA BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Common Name (Species)	Status	Feeding Guilds	Food Web Category
Clay-colored sparrow (Spizella pallida)		herbivore	terrestrial/upland bird
Fox sparrow (Passerella iliaca)		herbivore	terrestrial/upland bird
Lincoln's sparrow (Melospiza melodia)		herbivore	terrestrial/upland bird
Swamp sparrow (Melospiza georgiana)		herbivore	terrestrial/upland bird
White-throated sparrow (Zonotrichia albicollis)		herbivore	terrestrial/upland bird
Golden-crowned sparrow (Zonotrichia atricapilla)		herbivore	terrestrial/upland bird
White-crowned sparrow (Zonotrichia leucophrys)		herbivore	terrestrial/upland bird
Snow bunting (Plectrophenax nivalis)		herbivore	terrestrial/upland bird
Northern oriole (Icterus gabula)		herbivore	terrestrial/upland bird
Brambling (Fringilla montifringilla)		herbivore	terrestrial/upland bird
Purple finch (Carpodacus purpureus)		herbivore	terrestrial/upland bird
House finch (Carpodacus mexicanus)		herbivore	terrestrial/upland bird
Pine siskin (Carduelis pinus)		herbivore	terrestrial/upland bird
Lesser goldfinch (Carduelis psaltria)		herbivore	terrestrial/upland bird
American goldfinch (Carduelis tristis)		herbivore	terrestrial/upland bird
Red grossbill (Loxia curvirostra)		herbivore	terrestrial/upland bird
House sparrow (Passer domesticus)		herbivore	terrestrial/upland bird
Carnivorous Birds			
Black turnstone (Arenaria melanocephala)		carnivore shorebird	surface-searching shorebird
Stilt sandpiper (Calidris himantopus)		carnivore shorebird	surface-searching shorebird
Surfbird (Aphriza virgata)		carnivore shorebird	surface-searching shorebird
Rock sandpiper (Calidris ptilocnemis)		carnivore shorebird	surface-searching shorebird
Black oystercatcher (Haematopus bachmani)		carnivore shorebird	surface-searching shorebird
Hudsonian godwit (Limosa haemastica)		carnivore shorebird	surface-searching shorebird
Red knot (Calidris canutus)		carnivore shorebird	surface-searching shorebird
Marbled godwit (Limosa fedoa)		carnivore shorebird	surface-searching shorebird
Long-billed curlew (Numenius americanus)		carnivore shorebird	surface-searching shorebird
Ruff (Philomachus pugnax)		carnivore shorebird	surface-searching shorebird
Short-billed dowitcher (Limnodromus griseus)		carnivore shorebird	surface-searching shorebird
Bar-tailed godwit (Limosa lapponica)		carnivore shorebird	surface-searching shorebird
Black-bellied plover (Charadrius squatarola)		carnivore shorebird	surface-searching shorebird
Western snowy plover (Charadrius alexandrinus)	T	carnivore shorebird	surface-searching shorebird
Lesser Golden plover (Pluvialis dominica)		carnivore shorebird	surface-searching shorebird
Semipalmated plover (Charadrius semipalmatus)		carnivore shorebird	surface-searching shorebird
Killdeer (Charadrius vociferus)		carnivore shorebird	surface searching shorebird
Semipalmated saandpiper (Calidris pusilla)		carnivore shorebird	surface-searching shorebird
Marsh sandpiper (Tringa solitaria)		carnivore shorebird	surface-searching shorebird
Sanderling (Calidris alba)		carnivore shorebird	surface-searching shorebird
Wilson's phalarope (Phalaropus tricolor)		carnivore shorebird	surface-searching shorebird
Whimbrel (Numenius phaeopus)		carnivore shorebird	surface-searching shorebird
Long-billed dowitcher (Limnodromus scolopaceus)		carnivore shorebird	surface-searching shorebird
Baird's sandpiper (Calidris bairdii)		carnivore shorebird	surface-searching shorebird
Ruddy turnstone (Arenaria interpres)		carnivore shorebird	surface-searching shorebird
Common snipe (Gallinago gallinago)		carnivore shorebird	surface searching shorebird

TABLE 3-3

BIRD SPECIES POTENTIALLY PRESENT IN MAD RIVER SLOUGH AND ARCATA BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Common Name (Species)	Status	Feeding Guilds	Food Web Category
Dunlin (Calidris alpina)		carnivore shorebird	surface-searching shorebird
Western sandpiper (Calidris mauri)		carnivore shorebird	surface-searching shorebird
Wandering tattler (Heteroscelus incanus)		carnivore shorebird	surface-searching shorebird
Greater yellowlegs (Tringa melanoleuca		carnivore shorebird	surface-searching shorebird
Red-necked phalarope (Phalaropus lobatus)		carnivore shorebird	surface-searching shorebird
Pectoral sandpiper (Calidris melanotus)		carnivore shorebird	surface-searching shorebird
Sharped-tailed sandpiper (Calidris acuminata)		carnivore shorebird	surface-searching shorebird
Willet (Catoptrophorus semipalmatus)		carnivore shorebird	surface-searching shorebird
Red phalarope (Phalaropus fulicarius)		carnivore shorebird	surface-searching shorebird
Lesser yellowlegs (Tringa flavipes)		carnivore shorebird	surface-searching shorebird
Least sandpiper (Calidris minutilla)		carnivore shorebird	surface-searching shorebird
Black-necked stilt (Himantopus mexicanus)		carnivore shorebird	surface-searching shorebird
Red-necked stint (Calidris ruficollis)		carnivore shorebird	surface-searching shorebird
American avocet (Recurvirostra americana)		carnivore shorebird	surface-searching shorebird
Spotted sandpiper (Actitis macularia)		carnivore shorebird	surface-searching shorebird
American bittern (Botaurus lentiginosus)		carnivore shorebird	surface-searching shorebird
Great egret (Casmerodius albus)		carnivore shorebird	surface-searching shorebird
Snowy egret (egretta thula)		carnivore shorebird	surface-searching shorebird
Great Blue heron (Ardea herodias)		carnivore shorebird	surface-searching shorebird
Cattle egret (Bubulcus ibis)		carnivore shorebird	surface-searching shorebird
Green-backed heron (Butorides striatus)		carnivore shorebird	surface-searching shorebird
Black-crowned night heron (Nyctiocorax nycticorax)		carnivore shorebird	surface-searching shorebird
Double-crested cormorant (Phalacrocorax auritus)	SC	carnivore shorebird	surface-searching shorebird
Brandt's cormorant (Phalacrocorax penicillatus)		carnivore shorebird	surface-searching shorebird
Pelagic cormorant (Phalacrocorax pelagicus)		carnivore shorebird	surface-searching shorebird
White-faced ibis (Pelagadis chichi)		carnivore shorebird	surface-searching shorebird
California brown pelican (Pelecanus occidentalis)	E/SE	carnivore/piscivore	diving and surface water bird
American white pelican (Pelecanus erythrorhynchos)	SC	carnivore/piscivore	diving and surface water bird
Red-throated loon (Gavia stellata)		carnivore/piscivore	diving and surface water bird
Pacific loon (Gavia pacifica)		carnivore/piscivore	diving and surface water bird
Common loon (Gavia immer)	SC	carnivore/piscivore	diving and surface water bird
Yellow-billed loon (Gavia adamsii)		carnivore/piscivore	diving and surface water bird
Peid-billed grebe (Podilymbus podiceps)		carnivore	diving and surface water bird
Horned grebe (Podiceps auritus)		carnivore	diving and surface water bird
Red-necked grebe (Podeiceps grisegena)		carnivore	diving and surface water bird
Eared grebe (Podiceps nigicollis)		carnivore	diving and surface water bird
Western grebe (Aechmophorus occidentalis)		carnivore	diving and surface water bird
Clark's grebe (Aechmophorus clarkii)		carnivore	diving and surface water bird
Northern fulmar (Fulmarus glacialis))		carnivore	diving and surface water bird
Fork-tailed storm-petral (Oceanodroma furcata)		carnivore	diving and surface water bird
Leach's storm-petral (Oceanodroma leucorhoa)		carnivore	diving and surface water bird
Black scoter (Melanitta nigra)		carnivore	diving and surface water bird
Surf scoter (Melanitta perspicillata)		carnivore	diving and surface water bird

TABLE 3-3

BIRD SPECIES POTENTIALLY PRESENT IN MAD RIVER SLOUGH AND ARCATA BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Common Name (Species)	Status	Feeding Guilds	Food Web Category
White-winged scoter (Melanitta fusca)		carnivore	diving and surface water bird
King eider (Somateria spectabilis)		carnivore	diving and surface water bird
Steller's eider (Polysticta stelleri)		carnivore	diving and surface water bird
Harlequin duck (Histrionicus histrionicus)	SC	carnivore	diving and surface water bird
Oldsquaw (Clangula hyemalis)		carnivore	diving and surface water bird
Common goldeneye (Bucephala clangula)		carnivore	diving and surface water bird
Barrow's goldeneye (Bucephala islandica)	SC	carnivore	diving and surface water bird
Hooded merganser (Lophodytes cucullatus)		carnivore/piscivore	diving and surface water bird
Red-Breasted merganser (Mergus serratus)		carnivore/piscivore	diving and surface water bird
Common merganser (Mergus merganser)		carnivore/piscivore	diving and surface water bird
Turkey vulture (Cathartes aura)		carnivore	aerial-searching bird
Osprey (Pandion haliaetus)	SC	carnivore/piscivore	aerial-searching bird
Black-shoulderd kite (Elanus caeruleus)		carnivore	aerial-searching bird
Northern harrier (Circus cyaneus)	SC	carnivore	aerial-searching bird
Sharp-shinned hawk (Accipiter striatus)	SC	carnivore	aerial-searching bird
Cooper's hawk (Accipiter cooperii)		carnivore	aerial-searching bird
Red-shouldered hawk (Buteo lineatus)		carnivore	aerial-searching bird
Red-tailed hawk (Buteo jamaicensis)		carnivore	aerial-searching bird
Rough-legged hawk (Buteo lagopus)		carnivore	aerial-searching bird
American kestrel (Falcon sparverius)		carnivore	aerial-searching bird
Merlin (Falco columbarius)	SC	carnivore	aerial-searching bird
Praire falcon (Falco mexicanus)	SC	carnivore	aerial-searching bird
Peregrine falcon (Falco peregrinus)		carnivore	aerial-searching bird
Bald eagle (Haliaeetus leucocephalus)	T	carnivore	aerial-searching bird
Virginia rail (Rallus limicola)		carnivore	wading bird
American coot (Fulica americana)		carnivore	diving and surface water bird
Pomarine jaeger (Stercorarius pomarinus)		carnivore	aerial-searching bird
Parasitic jaeger (Stercorarius parasiticus)		carnivore	aerial-searching bird
Caspian tern (Sterna caspia)		carnivore	aerial-searching bird
Elegant tern (Sterna elegans)	SC	carnivore	aerial-searching bird
Common tern (Sterna hirundo)		carnivore	aerial-searching bird
Forster's tern (Sterna forsteri)		carnivore	aerial-searching bird
Black tern (Chlidonias niger)		carnivore	aerial-searching bird
Common murre (Uria aalge)		carnivore	aerial-searching bird
Pigeon guillemot (Cepphus columba)		carnivore	aerial-searching bird
Marbeled murrelet (Brachyramphus marmoratus)	T	carnivore	aerial-searching bird
Common barn-owl (Tyto alba)		carnivore	aerial-searching bird
Great horn owl (Bubo virginianus)		carnivore	aerial-searching bird
Snowy owl (Nyctea scandiaca)		carnivore	aerial-searching bird

TABLE 3-3

BIRD SPECIES POTENTIALLY PRESENT IN MAD RIVER SLOUGH AND ARCATA BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Common Name (Species)	Status	Feeding Guilds	Food Web Category
Burrowing owl (Athene cunicularia)	SC	carnivore	aerial-searching bird
Short-eared owl (Asio flammeus)	SC	carnivore	aerial-searching bird
Northern spotted owl (Strix occidentalis caurina)	T	carnivore	aerial-searching bird
Vaux's swift (Chaetura vauxi)		carnivore	aerial-searching bird
Belted kingfisher (Ceryle alcyon)		carnivore/piscivore	diving and surface water bird
Downy woodpecker (Picoides pubescens)		carnivore	terrestrial/upland bird
Hairy woodpecker (Picoides villosus)		carnivore	terrestrial/upland bird
Northern flicker (Colaptes auratus)		carnivore	terrestrial/upland bird
Western flycatcher (Empidonax difficilis)		carnivore	terrestrial/upland bird
Black phoebe (Sayornis nigrincans)		carnivore	terrestrial/upland bird
Ash-throated flycatcher (Myiarchus cinerascens)		carnivore	terrestrial/upland bird
Purple martin (Progne subis)		carnivore	terrestrial/upland bird
Tree swallow (Tachycineta bicolor)		carnivore	terrestrial/upland bird
Violet-green swallow (Tachycineta thalassinna)		carnivore	terrestrial/upland bird
Northern rough-winged swallow (Stelgidopteryx serripennis)		carnivore	terrestrial/upland bird
Bank swallow (Riparia riparia)		carnivore	terrestrial/upland bird
Cliff swallow (Hirundo pyrrhnota)		carnivore	terrestrial/upland bird
Barn swallow (Hirundo rustica)		carnivore	terrestrial/upland bird
Red-breasted nuthatch (Sitta canadensis)		carnivore	terrestrial/upland bird
Tennessee warbler (Vermivora chrysoptera)		carnivore	terrestrial/upland bird
Orange-crowned warbler (Vermivora celata)		carnivore	terrestrial/upland bird
Nashville warbler (Vermivora ruficapilla)		carnivore	terrestrial/upland bird
Yellow warbler (Dendroica petechia)		carnivore	terrestrial/upland bird
Cape May warbler (Dendroica tigrina)		carnivore	terrestrial/upland bird
Yellow-rumped warbler (Dendroica coronata)		carnivore	terrestrial/upland bird
Black-throated gray warbler (Dendroica nigrescens)		carnivore	terrestrial/upland bird
Townsend's warbler (Dendroica townsendi)		carnivore	terrestrial/upland bird
Palm warbler (Dendroica palmarum)		carnivore	terrestrial/upland bird
Bay-breasted warbler (Dendroica castaneca)		carnivore	terrestrial/upland bird
Blackpoll warbler (Dendroica striata)		carnivore	terrestrial/upland bird
Ovenbird (Seiurus aurocapillus)		carnivore	terrestrial/upland bird
Northern waterthrush (Seiurus noveboracensis)		carnivore	terrestrial/upland bird
MacGillivray's warbler (Oporonis tolmiei)		carnivore	terrestrial/upland bird
Common yellowthroat (Geothlypis trichas)		carnivore	terrestrial/upland bird
Wilson's warbler (Wilsonia pusilla)		carnivore	terrestrial/upland bird
Wester Yellow-billed cuckoo (Coccyzus americanus)		insectivore	terrestrial/upland bird

Abbreviations:
C = Federal candidate species
E = Federal endangered species
SC = State species of special concern
SE = State endangered species
T = Federal threatened species

TABLE 3-4

MAMMAL SPECIES POTENTIALLY PRESENT IN MAD RIVER SLOUGH AND ARCATA BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Common Name (Species)	Status	Feeding Guilds	Food Web Category
Carnivorous Mammals			
Saddle-backed dolphin (Delphinus delphis)		marine carnivore	marine mammal
Pacific white-sided dolphin (Lagenorhynchus obliquidens)		marine carnivore	marine mammal
Harbor porpoise (Phocoena phocoena)		marine carnivore	marine mammal
Dall's porpoise (Phocoenoides dalli)		marine carnivore	marine mammal
Grey whale (Eschrichtius robustus)		marine carnivore	marine mammal
Blue whale (Balaenoptera musculus)	E	marine carnivore	marine mammal
Fin whale (Balaenoptera physalus)	E	marine carnivore	marine mammal
Sei whale (Balaenoptera borealis)	E	marine carnivore	marine mammal
Sperm whale (Physeter macrocephalus)	E	marine carnivore	marine mammal
Humpback whale (Megaptera novaenglia)	E	marine carnivore	marine mammal
Northern sea lion (Eumetopias jubatus)	T	marine carnivore	marine mammal
California sea lion (Zalophus californianus)		marine carnivore	marine mammal
Harbor seal (Phoca vitulina)		marine carnivore	marine mammal
Gray Fox (Urocyon cinereoargenteus)		terrestrial carnivore	not assessed
Coyote (Canis latrans)		terrestrial carnivore	not assessed
Black bear (Ursus americanus)		terrestrial carnivore	not assessed
Raccoon (Procyon lotor)		terrestrial carnivore	not assessed
Ringtail (Bassariscus astutus)		terrestrial carnivore	not assessed
Marten (Martes americana)	SC	terrestrial carnivore	not assessed
Fisher (Martes pennanti)		semi-aquatic carnivore	not assessed
Mink (Mustela vison)		carnivore	not assessed
Long-tailed weasel (Mustela frenata)		terrestrial carnivore	not assessed
Ermine (Mustela erminea)		terrestrial carnivore	not assessed
Striped skunk (Mephitis mephitis)		terrestrial carnivore	not assessed
Spotted skunk (Spilogale putorius)		terrestrial carnivore	not assessed
River otter (Lutra canadensis)		aquatic carnivore	not assessed
Mountian Lion (Felis concolor)		terrestrial carnivore	not assessed
Bobcat (Lynx rufus)		terrestrial carnivore	not assessed
Omnivorous Mammals			
Virginia opossum (Didelphis virginiana)		terrestrial omnivore	not assessed
Pacific marsh shrew (Sorex pacificus)		terrestrial omnivore	not assessed
Vagrant shrew (Sorex vagrans)		terrestrial omnivore	not assessed
Marsh shrew (Sorex bendirii)		terrestrial omnivore	not assessed
Trowbridge's shrew (Sorex trowbridgii)		terrestrial omnivore	not assessed
shrew-mole (Neurotrichus gibbsii)		terrestrial omnivore	not assessed
Townsend's mole (Scapanus townsedii)		terrestrial omnivore	not assessed
Coast mole (Scapanus orarius)		terrestrial omnivore	not assessed
California ground squirrel (Spermophilus beecheyi)		terrestrial omnivore	not assessed
Townsend's chipmunk (Tamias townsendii)		terrestrial omnivore	not assessed
Douglas' squirrel (Tamiasciurus douglasii)		terrestrial omnivore	not assessed
Northern flying squirrel (Glaucomys sabrinus)		terrestrial omnivore	not assessed
Dusky-footed woodrat (Neotoma fuscipes)		terrestrial omnivore	not assessed

TABLE 3-4

MAMMAL SPECIES POTENTIALLY PRESENT
IN MAD RIVER SLOUGH AND ARCATA BAY
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Common Name (Species)	Status	Feeding Guilds	Food Web Category
Norway rat (Rattus norvegicus)		terrestrial omnivore	not assessed
Black rat (Rattus rattus)		terrestrial omnivore	not assessed
House mouse (Mus musculus)		terrestrial omnivore	not assessed
Herbivorous Mammals			
Black-tailed jack rabbit (Lepus californicus)		terrestrial herbivore	not assessed
Brush rabbit (Sylvilagus bachmani)		terrestrial herbivore	not assessed
Mountain beaver (Aplodontia rufa)		terrestrial herbivore	not assessed
Western gray squirrel (Sciurus griseus)		terrestrial herbivore	not assessed
Botta's pocket gopher (Thomomys bottae)		terrestrial herbivore	not assessed
American beaver (Castor canadensis)		terrestrial herbivore	not assessed
Western harvest mouse (Reithrodontomys megalotis)		terrestrial herbivore	not assessed
Pinon mouse (Peromyscus truei)		terrestrial herbivore	not assessed
Deer mouse (Peromyscus maniculatus)		terrestrial herbivore	not assessed
White-footed vole (Arborimus albipes)		terrestrial herbivore	not assessed
Red tree vole (Arborimus longicaudus)		terrestrial herbivore	not assessed
Western red-backed vole (Clethrionomys californicus)		terrestrial herbivore	not assessed
Creeping vole (Microtus oregoni)		terrestrial herbivore	not assessed
California vole (Microtus californicus)		terrestrial herbivore	not assessed
Townsend's vole (Microtus townsendii)		terrestrial herbivore	not assessed
Pacific jumping mouse (Zapus trinotatus)		terrestrial herbivore	not assessed
Porcupine (Erethizon dorsatum)		terrestrial herbivore	not assessed
Mule deer (Odocoileus hemionus)		terrestrial herbivore	not assessed
Elk (Cervus elaphus)		terrestrial herbivore	not assessed

Abbreviations:
C = Federal candidate species
E = Federal endangered species
SC = State species of special concern
SE = State endangered species
T = Federal threatened species

TABLE 3-5

INVERTEBRATE SPECIES POTENTIALLY PRESENT IN MAD RIVER SLOUGH AND ARCATA BAY*

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Common Name (Species)	Food Web Category
Porifera	
Haliclona permollis (Sponge)	benthic infauna & sessile epifauna
Haliclona sp. (Sponge)	benthic infauna & sessile epifauna
Cliona sp. (Sponge)	benthic infauna & sessile epifauna
Cnidarians	
Aequorea sp. (Hydromedusa)	pelagic zooplankton
Campanularia integra (Hydroid)	benthic infauna & sessile epifauna
Obelia borealis (Hydroid)	benthic infauna & sessile epifauna
Obelia longissima (Hydroid)	benthic infauna & sessile epifauna
Plumularia spp. (Hydroid)	benthic infauna & sessile epifauna
Sertularia spp. (Hydroid)	benthic infauna & sessile epifauna
Thuiaria similis (Hydroid)	benthic infauna & sessile epifauna
Tubularia crocea (Hydroid)	benthic infauna & sessile epifauna
Tubularia marina (Hydroid)	benthic infauna & sessile epifauna
Velella lata (By-the-wind sailor)	pelagic zooplankton
Aurelia spp. (Jellyfish)	pelagic zooplankton
Chrysaora sp. (Jellyfish)	pelagic zooplankton
Pelagia sp. (Jellyfish)	pelagic zooplankton
Anthopleura artemisia (Sand anemone)	benthic infauna & sessile epifauna
Anthopleura elegantissma (Aggregating anemone)	benthic infauna & sessile epifauna
Anthopleura xanthogrammica (Great green anemone)	benthic infauna & sessile epifauna
Cerianthus sp. (Burrowing anemone)	benthic infauna & sessile epifauna
Diadumene spp. (Orange striped anemone)	benthic infauna & sessile epifauna
Epiactis prolifera (Brooding anemone)	benthic infauna & sessile epifauna
Gersemia rubriformis (Sea strawberry)	benthic infauna & sessile epifauna
Haliplanella luciae (Anemone)	benthic infauna & sessile epifauna
Metridium senile (White anemone)	benthic infauna & sessile epifauna
Nematostella vectensis (Salt marsh anemone)	benthic infauna & sessile epifauna
Tealia crassicornis (Splotched anemone)	benthic infauna & sessile epifauna
Ctenophora	
Pleurobrachia bachei (Comb jelly)	benthic infauna & sessile epifauna
Nermertea	
Amphiphorus imparispinosus (Ribbon worm)	benthic infauna & sessile epifauna
Carinoma mutabilis (Ribbon worm)	benthic infauna & sessile epifauna
Carinomella lactea (Ribbon worm)	benthic infauna & sessile epifauna
Cerebratulus californiensis (Ribbon worm)	benthic infauna & sessile epifauna
Emplectonema sp. (Ribbon worm)	benthic infauna & sessile epifauna
Paranemertes californica (Ribbon worm)	benthic infauna & sessile epifauna
Tubulanus pellucidus (Ribbon worm)	benthic infauna & sessile epifauna
Tubulanus polymorphus (Ribbon worm)	benthic infauna & sessile epifauna
Polychaeta	
Abarenicola antebranchia (Lugworm)	benthic infauna & sessile epifauna
Abarenicola humboldtensis (Lugworm)	benthic infauna & sessile epifauna
Abarenicola pacifica (Lugworm)	benthic infauna & sessile epifauna
Amaena occidentalis (Hairy-gill worm)	benthic infauna & sessile epifauna
Ampharete arctica (Bristle worm)	benthic infauna & sessile epifauna
Anaitides groenlandica (Paddle worm)	benthic infauna & sessile epifauna
Anaitides williamsi (Paddle worm)	benthic infauna & sessile epifauna
Aricidea suecica (Paranoid worm)	benthic infauna & sessile epifauna
Armandia brevis (Bristle worm)	benthic infauna & sessile epifauna

TABLE 3-5

INVERTEBRATE SPECIES POTENTIALLY PRESENT IN MAD RIVER SLOUGH AND ARCATA BAY*

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Common Name (Species)	Food Web Category
Autolytus sp. (Bristle worm)	benthic infauna & sessile epifauna
Boccardia berkeleyorum (Spionid worm)	benthic infauna & sessile epifauna
Brania sp. (Bristle worm)	benthic infauna & sessile epifauna
Capitella capitata (Tube worm)	benthic infauna & sessile epifauna
Caulleriella alata (Thread worm)	benthic infauna & sessile epifauna
Caulleriella hamata (Thread worm)	benthic infauna & sessile epifauna
Caulleriella sp. (Thread worm)	benthic infauna & sessile epifauna
Chaetozone setosa (Hairy-gill worm)	benthic infauna & sessile epifauna
Chaetozone sp. (Hairy-gill worm)	benthic infauna & sessile epifauna
Cheilonereis cyclurus (Hermit crab worm)	benthic infauna & sessile epifauna
Chone gracillis (Paddle worm)	benthic infauna & sessile epifauna
Chone sp. (Paddle worm)	benthic infauna & sessile epifauna
Cirratulus cirratus (Bristle worm)	benthic infauna & sessile epifauna
Cistenides brevicoma (Tube worm)	benthic infauna & sessile epifauna
Cossura pygodactylata (Bristle worm)	benthic infauna & sessile epifauna
Dodecaceria concharum (Bristle worm)	benthic infauna & sessile epifauna
Drilonereis falcata (Bristle worm)	benthic infauna & sessile epifauna
Eteone californica (Paddle worm)	benthic infauna & sessile epifauna
Eteone dilatae (Paddle worm)	benthic infauna & sessile epifauna
Eteone pacifica (Paddle worm)	benthic infauna & sessile epifauna
Euclymene delineata (Polychaete worm)	benthic infauna & sessile epifauna
Eulalia aviculiseta (Paddle worm)	benthic infauna & sessile epifauna
Eumidia bifoliata (Paddle worm)	benthic infauna & sessile epifauna
Eumidia sanguinea (Paddle worm)	benthic infauna & sessile epifauna
Eunereis sp. (Mussel worm)	benthic infauna & sessile epifauna
Eupolymnia crescentis (Terebellid worm)	benthic infauna & sessile epifauna
Eusyllis cassimilis (Paddle worm)	benthic infauna & sessile epifauna
Euzonus mucronata (Bristle worm)	benthic infauna & sessile epifauna
Exogone laurei (Bristle worm)	benthic infauna & sessile epifauna
Exogone sp. (Bristle worm)	benthic infauna & sessile epifauna
Glycera americana (Bristle worm)	benthic infauna & sessile epifauna
Glycera capitata (Bristle worm)	benthic infauna & sessile epifauna
Glycera oxycephala (Bristle worm)	benthic infauna & sessile epifauna
Glycera tenuis (Bristle worm)	benthic infauna & sessile epifauna
Glycinde polygnatha (Bristle worm)	benthic infauna & sessile epifauna
Glycinde sp. (Bristle worm)	benthic infauna & sessile epifauna
Gyptis brevipalpa (Bristle worm)	benthic infauna & sessile epifauna
Halosydna brevisetosa (Scale worm)	benthic infauna & sessile epifauna
Halosydna latior (Scale worm)	benthic infauna & sessile epifauna
Haploscoloplos elongatus (Orbinid worm)	benthic infauna & sessile epifauna
Harmothoe imbricata (Scale worm)	benthic infauna & sessile epifauna
Harmothoe lunulata (Scale worm)	benthic infauna & sessile epifauna
Harmothoe priops (Scale worm)	benthic infauna & sessile epifauna
Hemipodus borealis (Slaty blue worm)	benthic infauna & sessile epifauna
Hemipodus imbricata (Slaty blue worm)	benthic infauna & sessile epifauna
Hesperone adventor (Scale worm)	benthic infauna & sessile epifauna
Heteromastus filobranchus (Capitellid worm)	benthic infauna & sessile epifauna
Lumbrineris californiensis (Bristle worm)	benthic infauna & sessile epifauna
Lumbrineris japonica (Bristle worm)	benthic infauna & sessile epifauna
Lumbrineris tetraura (Bristle worm)	benthic infauna & sessile epifauna

TABLE 3-5

INVERTEBRATE SPECIES POTENTIALLY PRESENT IN MAD RIVER SLOUGH AND ARCATA BAY*

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Common Name (Species)	Food Web Category
Lumbrineris zonata (Bristle worm)	benthic infauna & sessile epifauna
Lysilla labiata (Polychaete worm)	benthic infauna & sessile epifauna
Magelona pacifica (Bristle worm)	benthic infauna & sessile epifauna
Magelona pitelkai (Bristle worm)	benthic infauna & sessile epifauna
Magelona sacculata (Bristle worm)	benthic infauna & sessile epifauna
Mediomastus californiensis (Lug worm)	benthic infauna & sessile epifauna
Mellina oculata (Polychaete worm)	benthic infauna & sessile epifauna
Mesochaetopterus taylori (Bristle worm)	benthic infauna & sessile epifauna
Nainereis sp. (Bristle worm)	benthic infauna & sessile epifauna
Neanthes sp. (Bristle worm)	benthic infauna & sessile epifauna
Nephtys caecoides (Bristle worm)	benthic infauna & sessile epifauna
Nephtys californiensis (Bristle worm)	benthic infauna & sessile epifauna
Nephtys ferruginea (Bristle worm)	benthic infauna & sessile epifauna
Nephtys parva (Bristle worm)	benthic infauna & sessile epifauna
Nereis sp. (Bristle worm)	benthic infauna & sessile epifauna
Nothria sp. (Bristle worm)	benthic infauna & sessile epifauna
Notomastus tenuis (Thin red worm)	benthic infauna & sessile epifauna
Ophelia assimilis (Bristle worm)	benthic infauna & sessile epifauna
Ophelia magna (Bristle worm)	benthic infauna & sessile epifauna
Owenia collaris (Tube worm)	benthic infauna & sessile epifauna
Paleonotus bellis (Bristle worm)	benthic infauna & sessile epifauna
Paraonis gracilis (Bristle worm)	benthic infauna & sessile epifauna
Phloe glabra (Polychaete worm)	benthic infauna & sessile epifauna
Phloe tuberculata (Polychaete worm)	benthic infauna & sessile epifauna
Pholoides aspera (Polychaete worm)	benthic infauna & sessile epifauna
Phragmatopoma californica (Tube worm)	benthic infauna & sessile epifauna
Pilargis maculata (Polychaete worm)	benthic infauna & sessile epifauna
Pisione remota (Polychaete worm)	benthic infauna & sessile epifauna
Pista cristata (Bristle worm)	benthic infauna & sessile epifauna
Pista pacifica (Bristle worm)	benthic infauna & sessile epifauna
Platynereis agassizi (Bristle worm)	benthic infauna & sessile epifauna
Platynereis bicanaliculata (Tube worm)	benthic infauna & sessile epifauna
Polydora brachycephala (Spionid worm)	benthic infauna & sessile epifauna
Polydora ligni (Spionid worm)	benthic infauna & sessile epifauna
Polydora pygidialis (Spionid worm)	benthic infauna & sessile epifauna
Polydora socialis (Spionid worm)	benthic infauna & sessile epifauna
Polydora websteri (Spionid worm)	benthic infauna & sessile epifauna
Prinospio cirrifera (Spionid worm)	benthic infauna & sessile epifauna
Protodorvillea gracilis (Bristle worm)	benthic infauna & sessile epifauna
Pseudopolydora kempi (Spionid worm)	benthic infauna & sessile epifauna
Sabellaria cementarium (Plume worm)	benthic infauna & sessile epifauna
Sabellaria gracilis (Plume worm)	benthic infauna & sessile epifauna
Scalibregma inflatum (Bristle worm)	benthic infauna & sessile epifauna
Schistomeringos longicornis (Polychaete worm)	benthic infauna & sessile epifauna
Scolelepis sp. (Spionid worm)	benthic infauna & sessile epifauna
Scoloplos sp. (Bristle worm)	benthic infauna & sessile epifauna
Serpula vermicularis (Plume worm)	benthic infauna & sessile epifauna
Sphaerosyllis californiensis (Syllid worm)	benthic infauna & sessile epifauna
Spio filicornis (Spionid worm)	benthic infauna & sessile epifauna
Spiophanes anoculata (Spionid worm)	benthic infauna & sessile epifauna

TABLE 3-5

INVERTEBRATE SPECIES POTENTIALLY PRESENT IN MAD RIVER SLOUGH AND ARCATA BAY*

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Common Name (Species)	Food Web Category
Spiophanes berkeleyorum (Spionid worm)	benthic infauna & sessile epifauna
Spiophanes bombyx (Spionid worm)	benthic infauna & sessile epifauna
Sternapsis fossor (Bristle worm)	benthic infauna & sessile epifauna
Sthenelais berkeleyi (Bristle worm)	benthic infauna & sessile epifauna
Sthenelais tertiaglabrata (Bristle worm)	benthic infauna & sessile epifauna
Streblosoma crassibranchia (Bristle worm)	benthic infauna & sessile epifauna
Streblospio benedicti (Spionid worm)	benthic infauna & sessile epifauna
Tenonia kitsapensis (Polychaete worm)	benthic infauna & sessile epifauna
Tharyx monilaris (Bristle worm)	benthic infauna & sessile epifauna
Tharyx Multifilis (Bristle worm)	benthic infauna & sessile epifauna
Trochochaeta franciscanum (Bristle worm)	benthic infauna & sessile epifauna
Typosyllis fasciata (Syllid worm)	benthic infauna & sessile epifauna
Typosyllis hyalina (Syllid worm)	benthic infauna & sessile epifauna
Archiannelida	
Polygordius sp.	benthic infauna & sessile epifauna
Saccocirrus sp.	benthic infauna & sessile epifauna
Sipuncula	
Goldfingia hespera (Peanut worm)	benthic infauna & sessile epifauna
Echiura	
Listriolobus pelodes (Spoon worm)	benthic infauna & sessile epifauna
Urechis caupo (Fat innkeeper)	benthic infauna & sessile epifauna
Phoronida	
Phoronopsis viridis (Green plume worm)	benthic infauna & sessile epifauna
Phoronis pallida (Plume worm)	benthic infauna & sessile epifauna
Amphipoda	
Allorchestes angusta (Beach hopper)	epibenthic zooplankton
Anisogammarus confervicolus (Gammarid)	epibenthic zooplankton
Anisogammarus pugettensis (Gammarid)	epibenthic zooplankton
Aoroides columbiae (Gammarid)	epibenthic zooplankton
Atylus tridens (Gammarid)	epibenthic zooplankton
Caprella angusta (Skeleton shrimp)	epibenthic zooplankton
Caprella californica (Skeleton shrimp)	epibenthic zooplankton
Caprella equilibra (Skeleton shrimp)	epibenthic zooplankton
Caprella gracilior (Skeleton shrimp)	epibenthic zooplankton
Caprella laeviuscula (Skeleton shrimp)	epibenthic zooplankton
Corophium acherusicum (Gammarid)	epibenthic zooplankton
Corophium spinicorne (Gammarid)	epibenthic zooplankton
Corophium stimpsoni (Gammarid)	epibenthic zooplankton
Cymadusa sp. (Gammarid)	epibenthic zooplankton
Echaustorius sp. (Gammarid)	epibenthic zooplankton
Ischyrocerus anguipes (Gammarid)	epibenthic zooplankton
Jassa falcata (Gammarid)	epibenthic zooplankton
Megamphopus martesia (Gammarid)	epibenthic zooplankton
Melita dentata (Gammarid)	epibenthic zooplankton
Metacaprella kennerlyi (Skeleton shrimp)	epibenthic zooplankton
Orchestia traskiana (Beach hopper)	epibenthic zooplankton
Orchestoidea benedicti (Beach hopper)	epibenthic zooplankton
Orchestoidea caliofforniana (Beach hopper)	epibenthic zooplankton
Paraphoxus spp. (Gammarid)	epibenthic zooplankton
Photis brevipes (Gammarid)	epibenthic zooplankton

TABLE 3-5

INVERTEBRATE SPECIES POTENTIALLY PRESENT IN MAD RIVER SLOUGH AND ARCATA BAY*

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Common Name (Species)	Food Web Category
Podocerus cristatus (Gammarid)	epibenthic zooplankton
Protomedia articulata (Gammarid)	epibenthic zooplankton
Synchelidium rectipalmum (Gammarid)	epibenthic zooplankton
Synchelidium shoemakeri (Gammarid)	epibenthic zooplankton
Tritella pilimana (Skeleton shrimp)	epibenthic zooplankton
Cirripedia	
Balanus crenatus (White barnacle)	benthic infauna & sessile epifauna
Balanus glandula (Chalky white barnacle)	benthic infauna & sessile epifauna
Balanus nubilus (Piling barnacle)	benthic infauna & sessile epifauna
Chthamalus dalli (Gray barnacle)	benthic infauna & sessile epifauna
Pollicipes polymerus (Goose barnacle)	benthic infauna & sessile epifauna
Semibalanus cariosus (Thatched barnacle)	benthic infauna & sessile epifauna
Copepoda	
Acartia clausi (Copepod)	pelagic zooplankton
Acartia logiremis (Copepod)	pelagic zooplankton
Acartia tonsa (Copepod)	pelagic zooplankton
Calanus finmarchicus (Copepod)	pelagic zooplankton
Clausidium vancouverense (Copepod)	pelagic zooplankton
Coryceaus affinis (Copepod)	pelagic zooplankton
Eucalanus bungii (Copepod)	pelagic zooplankton
Eurytemora affinis (Copepod)	pelagic zooplankton
Mytilicola orientalis (Copepod)	pelagic zooplankton
Oithona simulus (Copepod)	pelagic zooplankton
Oithona spinirostris (Copepod)	pelagic zooplankton
Paracalanus parva (Copepod)	pelagic zooplankton
Tortanus discaudatis (Copepod)	pelagic zooplankton
Cumacea	
Cumacea sp. (Cumacean)	pelagic zooplankton
Cumella vulgaris (Cumacean)	pelagic zooplankton
Diastylis sp. (Cumacean)	pelagic zooplankton
Diastylopsis dawsoni (Cumacean)	pelagic zooplankton
Eudorella pacifica (Cumacean)	pelagic zooplankton
Lamprops sp. (Cumacean)	pelagic zooplankton
Decapoda	
Callianassa californiensis (Ghost shrimp)	mobile macroinvertebrate
Callianassa gigas (Ghost shrimp)	mobile macroinvertebrate
Cancer antennarius (Rock crab)	mobile macroinvertebrate
Cancer anthonya (Yellow crab)	mobile macroinvertebrate
Cancer gracilis (Slender crab)	mobile macroinvertebrate
Cancer magister (Dungeness crab)	mobile macroinvertebrate
Cancer productus (Red crab)	mobile macroinvertebrate
Crangon franciscorum (Bay shrimp)	mobile macroinvertebrate
Crangon nigricauda (Black-tailed shrimp)	mobile macroinvertebrate
Crangon stylirostris (Bay shrimp)	mobile macroinvertebrate
Emerita analoga (Sand crab)	mobile macroinvertebrate
Hemigrapsus nudus (Purpose shore crab)	mobile macroinvertebrate
Hemigrapsus oregonensis (Green shore crab)	mobile macroinvertebrate
Heptacarpus brevirostris (Grass shrimp)	mobile macroinvertebrate
Hippolyte californiensis (Grass shrimip)	mobile macroinvertebrate
Lophopanopeus bellus (Pebble crab)	mobile macroinvertebrate

TABLE 3-5

INVERTEBRATE SPECIES POTENTIALLY PRESENT IN MAD RIVER SLOUGH AND ARCATA BAY*

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Common Name (Species)	Food Web Category
Pachygrapsus crassipes (Lined shore crab)	mobile macroinvertebrate
Pagurus spp. (Hermit crabs)	mobile macroinvertebrate
Pandalus danae (Coon stripe shrimp)	mobile macroinvertebrate
Petrolisthes cinctipes (Porcelain crab)	mobile macroinvertebrate
Pinnixia franciscana (Pea crab)	mobile macroinvertebrate
Pugettia producta (Kelp crab)	mobile macroinvertebrate
Upogebia pugettensis (Blue mud shrimp)	mobile macroinvertebrate
Isopoda	
Alloniscus perconvexus (Isopod)	epibenthic zooplankton
Armadilloniscus coronacapitalis (Isopod)	epibenthic zooplankton
Cirolana harfordi (Isopod)	epibenthic zooplankton
Gnorimosphaeroma oregonensis (Isopod)	epibenthic zooplankton
Idotea stenops (Isopod)	epibenthic zooplankton
Idotea wosnesenskii (Isopod)	epibenthic zooplankton
Limnoria quadripunctata (Isopod)	epibenthic zooplankton
Limnoria tripunctata (Isopod)	epibenthic zooplankton
Littorophiloscia richardsonae (Isopod)	epibenthic zooplankton
Munna sp. (Isopod)	epibenthic zooplankton
Porcellio sp. (Isopod)	epibenthic zooplankton
Synidotea sp. (Isopod)	epibenthic zooplankton
Mysidacea	
Archaeomysis grebnitzkii (Mysid)	mobile macroinvertebrate
Tenaidacea	
Leptochelia dubia (Cheliferan)	mobile macroinvertebrate
Tenais sp. (Cheliferan)	mobile macroinvertebrate
Pycnogonida	
Achelia chelata (Sea spider)	mobile macroinvertebrate
Achelia nudiuscula (Sea spider)	mobile macroinvertebrate
Halosoma viridintestinale (Green sea spider)	mobile macroinvertebrate
Bilvalvia	
Adula diegensis (Mytilid)	benthic infauna & sessile epifauna
Axinopsida serricata	benthic infauna & sessile epifauna
Bankia setacea (Pacific shipworm)	benthic infauna & sessile epifauna
Clinocardium nuttallii (Basket cockle)	benthic infauna & sessile epifauna
Crassostrea gigas (Giant Pacific oyster)	benthic infauna & sessile epifauna
Gemma gemma (Gem clam)	benthic infauna & sessile epifauna
Hinnites giganteus (Rock scallop)	benthic infauna & sessile epifauna
Lyonsia californica (California lyonsia)	benthic infauna & sessile epifauna
Macoma balthica (Baltic macoma)	benthic infauna & sessile epifauna
Macoma identata (Identate macoma)	benthic infauna & sessile epifauna
Macoma inquinata (Inquinate macoma)	benthic infauna & sessile epifauna
Macoma nasuta (Bent-nose clam)	benthic infauna & sessile epifauna
Mercenaria mercenaria (Quahog clam)	benthic infauna & sessile epifauna
Mya arenaria (Soft-shell clam)	benthic infauna & sessile epifauna
Mysella tumida (Clam)	benthic infauna & sessile epifauna
Mytilus edulis (Bay mussel)	benthic infauna & sessile epifauna
Mytilus californianus (California mussel)	benthic infauna & sessile epifauna
Ostrea lurida (Native oyster)	benthic infauna & sessile epifauna
Ostrea edulis (European oyster)	benthic infauna & sessile epifauna
Panopea generosa (Geoduck)	benthic infauna & sessile epifauna

TABLE 3-5

INVERTEBRATE SPECIES POTENTIALLY PRESENT IN MAD RIVER SLOUGH AND ARCATA BAY*

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Common Name (Species)	Food Web Category
Penitella penita (Common piddock)	benthic infauna & sessile epifauna
Petricola carditoides (Petricolid clam)	benthic infauna & sessile epifauna
Pododesmus cepio (Rock oyster)	benthic infauna & sessile epifauna
Protothaca staminea (Pacific littleneck)	benthic infauna & sessile epifauna
Protothaca tenerrima (Thin-shelled littleneck)	benthic infauna & sessile epifauna
Saxidomus giganteus (Smooth Washington clam)	benthic infauna & sessile epifauna
Saxidomus nuttali (Common Washington clam)	benthic infauna & sessile epifauna
Siliqua patula (Razor clam)	benthic infauna & sessile epifauna
Solen sicarius (Sickle razor clam)	benthic infauna & sessile epifauna
Tagelus californianus (Jackknife clam)	benthic infauna & sessile epifauna
Tapes japonica (Manila clam)	benthic infauna & sessile epifauna
Tellina bodegensis (Bodega tellin)	benthic infauna & sessile epifauna
Tellina modesta (Modesta tellin)	benthic infauna & sessile epifauna
Tellina nuculoides (Tellin tellin)	benthic infauna & sessile epifauna
Transennella tantilla (Little transennella)	benthic infauna & sessile epifauna
Tresus capax (Gaper clam)	benthic infauna & sessile epifauna
Tresus nuttallii (Gaper clam)	benthic infauna & sessile epifauna
Zirfaea pilsbryi (Rough piddock)	benthic infauna & sessile epifauna
Gastropoda	
Acmaea mitra (Dunce cap limpet)	benthic infauna & sessile epifauna
Aglaja diomedea (Sea slug)	benthic infauna & sessile epifauna
Alvinia compacta (Snail)	benthic infauna & sessile epifauna
Anisodoris nobilis (Sea lemon nudibranch)	benthic infauna & sessile epifauna
Assiminea californica (Translucent assiminea)	benthic infauna & sessile epifauna
Calliostoma canaliculatum (Top shell)	benthic infauna & sessile epifauna
Collisella asmi (Limpet)	benthic infauna & sessile epifauna
Collisella digitalis (Common limpet)	benthic infauna & sessile epifauna
Collisella pelta (Shield limpet)	benthic infauna & sessile epifauna
Collisella scabra (Rough limpet)	benthic infauna & sessile epifauna
Cyclostremella sp. (Snail)	benthic infauna & sessile epifauna
Cylichna alba (Snail)	benthic infauna & sessile epifauna
Dendronotus giganteus (Giant nudibranch)	benthic infauna & sessile epifauna
Dialula sandiegensis (Nudibranch)	benthic infauna & sessile epifauna
Diodora aspera (Rough keyhole limpet)	benthic infauna & sessile epifauna
Dirona albolineata (Nudibranch)	benthic infauna & sessile epifauna
Epitonium sawinae (Snail)	benthic infauna & sessile epifauna
Fartulum occidentale (Snail)	benthic infauna & sessile epifauna
Haminoea vesicula (Snail)	benthic infauna & sessile epifauna
Hermissenda crassicornis (Nudibranch)	benthic infauna & sessile epifauna
Lacuna sp. (Snail)	benthic infauna & sessile epifauna
Littorina newcombiana (Newcomb's littorine)	benthic infauna & sessile epifauna
Littorina planaxis (Periwinkle)	benthic infauna & sessile epifauna
Littorina scutulata (Periwinkle)	benthic infauna & sessile epifauna
Mitrella gouldii (Snail)	benthic infauna & sessile epifauna
Nassarius fossatus (Channeled dog whelk)	benthic infauna & sessile epifauna
Nassarius mendicus (Lean dog whelk)	benthic infauna & sessile epifauna
Nucella emarginata (Dog winkle)	benthic infauna & sessile epifauna
Nucella lamellosa (Dog winkle)	benthic infauna & sessile epifauna
Odostomia sp. (Snail)	benthic infauna & sessile epifauna
Olivella biplicata (Purple olive shell)	benthic infauna & sessile epifauna

TABLE 3-5

INVERTEBRATE SPECIES POTENTIALLY PRESENT IN MAD RIVER SLOUGH AND ARCATA BAY*

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Common Name (Species)	Food Web Category
Olivella pycna (Olive shell)	benthic infauna & sessile epifauna
Ovatella myosotis (Mud snail)	benthic infauna & sessile epifauna
Phyllaplysia taylori (Tectibranch)	benthic infauna & sessile epifauna
Polinices lewisii (Moon snail)	benthic infauna & sessile epifauna
Rictaxis punctocaelatus (Barrel shell)	benthic infauna & sessile epifauna
Searlesia dira (Snail)	benthic infauna & sessile epifauna
Tegula brunnea (Brown tegula)	benthic infauna & sessile epifauna
Tegula funebralis (Black tegula)	benthic infauna & sessile epifauna
Turbonilla sp. (Snail)	benthic infauna & sessile epifauna
Octopoda	
Octopus dolfleini (Octopus)	mobile macroinvertebrate
Polyplacophora	
Ischnochiton regularis (Blue chiton)	benthic infauna & sessile epifauna
Katharina tunicata (Black chiton)	benthic infauna & sessile epifauna
Mopalia ciliata (Notched chiton)	benthic infauna & sessile epifauna
Mopalia lignosa (Hairy chiton)	benthic infauna & sessile epifauna
Echinodermata	
Amphiodia occidentalis (Brittle star)	mobile macroinvertebrate
Amphipholis sp. (Brittle star)	mobile macroinvertebrate
Dendraster excentricus (Sand dollar)	mobile macroinvertebrate
Eupentacta quinquesemita (White sea cucumber)	mobile macroinvertebrate
Leptasterias pusilla (Six-rayed sea star)	mobile macroinvertebrate
Leptosynapta albicans (Sea cucumber)	mobile macroinvertebrate
Pisaster brevispinus (Short spined sea star)	mobile macroinvertebrate
Pisaster ochraceous (Common sea star)	mobile macroinvertebrate
Pycnopodia helianthoides (Sun star)	mobile macroinvertebrate
Strongylocentrotus purpuratus (Purple urchin)	mobile macroinvertebrate
Bryozoa	
Bowerbankia gracilis (Bryosoan)	pelagic zooplankton
Bugula pacifica (Bryosoan)	pelagic zooplankton
Crisia occidentalis (Bryosoan)	pelagic zooplankton
Membranipora membranacea (Bryosoan)	pelagic zooplankton
Schizoporella unicornis (Bryosoan)	pelagic zooplankton
Tricellaria occidentalis (Bryozoan)	pelagic zooplankton

* Feeding guild not included since community will be evaluated as a whole.

TABLE 3-6

THREATENED, ENDANGERED, AND SPECIES OF CONCERN

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

FISH	
Coho salmon (Oncorhynchus kisutch)	State & Federal Threatened Species
Chinook salmon (Oncorhynchus tshawytscha)	Federal Threatended Species
N. California Steelhead (Oncorhynchus mykiss)	Federal Threatened Species
Bocaccio (Sebastes paucispinis)	Federal Candidate Species
Tidewater goby (Eucyclogobius newberryi)	Federal Endangered Species
BIRDS	
Laughing Gull (Larus atricilla)	Species of Special Concern
Western Snowy Plover (Charadrius alexandrinus)	Federal Threatened Species
Double-crested Cormorants (Phalacrocorax auritus)	Species of Special Concern
California Brown Pelican (Pelecanus occidentalis)	State & Federal Endangered Species
American White Pelican (Pelecanus erythrorhynchos)	Species of Special Concern
Common Loon (Gavia immer)	Species of Special Concern
Harlequin Duck (Histrionicus histrionicus)	Species of Special Concern
Barrow's Goldeneye (Bucephala islandica)	Species of Special Concern
Osprey (Pandion haliaetus)	Species of Special Concern
Northern Harrier (Circus cyaneus)	Species of Special Concern
Sharp-skinned Hawk (Accipiter striatus)	Species of Special Concern
Merlin (Falco columbarius)	Species of Special Concern
Praire Falcon (Falco mexicanus)	Species of Special Concern
Bald Eagle (Haliaeetus leucocephalus)	Federal Threatened Species
Elegant Tern (Sterna elegans)	Species of Special Concern
Marbeled Murrelet (Brachyramphus marmoratus)	Federal Threatened Species
Burrowing Owl (Athene cunicularia)	Species of Special Concern
Short-eared Owl (Asio flammeus)	Species of Special Concern
Northern spotted owl (Strix occidentalis caurina)	Federal Threatened Species
MAMMAL	
Marten (Martes americana)	Species of Special Concern
Blue whale (Balaenoptera musculus)	Federal Endangered Species
Fin whale (Balaenoptera physalus)	Federal Endangered Species
Sei whale (Balaenoptera borealis)	Federal Endangered Species
Sperm whale (Physeter macrocephalus)	Federal Endangered Species
Humpback whale (Megaptera novaenglia)	Federal Endangered Species
Northern sea lion (Eumetopias jubatus)	Federal Threatened Species
PLANTS	
Beach layia (Layia carnosa)	Federal Endangered Species
Howell’s montia (Montia howellii)	Species of Special Concern
Humboldt Bay owl’s-clover (Castilleja ambigua ssp. humboldtiensis)	Species of Special Concern
Humboldt Bay wallflower (Erysimum menziesii ssp. Eurekense)	Federal Endangered Species
Pink sand-verbena (Abronia umbellata ssp. breviflora)	Species of Special Concern
Point Reyes bird’s-beak (Cordylanthus maritimus ssp. palustris)	Species of Special Concern
Siskiyou checkerbloom (Sidalcea malviflora ssp. patula)	Species of Special Concern
Western Lily (Lilium occidentale)	Federal Endangered Species

TABLE 3-7

POTENTIAL REPRESENTATIVE RECEPTORS

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Trophic Level	Feeding Guild	Food Web Category	Representative Receptor
Producer	not applicable	phytoplankton and benthic macroalgae	no receptor identified
		macroalgae and angiosperms	no receptor identified
		macrophytes	eel grass beds, salt marshes
Primary	detritivore/herbivore	pelagic zooplankton	benthic invertebrate, zooplankton community
	detritivore/herbivore	epibenthic zooplankton	benthic invertebrate, zooplankton community
	detritivore/herbivore	benthic infauna and sessile epifauna	oysters and mussels
Secondary	omnivore	pelagic fish	pacific herring
	carnivore	demersal fish	english sole
	omnivore	mobile macroinvertebrates	dungeness or rock crab
Tertiary	piscivores	pelagic or demersal fish	chinook salmon
	piscivore	aerial searching birds	osprey
	herbivore, omnivore	diving and surface birds	brown pelican, mallard
	carnivore, piscivore	marine mammals	harbor seal, river otter
	carnivore	wading birds	great blue heron
	carnivore	surface searching shorebirds	spotted sandpiper, western snowy plover

TABLE 3-8

SITE HABITAT SUMMARY AND REPRESENTATIVE RECEPTORS FOR MAD RIVER SLOUGH AND ARCATA BAY[1]

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Habitat Type	Hectares[2]	Expected Species	Primary Seasons	Relative Occurrence	Species of Concern
Salt Marsh	393	Great Blue Heron	All	Common	NO
		Mallard	Spring, Fall, Winter	Common	NO
		English Sole	All	Abundant	NO
		Crab	All	Abundant	NO
		Benthic Community	All	Abundant	NO
Intertidal Mudflats Upper	NA	Harbor Seal	All	Abundant	NO
		River Otter	All	Common	NO
		Spotted Sandpiper	Spring, Summer, Fall	Uncommon/Rare	NO
		Western snowy Plover	All	Rare	YES
		Great Blue Heron	All	Common	NO
		Mallard	Spring, Fall, Winter	Common	NO
		English Sole	All	Abundant	NO
		Crab	All	Abundant	NO
		Benthic Community	All	Abundant	NO
Intertidal Mudflats Lower (Eelgrass Beds)	435	Harbor Seal	All	Abundant	NO
		River Otter	All	Common	NO
		Oysters and Mussels	All	Abundant	NO
		Great Blue Heron	All	Common	NO
		Mallard	Spring, Fall, Winter	Common	NO
		English Sole	All	Abundant	NO
		Crab	All	Abundant	NO
		Pacific Herring	All	Abundant	NO
		Benthic Community	All	Abundant	NO
Shallow Channel	NA	English Sole	All	Abundant	NO
		Chinook Salmon	All	Common	YES
		Crab	All	Abundant	NO
		Pacific Herring	All	Abundant	NO
		Great Blue Heron	All	Common	NO
		Brown Pelican	Summer, Fall	Rare to Common	YES
		Mallard	Spring, Fall, Winter	Common	NO
		Osprey	Spring, Summer, Fall	Common	YES
		Benthic Community	All	Abundant	NO
Deep-Water Channel	NA	Harbor Seal	All	Abundant	NO
		River Otter	All	Common	NO
		English Sole	All	Abundant	NO
		Pacific Herring	All	Abundant	NO
		Chinook Salmon	All	Common	YES
		Great Blue Heron	All	Common	NO
		Brown Pelican	Summer, Fall	Rare to Common	YES
		Mallard	Spring, Fall, Winter	Common	NO
		Osprey	Spring, Summer, Fall	Common	YES
		Benthic Community	All	Abundant	NO
Oyster Beds	NA	Oysters and Mussels	All	Abundant	NO
		Crab	All	Abundant	NO
		Benthic Community	All	Abundant	NO

Notes:
1. Representative receptor presence, seasonality and relative occurrence based on Barnhart, 1992. *The Ecology of Humboldt Bay, California: An Estuarine Profile* , Biological Report 1.
2. Coverage based on entire Humboldt Bay System (Barnhart, 1992)

TABLE 3-9

BIOLOGICAL, TOXICOLOGICAL, AND SOCIETAL CRITERIA FOR SELECTION OF REPRESENTATIVE SPECIES

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Habitat Type	Potential Receptor Group	Potential Contaminants	Contaminated Media	Direct Exposure Pathway	Food Web Exposure	Complete Exposure Pathway
Salt Marsh, Intertidal mudflats, Oyster Beds	Sessile Benthics (oysters and mussels)	Dioxins/furans, Zinc	Sediment	Sediment ingestion and contact	Sediment contact; ingestion of detritus, microflora, phytoplankton, benthic macroalgae	YES
Salt Marsh, Intertidal mudflats, Shallow channel, Oyster Beds	Mobile Benthics (crabs), Benthic infauna	Dioxins/furans, Zinc	Sediment	Sediment ingestion and contact	Sediment contact; ingestion of benthic invertebrates, detritus, microflora, phytoplankton, benthic macroalgae	YES
Salt Marsh, Intertidal mudflats	Diving and Surface Searching Bird (Mallard)	Dioxins/furans, Zinc	Sediment and plants	Sediment ingestion, contact, ingestion of plant material	Sediment contact and ingestion (incidental ingestion and contact while foraging); ingestion of plant material	YES
Salt Marsh, intertidal mudflats, Shallow channel	Wading Bird (Great Blue Heron)	Dioxins/furans, Zinc	Sediment and Prey items	Sediment contact, incidental ingestion, prey ingestion	Sediment contact and ingestion (incidental ingestion and contact while foraging); Ingestion of benthic invertebrates and fish	YES
Intertidal Mudflats, Shallow and deep channel,	Demersal Fish (English Sole)	Dioxins/furans, Zinc	Sediment and Prey items	Sediment contact, incidental ingestion, prey ingestion	Sediment contact and ingestion (incidental ingestion and contact while foraging); Ingestion of benthic invertebrates	YES
Intertidal Mudflats	Surface Searching Shore Bird (Spotted Sandpiper, Snowy Plover)	Dioxins/furans, Zinc	Sediment	Sediment contact, incidental ingestion, prey ingestion	Sediment and water contact/ingestion, benthic invertebrate ingestion	YES
Intertidal Mudflats, Shallow and deep channel	Marine Mammal (Harbor Seal and River Otter)	Dioxins/furans, Zinc	Sediment and Prey items	Sediment contact, incidental ingestion, prey ingestion	Sediment and water contact and ingestion to Harbor Seal (incidental ingestion and contact while hauling out), ingestion of prey items	YES
Shallow Channel	Benthic Infauna	Dioxins/furans, Zinc	Sediment	Sediment ingestion/contact	Sediment contact and ingestion to zooplankton community	YES
Shallow and deep channel	Diving and Surface Searching Bird (Brown Pelican)	Dioxins/furans, Zinc	Sediment and Prey items	Sediment contact, incidental ingestion, prey ingestion	Sediment and water contact/ingestion, fish ingestion	YES
Shallow and deep channel	Pelagic Fish (Chinook salmon)	Dioxins/furans, Zinc	Sediment	Ingestion of Prey	Ingestion of benthic invertebrates and fish	YES
Shallow and deep channel	Aerial Searching Bird (Osprey)	Dioxins/furans, Zinc	Prey items	Ingestion of Prey	Ingestion of fish	YES
Deep-water Channel	Benthic Infauna	Dioxins/furans, Zinc	Sediment	Sediment and water ingestion/contact	Sediment and water contact and ingestion to zooplankton community	YES
Deep-water Channel	Pelagic Fish (Pacific Herring)	Dioxins/furans, Zinc	Prey items	Ingestion of Prey	Ingestion of Planktonic community	YES

TABLE 3-10

ASSESSMENT OF POTENTIAL COMPLETE EXPOSURE PATHWAYS FOR MAD RIVER SLOUGH AND ARCATA BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Assessment Endpoints and Representative Receptors		Ecological Factors					Toxicological Factors			Societal Factors		
	Obsrved in Humboldt Bay (USFWS 1992)	**High Trophic Level Predator**	**Important Prey Species**	**Important to Structure or Function of Ecosystem (i.e. Keystone Species)**	**High Potential for Exposure based on Feeding or Life History**	**Susceptible to Bioaccumulation or Biomagnification of COCs**	**Toxicological Literature Available**	**Likely to Exhibit Toxic Effects**	**Directly Measure Toxic Endpoints**	**Species of Special Conservation Concern or Threatened /Endangered Species**	**Economically Important**	**High Social or Recreational Value**
1.) Protection of Threatened and Endangered Species												
Chinook Salmon (*Onchorynchus tshawytscha*) reproductive success	X	X		X	X	X	X	X	X	X	X	X
Brown Pelican (*Pelecanus occidentalis*) reproductive success	X	X			X	X	X	X	X	X		X
Western Snowy Plover (*Charadrius alexandrinus*) reproductive success	X	X			X	X		X	X	X		X
2.) Protection of Benthic Invertebrate Community												
Oyster and Mussel reproductive success	X		X	X	X	X	X	X	X		X	X
Benthic invertebrate community reproductive success	X		X	X	X		X	X	X			
Rock and/or Dungeness Crab reproductive success	X		X		X	X		X	X		X	X
3.) Protection of Fish Populations												
Pacific Herring (*Clupea harengus pallasi*) reproductive success	X		X	X	X	X	X	X	X		X	X
Chinook Salmon (*Onchorynchus tshawytscha*) reproductive success	X	X		X	X	X	X	X	X		X	X
English Sole (*Parophrys vetulus*) reproductive success	X	X			X	X		X	X		X	X
4.) Protection of Carnivorous/Piscivorous Birds												
Osprey (*Pandion haliaetus*) reproductive success	X	X		X	X	X	X	X	X			
Brown Pelican (*Pelecanus occidentalis*) reproductive success	X	X			X	X	X	X	X	X		X
Great Blue Heron *(Ardea herodias*) reproductive success	X	X		X	X	X	X	X	X			
Spotted Sandpiper *(Actitis macularia*) reproductive success	X	X		X	X	X		X	X			
Western Snowy Plover (*Charadrius alexandrinus*) reproductive success	X	X			X	X		X	X	X		X
5.) Protection of Omnivorous Birds (Aquatic)												
Mallard (*Anas platyrhynchos*) reproductive success	X				X	X	X	X	X		X	
6.) Protection of Marine Mammals												
Harbor Seal *(Phoca vitulina*) reproductive success	X	X		X	X	X	X	X	X			X
River Otter (*Lutra canadensis*) reproductive success	X	X		X	X	X	X	X	X			X
7.) Protection of Aquatic Plant Community												
Eel Grass community success	X		X	X					X		X	X

TABLE 3-11

SUMMARY OF EXPOSURE ASSUMPTIONS FOR TERRESTRIAL RECEPTORS

Sierra Pacific Industries

Arcata Division Sawmill

Arcata, California

Receptor	Body Weight (kg)	Body Weight Source	Ingestion Rate Food (kg/kg BW/day) WW	Ingestion Rate Food Source	Percent Sediment in Diet	Sediment Ingestion Source	Ingestion Rate Water (kg/kg BW/day)	Water Ingestion Rate Source	Percent of Prey In Diet									Source
									Perch	Sculpin	Shiner	Sole	Crab	Mussel	Oyster	Shrimp	Plant	
Brown Pelican	3.3	CalEPA Online; Minimum reported adult body weight.	0.18	CalEPA Online; Maximum reported adult ingestion rate.	10%	Conservative estimate based on Beyer et al. (1994)	0.04	Beyer et al. (1994) allometric equation for all birds.	20%	20%	20%	20%	0%	0%	0%	20%	0%	Generalized diet based on typical food ingested and prey tissue data available.
Great Blue Heron	2.2	Beyer et al. (1994); Minimum reported adult body weight.	0.18	Beyer et al. (1994); Maximum reported adult ingestion rate.	10%	Conservative estimate based on Beyer et al. (1994)	0.045	Beyer et al. (1994) allometric equation for all birds.	11%	11%	11%	33%	33%	0%	0%	0%	0%	Generalized diet based on typical food ingested and prey tissue data available.
Harbor Seal[1]	76.5	Beyer et al. (1994); Minimum reported adult body weight.	0.10	Beyer et al. (1994); Maximum reported adult ingestion rate.	2%	Conservative estimate based on 0% used for Kuluk Bay ERA (URS 1997)	0.064	Beyer et al. (1994) allometric equation for mammals.	21%	18%	21%	30%	3%	2%	2%	3%	0%	Generalized diet based on typical food ingested and prey tissue data available.
Mallard	1.2	Beyer et al. (1994); Adult Body weight used to calculate water ingestion rate.	0.11[2]	CalEPA Online; Maximum reported adult ingestion rate.	2%	Beyer et al. (1994)	0.058	Beyer et al. (1994) allometric equation for all birds.	0%	0%	0%	0%	0%	0%	0%	0%	100%	Generalized diet based on typical food ingested and prey tissue data available.
Osprey	1.4	Beyer et al. (1994); Minimum reported adult body weight.	0.21	Beyer et al. (1994); Maximum reported adult ingestion rate.	2%	Conservative estimate for birds that ingest primarily pelagic fish.	0.053	Beyer et al. (1994) allometric equation for all birds.	33%	33%	33%	0%	0%	0%	0%	0%	0%	Generalized diet based on typical food ingested and prey tissue data available.
River Otter[3]	6.7	Beyer et al. (1994); Minimum reported adult body weight.	0.1	Nagy (2001) allometric equation for fresh weight ingestion rate of carnivorous mammals.	2%	Estimate from Kuluk Bay ERA (URS 1997)	0.08	Beyer et al. (1994) allometric equation.	10%	15%	10%	10%	15%	15%	15%	10%	0%	Generalized diet based on typical food ingested and prey tissue data available.
Spotted Sandpiper	0.038	Beyer et al. (1994); Minimum reported adult body weight.	0.83[3]	Nagy (2001) allometric equation for fresh weight ingestion rate of shorebirds.	18%	Conservative estimate based on Western Sandpiper in Beyer et al. (1994))	0.17	Beyer et al. (1994) allometric equation for all birds.	0%	0%	0%	0%	100%	0%	0%	0%	0%	Generalized diet based on typical food ingested and prey tissue data available.
Western Snowy Plover	0.04	CalEPA Online; Minimum reported adult (free living) body weight.	0.82[4]	Nagy (2001) allometric equation for fresh weight ingestion rate of shorebirds.	10%	Conservative estimate	0.008	Beyer et al. (1994) allometric equation for all birds.	0%	0%	0%	0%	100%	0%	0%	0%	0%	Generalized diet based on typical food ingested and prey tissue data available.

TABLE 3-11

SUMMARY OF EXPOSURE ASSUMPTIONS FOR TERRESTRIAL RECEPTORS

Sierra Pacific Industries

Arcata Division Sawmill

Arcata, California

Notes:

For those species without readily available ingestion rates, food and water ingestion rates were calculated using allometric equations from Nagy (2001) for food, and Beyer et al. (1994) for water and sediment.

(1) Assumptions for harbor seal percent prey in diet are based on information presented in Barnhart (1992) that cites 42% of the harbor seal diet in Humboldt Bay coming from surfperches and only occasional feeding on invertebrates.

(2) Ingestion rate presented in the CalEPA Exposure Factor Report was presented as 130 g food/duck/day. To calculate the ingestion rate on the table, the rate was divided by the body weight to provide the units g food/g duck/day.

(3) No food ingestion rate available. Ingestion was calculated using Nagy (2001) equation for carnivorous mammals: IRf (WW) = (0.348 *(BW^0.859))/BW;

Assumptions for % sediment in diet were from the Kuluk Bay ERA (URS 1997) for a NAVY CLEAN site in Alaska for sea otter.

(4) No food ingestion rate was available. Ingestion was calculated using Nagy (2001) equation for shorebirds: IRf (WW) = (1.914*(BW^0.769))/BW

Abbreviations:

CalEPA = California Environmental Protection Agency

kg/kg BW/day - kilogram per kilogram body weight per day

WW = wet weight

TABLE 3-12

TOXICITY REFERENCE VALUES USED TO ASSESS POTENTIAL RISKS FROM SEDIMENT COPCS

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Parameter	Organism	Medium	TRV Type	Concentration	Units	Reference
Zinc	Benthic Invertebrate	Sediment	Effects Range Low	150	mg/kg dry	Long et al. 1995
Zinc	Benthic Invertebrate	Sediment	Effects Range Medium	410	mg/kg dry	Long et al. 1995
Zinc	Fish	Sediment	NA	NA		NA
2,3,7,8-TCDD TEQ	Benthic Invertebrate	Sediment	Interim Sediment Quality Guideline	0.85	ng/kg dry	CCME 2001
2,3,7,8-TCDD TEQ	Benthic Invertebrate	Sediment	Probable Effects Level	21.5	ng/kg dry	CCME 2001
2,3,7,8-TCDD TEQ	Fish	Sediment	Low Risk	60	ng/kg dry	Low risk tissue based sediment toxicity reference value for aquatic life using a BSAF of 0.3 (U.S. EPA 1993)
2,3,7,8-TCDD TEQ	Fish	Sediment	High Risk	100	ng/kg dry	High risk tissue based sediment toxicity reference value for aquatic life using a BSAF of 0.3 (U.S. EPA 1993)
2,3,7,8-TCDD TEQ	Fish	Tissue	Low Risk	50	ng/kg ww	Low risk tissue risk threshold to aquatic life (U.S. EPA 1993)
2,3,7,8-TCDD TEQ	Fish	Tissue	High Risk	80	ng/kg ww	High risk tissue based threshold to aquatic life (U.S. EPA 1993)
2,3,7,8-TCDD TEQ	Fish	Tissue	No observed effect concentration	72	ng/kg ww	Juvenile rainbow trout growth (Fisk et al. 1997)
2,3,7,8-TCDD TEQ	Fish	Tissue	Lowest observed effect concentration	150	ng/kg ww	Juvenile rainbow trout growth (Fisk et al. 1997)

Abbreviations:
dry = dry weight
mg/kg = milligrams per kilogram
NA = not available
ng/kg = nanograms per kilogram
ww = wet weight

TABLE 3-13

SUMMARY OF ZINC TISSUE RESIDUES ASSOCIATED WITH NO OR LOW EFFECTS ON SUBLETHAL ENDPOINTS

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Species	Life Stage	Test Duration (days)	Tissue Residue (ppm; wet weight)	Endpoint	Result	Reference
Fish						
Atlantic Salmon (freshwater)	juvenile	80	60	survival, growth, reproduction	no effect	1
Flagfish (freshwater)	embryo-adult	100	44	growth	no effect	2
Flagfish (freshwater)	larvae-adult	100	34	growth	no effect	2
Guppy (freshwater)	fry	134	280	survival, growth, reproduction	no effect	3
Molluscs						
Zebra Mussel	adult	70	50	filtration rate	NOEC	4
Zebra Mussel	adult	70	140	filtration rate	LOEC	4
Zebra Mussel	adult	70	140	mortality	NOEC	4
Zebra Mussel	adult	70	621	mortality	LOEC	4
Other Invertebrates						
Sea Urchin	larvae	NR	40.6	larval development	LOEC	5
Sea Urchin	larvae	NR	37	larval development	NOEC	5
Marine Amphipod	juvenile	NR	28	growth	LOEC	6

Notes:
Data from: *Linkage of Effects to Tissue Residues: Development of a Comprehensive Database for Aquatic Organisms Exposed to Inorganic and Organic Chemicals.* Jarvinen, A.W. and G.T. Ankley 1999. Setac Press.; and Environmental Residue Effects Database (U.S. ACE, 2003a).

1 Farmer GJ, Ashfield D, Smant HS. 1979. Effects of zinc on juvenile Atlantic salmon *Salmo salar:* Acute toxicity, food intake, growth, and bioaccumulation. Environ. Pollut. 19: 103-117.
2 Spehar RL. 1976. Cadmium and zinc toxicity to flagfish (*Jordanella floridae*). J. Fish Res Board Can 33:1939-1945.
3 Pierson KB. 1981. Effects of chronic zinc exposure on the growth, sexual maturity, reproduction, and bioaccumulation of the guppy, *Poecilia reticulata* . Can J Fish Aquati Sci 83:23-31.
4 Kraak, M.H.S., Y.A. Wink, S.C. Stuijfzand, M.C. Buckert-de Jong, C.J. De Groot and W. Admiraal. 1994. Chronic ecotoxicity of zinc and lead to Zebra mussel Dreissena polymorpha. Aquat. Toxicol. 30:77-89.
5 Radenac, G. D. Fichet, P. Miramand. 2001. Bioaccumulation and toxicity of four dissolved metals in Paracentrotus lividus sea-urchin embryo. Mar Environ Res 51: 151-166
6 Ahsanullah M, AR Williams. 1991. Sublethal effects and bioaccumulation of cadmium, chromium, copper, and zinc in the marine amphipod Allorchestas compressa. Mar Biol 108:59-65

Abbreviations:
LOEC = lowest observed effects level
NOEC = no observed effects level
PPM = parts per million
NR = not reported

TABLE 3-14

SUMMARY OF HAZARD QUOTIENTS FOR AQUATIC ASSESSMENT ENDPOINT SPECIES

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Organism	COPC	Units	Medium	Location	Statistic	Concentration	TRV Lower	TRV Upper	HQ Lower	HQ Upper	TRV Reference
HQs based on Comparison to Sediment-based TRVs											
Benthic Inverts	Zinc	mg/kg dry	Sediment	Humboldt Bay (<1' bgs)	Maximum	237	150	410	1.6	0.6	1
Benthic Inverts	Zinc	mg/kg dry	Sediment	Humboldt Bay (<1' bgs)	Mean	81.2	150	410	0.5	0.2	1
Benthic Inverts	Zinc	mg/kg dry	Sediment	Humboldt Bay (<1' bgs)	95% UCL	50.6	150	410	0.3	0.1	1
Benthic Inverts	Zinc	mg/kg dry	Sediment	Humboldt Bay (>1' bgs)	Maximum	96.1	150	410	0.6	0.2	1
Benthic Inverts	Zinc	mg/kg dry	Sediment	Humboldt Bay (>1' bgs)	Mean	74.0	150	410	0.5	0.2	1
Benthic Inverts	Zinc	mg/kg dry	Sediment	Humboldt Bay (>1' bgs)	--	--	150	410	--	--	1
Benthic Inverts	Zinc	mg/kg dry	Sediment	Mad River Slough (<1' bgs)	Maximum	111	150	410	0.7	0.3	1
Benthic Inverts	Zinc	mg/kg dry	Sediment	Mad River Slough (<1' bgs)	Mean	86.3	150	410	0.6	0.2	1
Benthic Inverts	Zinc	mg/kg dry	Sediment	Mad River Slough (<1' bgs)	95% UCL	50.7	150	410	0.3	0.1	1
Benthic Inverts	Zinc	mg/kg dry	Sediment	Mad River Slough (>1' bgs)	Maximum	106	150	410	0.7	0.3	1
Benthic Inverts	Zinc	mg/kg dry	Sediment	Mad River Slough (>1' bgs)	Mean	93.9	150	410	0.6	0.2	1
Benthic Inverts	Zinc	mg/kg dry	Sediment	Mad River Slough (>1' bgs)	95% UCL	53.6	150	410	0.4	0.1	1
Benthic Inverts	Zinc	mg/kg dry	Sediment	Upland	Maximum	811	150	410	5.4	2.0	1
Benthic Inverts	Zinc	mg/kg dry	Sediment	Upland	Mean	187	150	410	1.2	0.5	1
Benthic Inverts	Zinc	mg/kg dry	Sediment	Upland	95% UCL	139	150	410	0.9	0.3	1
Benthic Inverts	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Humboldt Bay (<1' bgs)	Maximum	11.7	0.85	21.5	14	0.5	2
Benthic Inverts	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Humboldt Bay (<1' bgs)	Mean	2.63	0.85	21.5	3.1	0.1	2
Benthic Inverts	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Humboldt Bay (<1' bgs)	95% UCL	3.28	0.85	21.5	3.9	0.2	2
Benthic Inverts	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Humboldt Bay (>1' bgs)	Maximum	10.6	0.85	21.5	12	0.5	2
Benthic Inverts	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Humboldt Bay (>1' bgs)	Mean	5.68	0.85	21.5	6.7	0.3	2
Benthic Inverts	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Humboldt Bay (>1' bgs)	95% UCL	8.85	0.85	21.5	10	0.4	2
Benthic Inverts	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Mad River Slough (<1' bgs)	Maximum	59.5	0.85	21.5	70	2.8	2
Benthic Inverts	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Mad River Slough (<1' bgs)	Mean	7.64	0.85	21.5	9.0	0.4	2
Benthic Inverts	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Mad River Slough (<1' bgs)	95% UCL	13.6	0.85	21.5	16	0.6	2
Benthic Inverts	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Mad River Slough (>1' bgs)	Maximum	69.1	0.85	21.5	81	3.2	2
Benthic Inverts	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Mad River Slough (>1' bgs)	Mean	21.4	0.85	21.5	25	1.0	2
Benthic Inverts	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Mad River Slough (>1' bgs)	95% UCL	34.5	0.85	21.5	41	1.6	2
Benthic Inverts	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Upland	Maximum	13.7	0.85	21.5	16	0.6	2
Benthic Inverts	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Upland	Mean	13.7	0.85	21.5	16	0.6	2
Benthic Inverts	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Upland	95% UCL	--	0.85	21.5	--	--	2
Fish	Zinc	mg/kg dry	Sediment	*No applicable TRV available*							
Fish	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Humboldt Bay (<1' bgs)	Maximum	11.7	60	100	0.2	0.1	3
Fish	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Humboldt Bay (<1' bgs)	Mean	2.63	60	100	0.04	0.03	3
Fish	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Humboldt Bay (<1' bgs)	95% UCL	3.28	60	100	0.1	0.03	3
Fish	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Humboldt Bay (>1' bgs)	Maximum	10.6	60	100	0.2	0.1	3
Fish	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Humboldt Bay (>1' bgs)	Mean	5.68	60	100	0.1	0.1	3
Fish	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Humboldt Bay (>1' bgs)	95% UCL	8.85	60	100	0.1	0.1	3
Fish	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Mad River Slough (<1' bgs)	Maximum	59.5	60	100	1.0	0.6	3
Fish	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Mad River Slough (<1' bgs)	Mean	7.64	60	100	0.1	0.1	3

TABLE 3-14

SUMMARY OF HAZARD QUOTIENTS FOR AQUATIC ASSESSMENT ENDPOINT SPECIES

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Organism	COPC	Units	Medium	Location	Statistic	Concentration	TRV Lower	TRV Upper	HQ Lower	HQ Upper	TRV Reference
Fish	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Mad River Slough (<1' bgs)	95% UCL	13.64	60	100	0.2	0.1	3
Fish	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Mad River Slough (>1' bgs)	Maximum	69.1	60	100	1.2	0.7	3
Fish	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Mad River Slough (>1' bgs)	Mean	21.4	60	100	0.4	0.2	3
Fish	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Mad River Slough (>1' bgs)	95% UCL	34.5	60	100	0.6	0.3	3
Fish	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Upland	Maximum	13.7	60	100	0.2	0.1	3
Fish	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Upland	Mean	13.7	60	100	0.2	0.1	3
Fish	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg dry	Sediment	Upland	95% UCL	--	60	100	--	--	3
HQs based on comparison to Tissue-based TRVs											
Oyster	Zinc	mg/kg wet	Tissue	Humboldt Bay	Maximum	140	50	140	2.8	1.0	4
Oyster	Zinc	mg/kg wet	Tissue	Humboldt Bay	Mean	97.8	50	140	2.0	0.7	4
Oyster	Zinc	mg/kg wet	Tissue	Humboldt Bay	95% UCL	121	50	140	2.4	0.9	4
Oyster	Zinc	mg/kg wet	Tissue	Mad River Slough	Maximum	110	50	140	2.2	0.8	4
Oyster	Zinc	mg/kg wet	Tissue	Mad River Slough	Mean	94.0	50	140	1.9	0.7	4
Oyster	Zinc	mg/kg wet	Tissue	Mad River Slough	95% UCL	--	50	140	--	--	4
Oyster	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Humboldt Bay	Maximum	4.31	50	80	0.1	0.1	5
Oyster	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Humboldt Bay	Mean	0.886	50	80	0.02	0.01	5
Oyster	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Humboldt Bay	95% UCL	3.19	50	80	0.06	0.04	5
Oyster	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Mad River Slough	Maximum	2.24	50	80	0.04	0.03	5
Oyster	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Mad River Slough	Mean	0.861	50	80	0.02	0.01	5
Oyster	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Mad River Slough	95% UCL	--	50	80	--	--	5
Crab	Zinc	mg/kg wet	Tissue	Humboldt Bay	Maximum	43.0	37	41	1.2	1.0	6
Crab	Zinc	mg/kg wet	Tissue	Humboldt Bay	Mean	37.7	37	41	1.0	0.9	6
Crab	Zinc	mg/kg wet	Tissue	Humboldt Bay	95% UCL	--	37	41	--	--	6
Crab	Zinc	mg/kg wet	Tissue	Mad River Slough	Maximum	45.0	37	41	1.2	1.1	6
Crab	Zinc	mg/kg wet	Tissue	Mad River Slough	Mean	32.2	37	41	0.9	0.8	6
Crab	Zinc	mg/kg wet	Tissue	Mad River Slough	95% UCL	41.9	37	41	1.1	1.0	6
Crab	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Humboldt Bay	Maximum	2.93	50	80	0.1	0.04	5
Crab	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Humboldt Bay	Mean	1.04	50	80	0.02	0.01	5
Crab	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Humboldt Bay	95% UCL	2.16	50	80	0.04	0.03	5
Crab	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Mad River Slough	Maximum	2.29	50	80	0.05	0.03	5
Crab	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Mad River Slough	Mean	0.527	50	80	0.01	0.01	5
Crab	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Mad River Slough	95% UCL	1.12	50	80	0.02	0.01	5
Mussel	Zinc	mg/kg wet	Tissue	Mad River Slough	Maximum	12.0	50	140	0.2	0.1	4
Mussel	Zinc	mg/kg wet	Tissue	Mad River Slough	Mean	12.0	50	140	0.2	0.1	4
Mussel	Zinc	mg/kg wet	Tissue	Mad River Slough	95% UCL	--	50	140	--	--	4
Mussel	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Humboldt Bay	Maximum	0.436	50	80	0.01	0.01	5
Mussel	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Humboldt Bay	Mean	0.436	50	80	0.01	0.01	5
Mussel	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Humboldt Bay	95% UCL	--	50	80	--	--	5
Mussel	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Mad River Slough	Maximum	0.985	50	80	0.02	0.01	5
Mussel	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Mad River Slough	Mean	0.586	50	80	0.01	0.01	5

TABLE 3-14

SUMMARY OF HAZARD QUOTIENTS FOR AQUATIC ASSESSMENT ENDPOINT SPECIES

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Organism	COPC	Units	Medium	Location	Statistic	Concentration	TRV Lower	TRV Upper	HQ Lower	HQ Upper	TRV Reference
Mussel	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Mad River Slough	95% UCL	--	50	80	--	--	5
Sculpin	Zinc	mg/kg wet	Tissue	Humboldt Bay	Maximum	11.0	34	60	0.3	0.2	7
Sculpin	Zinc	mg/kg wet	Tissue	Humboldt Bay	Mean	11.0	34	60	0.3	0.2	7
Sculpin	Zinc	mg/kg wet	Tissue	Humboldt Bay	95% UCL	--	34	60	--	--	7
Sculpin	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Humboldt Bay	Maximum	1.28	72	150	0.02	0.01	8
Sculpin	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Humboldt Bay	Mean	0.499	72	150	0.01	0.003	8
Sculpin	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Humboldt Bay	95% UCL	--	72	150	--	--	8
Sculpin	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Mad River Slough	Maximum	0.380	72	150	0.01	0.003	8
Sculpin	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Mad River Slough	Mean	0.265	72	150	0.004	0.002	8
Sculpin	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Mad River Slough	95% UCL	--	72	150	--	--	8
Perch	Zinc	mg/kg wet	Tissue	Humboldt Bay	Maximum	40.0	34	60	1.2	0.7	7
Perch	Zinc	mg/kg wet	Tissue	Humboldt Bay	Mean	40.0	34	60	1.2	0.7	7
Perch	Zinc	mg/kg wet	Tissue	Humboldt Bay	95% UCL	--	34	60	--	--	7
Perch	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Humboldt Bay	Maximum	0.305	72	150	0.004	0.002	8
Perch	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Humboldt Bay	Mean	0.227	72	150	0.003	0.002	8
Perch	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Humboldt Bay	95% UCL	--	72	150	--	--	8
Shiner	Zinc	mg/kg wet	Tissue	Humboldt Bay	Maximum	27.0	34	60	0.8	0.5	7
Shiner	Zinc	mg/kg wet	Tissue	Humboldt Bay	Mean	18.5	34	60	0.5	0.3	7
Shiner	Zinc	mg/kg wet	Tissue	Humboldt Bay	95% UCL	27.0	34	60	0.8	0.5	7
Shiner	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Humboldt Bay	Maximum	0.622	72	150	0.01	0.004	8
Shiner	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Humboldt Bay	Mean	0.401	72	150	0.01	0.003	8
Shiner	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Humboldt Bay	95% UCL	--	72	150	--	--	8
Shiner	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Mad River Slough	Maximum	0.406	72	150	0.01	0.003	8
Shiner	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Mad River Slough	Mean	0.406	72	150	0.006	0.003	8
Shiner	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Mad River Slough	95% UCL	--	72	150	--	--	8
Sole	Zinc	mg/kg wet	Tissue	Humboldt Bay	Maximum	17.0	34	60	0.5	0.3	7
Sole	Zinc	mg/kg wet	Tissue	Humboldt Bay	Mean	13.0	34	60	0.4	0.2	7
Sole	Zinc	mg/kg wet	Tissue	Humboldt Bay	95% UCL	--	34	60	--	--	7
Sole	Zinc	mg/kg wet	Tissue	Mad River Slough	Maximum	15.0	34	60	0.4	0.3	7
Sole	Zinc	mg/kg wet	Tissue	Mad River Slough	Mean	14.0	34	60	0.4	0.2	7
Sole	Zinc	mg/kg wet	Tissue	Mad River Slough	95% UCL	--	34	60	--	--	7
Sole	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Humboldt Bay	Maximum	0.260	72	150	0.004	0.002	8
Sole	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Humboldt Bay	Mean	0.154	72	150	0.002	0.001	8
Sole	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Humboldt Bay	95% UCL	0.306	72	150	0.004	0.002	8
Sole	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Mad River Slough	Maximum	0.360	72	150	0.005	0.002	8
Sole	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Mad River Slough	Mean	0.194	72	150	0.003	0.001	8
Sole	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Mad River Slough	95% UCL	0.273	72	150	0.004	0.002	8
Shrimp	Zinc	mg/kg wet	Tissue	Mad River Slough	Maximum	11.0	na	28	NA	0.4	9
Shrimp	Zinc	mg/kg wet	Tissue	Mad River Slough	Mean	11.0	na	28	NA	0.4	9
Shrimp	Zinc	mg/kg wet	Tissue	Mad River Slough	95% UCL	--	na	28	NA	--	9

TABLE 3-14

SUMMARY OF HAZARD QUOTIENTS FOR AQUATIC ASSESSMENT ENDPOINT SPECIES

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Organism	COPC	Units	Medium	Location	Statistic	Concentration	TRV Lower	TRV Upper	HQ Lower	HQ Upper	TRV Reference
Shrimp	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Humboldt Bay	Maximum	0.681	50	80	0.014	0.009	5
Shrimp	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Humboldt Bay	Mean	0.406	50	80	0.008	0.005	5
Shrimp	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Humboldt Bay	95% UCL	--	50	80	--	--	5
Shrimp	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Mad River Slough	Maximum	0.256	50	80	0.005	0.003	5
Shrimp	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Mad River Slough	Mean	0.153	50	80	0.003	0.002	5
Shrimp	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Mad River Slough	95% UCL	--	50	80	--	--	5
Shark	Zinc	mg/kg wet	Tissue	Mad River Slough	Maximum	4.00	34	60	0.1	0.1	7
Shark	Zinc	mg/kg wet	Tissue	Mad River Slough	Mean	4.00	34	60	0.1	0.1	7
Shark	Zinc	mg/kg wet	Tissue	Mad River Slough	95% UCL	--	34	60	--	--	7
Shark	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Mad River Slough	Maximum	0.063	72	150	0.0009	0.0004	8
Shark	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Mad River Slough	Mean	0.063	72	150	0.0009	0.0004	8
Shark	2,3,7,8-TCDD TEQ (Fish TEFs)	ng/kg wet	Tissue	Mad River Slough	95% UCL	--	72	150	--	--	8

Notes:

1 ER-L and ER-M (Long et al. 1995)
2 Canadian Sediment Quality Guidelines for dioxins/furans (CCME 2001)
3 Low and high risk tissue based thresholds for sediments using a BSAF of 0.3 (U.S. EPA 1993)
4 Zebra Mussel NOEC and LOEC tissue residue (Kraak et al. 1994)
5 Low and high risk tissue residue thresholds for aquatic life (U.S. EPA 1993)
6 Sea Urchin NOED and LOED (Radenac, G. D. Fichet, P. Miramand. 2001)
7 Fish Tissue Residue NOECs (Farmer et al. 1979; Spehar 1976)
8 Growth NOEC and LOEC for Rainbow trout (Fisk et al. 1997)
9 Growth LOEC for Amphipod (Ahsanullah and Williams 1991)

Abbreviations:

<1' bgs= less than 1 foot below ground surface
>1' bgs = greater than 1 foot below ground surface
2,3,7,8,-TCDD TEQs (Fish TEFs) = 2,3,7,8-tetrachlordibenzo-p-dioxin toxicity equivalents using toxicity equivalency factors for fish
95% UCL = 95% upper confidence limit calculated using ProUCL (Table 2-4) for media with five or more samples.
HQ = hazard quotient
mg/kg dry = milligram per kilogram dry weight
ng/kg dry = nanogram per kilogram dry weight
mg/kg wet= milligram per kilogram wet weight
ng/kg wet = nanogram per kilogram wet weight
TRV = toxicity reference value
NA = not applicable
na = not available
-- = small number of samples; statistics not applied.

TABLE 3-15

TOTAL INFAUNAL COMMUNITY MEASURES, SUM OF THREE REPLICATES

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Group	Measure	Station							
		1	2	3	4	5	6	7	8
Crustaceans	Total count	39	214	51	329	73	141	201	11
	Total biomass	0.111	0.349	0.021	0.127	0.061	0.132	0.578	0.038
	Number of species	9	14	6	4	9	9	13	7
	Dominance index	3	4	3	1	3	4	4	5
	Evenness	0.68	0.68	0.73	0.35	0.78	0.84	0.82	0.91
	Margalef diversity index	2.18	2.42	1.27	0.52	1.86	1.62	2.26	2.50
	Shannon-Wiener diversity index	1.49	1.80	1.30	0.49	1.70	1.84	2.11	1.77
Echinoderms	Total count						2		
	Total biomass						0.001		
	Number of species						1		
Minor Phyla	Total count	41	48	13	2	278	52	48	3106
	Total biomass	1.38	0.737	0.353	0.002	5.393	1.745	0.338	146.81
	Number of species	5	9	4	2	4	6	6	7
	Dominance index	2	4	2	2	1	2	2	1
	Evenness	0.74	0.86	0.75	1.00	0.50	0.65	0.73	0.07
	Margalef diversity index	1.08	2.07	1.17	1.44	0.53	1.27	1.29	0.75
	Shannon-Wiener diversity index	1.19	1.89	1.04	0.69	0.70	1.17	1.32	0.14
Molluscs	Total count	311	74	108	38	180	470	329	379
	Total biomass	1.202	25.414	22.971	0.211	0.703	12.462	6.819	12.534
	Number of species	7	6	4	3	5	8	11	11
	Dominance index	1	3	1	2	1	2	2	2
	Evenness	0.40	0.85	0.38	0.63	0.32	0.48	0.52	0.54
	Margalef diversity index	1.05	1.16	0.64	0.55	0.77	1.14	1.73	1.68
	Shannon-Wiener diversity index	0.77	1.51	0.53	0.69	0.52	1.00	1.24	1.30
Polychaetes	Total count	2067	1097	407	766	2091	3041	3346	3643
	Total biomass	3.996	2.526	1.025	7.032	1.83	8.377	8.856	19.528
	Number of species	22	29	22	16	26	27	32	25
	Dominance index	4	6	4	3	4	3	6	2
	Evenness	0.57	0.70	0.67	0.58	0.63	0.50	0.64	0.35
	Margalef diversity index	2.75	4.00	3.49	2.26	3.27	3.24	3.82	2.93
	Shannon-Wiener diversity index	1.75	2.36	2.06	1.60	2.07	1.63	2.21	1.11
Overall	Total count	2458	1433	579	1135	2622	3706	3924	7139
	Total biomass	6.689	29.026	24.37	7.372	7.987	22.717	16.591	178.91
	Number of species	43	58	36	25	44	51	62	50
	Dominance index	5	11	7	4	6	5	8	2
	Evenness	0.57	0.73	0.71	0.62	0.66	0.55	0.65	0.40
	Margalef diversity index	5.38	7.84	5.50	3.41	5.46	6.08	7.37	5.52
	Shannon-Wiener diversity index	2.16	2.97	2.54	1.99	2.51	2.17	2.66	1.57

TABLE 3-16

AVERAGE INFAUNAL COMMUNITY MEASURES, MEAN OF THREE REPLICATES

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Group	Measure	Station							
		1	2	3	4	5	6	7	8
Crustaceans	Total count	13.0	71.3	17.0	109.7	24.3	47.0	67.0	3.7
	Total biomass	0.04	0.12	0.01	0.04	0.02	0.04	0.19	0.01
	Number of species	5.00	8.67	4.33	3.00	6.00	6.33	9.67	3.00
	Dominance index	2.67	3.00	2.00	1.33	3.00	3.33	4.67	2.33
	Evenness	0.80	0.72	0.81	0.41	0.87	0.87	0.86	0.95
	Margalef diversity index	1.62	1.77	1.18	0.44	1.68	1.38	2.08	1.51
	Shannon-Wiener diversity index	1.30	1.49	1.13	0.47	1.55	1.55	1.95	1.02
Echinoderms	Total count						0.7		
	Total biomass						0.00		
	Number of species						0.33		
Minor Phyla	Total count	13.7	16.0	4.3	0.7	92.7	17.3	16.0	1035.3
	Total biomass	0.46	0.25	0.12	0.00	1.80	0.58	0.11	48.94
	Number of species	2.67	5.00	2.33	0.67	2.67	4.00	4.33	4.33
	Dominance index	1.67	3.33	1.33	1.00	1.33	2.00	2.67	1.00
	Evenness	0.79	0.94	0.81	NC	0.60	0.77	0.84	0.09
	Margalef diversity index	0.67	1.65	1.20	NC	0.37	1.06	1.24	0.48
	Shannon-Wiener diversity index	0.75	1.36	0.59	0.00	0.56	1.05	1.22	0.14
Molluscs	Total count	103.7	24.7	36.0	12.7	60.0	156.7	109.7	126.3
	Total biomass	0.40	8.47	7.66	0.07	0.23	4.15	2.27	4.18
	Number of species	4.33	5.00	3.00	2.33	3.00	6.00	8.00	8.00
	Dominance index	1.67	3.00	1.00	1.67	1.00	2.00	2.00	2.33
	Evenness	0.49	0.87	0.47	0.82	0.50	0.56	0.57	0.61
	Margalef diversity index	0.72	1.25	0.59	0.77	0.48	0.99	1.50	1.45
	Shannon-Wiener diversity index	0.72	1.38	0.54	0.70	0.50	0.99	1.18	1.26
Polychaetes	Total count	689.0	365.7	135.7	255.3	697.0	1013.7	1115.3	1214.3
	Total biomass	1.33	0.84	0.34	2.34	0.61	2.79	2.95	6.51
	Number of species	18.33	21.00	15.00	12.33	20.00	20.67	25.67	19.00
	Dominance index	3.33	5.33	3.67	2.67	4.33	2.67	5.67	1.67
	Evenness	0.58	0.74	0.69	0.61	0.68	0.54	0.67	0.37
	Margalef diversity index	2.66	3.39	2.87	2.07	2.91	2.84	3.53	2.54
	Shannon-Wiener diversity index	1.69	2.24	1.86	1.52	2.04	1.62	2.18	1.10
Overall	Total count	819.3	477.7	193.0	378.3	874.0	1235.3	1308.0	2379.7
	Total biomass	2.23	9.68	8.12	2.46	2.66	7.57	5.53	59.64
	Number of species	30.33	39.67	24.67	18.33	31.67	37.33	47.67	34.33
	Dominance index	5.00	9.33	6.33	4.00	6.00	4.67	8.33	2.00
	Evenness	0.61	0.76	0.74	0.66	0.71	0.59	0.68	0.44
	Margalef diversity index	4.37	6.26	4.53	2.94	4.53	5.11	6.53	4.29
	Shannon-Wiener diversity index	2.08	2.80	2.37	1.92	2.45	2.14	2.62	1.55

TABLE 3-17

SUMMARY OF EXPOSURE ESTIMATES AND HAZARD QUOTIENTS FOR WILDLIFE ASSESSMENT ENDPOINT SPECIES

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

				Intake (mg/kg BW/day)												TRVs (mg/kg BW/day)[3]		Hazard Quotient	
Receptor	**Chemical[4]**	**Location**	**Statistic**	**Perch**	**Sculpin**	**Shiner**	**Sole**	**Crab**	**Mussell**	**Oyster**	**Shrimp**	**Plant**	**Food Total[1]**	**Sediment[2]**	**Total**	**NOAEL**	**LOAEL**	**NOAEL**	**LOAEL**
Birds																			
Brown Pellican	Dioxins/Furans	Mad River Slough	Maximum	2.12E-08	1.80E-08	1.94E-08	2.45E-08	0.00E+00	0.00E+00	0.00E+00	1.33E-08	0.00E+00	9.65E-08	1.43E-06	1.52E-06	1.00E-05	1.00E-04	0.2	0.02
	Dioxins/Furans	Mad River Slough	95 UCL	2.12E-08	1.80E-08	1.94E-08	1.76E-08	0.00E+00	0.00E+00	0.00E+00	1.33E-08	0.00E+00	8.96E-08	2.34E-07	3.24E-07	1.00E-05	1.00E-04	0.03	<0.01
	Dioxins/Furans	Humbolt Bay	Maximum	2.12E-08	6.84E-08	5.29E-08	1.30E-08	0.00E+00	0.00E+00	0.00E+00	6.05E-08	0.00E+00	2.16E-07	3.45E-07	5.61E-07	1.00E-05	1.00E-04	0.06	<0.01
	Dioxins/Furans	Humbolt Bay	95 UCL	2.12E-08	6.84E-08	5.29E-08	1.30E-08	0.00E+00	0.00E+00	0.00E+00	6.05E-08	0.00E+00	2.16E-07	9.02E-08	3.06E-07	1.00E-05	1.00E-04	0.03	0.00
	Zinc	Mad River Slough	Maximum	1.44E+00	3.96E-01	9.72E-01	5.40E-01	0.00E+00	0.00E+00	0.00E+00	3.96E-01	0.00E+00	3.74E+00	2.00E+00	5.74E+00	1.45E+01	1.31E+02	0.4	0.04
	Zinc	Mad River Slough	95 UCL	1.44E+00	3.96E-01	9.72E-01	5.40E-01	0.00E+00	0.00E+00	0.00E+00	3.96E-01	0.00E+00	3.74E+00	1.67E+00	5.42E+00	1.45E+01	1.31E+02	0.4	0.04
	Zinc	Humbolt Bay	Maximum	1.44E+00	3.96E-01	9.72E-01	6.12E-01	0.00E+00	0.00E+00	0.00E+00	3.96E-01	0.00E+00	3.82E+00	4.27E+00	8.08E+00	1.45E+01	1.31E+02	0.6	0.06
	Zinc	Humbolt Bay	95 UCL	1.44E+00	3.96E-01	9.72E-01	6.12E-01	0.00E+00	0.00E+00	0.00E+00	3.96E-01	0.00E+00	3.82E+00	1.69E+00	5.51E+00	1.45E+01	1.31E+02	0.4	0.04
Great Blue Heron	Dioxins/Furans	Mad River Slough	Maximum	1.17E-08	9.90E-09	1.07E-08	4.04E-08	1.91E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.64E-07	1.43E-06	1.69E-06	1.00E-05	1.00E-04	0.2	0.02
	Dioxins/Furans	Mad River Slough	95 UCL	1.17E-08	9.90E-09	1.07E-08	2.90E-08	1.09E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.71E-07	2.34E-07	4.05E-07	1.00E-05	1.00E-04	0.04	<0.01
	Dioxins/Furans	Humbolt Bay	Maximum	1.17E-08	3.76E-08	2.91E-08	2.14E-08	9.03E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.90E-07	3.45E-07	5.35E-07	1.00E-05	1.00E-04	0.05	0.01
	Dioxins/Furans	Humbolt Bay	95 UCL	1.17E-08	3.76E-08	2.91E-08	2.14E-08	7.66E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.76E-07	2.34E-07	4.10E-07	1.00E-05	1.00E-04	0.04	<0.01
	Zinc	Mad River Slough	Maximum	7.92E-01	2.18E-01	5.35E-01	8.91E-01	2.67E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.11E+00	2.00E+00	7.11E+00	1.45E+01	1.31E+02	0.5	0.05
	Zinc	Mad River Slough	95 UCL	7.92E-01	2.18E-01	5.35E-01	8.91E-01	2.49E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.93E+00	1.67E+00	6.60E+00	1.45E+01	1.31E+02	0.5	0.05
	Zinc	Humbolt Bay	Maximum	7.92E-01	2.18E-01	5.35E-01	1.01E+00	2.55E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.11E+00	4.27E+00	9.37E+00	1.45E+01	1.31E+02	0.6	0.07
	Zinc	Humbolt Bay	95 UCL	7.92E-01	2.18E-01	5.35E-01	1.01E+00	2.55E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.11E+00	1.69E+00	6.80E+00	1.45E+01	1.31E+02	0.5	0.05
Mallard	Dioxins/Furans	Mad River Slough	Maximum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.88E-08	4.88E-08	1.74E-07	2.23E-07	1.00E-05	1.00E-04	0.02	<0.01
	Dioxins/Furans	Mad River Slough	95 UCL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.01E-09	8.01E-09	5.92E-08	7.58E-08	1.00E-05	1.00E-04	<0.01	<0.01
	Dioxins/Furans	Humbolt Bay	Maximum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-08	1.18E-08	4.21E-08	5.39E-08	1.00E-05	1.00E-04	0.01	<0.01
	Dioxins/Furans	Humbolt Bay	95 UCL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.09E-09	3.09E-09	1.05E-08	1.34E-08	1.00E-05	1.00E-04	<0.01	<0.01
	Zinc	Mad River Slough	Maximum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.22E+01	2.22E+01	2.44E-01	2.25E+01	1.45E+01	1.31E+02	1.5	0.17
	Zinc	Mad River Slough	95 UCL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.86E+01	1.86E+01	2.05E-01	1.88E+01	1.45E+01	1.31E+02	1.3	0.14
	Zinc	Humbolt Bay	Maximum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.74E+01	4.74E+01	5.21E-01	4.80E+01	1.45E+01	1.31E+02	3.3	0.37
	Zinc	Humbolt Bay	95 UCL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.88E+01	1.88E+01	2.07E-01	1.90E+01	1.45E+01	1.31E+02	1.3	0.15
Osprey	Dioxins/Furans	Mad River Slough	Maximum	4.13E-08	3.50E-08	3.78E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-07	3.33E-07	4.47E-07	1.00E-05	1.00E-04	0.04	<0.01
	Dioxins/Furans	Mad River Slough	95 UCL	4.13E-08	3.50E-08	3.78E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-07	1.13E-07	2.27E-07	1.00E-05	1.00E-04	0.02	<0.01
	Dioxins/Furans	Humbolt Bay	Maximum	4.13E-08	1.33E-07	1.03E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.77E-07	8.04E-08	3.57E-07	1.00E-05	1.00E-04	0.04	<0.01
	Dioxins/Furans	Humbolt Bay	95 UCL	4.13E-08	1.33E-07	1.03E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.77E-07	2.00E-08	2.97E-07	1.00E-05	1.00E-04	0.03	<0.01
	Zinc	Mad River Slough	Maximum	2.80E+00	7.69E-01	1.89E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.45E+00	4.66E-01	5.92E+00	1.45E+01	1.31E+02	0.4	0.05
	Zinc	Mad River Slough	95 UCL	2.80E+00	7.69E-01	1.89E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.45E+00	3.91E-01	5.85E+00	1.45E+01	1.31E+02	0.4	0.04
	Zinc	Humbolt Bay	Maximum	2.80E+00	7.69E-01	1.89E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.45E+00	9.95E-01	6.45E+00	1.45E+01	1.31E+02	0.4	0.05
	Zinc	Humbolt Bay	95 UCL	2.80E+00	7.69E-01	1.89E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.45E+00	3.95E-01	5.85E+00	1.45E+01	1.31E+02	0.4	0.04
Spotted Sandpiper	Dioxins/Furans	Mad River Slough	Maximum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.67E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.67E-06	1.18E-05	1.45E-05	1.00E-05	1.00E-04	1.5	0.15
	Dioxins/Furans	Mad River Slough	95 UCL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.53E-06	4.02E-06	5.55E-06	1.00E-05	1.00E-04	0.6	0.06
	Dioxins/Furans	Humbolt Bay	Maximum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.26E-06	2.86E-06	4.12E-06	1.00E-05	1.00E-04	0.4	0.04
	Dioxins/Furans	Humbolt Bay	95 UCL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.07E-06	7.10E-07	1.78E-06	1.00E-05	1.00E-04	0.2	0.02
	Zinc	Mad River Slough	Maximum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.74E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.74E+01	1.66E+01	5.39E+01	1.45E+01	1.31E+02	3.7	0.41
	Zinc	Mad River Slough	95 UCL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.49E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.49E+01	1.39E+01	4.88E+01	1.45E+01	1.31E+02	3.4	0.37
	Zinc	Humbolt Bay	Maximum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E+01	3.54E+01	7.11E+01	1.45E+01	1.31E+02	4.9	0.54
	Zinc	Humbolt Bay	95 UCL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E+01	1.40E+01	4.97E+01	1.45E+01	1.31E+02	3.4	0.38
Western Snowy Plover	Dioxins/Furans	Mad River Slough	Maximum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.64E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.64E-06	6.49E-06	9.13E-06	1.00E-05	1.00E-04	0.9	0.09
	Dioxins/Furans	Mad River Slough	95 UCL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.51E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.51E-06	2.21E-06	3.71E-06	1.00E-05	1.00E-04	0.4	0.04
	Dioxins/Furans	Humbolt Bay	Maximum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.25E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.25E-06	1.57E-06	2.82E-06	1.00E-05	1.00E-04	0.3	0.03
	Dioxins/Furans	Humbolt Bay	95 UCL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E-06	3.90E-07	1.45E-06	1.00E-05	1.00E-04	0.1	0.01
	Zinc	Mad River Slough	Maximum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.69E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.69E+01	9.10E+00	4.60E+01	1.45E+01	1.31E+02	3.2	0.4
	Zinc	Mad River Slough	95 UCL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.44E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.44E+01	7.63E+00	4.21E+01	1.45E+01	1.31E+02	2.9	0.3
	Zinc	Humbolt Bay	Maximum	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.53E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.53E+01	1.94E+01	5.47E+01	1.45E+01	1.31E+02	3.8	0.4
	Zinc	Humbolt Bay	95 UCL	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.53E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.53E+01	7.71E+00	4.30E+01	1.45E+01	1.31E+02	3.0	0.3

TABLE 3-17

SUMMARY OF EXPOSURE ESTIMATES AND HAZARD QUOTIENTS FOR WILDLIFE ASSESSMENT ENDPOINT SPECIES

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Geomatrix

				Intake (mg/kg BW/day)													TRVs (mg/kg BW/day)[3]		Hazard Quotient	
Receptor	**Chemical[4]**	**Location**	**Statistic**	**Perch**	**Sculpin**	**Shiner**	**Sole**	**Crab**	**Mussell**	**Oyster**	**Shrimp**	**Plant**	**Food Total[1]**	**Sediment[2]**	**Total**	**NOAEL**	**LOAEL**	**NOAEL**	**LOAEL**
Mammals																			
Harbor Seal	Dioxins/Furans	Mad River Slough	Maximum	6.09E-09	6.48E-09	7.98E-09	1.17E-08	1.21E-08	1.92E-09	4.44E-09	7.50E-10	0.00E+00	5.15E-08	2.41E-07	2.92E-07	1.00E-06	1.00E-05	0.3	0.03
	Dioxins/Furans	Mad River Slough	95 UCL	6.09E-09	6.48E-09	7.98E-09	8.28E-09	5.28E-09	4.44E-09	1.92E-09	7.50E-10	0.00E+00	4.12E-08	3.76E-08	7.88E-08	1.00E-06	1.00E-05	0.08	0.01
	Dioxins/Furans	Humbolt Bay	Maximum	6.09E-09	2.16E-08	1.34E-08	7.20E-09	3.75E-09	7.80E-10	8.64E-09	2.10E-09	0.00E+00	6.36E-08	2.62E-08	8.98E-08	1.00E-06	1.00E-05	0.09	0.01
	Dioxins/Furans	Humbolt Bay	95 UCL	6.09E-09	2.16E-08	1.34E-08	7.20E-09	3.33E-09	6.36E-09	7.80E-10	2.10E-09	0.00E+00	6.09E-08	8.20E-09	6.91E-08	1.00E-06	1.00E-05	0.07	0.01
	Zinc	Mad River Slough	Maximum	8.40E-01	1.98E-01	5.67E-01	4.50E-01	1.35E-01	2.40E-02	2.20E-01	3.30E-02	0.00E+00	2.47E+00	2.22E-01	2.69E+00	1.60E+02	3.20E+02	0.02	<0.01
	Zinc	Mad River Slough	95 UCL	8.40E-01	1.98E-01	5.67E-01	4.50E-01	1.26E-01	2.40E-02	2.20E-01	3.30E-02	0.00E+00	2.46E+00	1.86E-01	2.64E+00	1.60E+02	3.20E+02	0.02	<0.01
	Zinc	Humbolt Bay	Maximum	8.40E-01	1.98E-01	5.67E-01	5.10E-01	1.29E-01	2.40E-02	2.80E-01	3.30E-02	0.00E+00	2.58E+00	4.74E-01	3.06E+00	1.60E+02	3.20E+02	0.02	<0.01
	Zinc	Humbolt Bay	95 UCL	8.40E-01	1.98E-01	5.67E-01	5.10E-01	1.29E-01	2.40E-02	2.41E-01	3.30E-02	0.00E+00	2.54E+00	1.88E-01	2.73E+00	1.60E+02	3.20E+02	0.02	<0.01
River Otter	Dioxins/Furans	Mad River Slough	Maximum	2.90E-09	5.40E-09	3.80E-09	3.90E-09	6.05E-08	1.44E-08	3.33E-08	2.50E-09	0.00E+00	1.27E-07	2.41E-07	3.67E-07	1.00E-06	1.00E-05	0.4	0.04
	Dioxins/Furans	Mad River Slough	95 UCL	2.90E-09	5.40E-09	3.80E-09	2.76E-09	2.64E-08	3.33E-08	1.44E-08	2.50E-09	0.00E+00	9.15E-08	3.76E-08	1.29E-07	1.00E-06	1.00E-05	0.1	0.01
	Dioxins/Furans	Humbolt Bay	Maximum	2.90E-09	1.80E-08	6.40E-09	2.40E-09	1.88E-08	5.85E-09	6.48E-08	7.00E-09	0.00E+00	1.26E-07	2.62E-08	1.52E-07	1.00E-06	1.00E-05	0.2	0.02
	Dioxins/Furans	Humbolt Bay	95 UCL	2.90E-09	1.80E-08	6.40E-09	2.40E-09	1.67E-08	4.77E-08	5.85E-09	7.00E-09	0.00E+00	1.07E-07	8.20E-09	1.15E-07	1.00E-06	1.00E-05	0.1	0.01
	Zinc	Mad River Slough	Maximum	4.00E-01	1.65E-01	2.70E-01	1.50E-01	6.75E-01	1.80E-01	1.65E+00	1.10E-01	0.00E+00	3.60E+00	2.22E-01	3.82E+00	1.60E+02	3.20E+02	0.02	0.01
	Zinc	Mad River Slough	95 UCL	4.00E-01	1.65E-01	2.70E-01	1.50E-01	6.30E-01	1.80E-01	1.65E+00	1.10E-01	0.00E+00	3.56E+00	1.86E-01	3.74E+00	1.60E+02	3.20E+02	0.02	0.01
	Zinc	Humbolt Bay	Maximum	4.00E-01	1.65E-01	2.70E-01	1.70E-01	6.45E-01	1.80E-01	2.10E+00	1.10E-01	0.00E+00	4.04E+00	4.74E-01	4.51E+00	1.60E+02	3.20E+02	0.03	0.01
	Zinc	Humbolt Bay	95 UCL	4.00E-01	1.65E-01	2.70E-01	1.70E-01	6.45E-01	1.80E-01	1.81E+00	1.10E-01	0.00E+00	3.75E+00	1.88E-01	3.94E+00	1.60E+02	3.20E+02	0.02	0.01

Notes:

Shaded cells indicate HQ>1

1. Food intake values are based on wet weight ingestion rates and wet weight tissue data
2. Sediment ingestion data are based on dry weight sediment concentration data
3. Toxicity Reference Values are based on 2,3,7,8-TCDD toxic equivalents (TEQ)
4. Chemical concentrations for dioxins/furans are expressed on a 2,3,7,8-TCDD TEQ basis

Abbreviations:

95 UCL = 95 percent upper confidence limit
LOAEL = lowest observed adverse effects level
NOAEL = no observed adverse effects level
mg/kg = milligram per kilogram
mg/kg BW/day = milligram per kilogram per day
TRV = toxicity reference value

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TABLE 3-18

SUMMARY OF EXPOSURE ESTIMATES AND HAZARD QUOTIENTS FOR SANDPIPER AND PLOVER BASED ON SITE-SPECIFIC CRAB DATA AND CALCULATED INVERTEBRATE TISSUE CONCENTRATIONS

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Receptor[1]	Chemical[2]	Location	Sediment Statistic	BSAF[3] Value		Intake (mg/kg BW/ day)				TRVs (mg/kg BW/ day)[6]		Hazard Quotient	
						Site Crab	Calculated Invertebrate[4]	Sediment[5]	Total	NOAEL	LOAEL	NOAEL	LOAEL
Spotted Sandpiper	Dioxins/Furans	Mad River Slough	Maximum	Site specific Crab data used		2.67E-06	2.67E-06	1.18E-05	1.45E-05	1.00E-05	1.00E-04	1.5	0.15
	Dioxins/Furans	Mad River Slough	95 UCL			1.53E-06	1.53E-06	4.02E-06	5.55E-06	1.00E-05	1.00E-04	0.6	0.06
	Dioxins/Furans	Humbolt Bay	Maximum			1.26E-06	1.26E-06	2.86E-06	4.12E-06	1.00E-05	1.00E-04	0.4	0.04
	Dioxins/Furans	Humbolt Bay	95 UCL			1.07E-06	1.07E-06	7.10E-07	1.78E-06	1.00E-05	1.00E-04	0.2	0.02
	Dioxins/Furans	Mad River Slough	Maximum	3.10E-02	Min	na	2.04E-06	1.18E-05	1.39E-05	1.00E-05	1.00E-04	1.4	0.1
	Dioxins/Furans	Mad River Slough	95 UCL	" "	" "	na	6.92E-07	4.02E-06	4.71E-06	1.00E-05	1.00E-04	0.5	0.05
	Dioxins/Furans	Humbolt Bay	Maximum	" "	" "	na	4.93E-07	2.86E-06	3.35E-06	1.00E-05	1.00E-04	0.3	0.03
	Dioxins/Furans	Humbolt Bay	95 UCL	" "	" "	na	1.22E-07	7.10E-07	8.32E-07	1.00E-05	1.00E-04	0.08	0.01
	Dioxins/Furans	Mad River Slough	Maximum	4.42E-01	Mean	na	2.91E-05	1.18E-05	4.09E-05	1.00E-05	1.00E-04	4.1	0.4
	Dioxins/Furans	Mad River Slough	95 UCL	" "	" "	na	9.87E-06	4.02E-06	1.39E-05	1.00E-05	1.00E-04	1.4	0.14
	Dioxins/Furans	Humbolt Bay	Maximum	" "	" "	na	7.03E-06	2.86E-06	9.89E-06	1.00E-05	1.00E-04	1.0	0.1
	Dioxins/Furans	Humbolt Bay	95 UCL	" "	" "	na	1.74E-06	7.10E-07	2.45E-06	1.00E-05	1.00E-04	0.2	0.02
	Dioxins/Furans	Mad River Slough	Maximum	3.13E+00	Max	na	2.06E-04	1.18E-05	2.18E-04	1.00E-05	1.00E-04	21.8	2.2
	Dioxins/Furans	Mad River Slough	95 UCL	" "	" "	na	6.99E-05	4.02E-06	7.39E-05	1.00E-05	1.00E-04	7.4	0.7
	Dioxins/Furans	Humbolt Bay	Maximum	" "	" "	na	4.98E-05	2.86E-06	5.27E-05	1.00E-05	1.00E-04	5.3	0.5
	Dioxins/Furans	Humbolt Bay	95 UCL	" "	" "	na	1.23E-05	7.10E-07	1.30E-05	1.00E-05	1.00E-04	1.3	0.1
Western Snowy Plover	Dioxins/Furans	Mad River Slough	Maximum	Site specific Crab data used		2.64E-06	2.64E-06	6.49E-06	9.13E-06	1.00E-05	1.00E-04	0.9	0.09
	Dioxins/Furans	Mad River Slough	95 UCL			1.51E-06	1.51E-06	2.21E-06	3.71E-06	1.00E-05	1.00E-04	0.4	0.04
	Dioxins/Furans	Humbolt Bay	Maximum			1.25E-06	1.25E-06	1.57E-06	2.82E-06	1.00E-05	1.00E-04	0.3	0.03
	Dioxins/Furans	Humbolt Bay	95 UCL			1.06E-06	1.06E-06	3.90E-07	1.45E-06	1.00E-05	1.00E-04	0.1	0.01
	Dioxins/Furans	Mad River Slough	Maximum	3.10E-02	Min	na	2.01E-06	6.49E-06	8.51E-06	1.00E-05	1.00E-04	0.9	0.09
	Dioxins/Furans	Mad River Slough	95 UCL	" "	" "	na	6.84E-07	2.21E-06	2.89E-06	1.00E-05	1.00E-04	0.3	0.03
	Dioxins/Furans	Humbolt Bay	Maximum	" "	" "	na	4.87E-07	1.57E-06	2.06E-06	1.00E-05	1.00E-04	0.2	0.02
	Dioxins/Furans	Humbolt Bay	95 UCL	" "	" "	na	1.21E-07	3.90E-07	5.10E-07	1.00E-05	1.00E-04	0.05	0.01
	Dioxins/Furans	Mad River Slough	Maximum	4.42E-01	Mean	na	2.87E-05	6.49E-06	3.52E-05	1.00E-05	1.00E-04	3.5	0.4
	Dioxins/Furans	Mad River Slough	95 UCL	" "	" "	na	9.75E-06	2.21E-06	1.20E-05	1.00E-05	1.00E-04	1.2	0.12
	Dioxins/Furans	Humbolt Bay	Maximum	" "	" "	na	6.94E-06	1.57E-06	8.51E-06	1.00E-05	1.00E-04	0.9	0.1
	Dioxins/Furans	Humbolt Bay	95 UCL	" "	" "	na	1.72E-06	3.90E-07	2.11E-06	1.00E-05	1.00E-04	0.2	0.02
	Dioxins/Furans	Mad River Slough	Maximum	3.13E+00	Max	na	2.04E-04	6.49E-06	2.10E-04	1.00E-05	1.00E-04	21.0	2.1
	Dioxins/Furans	Mad River Slough	95 UCL	" "	" "	na	6.90E-05	2.21E-06	7.12E-05	1.00E-05	1.00E-04	7.1	0.7
	Dioxins/Furans	Humbolt Bay	Maximum	" "	" "	na	4.92E-05	1.57E-06	5.08E-05	1.00E-05	1.00E-04	5.1	0.5
	Dioxins/Furans	Humbolt Bay	95 UCL	" "	" "	na	1.22E-05	3.90E-07	1.26E-05	1.00E-05	1.00E-04	1.3	0.1

TABLE 3-18

SUMMARY OF EXPOSURE ESTIMATES AND HAZARD QUOTIENTS FOR SANDPIPER AND PLOVER BASED ON SITE-SPECIFIC CRAB DATA AND CALCULATED INVERTEBRATE TISSUE CONCENTRATIONS

Notes:

Shaded cells indicate HQ>1

[1] Ingestion rates and assumptions for these receptors are presented in Table 3-11. Where crab was not used as the prey item, BSAF estimated invertebrate concentrations were derived by the following equation: $concentration_{invert} = BSAF * concentration_{sed}$

[2] COPC concentrations for PCDD/Fs are expressed on a TEQ basis

[3] BSAF minimum, mean, and maximum values were derived from BSAFs presented in US ACE (2003)

[4] Food intake values are based on wet weight ingestion rates and wet weight tissue data

[5] Sediment ingestion data are based on dry weight sediment concentration data

[6] TRVs are based on 2,3,7,8 TCDD toxic equivelants.

Abbreviations:

95 UCL = 95 percent upper confidence limit

mg/kg BW/day = milligram per kilogram per day

LOAEL = lowest observed adverse effects level

BSAF = biota-sediment accumulation factor

NOAEL = no observed adverse effects level

TRV = toxicity reference value

TABLE 4-1

SUMMARY OF REPRESENTATIVE CONCENTRATIONS IN BIOTA FOR MAD RIVER SLOUGH AND HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Chemical	Fish Type	Species	Number of Samples		Mean		Upperbound Representative Concentration	
			Humboldt Bay	Mad River Slough	Humboldt Bay	Mad River Slough	Humboldt Bay	Mad River Slough
2,3,7,8-TCDD TEQ (Mammal TEFs) (ng/kg)	Shellfish	Crab	5	9	0.65	**0.78**	1.11	**1.8**
		Mussel	1	3	--	0.58	0.39	0.96
		Oyster	20	3	0.89	**0.85**	3.18	**2.22**
		Shrimp	2	3	0.42	**0.15**	0.70	**0.25**
	Fin Fish	Perch	3	0	0.23	NA	0.31	NA
		Sculpin	4	2	0.48	0.26	1.20	0.36
		Shark	0	1	NA	--	NA	0.06
		Shiner	4	1	0.40	--	0.64	0.38
		Sole	4	2	0.15	0.21	0.24	0.28
		Maximum Fin Fish			0.48	**0.26**	1.20	**0.38**
Zinc (mg/kg)	Shellfish	Crab	3	5	38	**32**	43	**42**
		Mussel	0	1	NA	--	NA	12
		Oyster	11	2	98	**94**	121	**110**
		Shrimp	0	1	NA	**--**	NA	**11**
	Fin Fish	Perch	1	0	--	NA	40	NA
		Sculpin	1	0	--	NA	11	NA
		Shark	0	1	NA	--	NA	4
		Shiner	4	0	19	NA	27	NA
		Sole	4	2	13	14	17	15
		Maximum Fin Fish			19	**14**	40	**15**

Abbreviations:
-- - not calculated; number of fish caught insufficient to calculate.
-- = insufficient number of samples to calculate value
Bold indicates the representative concentration for the specific species used in the risk assessment.
mg/kg = milligram per kilogram
NA = not applicable; no fish caught in this category
ng/kg = nanograms per kilogram
TEF = toxicity equivalent factor

TABLE 4-2

EXPOSURE PARAMETERS FOR RESIDENT SCENARIO

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Exposure Parameter	Units	Reasonable Maximum Exposure (RME)
GENERAL EXPOSURE PARAMETERS		
Exposure Frequency (EF)	days/year	Value: 350 Rationale: Cal-EPA, 1992; U.S. EPA, 1991
Exposure Duration (ED)	years	Value: 30 Rationale: Cal-EPA, 1992; U.S. EPA, 1991
Body Weight (BW)	kg	Value: 70 Rationale: Cal-EPA, 1992; U.S. EPA, 1991
Averaging Time (AT)	days	Value: 9125 (noncarcinogens) 25,550 (carcinogens) Rationale: Cal-EPA, 1992; U.S. EPA, 1991
Pathway-Specific Parameters		
Fish Ingestion		
Fin Fish Ingestion Rate (IR_f)	g/day	Value: 21 Rationale: OEHHA, 2001; Median value
Oyster Ingestion Rate (IR_o)	g/day	Value: 0.17 Rationale: U.S. EPA, 2002
Shrimp Ingestion Rate (IR_s)	g/day	Value: 2.6 Rationale: U.S. EPA, 2002
Crab Ingestion Rate (IR_c)	g/day	Value: 0.3 Rationale: U.S. EPA, 2002

Abbreviations:

Cal-EPA = State of California Environmental Protection Agency
g/day = grams per day
kg = kilograms
U.S. EPA = United States Environmental Protection Agency

TABLE 4-3

EXPOSURE PARAMETERS FOR ANGLER SCENARIO

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Exposure Parameter	Units	Reasonable Maximum Exposure (RME)
GENERAL EXPOSURE PARAMETERS		
Exposure Frequency (EF)	days/year	Value: 350 Rationale: Cal-EPA, 1992; U.S. EPA, 1991
Exposure Duration (ED)	years	Value: 30 Rationale: Cal-EPA, 1992; U.S. EPA, 1991
Body Weight (BW)	kg	Value: 70 Rationale: Cal-EPA, 1992; U.S. EPA, 1991
Averaging Time (AT)	days	Value: 9125 (noncarcinogens) 25,550 (carcinogens) Rationale: Cal-EPA, 1992; U.S. EPA, 1991
Pathway-Specific Parameters		
Fish Ingestion		
Fin Fish Ingestion Rate (IR_f)	g/day	Value: 161 Rationale: OEHHA, 2001; 95 percent upper confidence limit
Oyster Ingestion Rate (IR_o)	g/day	Value: 1.36 Rationale: U.S. EPA, 2002; eight times greater than mean value based on fin fish median and 95 percent upper confidence limit
Shrimp Ingestion Rate (IR_s)	g/day	Value: 2.08 Rationale: U.S. EPA, 2002; eight times greater than mean value based on fin fish median and 95 percent upper confidence limit
Crab Ingestion Rate (IR_c)	g/day	Value: 2.4 Rationale: U.S. EPA, 2002; eight times greater than mean value based on fin fish median and 95 percent upper confidence limit

Abbreviations:

Cal-EPA = State of California Environmental Protection Agency
g/day = grams per day
kg = kilograms
U.S. EPA = United States Environmental Protection Agency

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TABLE 4-4

TOXICITY CRITERIA FOR CHEMICALS OF POTENTIAL CONCERN

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Oral Chronic Noncarcinogenic Toxicity Criteria						
Chemical	**Reference Dose (RfDo) (mg/kg-day)**	**UF x MF**	**Target Species**	**Target Organ**	**Critical Effect**	**Reference**
2,3,7,8-TCDD	1.00E-08	NA	NA	NA	NA	OEHHA, 2003
Zinc	0.3	3 x 1	Human	Blood	Enzyme Changes	IRIS

Oral Carcinogenic Toxicity Criteria							
Chemical	**Slope Factor (SFo) $(mg/kg\text{-}d)^{-1}$**	**Target Species**	**Target Organ**	**Critical Effect**	**Reference**	**Classification**	**Reference**
2,3,7,8-TCDD	1.30E+05	mouse	liver	Cancer	OEHHA, 2002 and 2003b	1	IARC
Zinc	--	--	--	--	--	--	--

References:
IRIS = U.S. EPA, 2004, Integrated Risk Information System (IRIS) Data Base, <http://www.epa.gov/iris>
OEHHA, 2002 = Office of Environmental Health Hazard Assessment, 2002, Technical Support Document for Describing Available Cancer Potency Factors.
OEHHA, 2003b = OEHHA, 2003, Air Toxics Hot Spots Program Guidance Manual For Preparation Of Health Risk Assessments, August.
IARC = International Agency for Research on Cancer, 2004, <http://www-cie.iarc.fr/htdocs/monographs/vol69/dioxin.html>.

Notes:
UF = Uncertainty Factor
MF = Modifying Factor
NA = Not available
-- = Not applicable
1 = This chemical is carcinogenic to humans.

Abbreviation:
2,3,7,8-TCDD = 2,3,7,8-tetrachlorodibenzo-p-dioxin

TABLE 4-5

SUMMARY OF NONCANCER HAZARD INDEXES

Sierra Pacific Industries Arcata Division Sawmill
Arcata, California

Chemical	Exposure Pathway				
	Ingestion of Fin Fish	**Ingestion of Oysters**	**Ingestion of Shrimp**	**Ingestion of Crab**	**Total**
Resident					
Dioxins/Furans	0.0090	0.00024	0.00064	0.00038	0.01
Zinc	0.016	0.00088	0.0016	0.00053	0.02
Off-Site Exposure to Chemicals at the Mill[2]					0.00002
Total	0.03	0.001	0.002	0.0009	0.03
Angler					
Dioxins/Furans	0.10	0.0050	0.0085	0.0069	0.1
Zinc	0.13	0.0082	0.0125	0.0055	0.2
Off-Site Exposure to Chemicals at the Mill[2]					0.00002
Total	0.2	0.013	0.021	0.012	0.3

Notes:
1. Includes potential noncancer hazard indexes for off-site receptors predicted in the *Baseline Human Health Risk*

TABLE 4-6

SUMMARY OF LIFETIME CANCER RISKS

Sierra Pacific Industries Arcata Division Sawmill

Arcata, California

Chemical	Exposure Pathway Ingestion of Fin Fish	Ingestion of Oysters	Ingestion of Shrimp	Ingestion of Crab	Total
Resident					
Dioxins/Furans	4.2E-06	1.1E-07	3.0E-07	1.8E-07	5.E-06
Zinc	NA	NA	NA	NA	NA
Off-Site Exposure to Chemicals at the Mill[1]					4.0E-09
Total	4.2E-06	1.1E-07	3.0E-07	1.8E-07	5.E-06
Angler					
Dioxins/Furans	4.7E-05	2.3E-06	4.0E-06	3.3E-06	6.E-05
Zinc	NA	NA	NA	NA	NA
Off-Site Exposure to Chemicals at the Mill[1]					4.0E-09
Total	5.E-05	2.E-06	4.E-06	3.E-06	6.E-05

1. Includes potential lifetime cancer risks for off-site receptors predicted in the *Baseline Human Health Risk Assessment of On-Site Soil and Groundwater* (Geomatrix, 2003).

TABLE 4-7

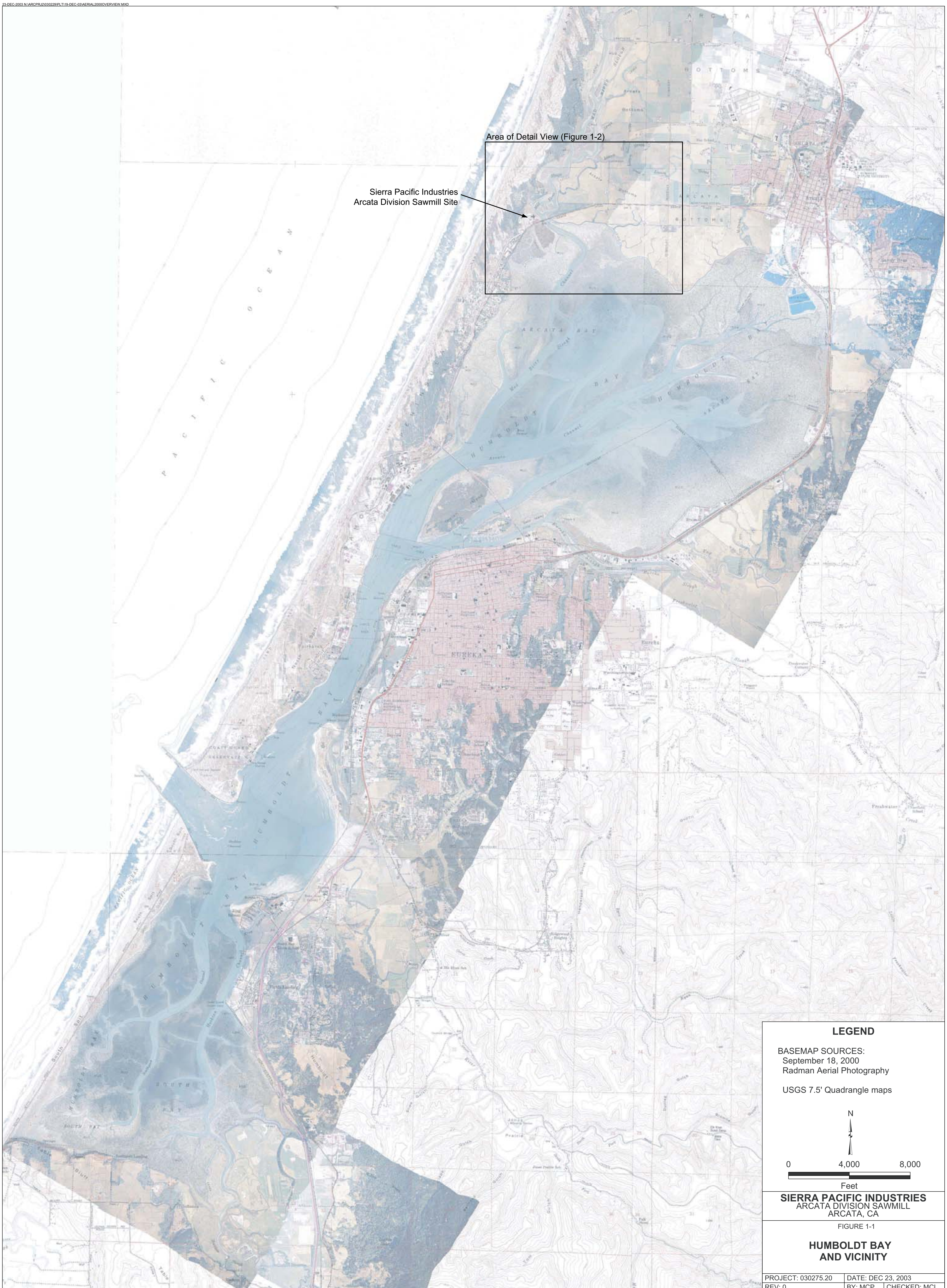
SUMMARY OF POTENTIAL HUMAN HEALTH RISKS[1]

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Receptor	Hazard Index	Lifetime Cancer Risk
Resident	0.03	5E-06
Angler	0.3	6E-05

1. Includes risks associated with ingestion of fish and shellfish and potential health risks to off-site receptors predicted in the *Baseline Human Health Risk Assessment of On-Site Soil and Groundwater* (Geomatrix, 2003).

FIGURES



LEGEND

BASEMAP SOURCES:
September 18, 2000
Radman Aerial Photography

USGS 7.5' Quadrangle maps

SIERRA PACIFIC INDUSTRIES
ARCATA DIVISION SAWMILL
ARCATA, CA

FIGURE 1-1

HUMBOLDT BAY AND VICINITY

PROJECT: 030275.20	DATE: DEC 23, 2003	
REV: 0	BY: MCP	CHECKED: MCL

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consulting scientists and engineers

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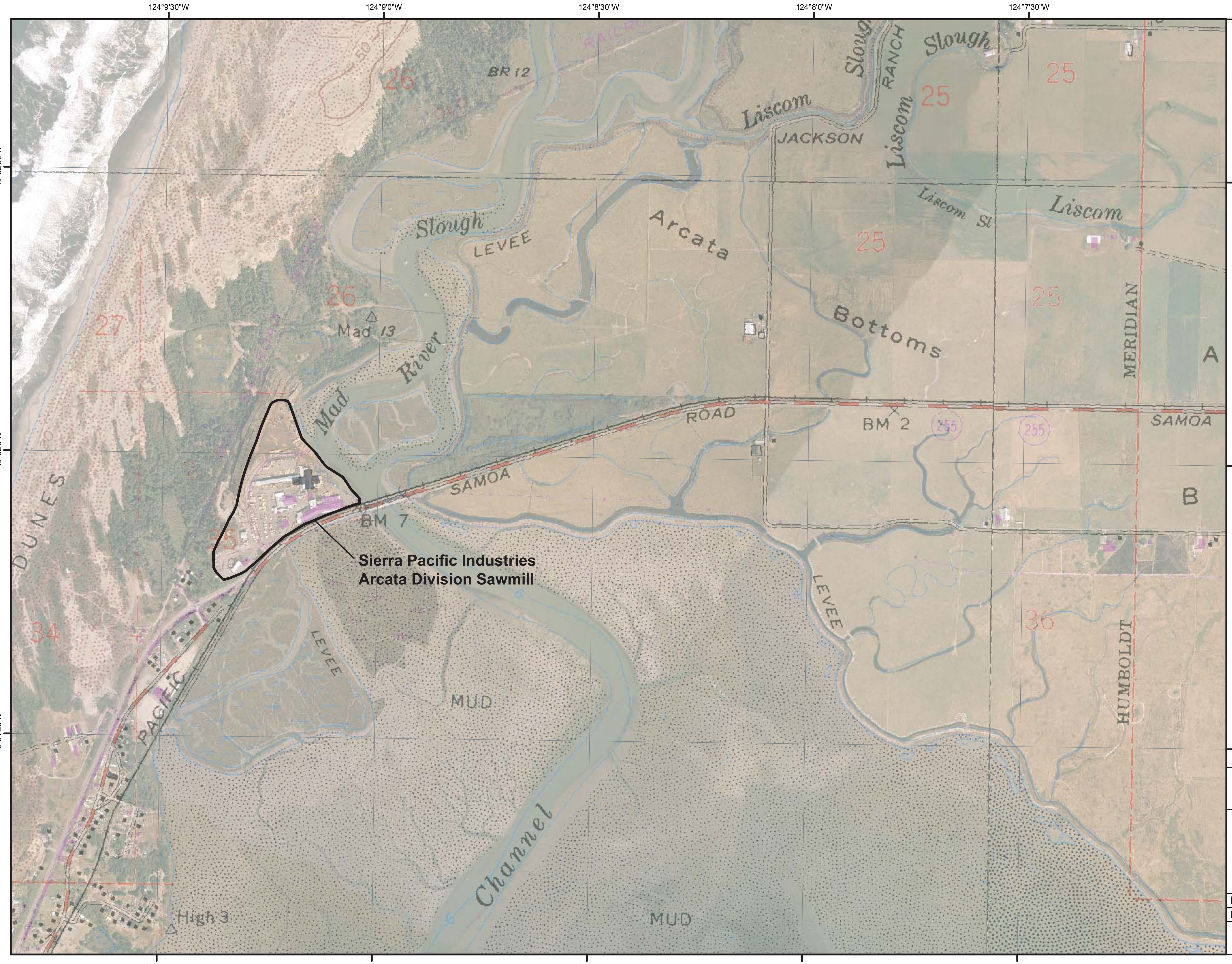

LEGEND

BASEMAP SOURCES:
September 18, 2000
Radman Aerial Photography

USGS 7.5' Quadrangle maps

N

0 1,000 2,000
Feet

SIERRA PACIFIC INDUSTRIES
ARCATA DIVISION SAWMILL
ARCATA, CA

FIGURE 1-2

ARCATA SAWMILL VICINITY

PROJECT: 030275.20	DATE: DEC 23, 2003	
REV: 0	BY: MCP	CHECKED: MCL

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consulting scientists and engineers
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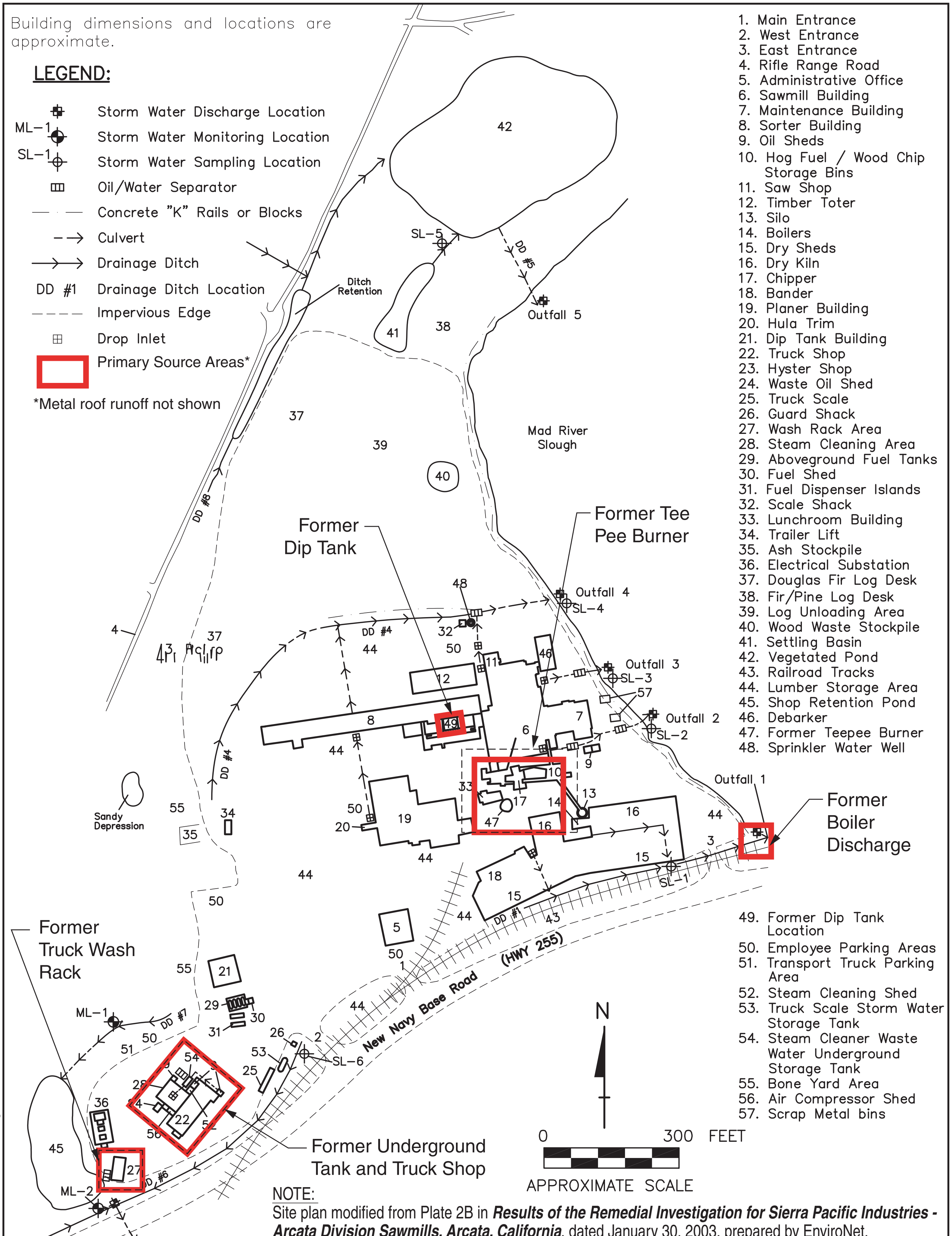

NOTE:
Site plan modified from Plate 2B in ***Results of the Remedial Investigation for Sierra Pacific Industries - Arcata Division Sawmills, Arcata, California***, dated January 30, 2003, prepared by EnviroNet.

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SITE PLAN
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Project No. 9329

Figure **1-3**

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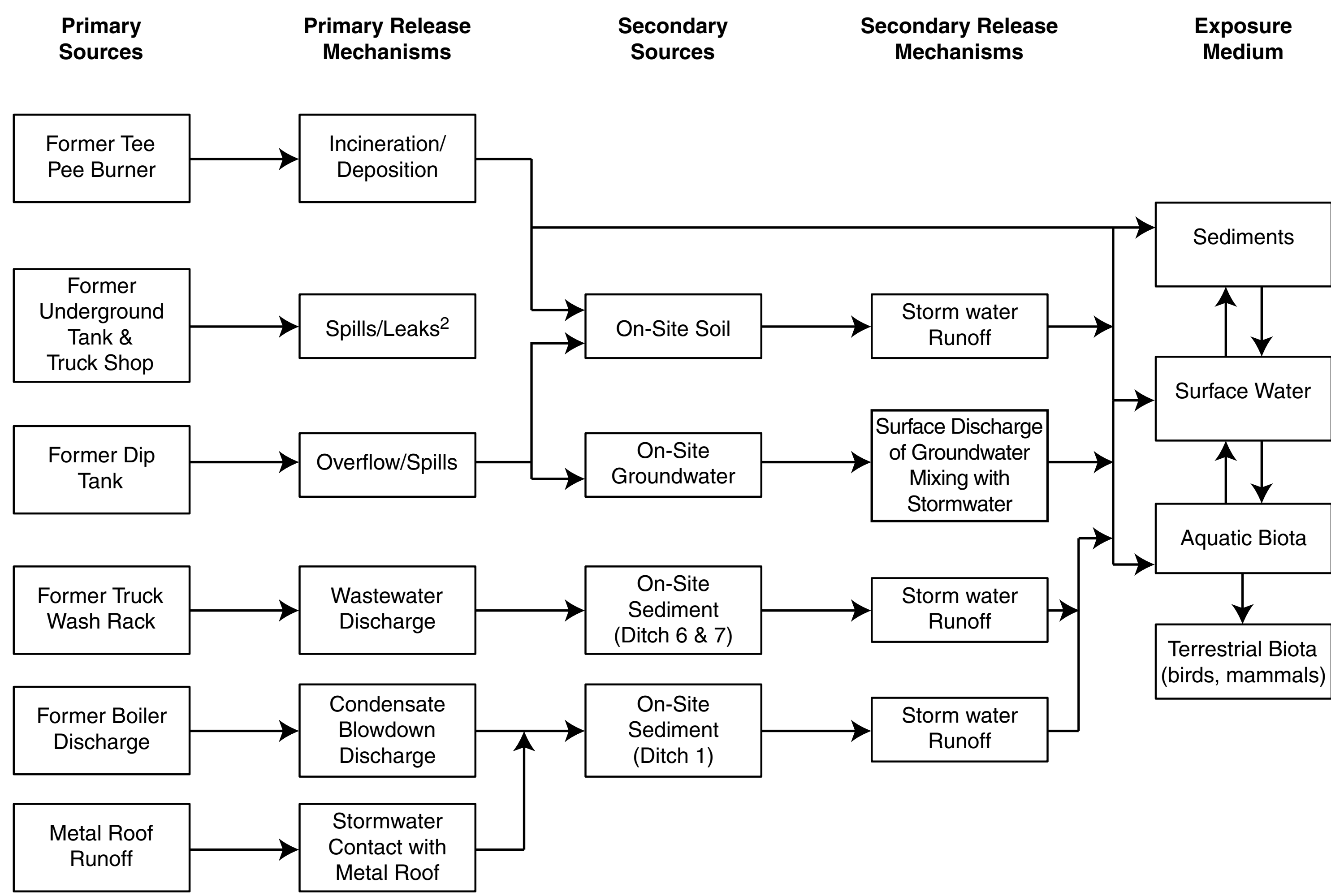

RECEPTORS

Exposure Medium	Exposure Route	Avian Piscivore	Avian Carnivore	Avian Omnivore	Mammalian Omnivore	Fish	Aquatic Invertebrates	Plants	Nearby Residents	Anglers
Sediments	Ingestion	■	□	■	■	□	□			
	Dermal Contact[3]	□	□	□	□	■	■	■		
Surface Water	Ingestion[4]	■	■	■	■	□	□	■		
	Dermal Contact	□	□	□	□	■	■			
Aquatic Biota	Ingestion	■	■	■	■	□	□		■	■
Terrestrial Biota (birds, mammals)	Ingestion		■	■	■					

Notes:

1 Conceptual site model for on-site human health risk assessment provided in Baseline Human Health Risk Assessment of On-Site Soil and Groundwater (Geomatrix/MFG, 2003)

2 Chemicals associated with the underground storage tank and truck shop area have not migrated off site.

3 Dermal contact for plants means direct contact with external surfaces of roots and buried parts

4 Ingestion of saltwater is incidental (i.e., not a drinking water source)

■	Complete Exposure Pathway to be Evalauted Quantitatively
□	Complete Exposure Pathway to be Evaluated Qualitatively [NOTE: ingestion of surface water and ingestion of sediment for aquatic receptors are incorporated into sediment quality guidelines, toxicity tests, and bioaccumulation tests
	Incomplete Exposure Pathway

SIERRA PACIFIC INDUSTRIES
ARCATA DIVISION SAWMILL
Arcata, California

FIGURE 2-1

CONCEPTUAL SITE MODEL
ECOLOGICAL AND OFF-SITE HUMAN HEALTH RISK ASSESSMENT[1]

PROJECT: 9329 Task 20	DATE: April 10, 2004	
REV:	BY: SMC	CHECKED BY: AMH

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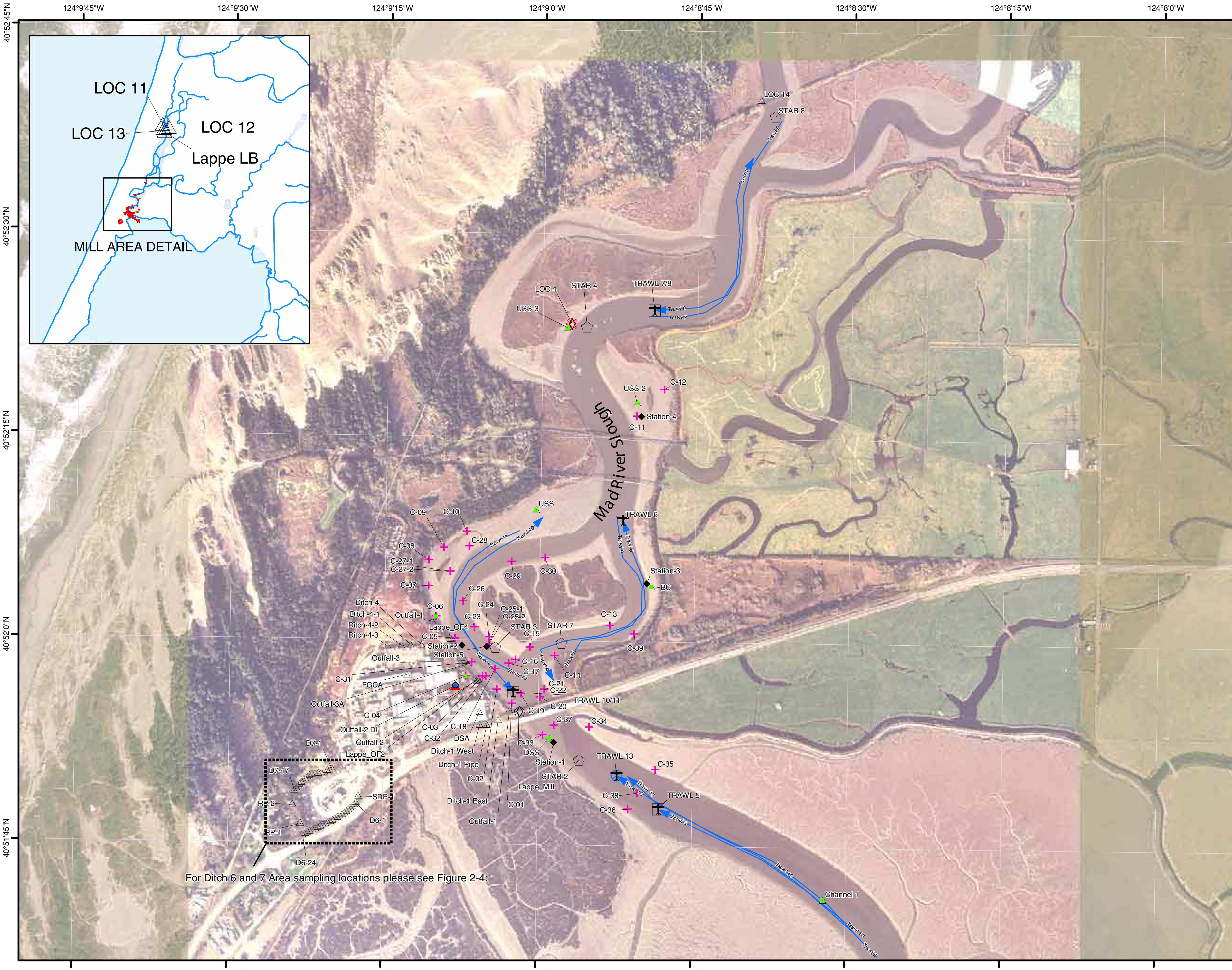

LEGEND

Trawl track

Sampling Locations

- Crab
- Fish
- Mussel
- Oyster
- Sediment - core
- Sediment - surface
- Shark
- Shrimp
- Soil
- Water
- Bioassay/Bioaccumulation test
- Benthic Infaunal assessment

LOC/STAR/TRAWL: Refer to sample collection locations. No samples collected from Trawl 9 & 12.

HABITAT SOURCES:
Humbolt Bay Harbor, Recreation and Conservation District (http://humboldtbay.cnrs.humboldt.edu/gis/data_downloads.html)

SAMPLING LOCATION DATA SOURCES:
Environ, 2003. Sampling Analysis and Work Plan October 2002 Field Sampling in the Mad River Slough and Arcata Bay, California. February 21.

BASEMAP SOURCES:
September 18, 2000 Radman Aerial Photography
Detailed Imagery Inset: 1997 Aerial Photography

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ARCATA, CA

FIGURE 2-2

ON-SITE AND MAD RIVER SLOUGH SAMPLING LOCATIONS

PROJECT: 030275.20	DATE: APR 12, 2004	
REV: 0	BY: CRL	CHECKED: SMC

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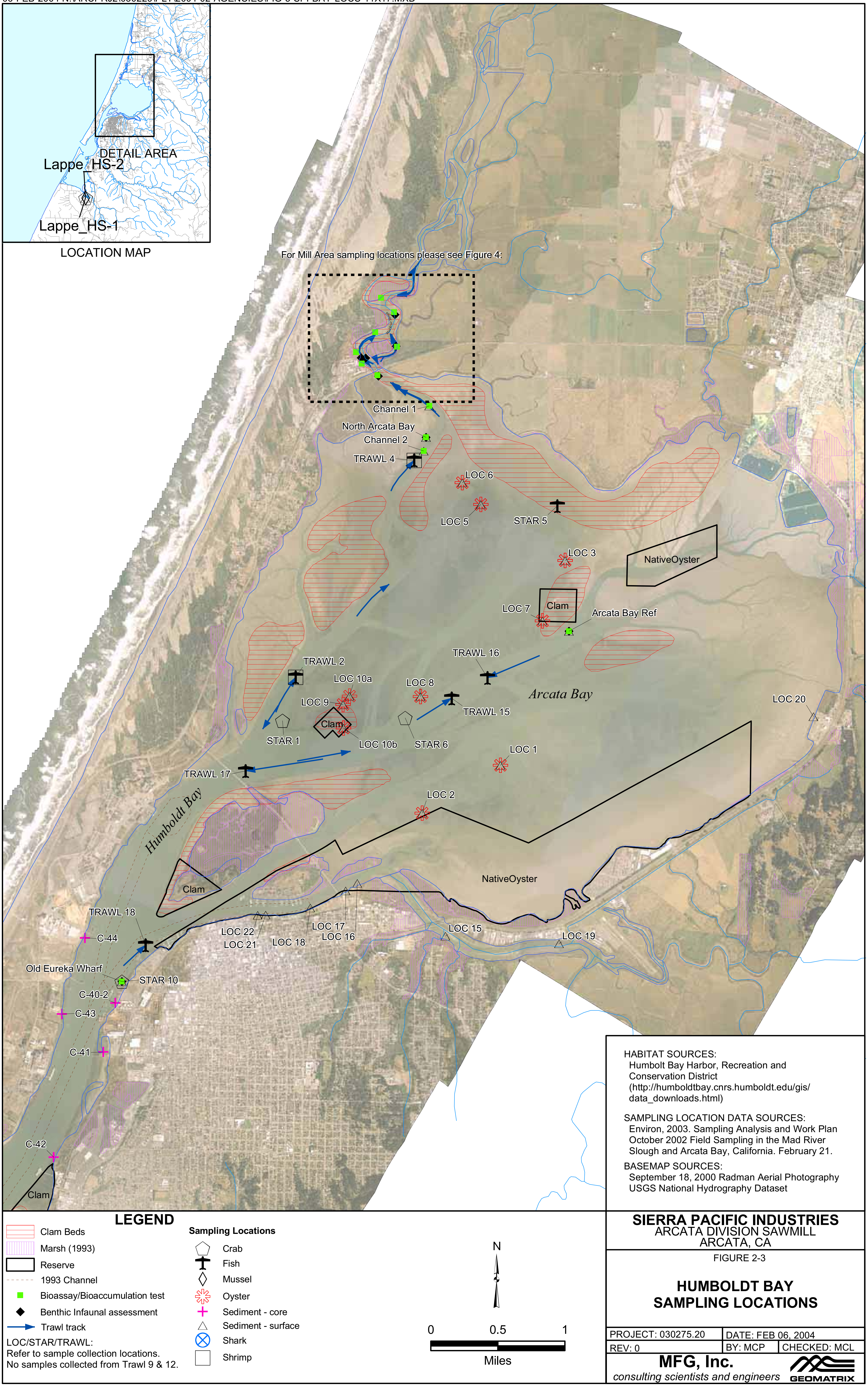
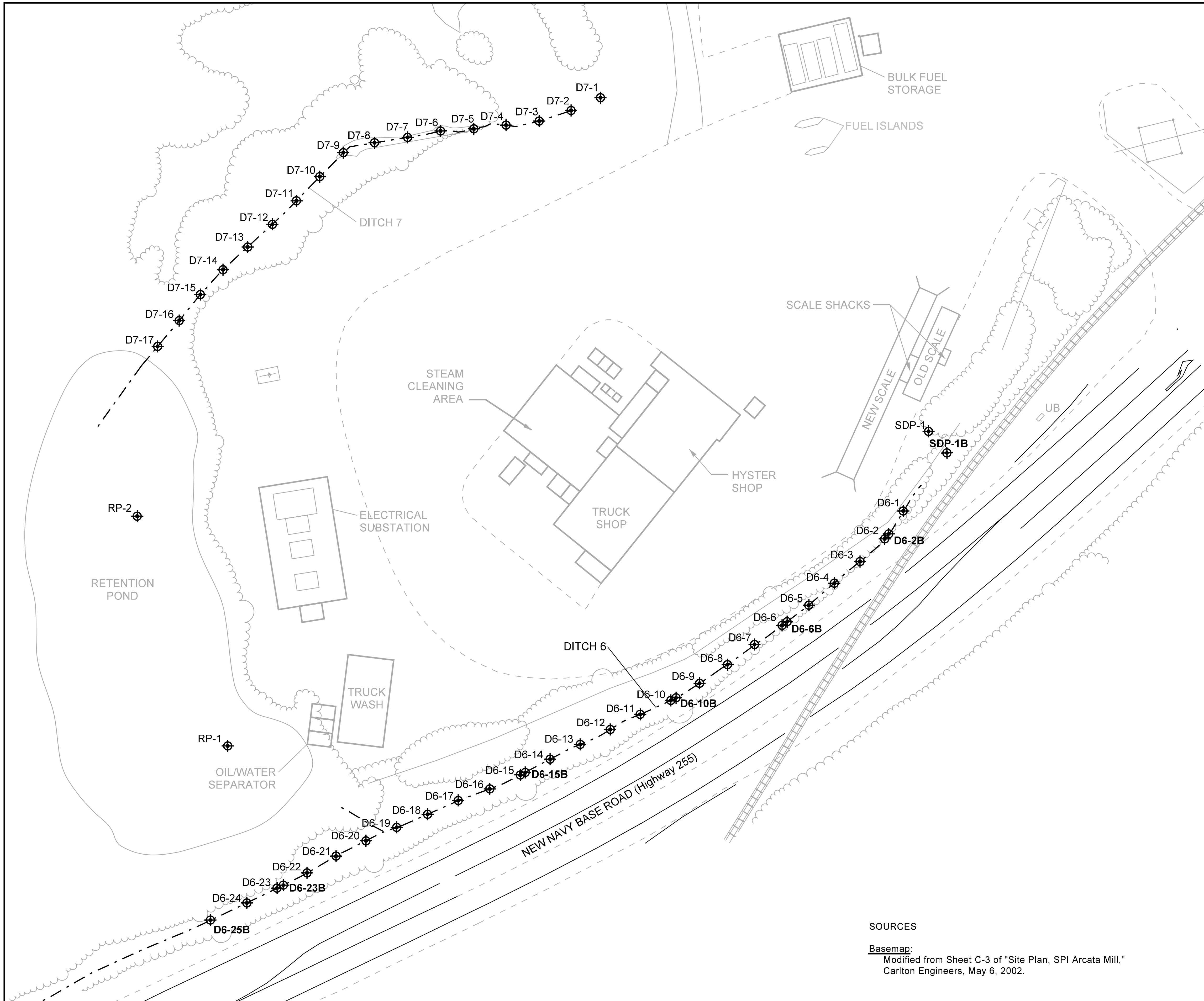
06-FEB-2004 N:\ARCPRJ2\030229\PLT\2004-02-AGENCIES\FIG-5-SPI-BAY-LOCS-11X17.MXD





SOURCES

Basemap:
Modified from Sheet C-3 of "Site Plan, SPI Arcata Mill," Carlton Engineers, May 6, 2002.

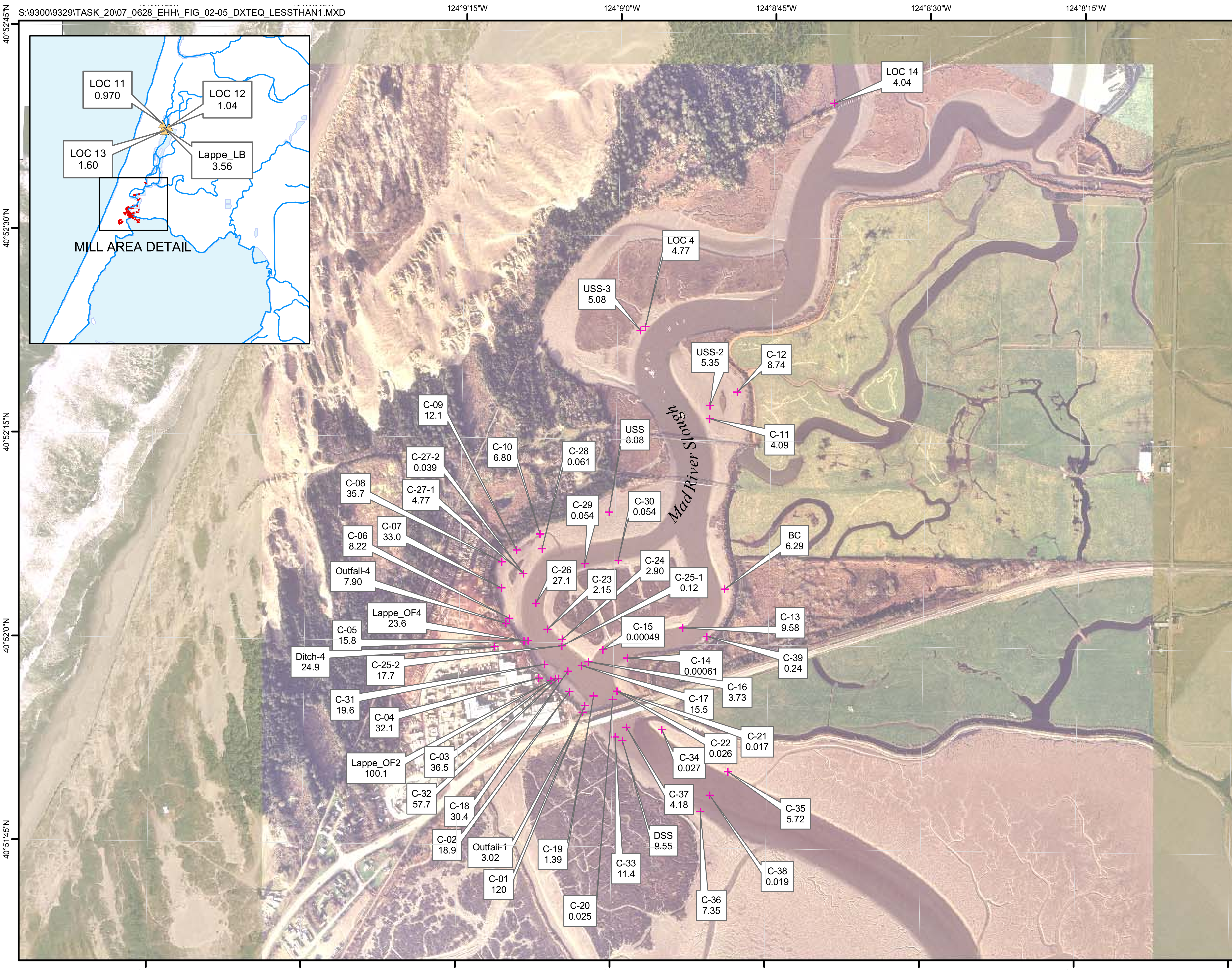
DITCHES 6 AND 7 AND RETENTION POND SAMPLING LOCATIONS
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

GEOMATRIX

Project No.	Figure
9329	2-4

03-SEP-2004 13:47 kuber
S:\9300\9329\task_20\04_0324_Eco_NNRA_fig_02-04.dgn
\\OAKPRNT1\Splash_hold geomtrx.ctb MAP_4mv.pen

S:\9300\9329\TASK_20\07_0628_EHH_FIG_02-05_DXTEQ_LESSTHAN1.MXD



LEGEND

Sampling Locations

- \+ Sediment - core
- △ Sediment - surface

NOTES:

1. All dioxin/furan concentrations are in ng/kg dry weight of 2,3,7,8-TCDD toxicity equivalents (TEQs) using toxicity equivalency factors (TEFs) for mammals.
2. Some core sample depth ranges extended across the 1-foot depth below surface (e.g., 0.5 to 1.5 feet). These samples were included in both the <1 and >=1 foot data groups.
3. The maximum concentration is posted for sample locations where more than one depth interval is available.

BASEMAP SOURCES:
September 18, 2000 Radman Aerial Photography
Detailed Imagery Inset: 1997 Aerial Photography

Revised 7/23/07

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FIGURE 2-5

DIOXIN/FURAN CONCENTRATIONS IN UPLAND SAMPLES AND IN SHALLOW MAD RIVER SLOUGH SEDIMENTS (<1 FOOT BELOW SURFACE)

PROJECT: 020510	DATE: JUNE 2007
REV: 0	BY: CRL / CHECKED: SMC

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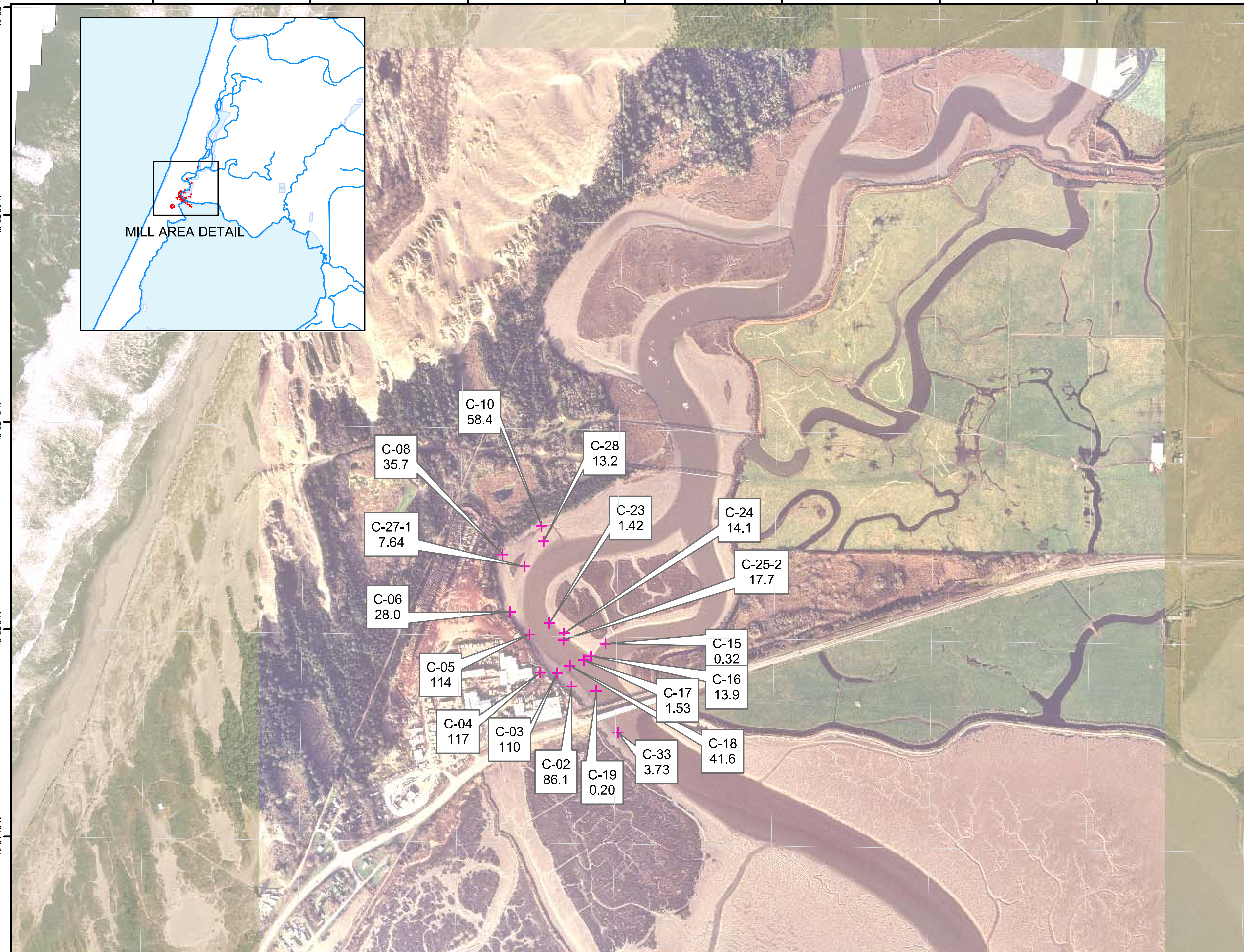
S:\9300\9329\TASK_20\07_0628_EHH_FIG_02-06_DXTEQ_GREATERTHAN1.MXD



LEGEND

Sampling Locations

+ Sediment - core

△ Sediment - surface

NOTES:

1. All dioxin/furan concentrations are in ng/kg dry weight of 2,3,7,8-TCDD toxicity equivalents (TEQs) using toxicity equivalency factors (TEFs) for mammals.
2. Some core sample depth ranges extended across the 1-foot depth below surface (e.g., 0.5 to 1.5 feet). These samples were included in both the <1 and >=1 foot data groups.
3. The maximum concentration is posted for sample locations where more than one depth interval is available.

BASEMAP SOURCES:
September 18, 2000 Radman Aerial Photography
Detailed Imagery Inset: 1997 Aerial Photography

N

0 700 1,400

Feet

Revised 7/23/07

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FIGURE 2-6

DIOXIN/FURAN CONCENTRATIONS IN DEEPER MAD RIVER SLOUGH SEDIMENTS (>=1 FOOT BELOW SURFACE)

PROJECT: 020510	DATE: JUNE 2007	
REV: 0	BY: CRL	CHECKED: SMC

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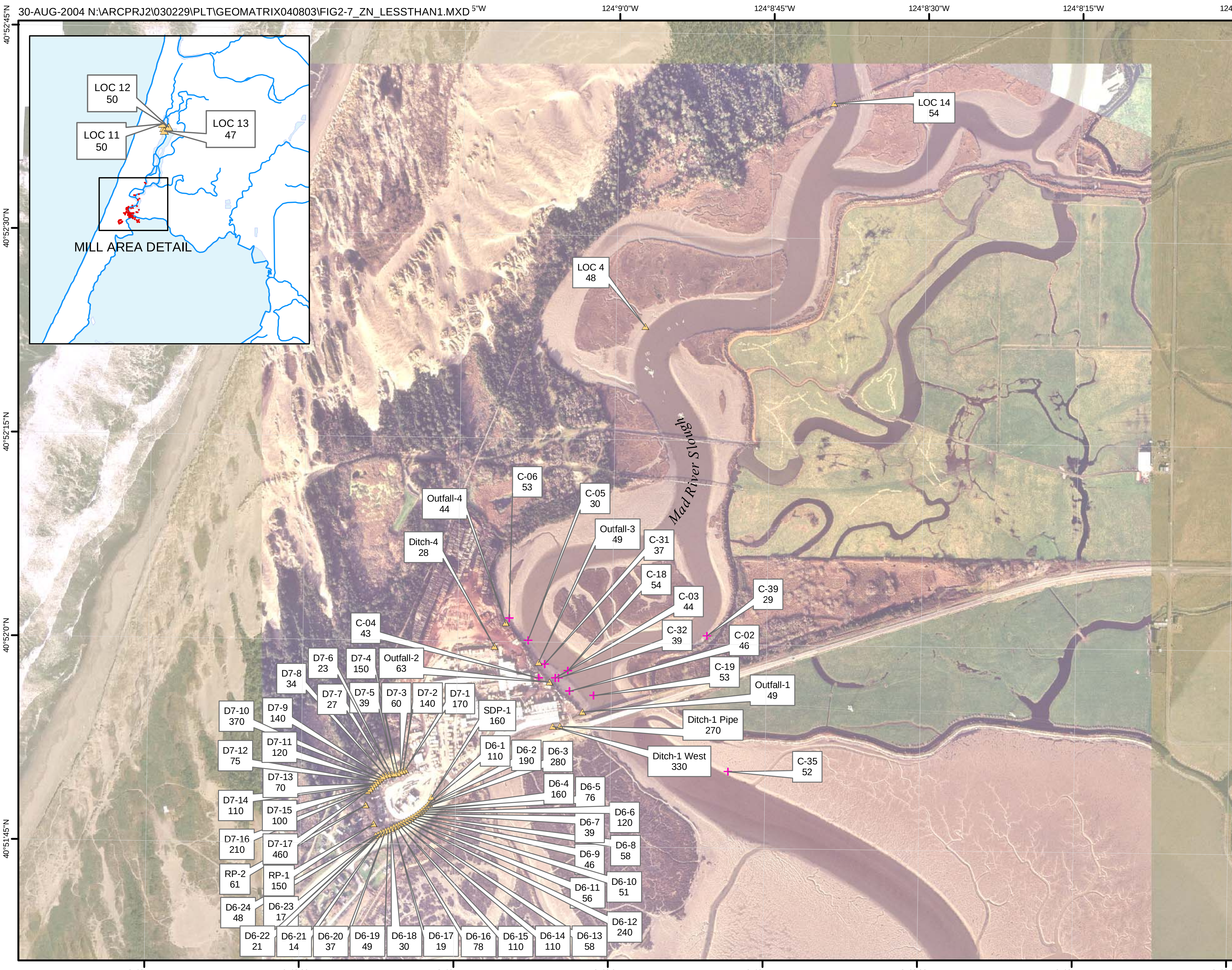
30-AUG-2004 N:\ARCPRJ2\030229\PLT\GEOMATRIX040803\FIG2-7_ZN_LESSTHAN1.MXD



LEGEND

Sample Locations

- \+ Sediment - core
- ▲ Sediment - surface

NOTES:

1. All zinc data are in mg/kg wet weight.
2. Some core sample depth ranges extended across the 1-foot depth below surface (e.g., 0.05 - 1.5 feet). These samples were included in both the < 1 and >=1 foot data groups.
3. The maximum concentration is posted for sample locations where more than one depth interval is available.

BASEMAP SOURCES:
September 18, 2000 Radman Aerial Photography
Detailed Imagery Inset: 1997 Aerial Photography

N

0 700 1,400

Feet

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ARCATA DIVISION SAWMILL
ARCATA, CA

FIGURE 2-7

ZINC CONCENTRATIONS IN UPLAND SAMPLES AND IN SHALLOW MAD RIVER SLOUGH SEDIMENTS (<1 FOOT BELOW SURFACE)

PROJECT: 020510	DATE: AUG 30, 2004
REV: 0	BY: CRL / CHECKED: SMC

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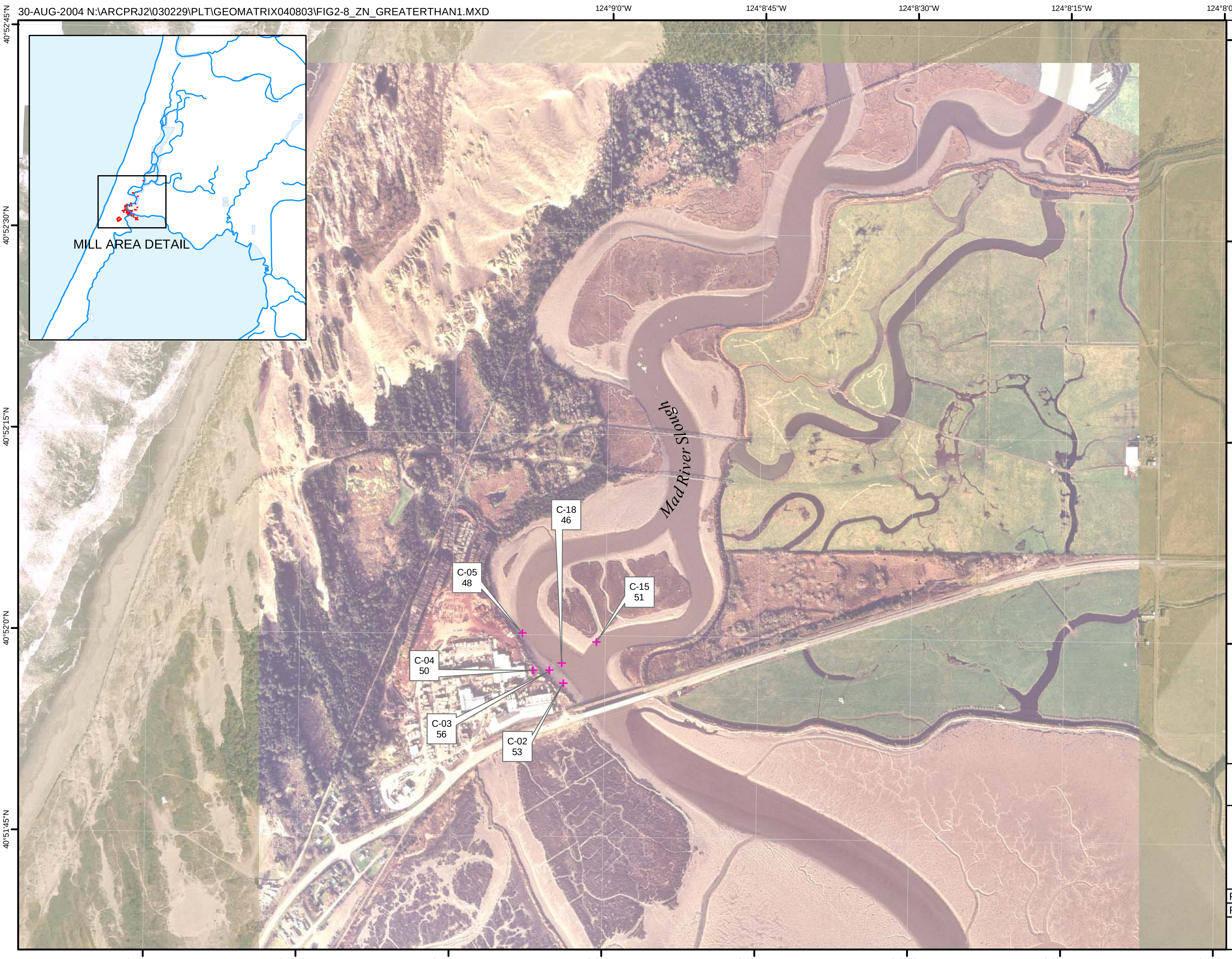
30-AUG-2004 N:\ARCPRJ2\030229\PLT\GEOMATRIX040803\FIG2-8_ZN_GREATERTHAN1.MXD



LEGEND

Sampling Locations

+ Sediment - core
▲ Sediment - surface

NOTES:
1. All zinc data are in mg/kg wet weight.

2. Some core sample depth ranges extended across the 1-foot depth below surface (e.g., 0.5 to 1.5 feet). These samples were included in both the <1 and >=1 foot data groups.

BASEMAP SOURCES:
September 18, 2000 Radman Aerial Photography
Detailed Imagery Inset: 1997 Aerial Photography

N

0 700 1,400
Feet

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ARCATA DIVISION SAWMILL
ARCATA, CA

FIGURE 2-8
ZINC CONCENTRATIONS IN DEEPER MAD RIVER SLOUGH SEDIMENTS (>=1 FOOT BELOW SURFACE)

PROJECT: 020510	DATE: AUG 30, 2004	
REV: 0	BY: CRL	CHECKED: SMC

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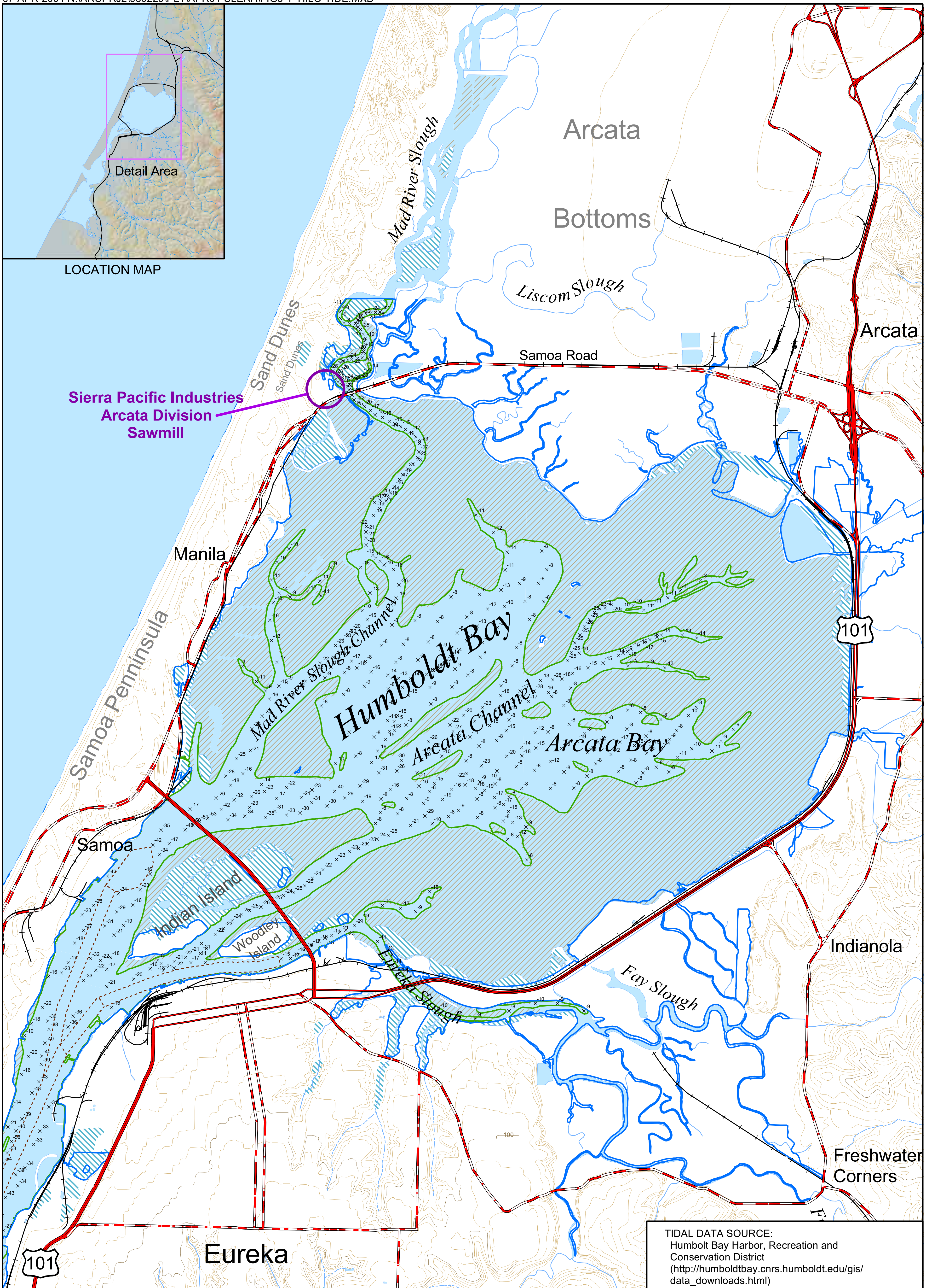
07-APR-2004 N:\ARCPRJ2\030229\PLT\APR04-SLERA\FIG3-1 HILO-TIDE.MXD



TIDAL DATA SOURCE:
Humbolt Bay Harbor, Recreation and Conservation District (http://humboldtbay.cnrs.humboldt.edu/gis/data_downloads.html)

Legend

Hydrology

- Perennial Stream
- Intermittent Stream
- Shoreline
- 1993 Channel
- Lake, Pond, River or Ocean
- Tidal Flat
- Marsh or Wetland
- × Depth in Feet (1993)

Transportation

- Highway (Undivided)
- Highway (Divided by Centerline)
- Primary Road (Undivided)
- Primary Road (Divided by Centerline)
- Railroad

Tidal Features

- High Tide (1993)
- Low Tide (1993)

N

0 0.5 1
Miles

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ARCATA, CA

FIGURE 3-1

ARCATA BAY AND MAD RIVER SLOUGH TIDAL LIMITS

PROJECT: 030275.20	DATE: APR 07, 2004
REV: 0	BY: CRL CHECKED: SC

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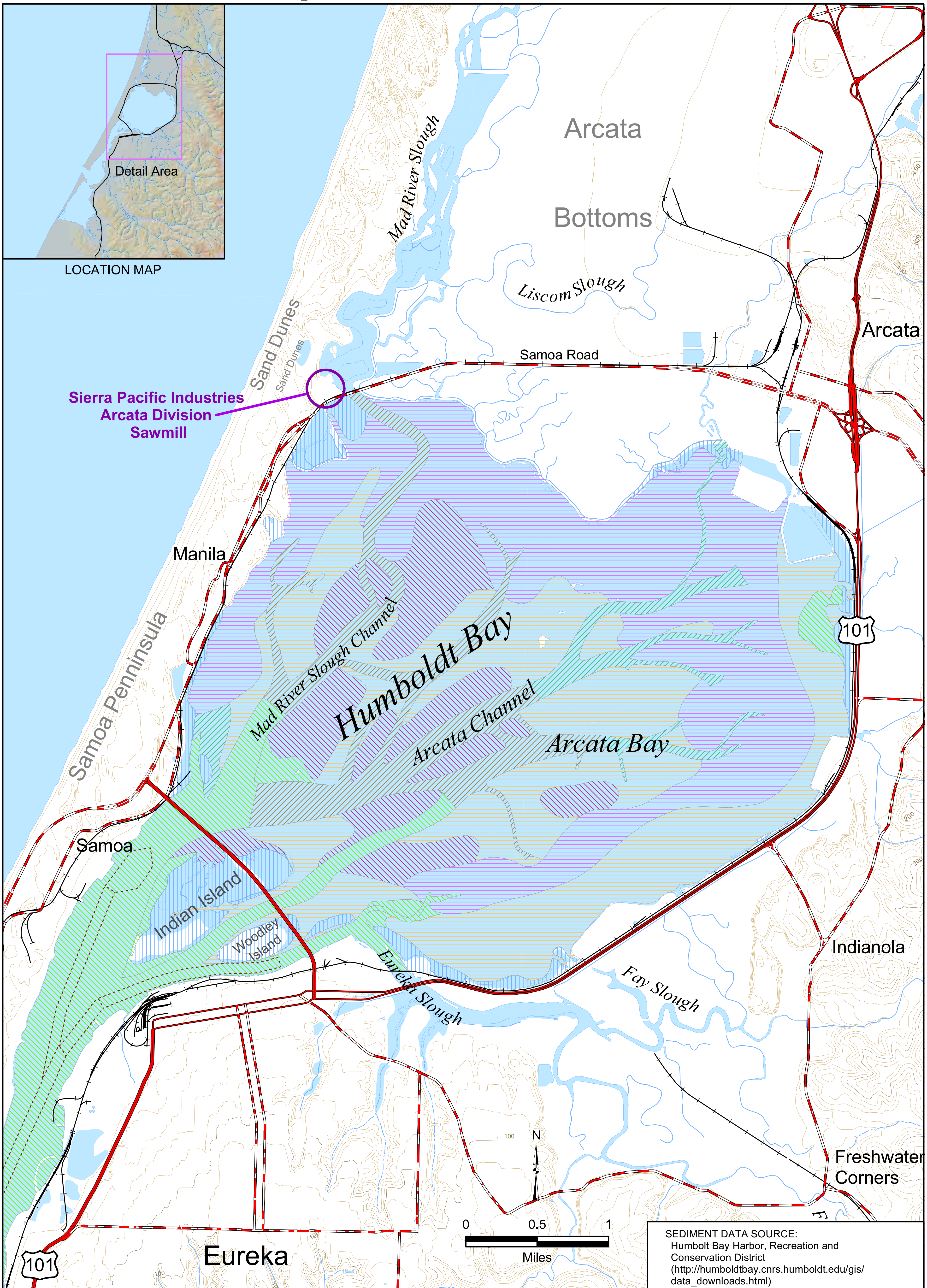
07-APR-2004 N:\ARCPRJ2\030229\PLT\APR04-SLERA\FIG3-2_SED-DIST.MXD



SEDIMENT DATA SOURCE:
Humbolt Bay Harbor, Recreation and Conservation District
(http://humboldtbay.cnrs.humboldt.edu/gis/data_downloads.html)

Legend

Hydrology
- Perennial Stream
- Intermittent Stream
- Shoreline
- 1993 Channel
- Open Water

Transportation
- Highway (Undivided)
- Highway (Divided by Centerline)
- Primary Road (Undivided)
- Primary Road (Divided by Centerline)

Sediment Types
- Marsh
- Sand
- Sand and Gravel
- Sand-Silt-Clay
- Silty Clay
- Silty Sand
- Clayey Silt
- Very Clayey Silt

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FIGURE 3-2

ARCATA BAY AND MAD RIVER SLOUGH SEDIMENT DISTRIBUTION

PROJECT: 030275.20	DATE: APR 07, 2004	
REV: 0	BY: DCC	CHECKED: SC

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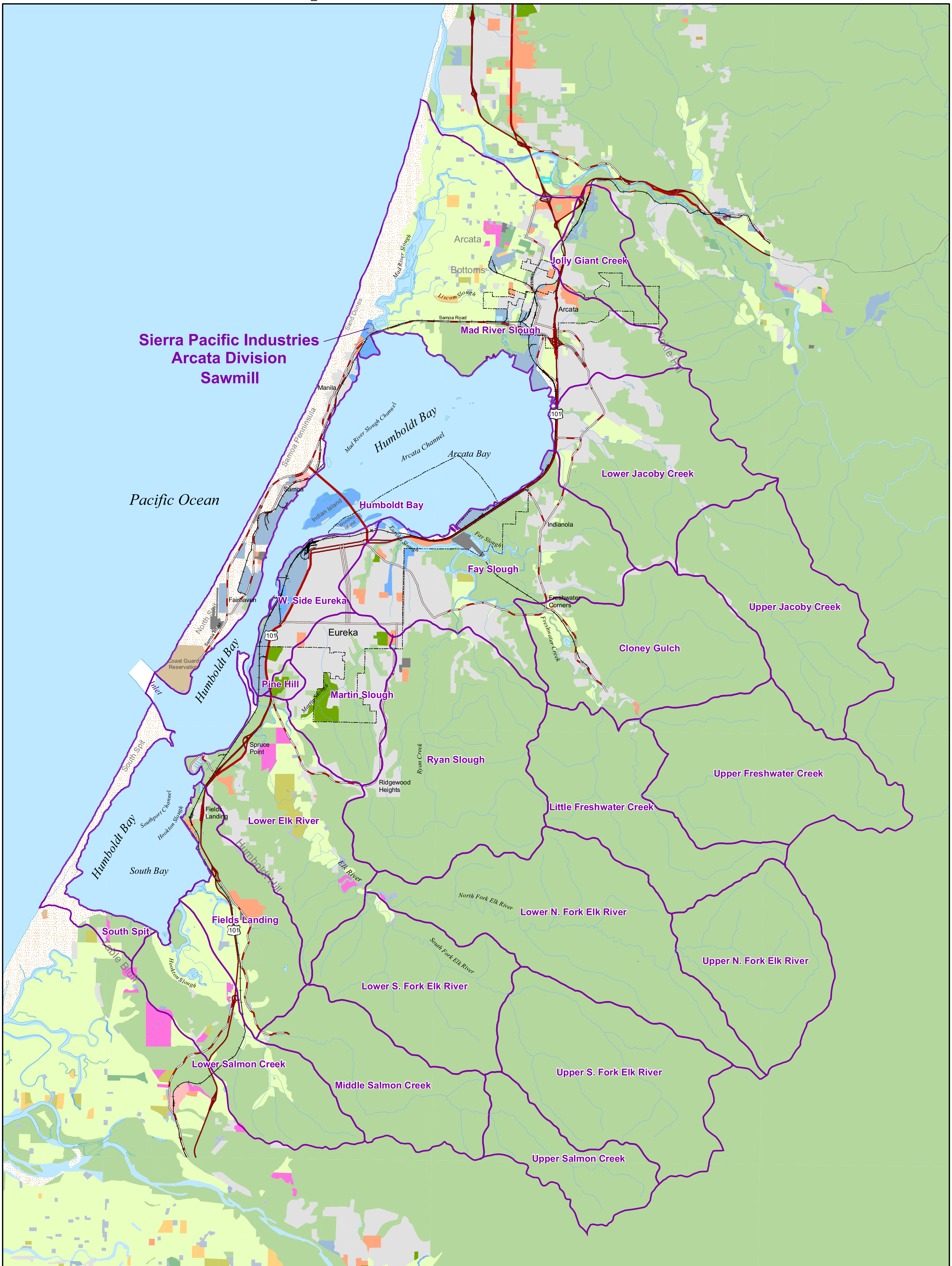
12-APR-2004 N:\ARCPRJ2\030229\PLT\APR04-SLERA\FIG3-3_LANDUSE-OVERVIEW.MXD



LAND USE SOURCE:
California Department of Water Resources, 1996.
(http://www.waterplan.water.ca.gov)

Legend

- Subwatersheds

Land Use Classification

- Citrus
- Fruits and Nuts
- Field Crops
- Grain and Hay Crops
- Pasture
- Nursery and Berry Crops
- Marsh and Riparian
- Native Vegetation
- Semi Agricultural
- Urban Landscape
- Residential
- Urban
- Urban Commercial
- Industrial
- Water Surface
- Vacant
- Idle
- Barren

N

0 10,000 20,000 Feet

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ARCATA, CA

FIGURE 3-3

**HUMBOLDT BAY
LAND USE AND WATERSHEDS**

PROJECT: 030275.20	DATE: APR 12, 2004	
REV: 0	BY: CRL	CHECKED: SMC

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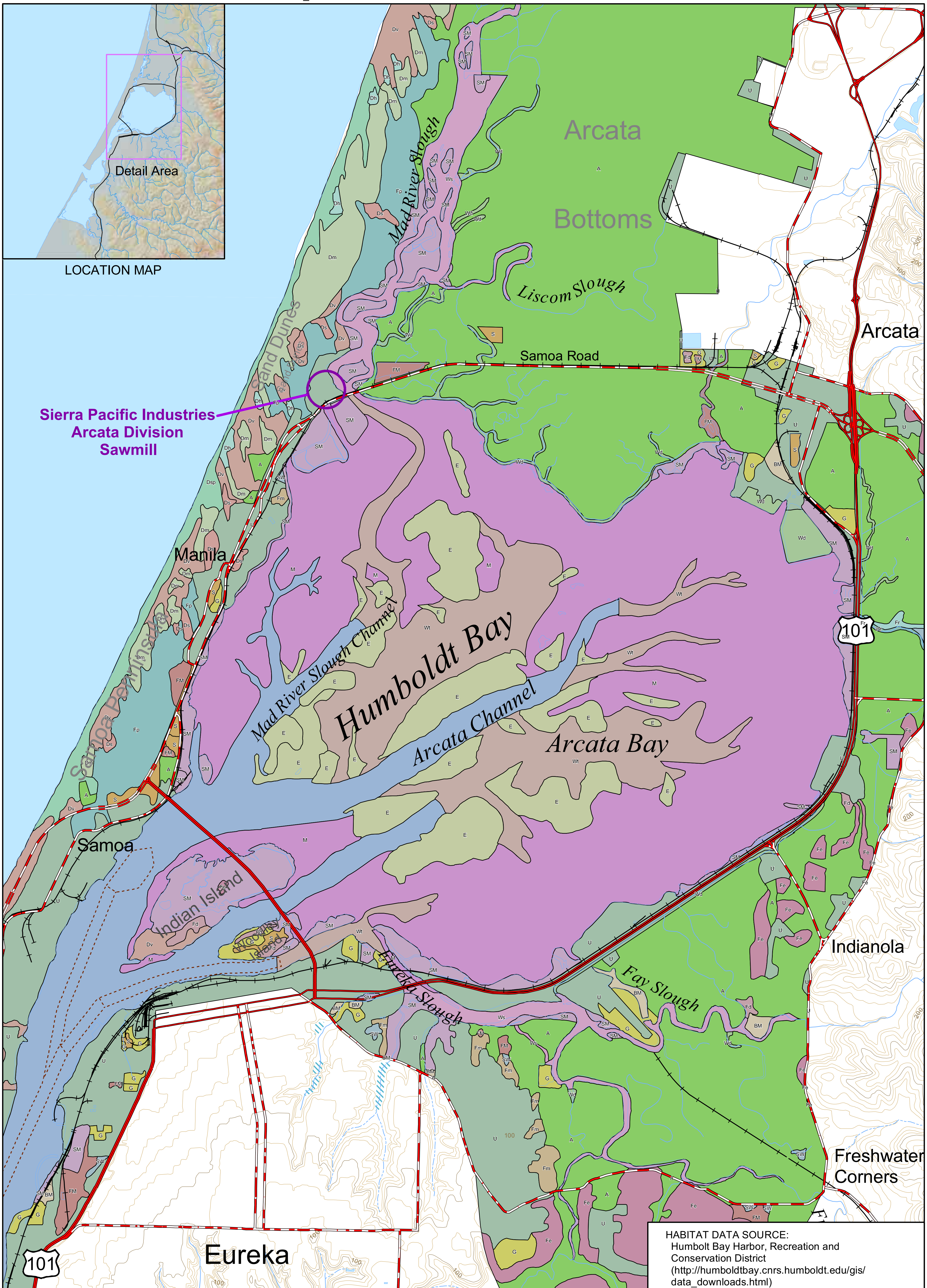
07-APR-2004 N:\ARCPRJ2\030229\PLT\APR04-SLERA\FIG3-4_LANDUSE-DETAIL.MXD



HABITAT DATA SOURCE:
Humbolt Bay Harbor, Recreation and Conservation District
(http://humboldtbay.cnrs.humboldt.edu/gis/data_downloads.html)

Legend

A = Agriculture	Fd = Deciduous Forest	SM = Salt Marsh
BM = Brackish Marsh	Fe = Evergreen Forest	SW = Swamp
Dh = Dune Hollow	Fm = Mixed Forest	U = Urban
Dm = Moving Dune	Fp = Pine Forest	UG = Urban/Grassland
Ds = Dune Swamp	Fr = Riparian Forest	Wc = Deep Tidal Channels
Dsp = Sparsely Vegetated Dune	G = Grassland	Wd = Ditches and Closed Channels
Dv = Vegetated Dune	J = Jetties and Reefs	Wr = Creeks and Rivers
E = Eelgrass	M = Mudflat	Ws = Tidal Creeks and Sloughs
FM = Freshwater Marsh	S = Shrub	Wt = Shallow Tidal Channel

0 0.5 1
Miles

N

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ARCATA, CA

FIGURE 3-5

ARCATA BAY AND MAD RIVER SLOUGH HABITAT TYPES

PROJECT: 030275.20	DATE: APR 12, 2004
REV: 0	BY: DCC CHECKED: SC

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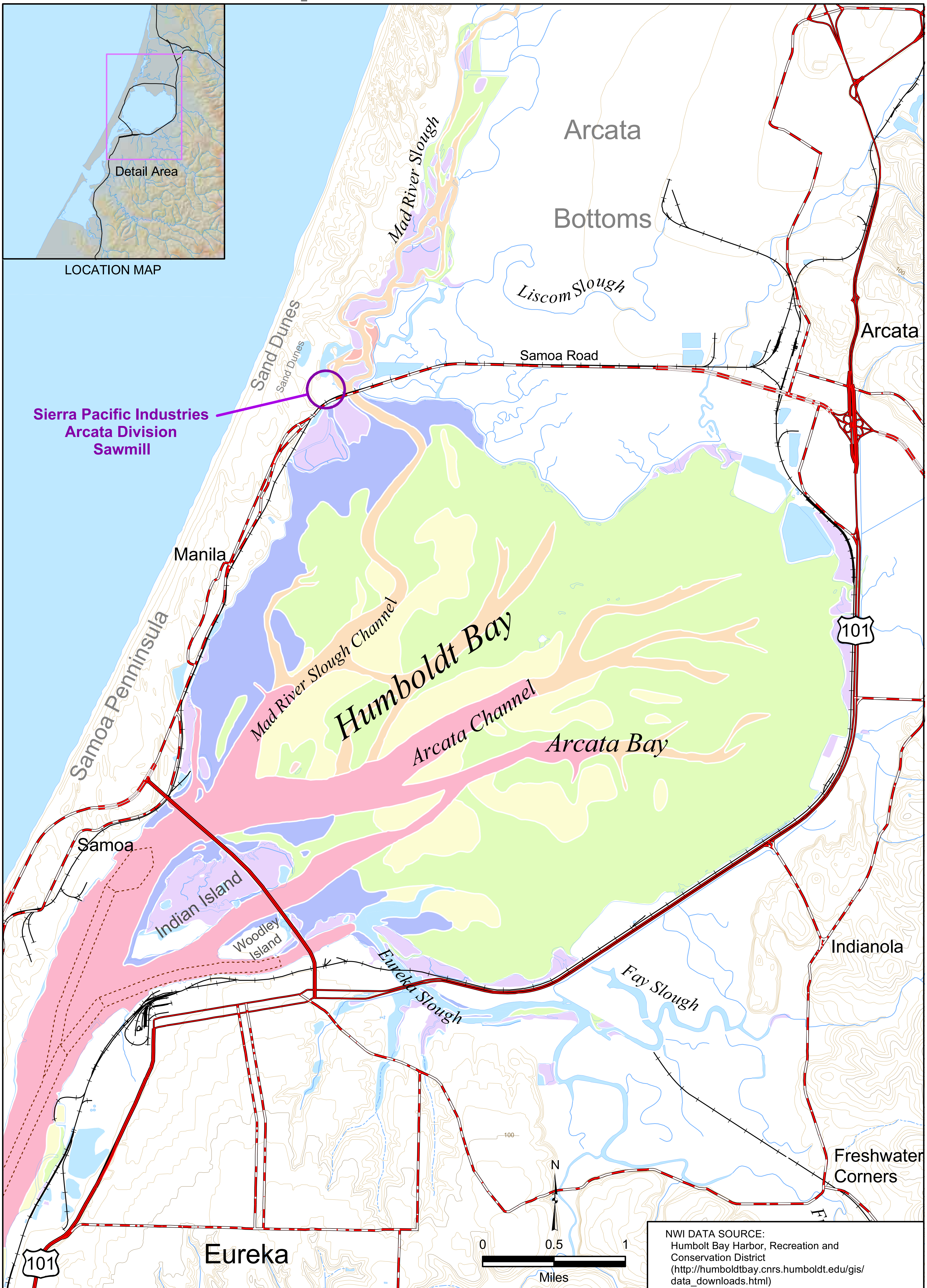
07-APR-2004 N:\ARCPRJ2\030229\PLT\APR04-SLERA\FIG3-6_WETLANDS.MXD



Legend

National Wetlands Inventory

- E1UB2L - Subtidal, Unconsolidated Bottom, Sand, Subtidal
- E1UB3L - Subtidal, Unconsolidated Bottom, Mud, Subtidal
- E2AB1/US3N - Intertidal, Aquatic Bed, Algal/Unconsolidated Shore, Mud, Regularly Flooded
- E2AB3M - Intertidal, Aquatic Bed, Rooted Vascular, Irregularly Exposed
- E2EM1N - Intertidal, Emergent, Persistent, Regularly Flooded
- E2US2N - Intertidal, Unconsolidated Shore, Sand, Regularly Flooded
- E2US3/AB1N - Intertidal, Unconsolidated Shore, Mud/Aquatic Bed, Algal, Regularly Flooded
- E2US3N - Intertidal, Unconsolidated Shore, Mud, Regularly Flooded

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FIGURE 3-6

ARCATA BAY AND MAD RIVER SLOUGH NATIONAL WETLANDS INVENTORY

PROJECT: 030275.20	DATE: APR 07, 2004	
REV: 0	BY: DCC	CHECKED: SC

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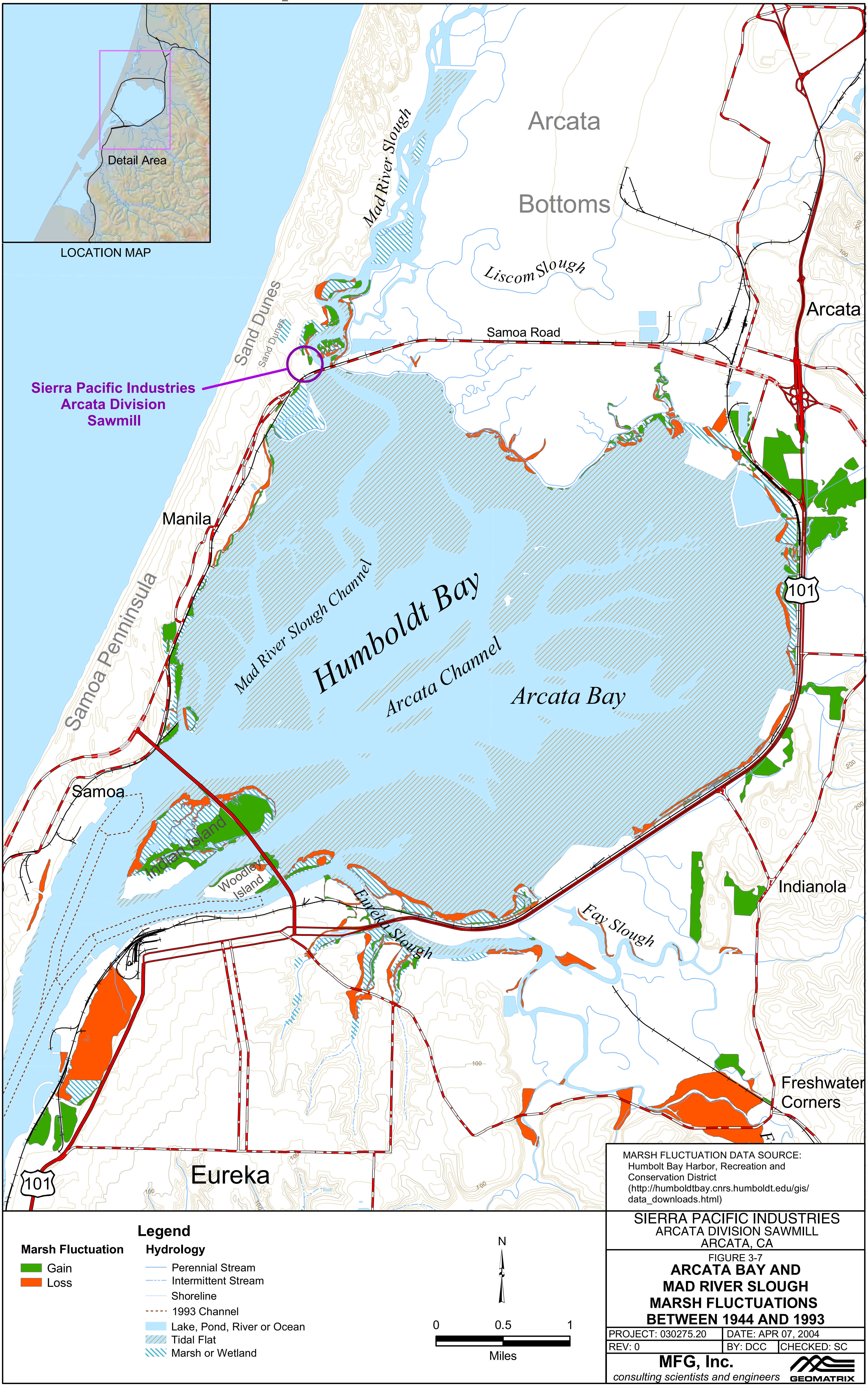

MARSH FLUCTUATION DATA SOURCE:
Humbolt Bay Harbor, Recreation and Conservation District
(http://humboldtbay.cnrs.humboldt.edu/gis/data_downloads.html)

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FIGURE 3-7
ARCATA BAY AND MAD RIVER SLOUGH MARSH FLUCTUATIONS BETWEEN 1944 AND 1993

PROJECT: 030275.20	DATE: APR 07, 2004	
REV: 0	BY: DCC	CHECKED: SC

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07-APR-2004 N:\ARCPRJ2\030229\PLT\APR04-SLERA\FIG3-8_EEL-GRASS.MXD

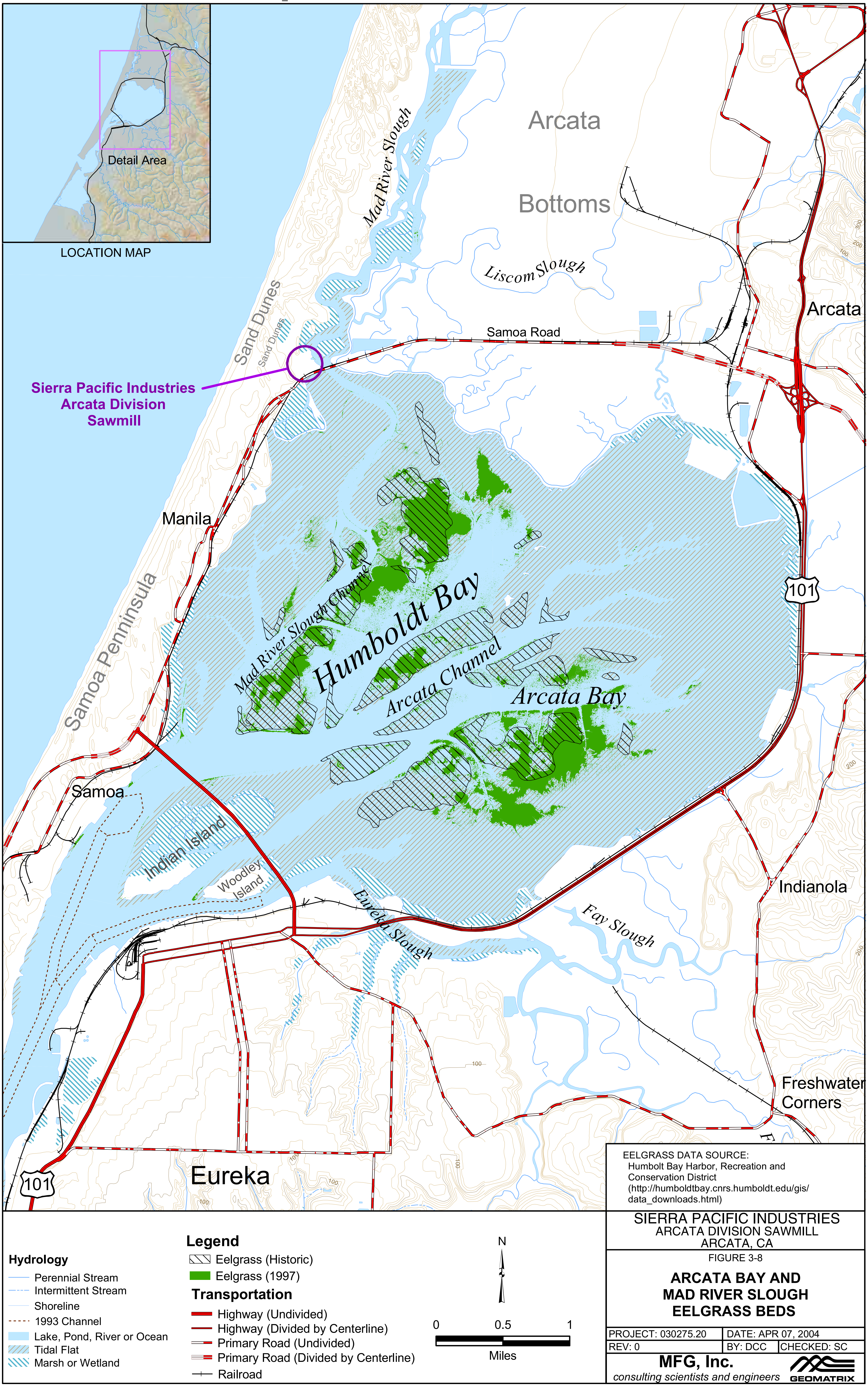

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FIGURE 3-8

ARCATA BAY AND MAD RIVER SLOUGH EELGRASS BEDS

PROJECT: 030275.20	DATE: APR 07, 2004	
REV: 0	BY: DCC	CHECKED: SC

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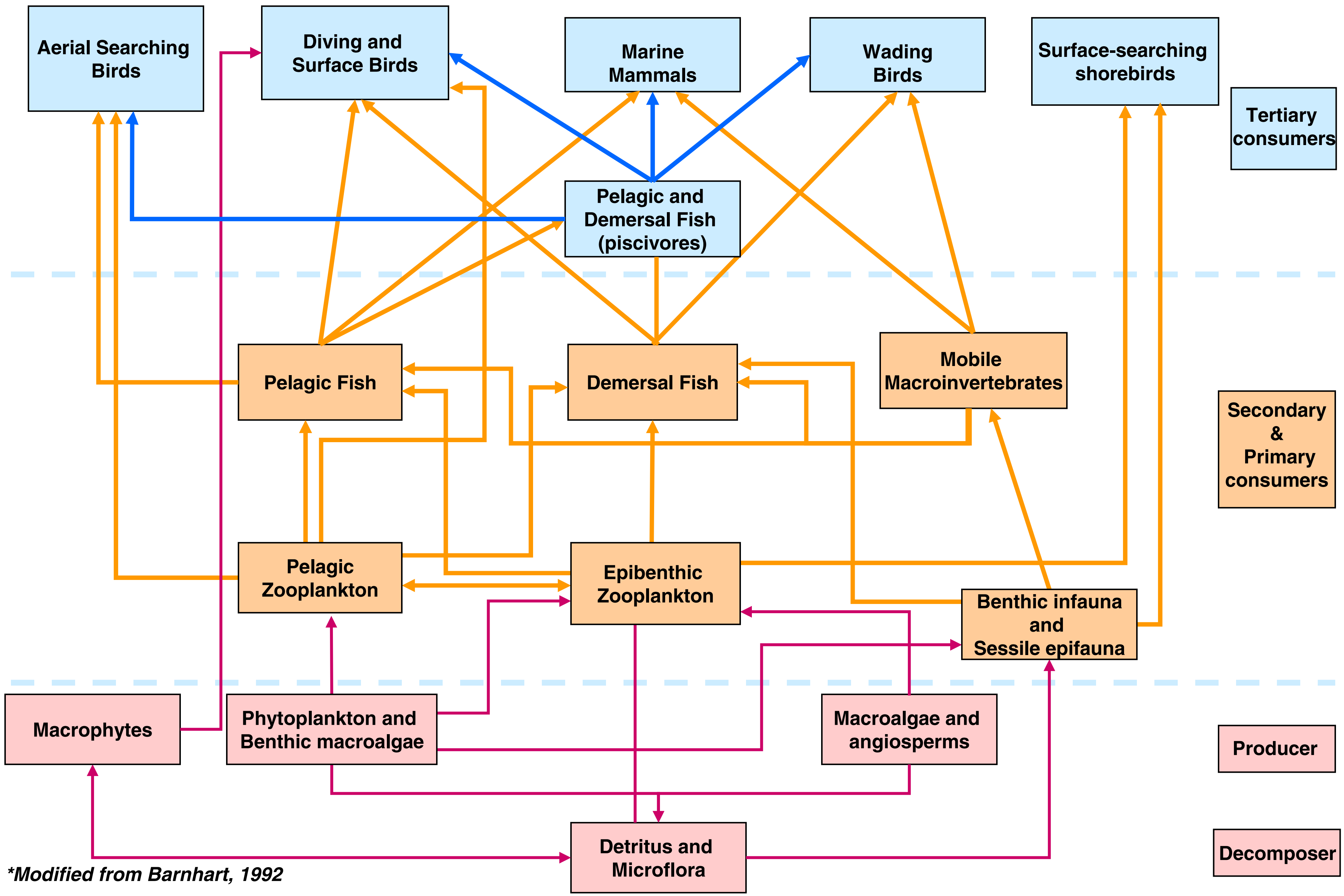

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Arcata, California

Figure 3-9 Conceptual Food Web for Mad River Slough and Arcata Bay *

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GEOMATRIX

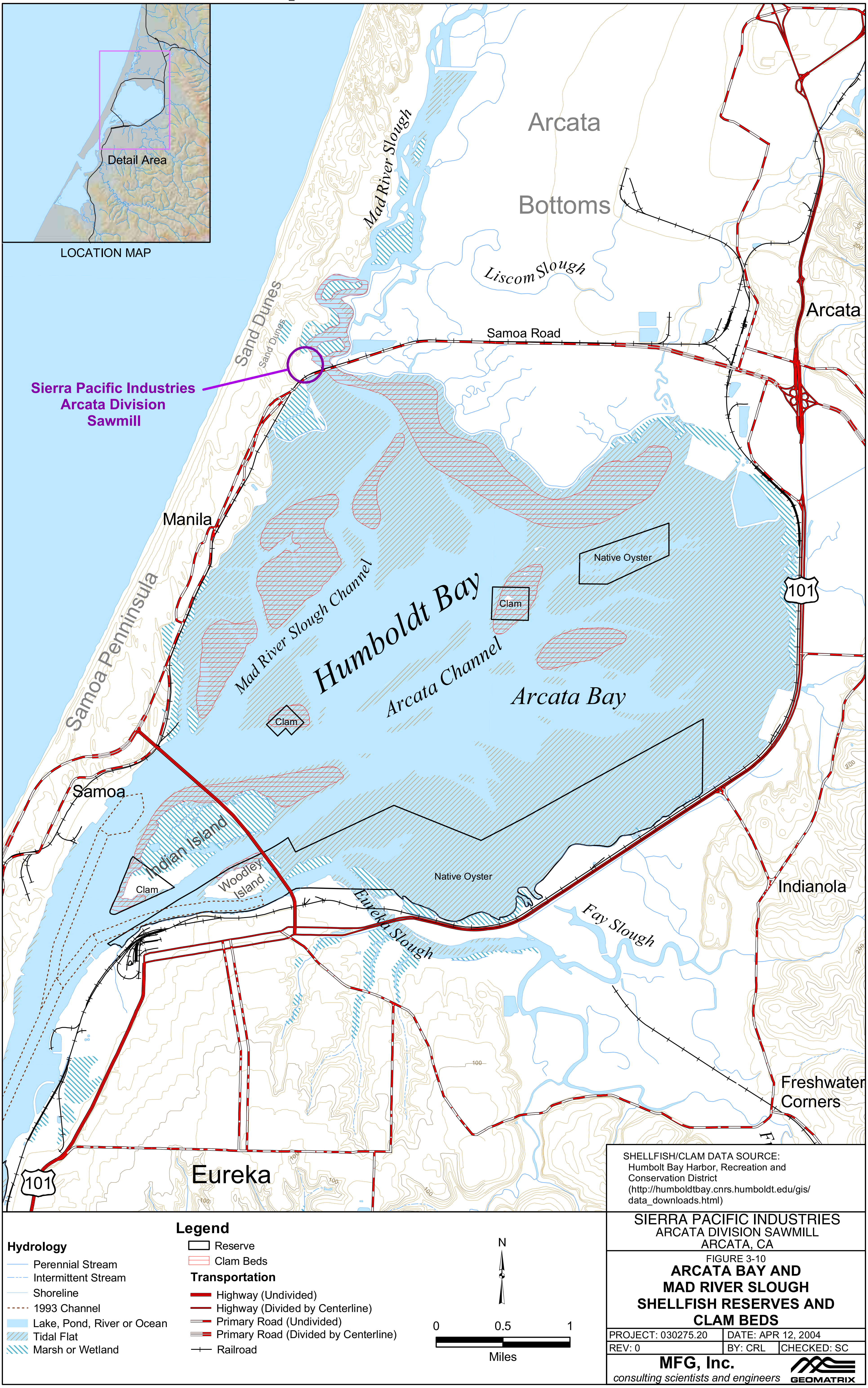

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FIGURE 3-10
ARCATA BAY AND MAD RIVER SLOUGH SHELLFISH RESERVES AND CLAM BEDS

PROJECT: 030275.20	DATE: APR 12, 2004	
REV: 0	BY: CRL	CHECKED: SC

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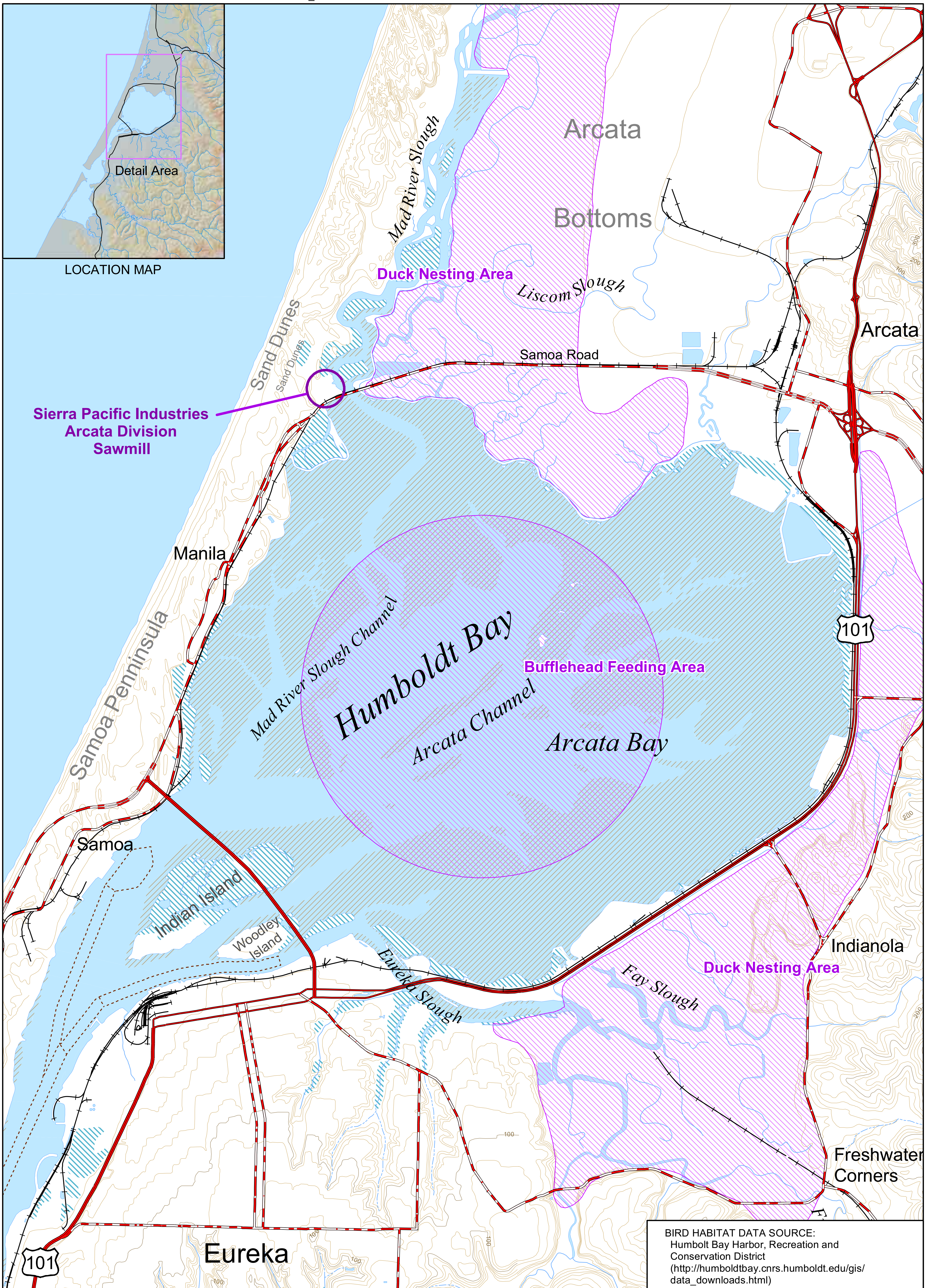
08-APR-2004 N:\ARCPRJ2\030229\PLT\APR04-SLERA\FIG3-10_BIRD-HAB.MXD



BIRD HABITAT DATA SOURCE:
Humbolt Bay Harbor, Recreation and Conservation District
(http://humboldtbay.cnrs.humboldt.edu/gis/data_downloads.html)

Legend

Hydrology
- Perennial Stream
- Intermittent Stream
- Shoreline
- 1993 Channel
- Lake, Pond, River or Ocean
- Tidal Flat
- Marsh or Wetland

Transportation
- Highway (Undivided)
- Highway (Divided by Centerline)
- Primary Road (Undivided)
- Primary Road (Divided by Centerline)
- Railroad

N

0 0.5 1
Miles

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ARCATA, CA

FIGURE 3-11

ARCATA BAY AND MAD RIVER SLOUGH BIRD HABITATS

PROJECT: 030275.20	DATE: APR 08, 2004	
REV: 0	BY: CRL	CHECKED: SC

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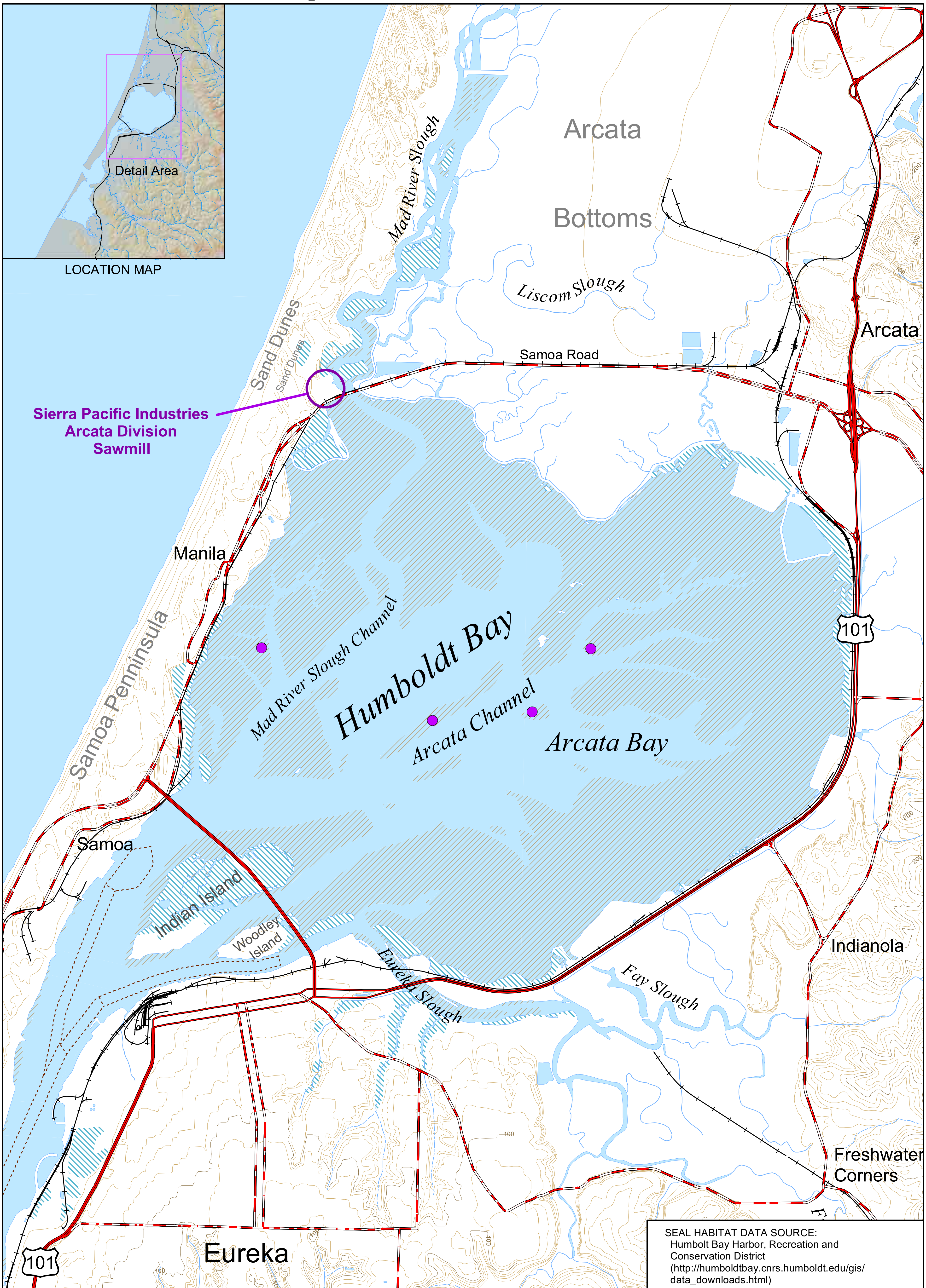
08-APR-2004 N:\ARCPRJ2\030229\PLT\APR04-SLERA\FIG3-12_SEAL-HAB.MXD



SEAL HABITAT DATA SOURCE:
Humbolt Bay Harbor, Recreation and Conservation District (http://humboldtbay.cnrs.humboldt.edu/gis/data_downloads.html)

Legend

Hydrology

- Perennial Stream
- Intermittent Stream
- Shoreline
- 1993 Channel
- Lake, Pond, River or Ocean
- Tidal Flat
- Marsh or Wetland

Transportation

- Highway (Undivided)
- Highway (Divided by Centerline)
- Primary Road (Undivided)
- Primary Road (Divided by Centerline)
- Railroad
- Seal Location

N

0 0.5 1

Miles

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FIGURE 3-12

ARCATA BAY AND MAD RIVER SLOUGH SEAL HABITAT

PROJECT: 030275.20	DATE: APR 08, 2004	
REV: 0	BY: CRL	CHECKED: SC

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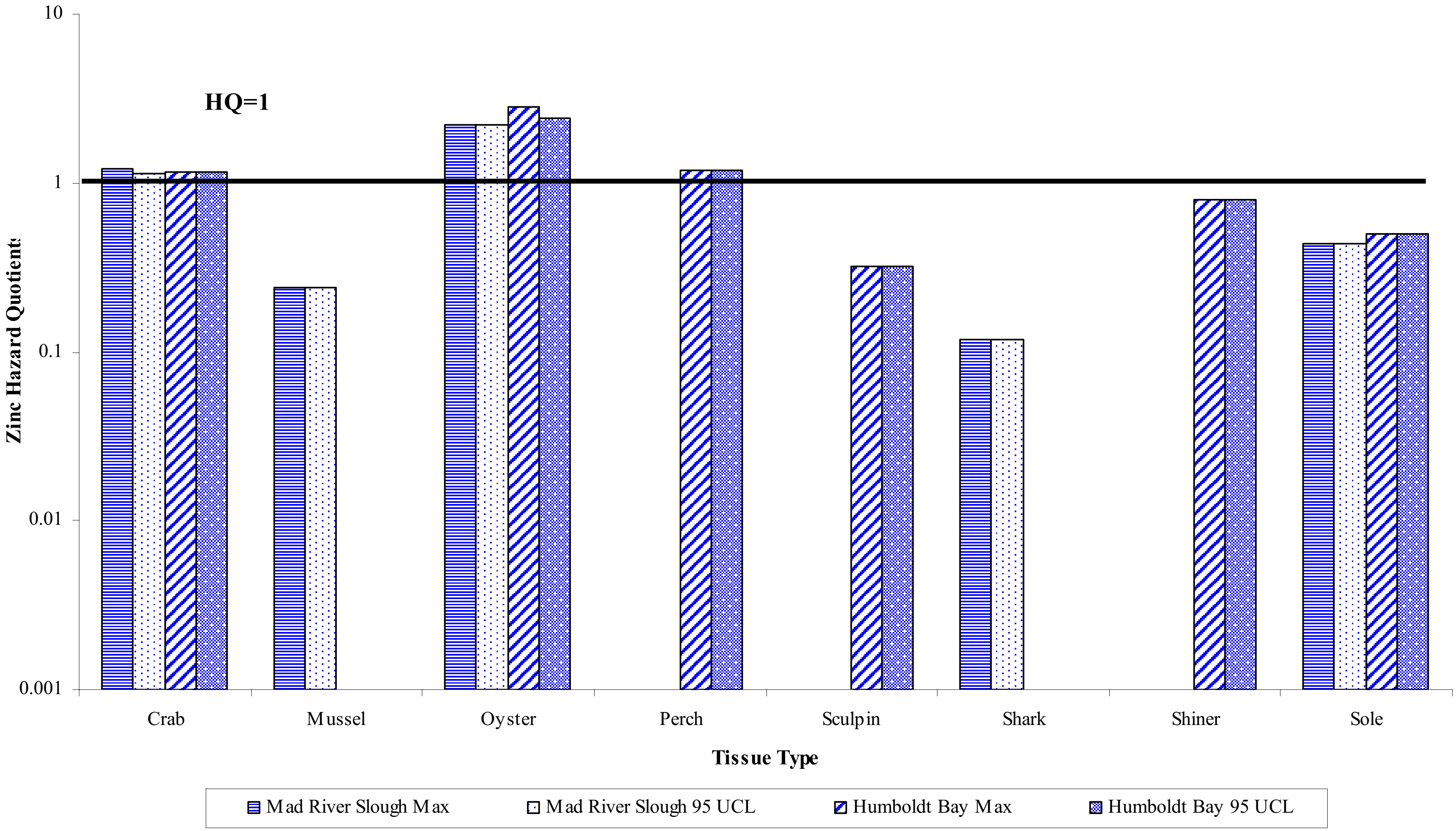

Hazard Quotients for Lower Toxicity Reference Value
95 UCL – 95 percent upper confidence limit

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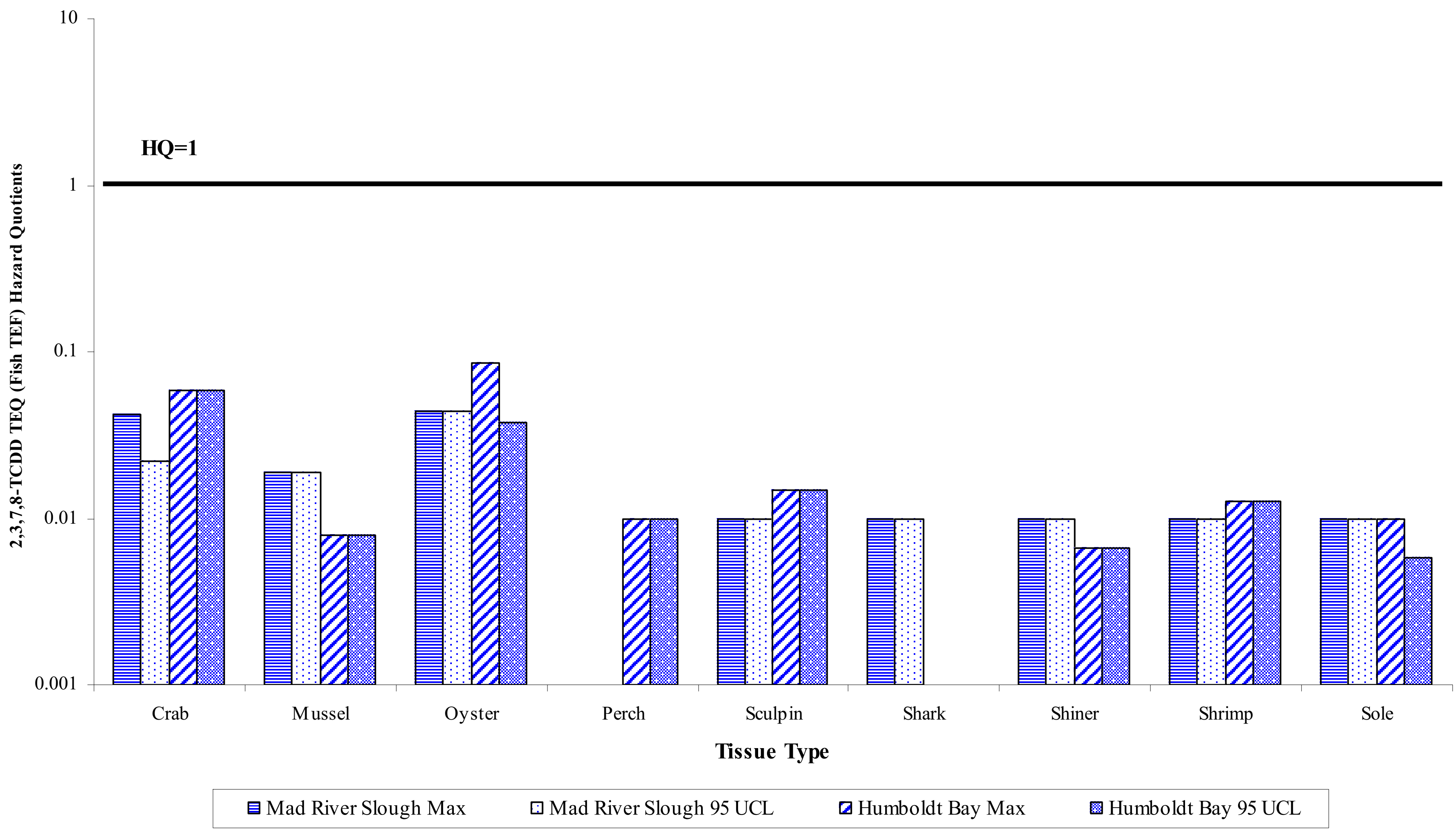
ARCATA DIVISION SAWMILL
Arcata, California

Figure 3-13 Hazard Quotients for Zinc in Biological Tissue for Mad River Slough and Humboldt Bay

GEOMATRIX



Hazard Quotients for Lower Toxicity Reference Value
95 UCL – 95 percent upper confidence limit

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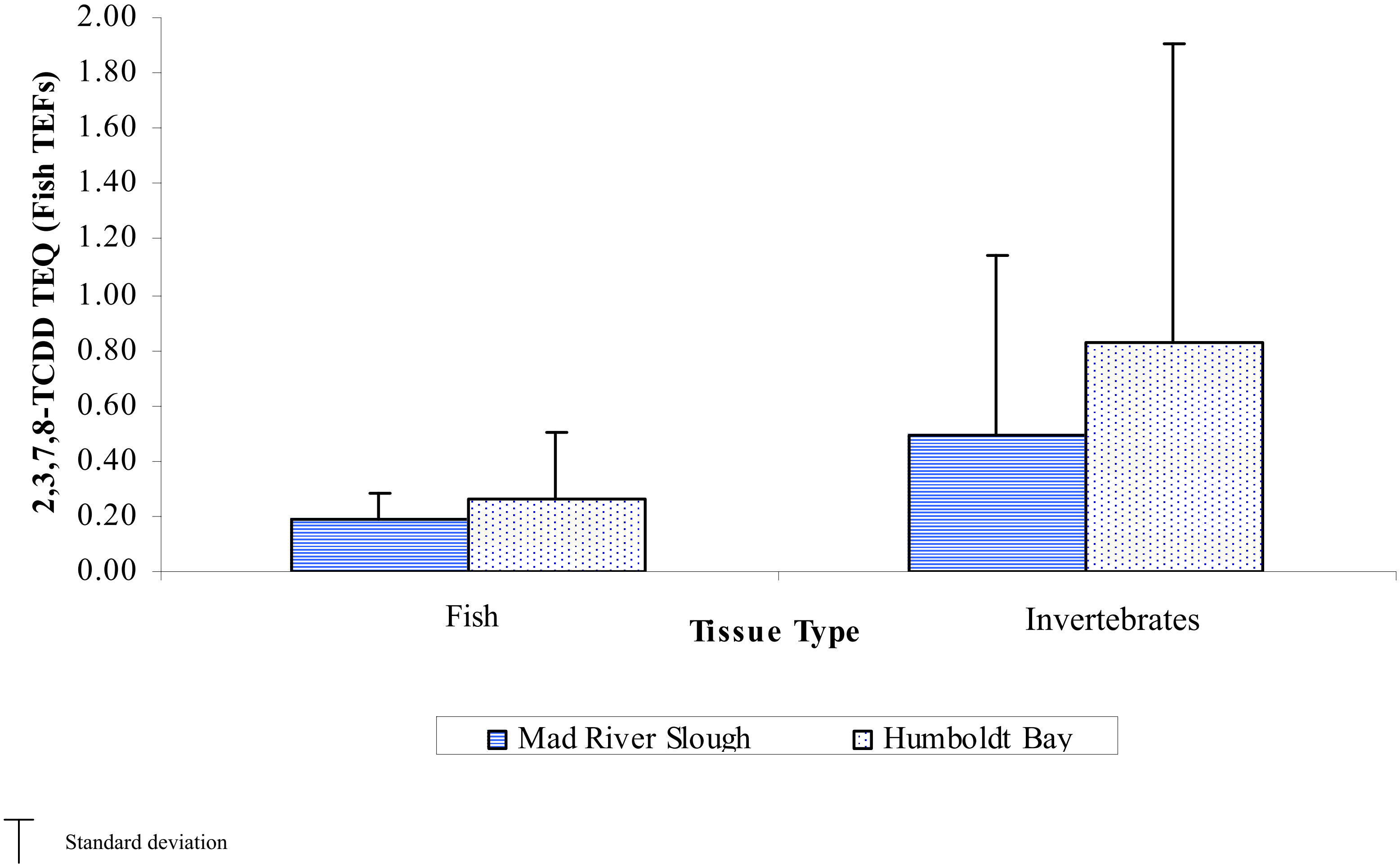
Arcata, California

Figure 3-14 Hazard Quotients for Toxicity Equivalents in Biological Tissue for Mad River Slough and Humboldt Bay

GEOMATRIX



2,3,7,8-TCDD TEQ (Fish TEFs) – 2,3,7,8-TCDD Toxicity Equivalents based on toxicity equivalency factors for fish

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Figure 3-15 Comparison of Mean Toxicity Equivalents for Mad River Slough and Humboldt Bay Fish and Invertebrate Tissues

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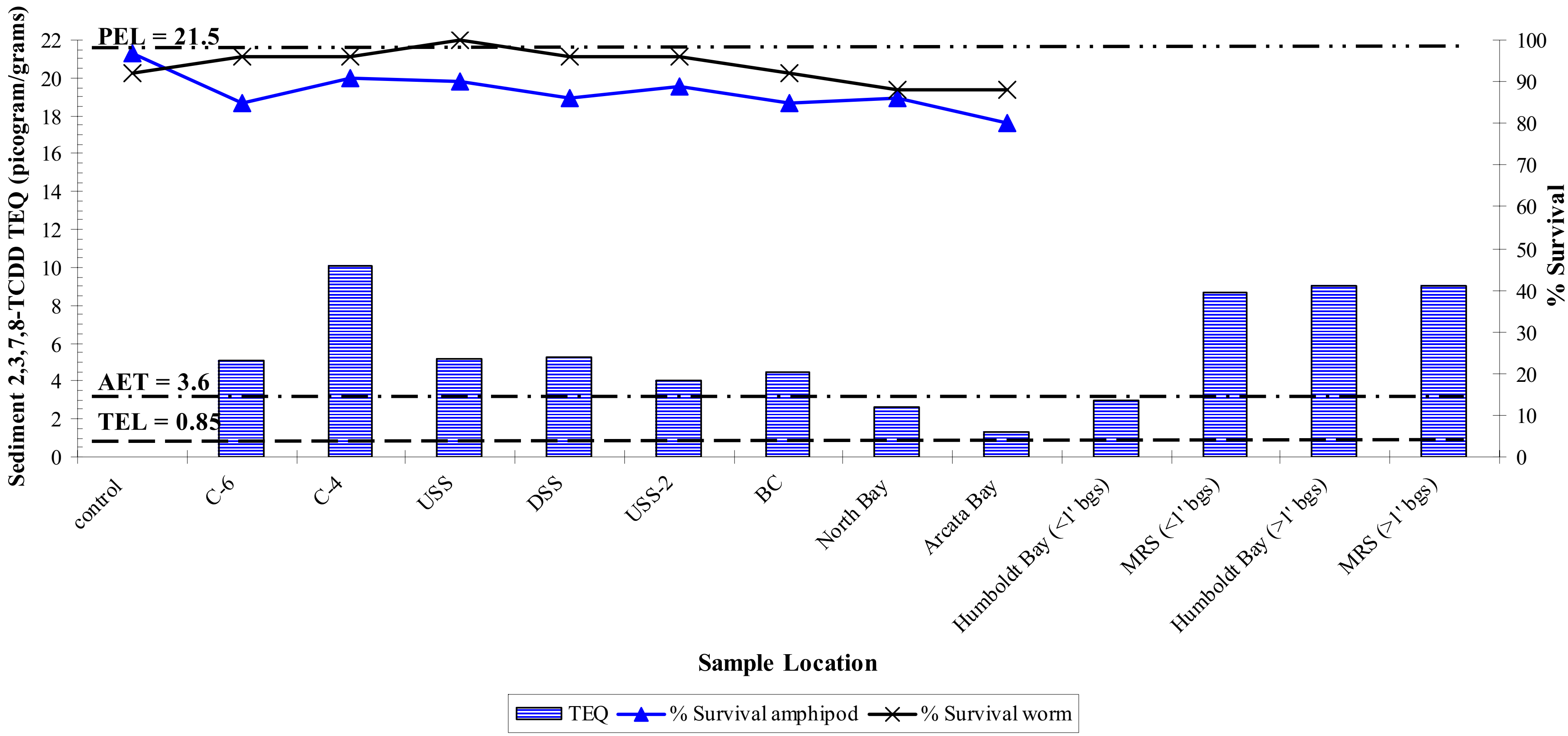

TEL = Threshold Effects Level (CCME 2001)
AET = Apparent Effects Threshold (NOAA 1999)
PEL = Probable Effects Level (CCME 2001)

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Arcata, California

Figure 3-16 Bioassay Sediment Toxicity Equivalents, Survival, and Effects Benchmarks for Mad River Slough and Humboldt Bay

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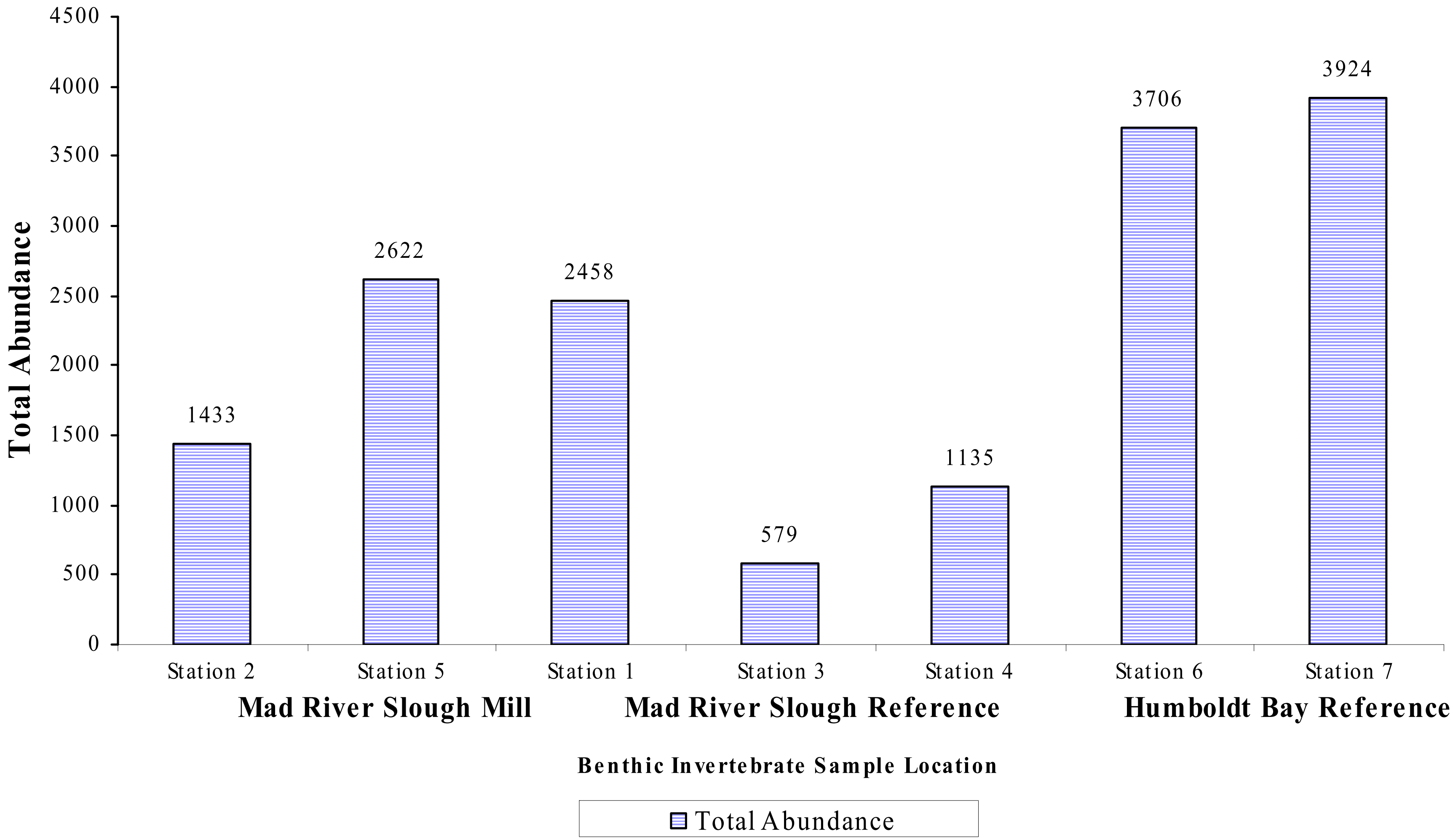
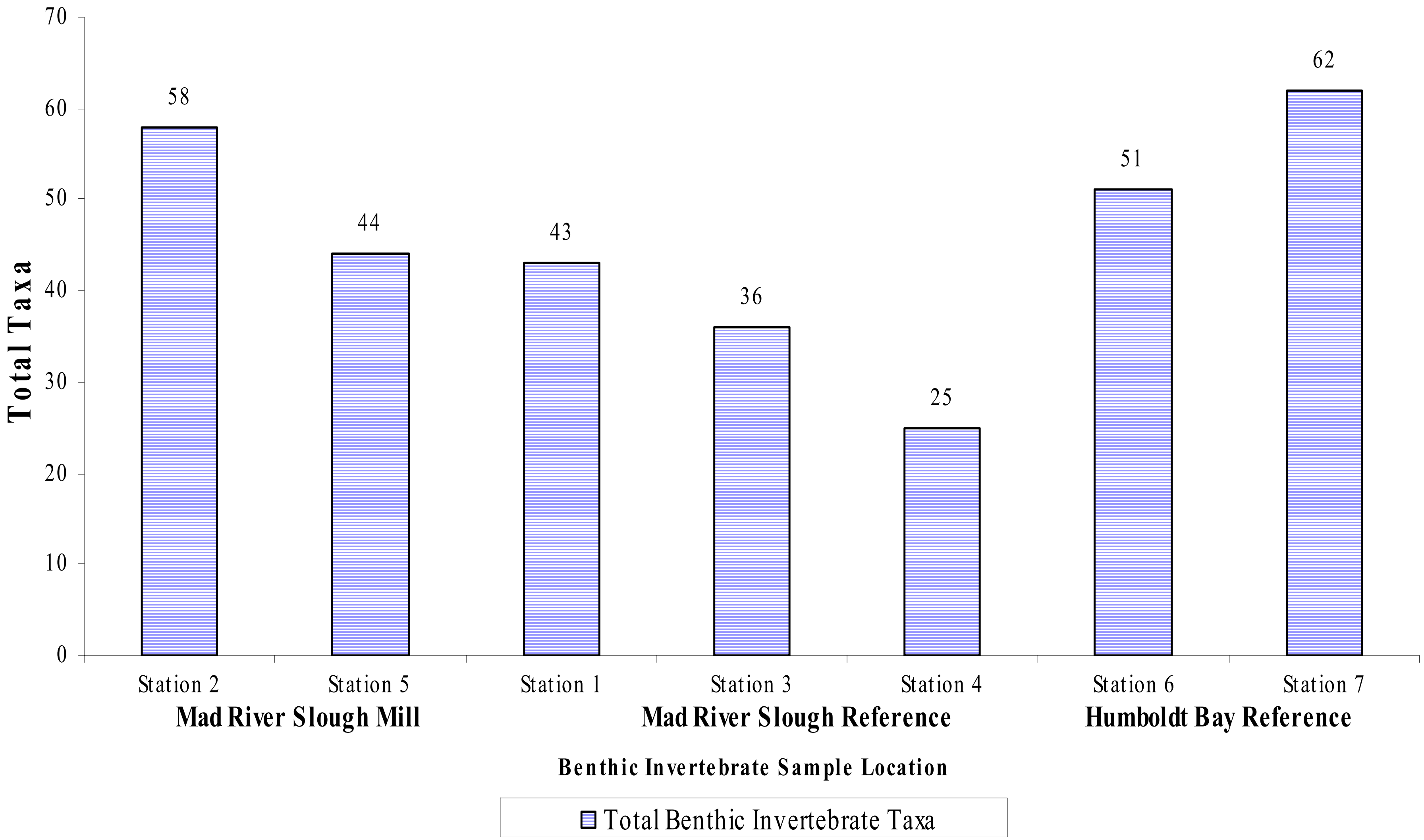
GEOMATRIX



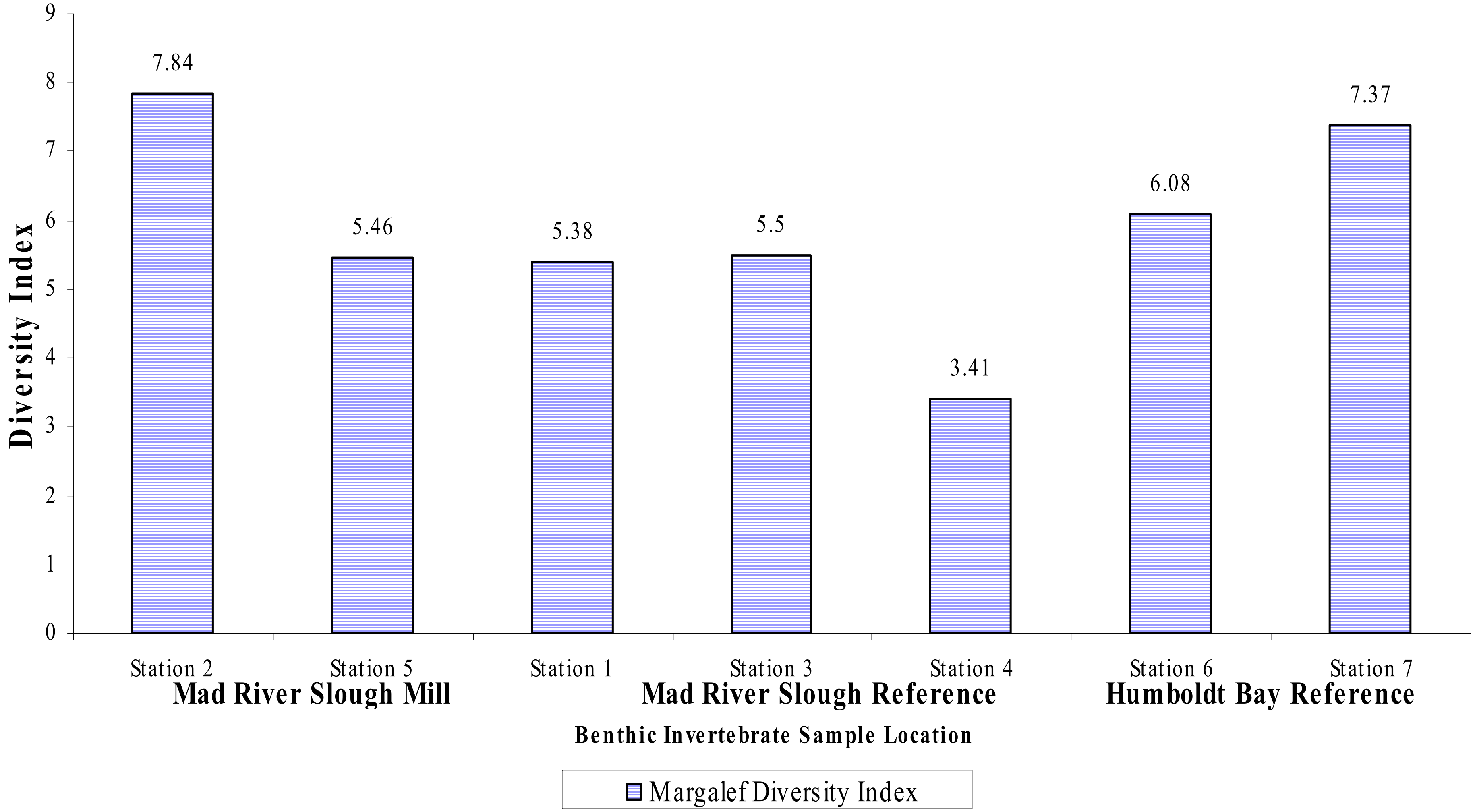
SIERRA PACIFIC INDUSTRIES ARCATA DIVISION SAWMILL Arcata, California	**Figure 3-17 Total Number of Benthic Invertebrate Abundance for Mad River Slough and Humboldt Bay**	GEOMATRIX



SIERRA PACIFIC INDUSTRIES
ARCATA DIVISION SAWMILL
Arcata, California

Figure 3-18 Total Number of Benthic Invertebrate Taxa for Mad River Slough and Humboldt Bay

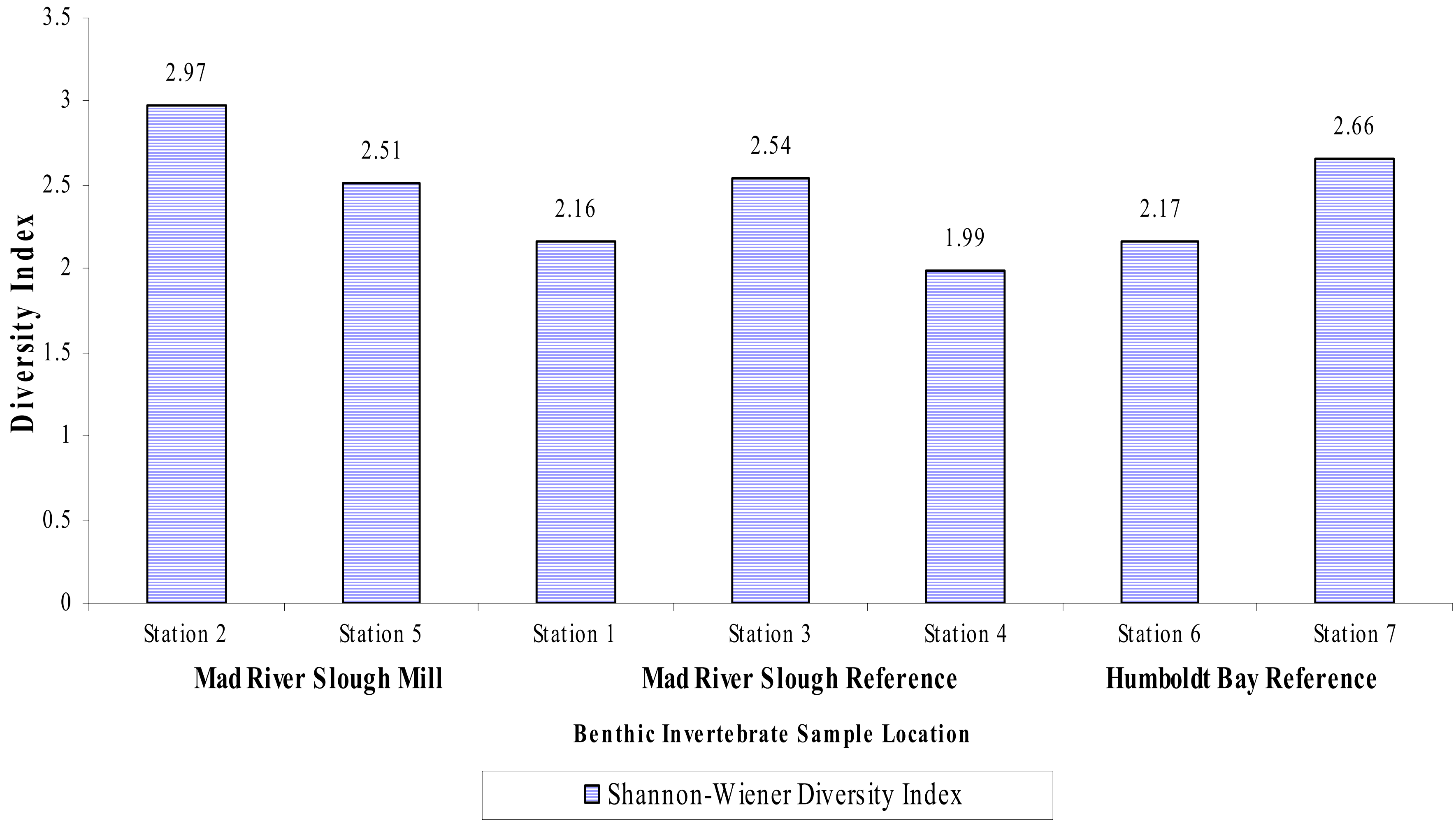
GEOMATRIX



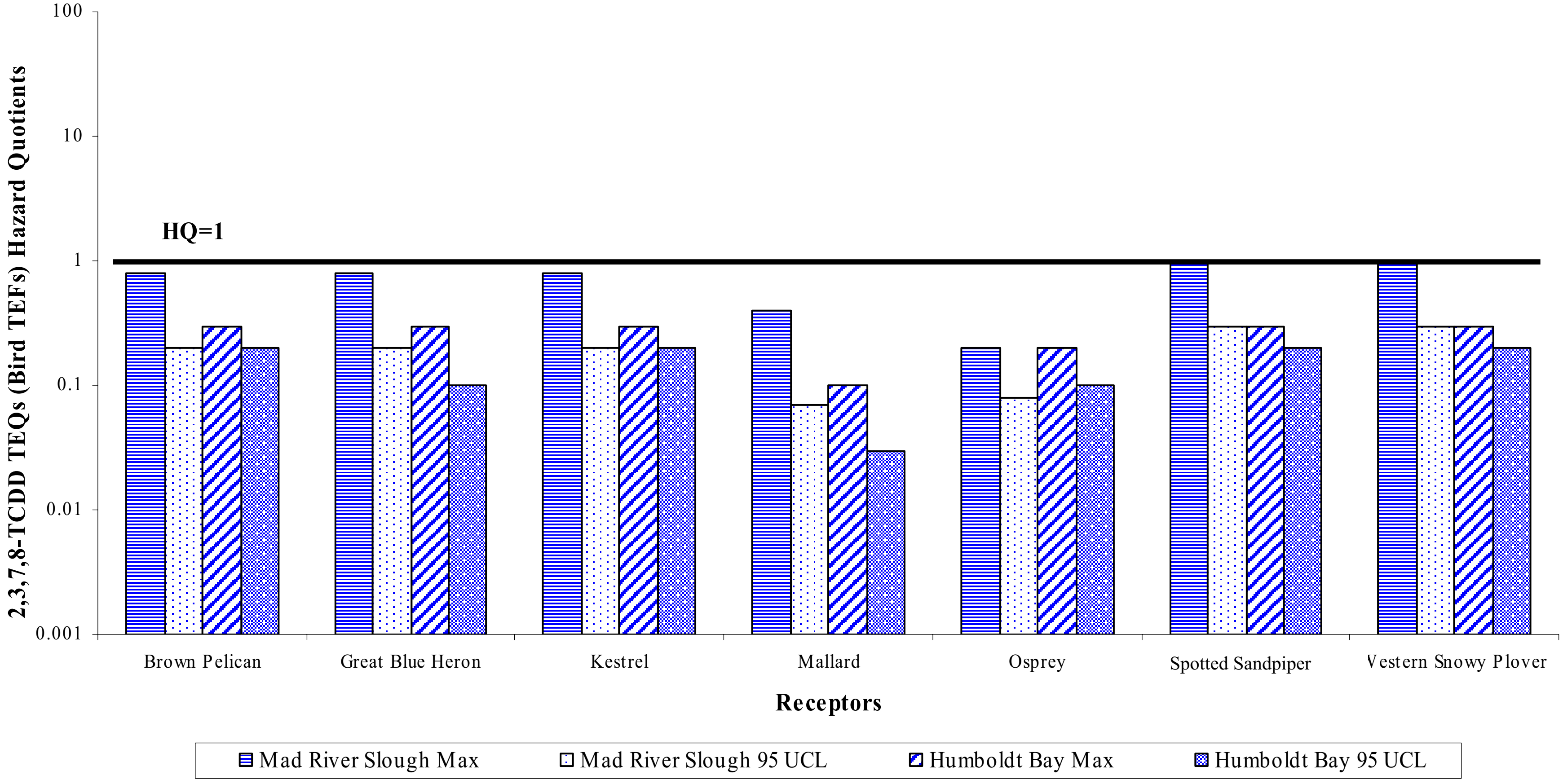
SIERRA PACIFIC INDUSTRIES
ARCATA DIVISION SAWMILL
Arcata, California

Figure 3-19 Total Benthic Invertebrate Margalef Diversity Index for Mad River Slough and Humboldt Bay

GEOMATRIX



SIERRA PACIFIC INDUSTRIES ARCATA DIVISION SAWMILL Arcata, California	**Figure 3-20 Total Benthic Invertebrate Shannon-Wiener Diversity Index for Mad River Slough and Humboldt Bay**	GEOMATRIX



95 UCL = 95 percent upper confidence limit
2,3,7,8 = TCDD TEQ (Bird TEFs) – 2,3,7,8-TCDD Toxicity Equivalents based on toxicity equivalency factors for birds.
HQ = Hazard Quotient
NOAEL = No observable adverse effects level

Revised 7/23/07

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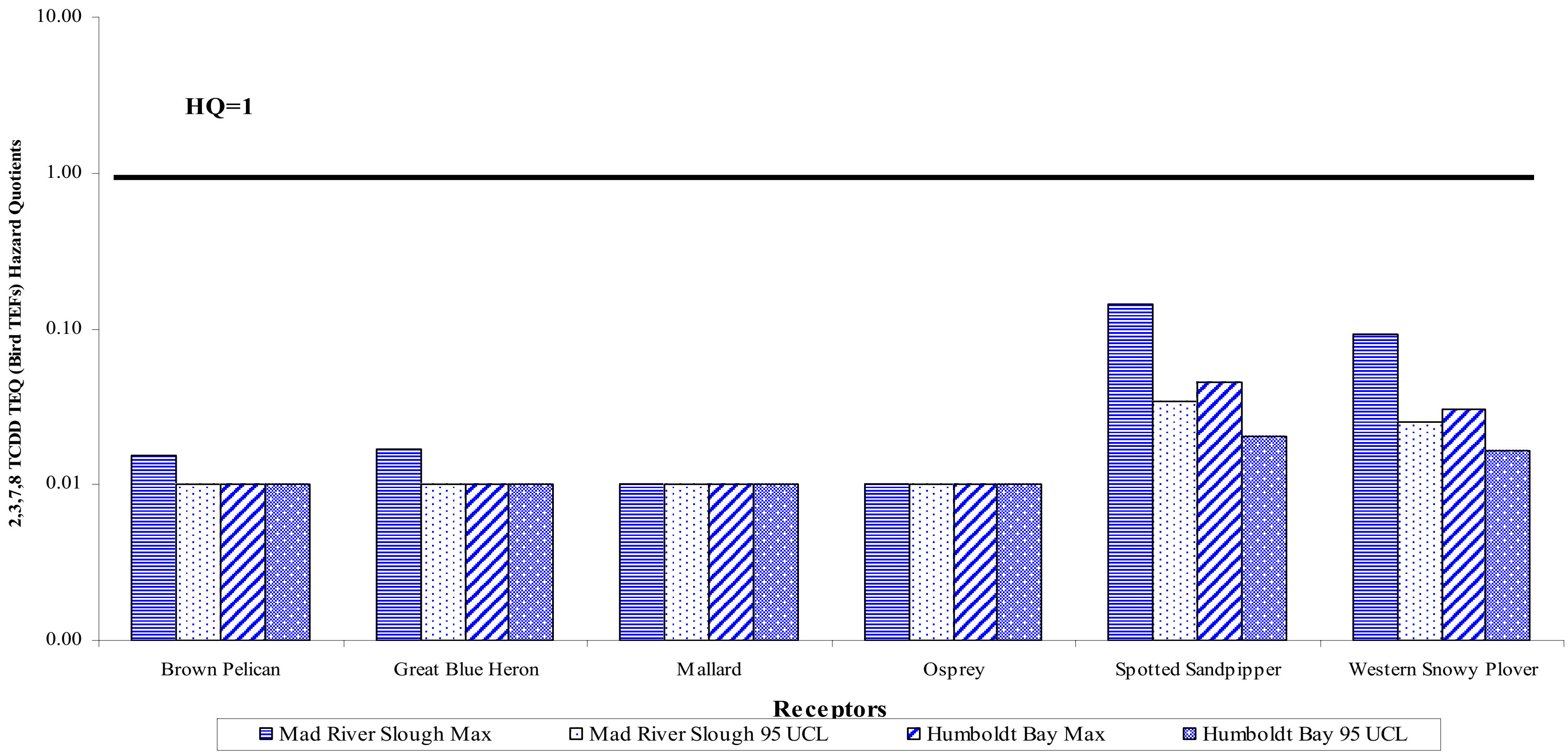
Arcata, California

Figure 3-21 Bird NOAEL Hazard Quotients for Toxicity Equivalents in Mad River Slough and Humboldt Bay

GEOMATRIX



95 UCL – 95 percent upper confidence limit
2,3,7,8-TCDD TEQ (Bird TEFs) – 2,3,7,8-TCDD toxicity equivalents based on toxicity equivalency factors for birds
LOAEL – Lowest observable adverse effects level

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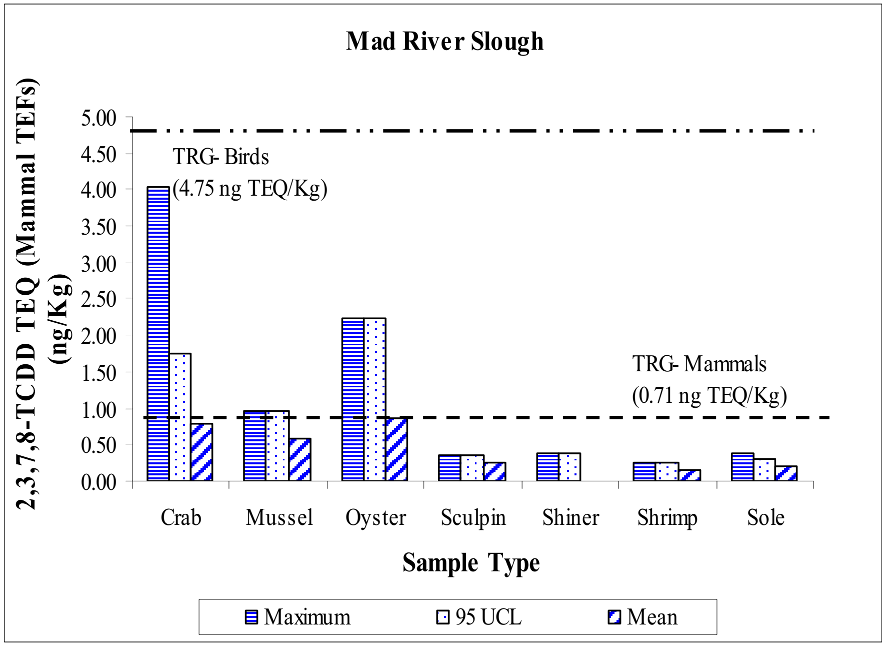
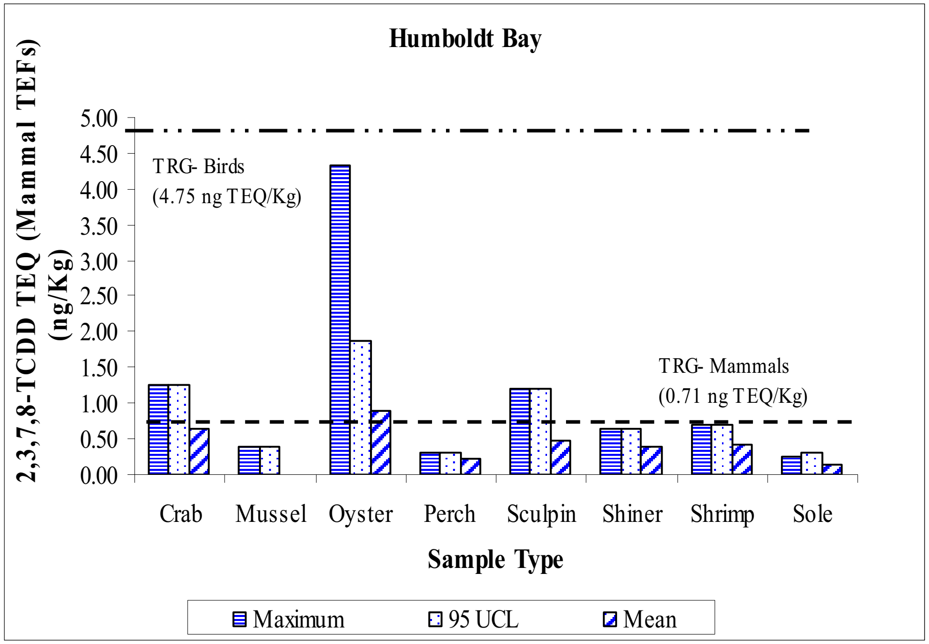
Figure 3-22 Bird LOAEL Hazard Quotients for Toxicity Equivalents in Mad River Slough and Humboldt Bay





TRG - Tissue Residue Guidelines from Environment Canada (2000)
95 UCL – 95 percent upper confidence limit
2,3,7,8-TCDD TEQ (Mammal TEFs) – 2,3,7,8-TCDD toxicity equivalents based on toxicity equivalency factors for mammals

Revised 7/23/07

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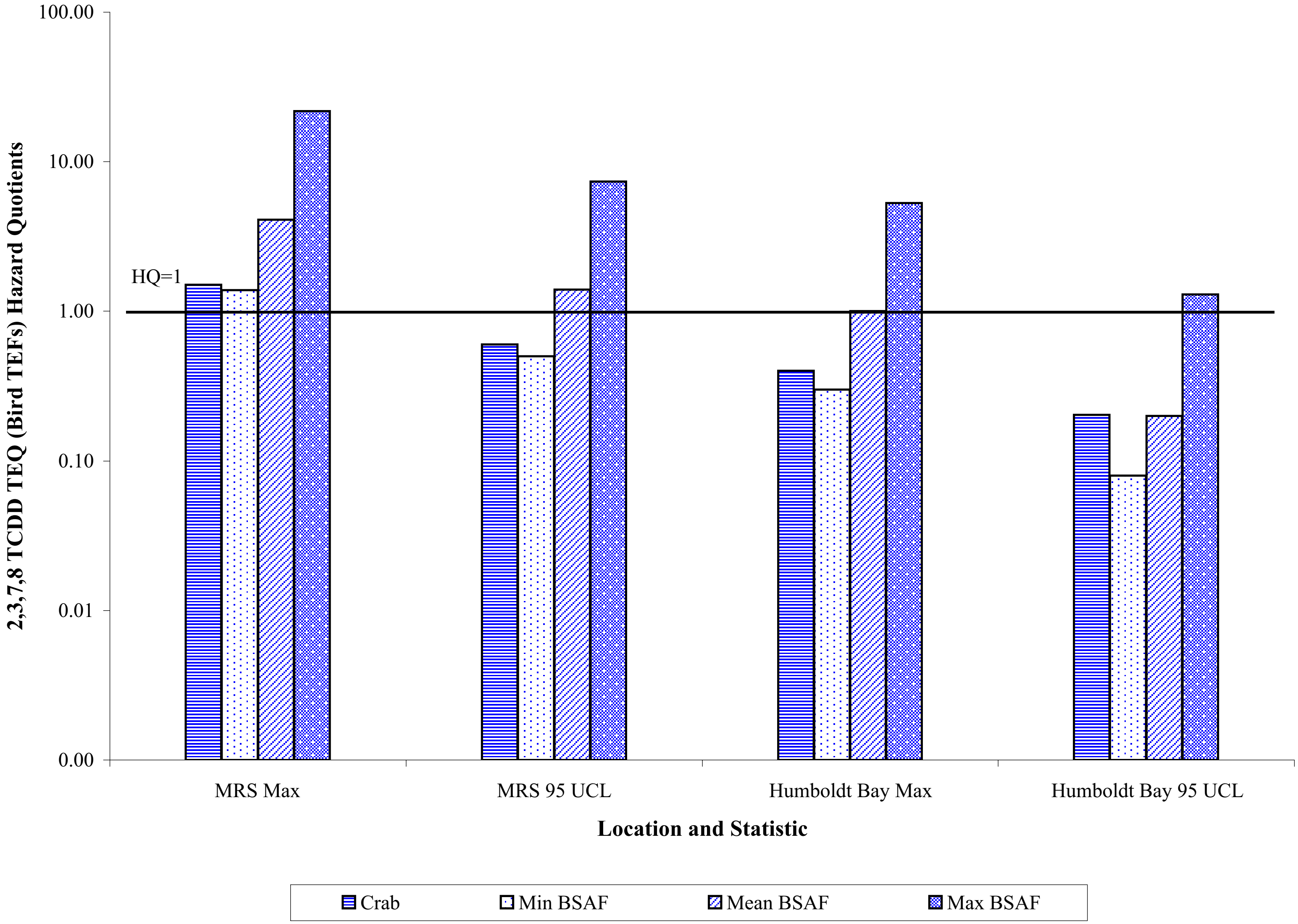
Arcata, California

Figure 3-23 Toxicity Equivalents in Aquatic Species From Mad River Slough and Humboldt Bay

GEOMATRIX



95 UCL – 95 percent upper confidence limit
2,3,7,8-TCDD TEQ (Bird TEFs) – 2,3,7,8-TCDD toxicity equivalents based on toxicity equivalency factors for birds
BSAF – Biota-Sediment Accumulation Factor
NOAEL – No observable adverse effect level

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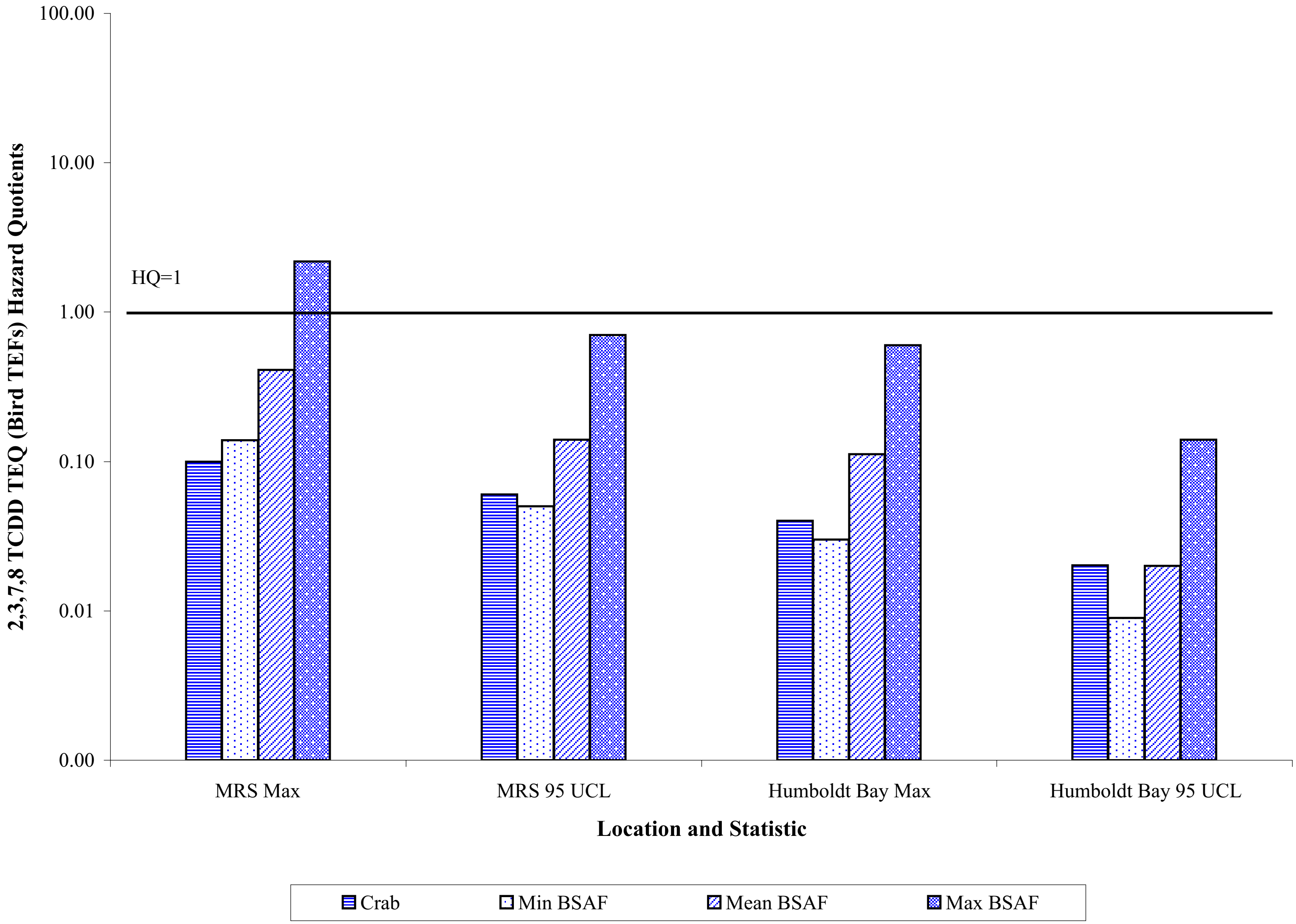
Figure 3-24 Spotted Sandpiper NOAEL Hazard Quotients in Mad River Slough and Humboldt Bay

GEOMATRIX



95 UCL – 95 percent upper confidence limit
2,3,7,8-TCDD TEQ (Bird TEFs) – 2,3,7,8-TCDD toxicity equivalents based on toxicity equivalency factors for birds
BSAF – Biota-Sediment Accumulation Factor
LOAEL – Lowest observable adverse effect level

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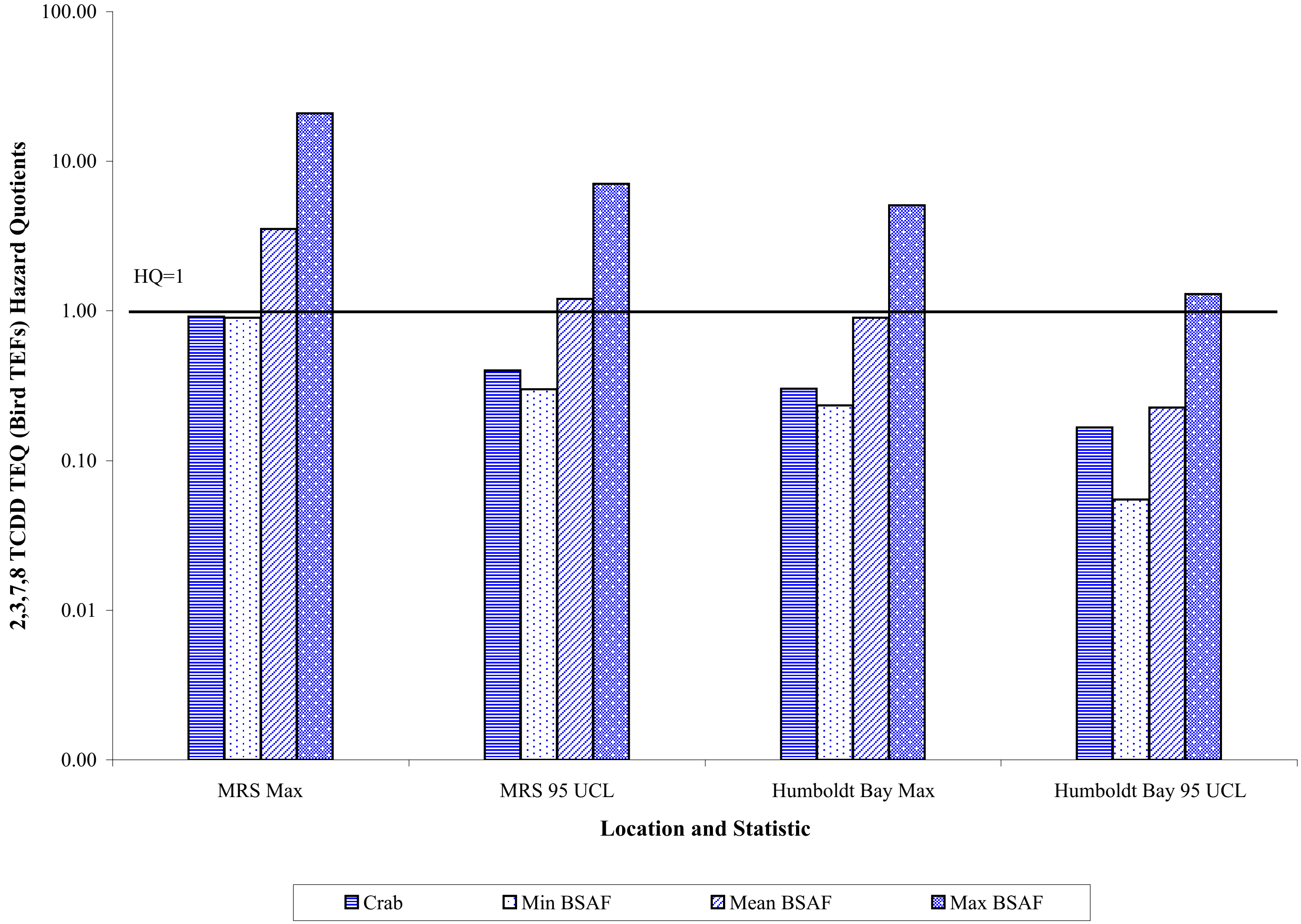
Figure 3-25 Spotted Sandpiper LOAEL Hazard Quotients in Mad River Slough and Humboldt Bay

GEOMATRIX



95 UCL – 95 percent upper confidence limit
2,3,7,8-TCDD TEQ (Bird TEFs) – 2,3,7,8-TCDD toxicity equivalents based on toxicity equivalency factors for birds
BSAF – Biota-Sediment Accumulation Factor
NOAEL – No observable adverse effect level

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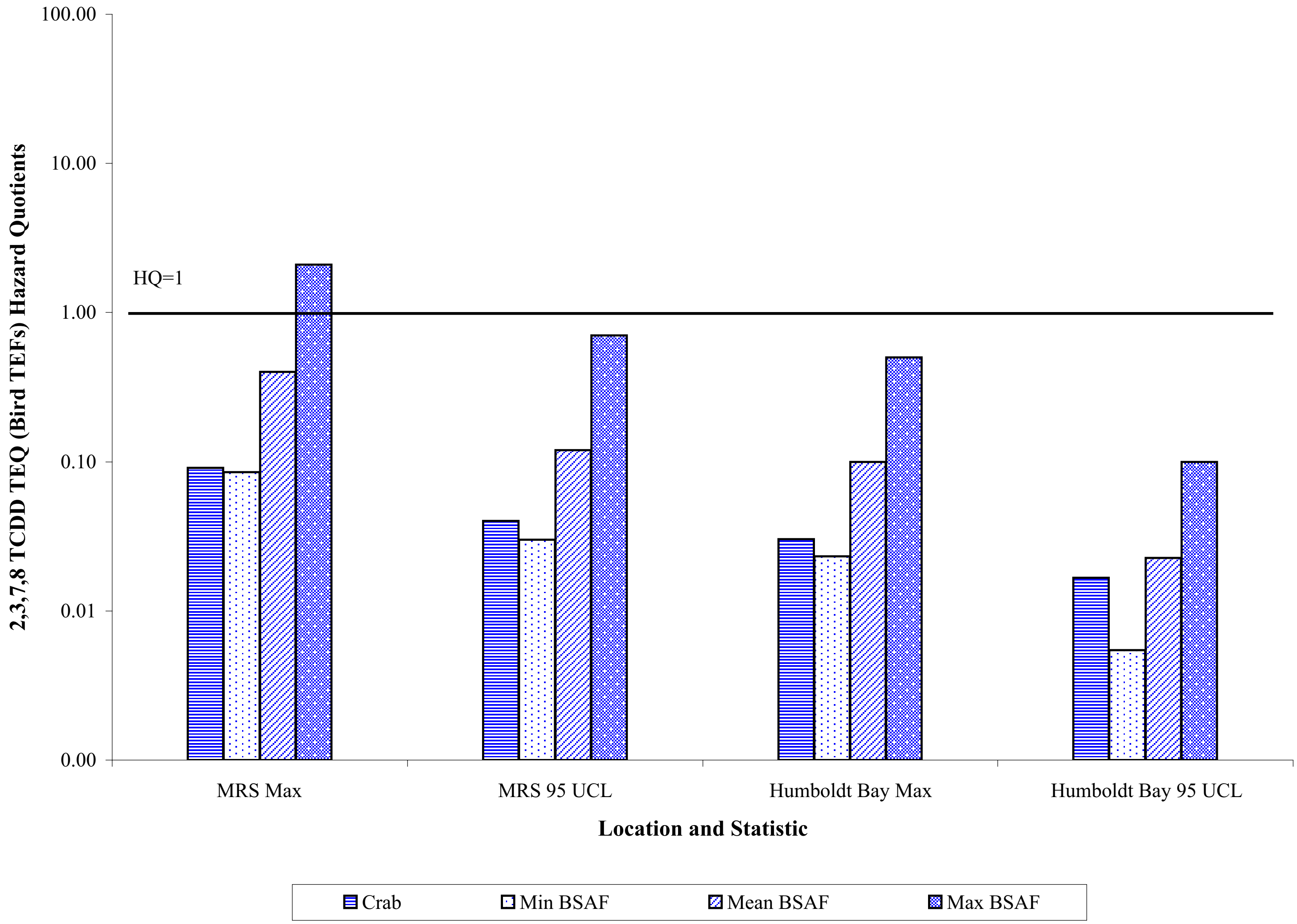
Figure 3-26 Western Snowy Plover NOAEL Hazard Quotients in Mad River Slough and Humboldt Bay

GEOMATRIX



95 UCL – 95 percent upper confidence limit
2,3,7,8-TCDD TEQ (Bird TEFs) – 2,3,7,8-TCDD toxicity equivalents based on toxicity equivalency factors for birds
BSAF – Biota-Sediment Accumulation Factor
LOAEL – Lowest observed adverse effect level

Revised 7/23/07

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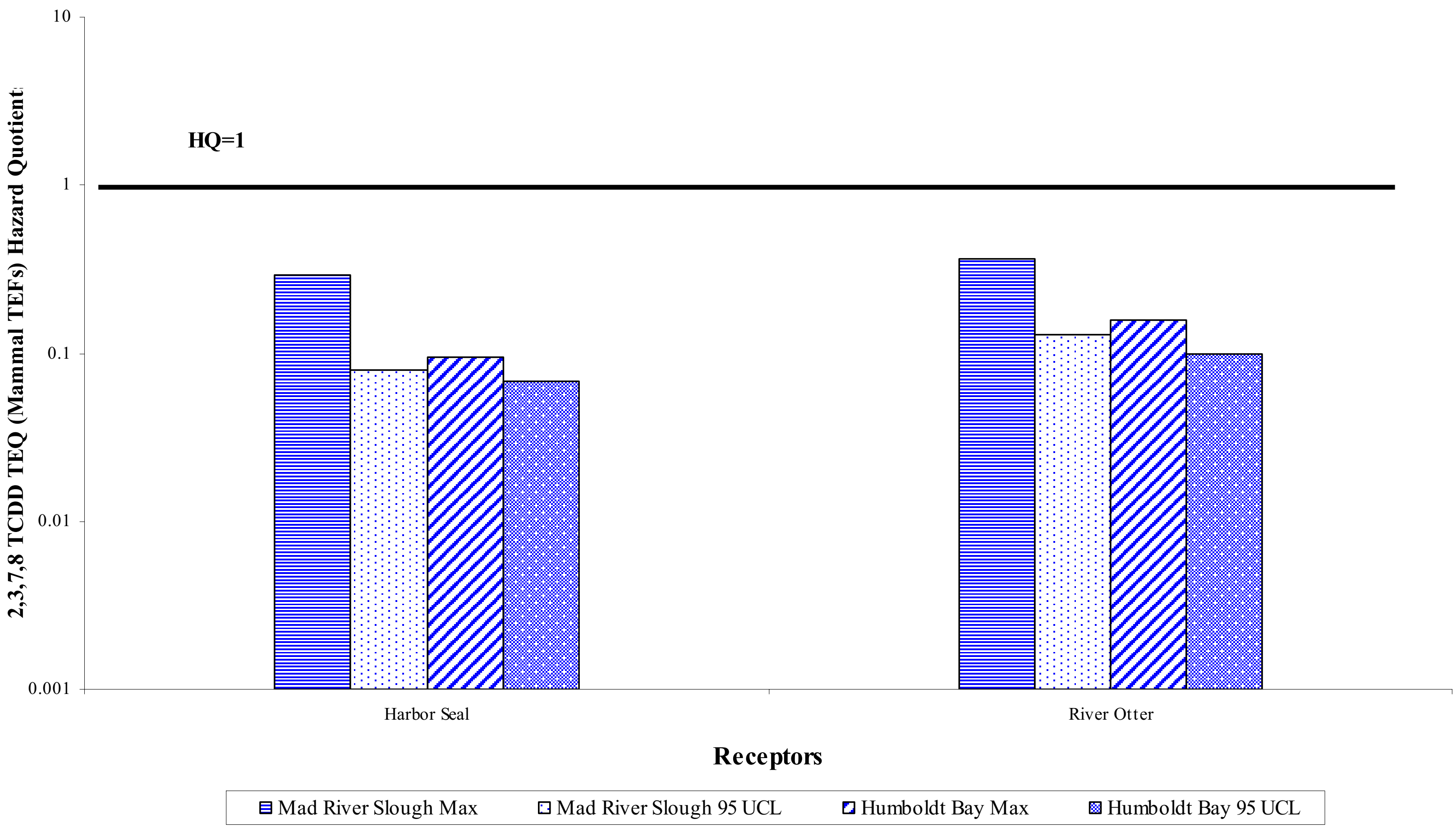
ARCATA DIVISION SAWMILL
Arcata, California

Figure 3-27 Western Snowy Plover LOAEL Hazard Quotients in Mad River Slough and Humboldt Bay

GEOMATRIX



95 UCL – 95 percent upper confidence limit
2,3,7,8-TCDD TEQ (Mammal TEFs) – 2,3,7,8-TCDD toxicity equivalents based on toxicity equivalency factors for mammals
BSAF – Biota-Sediment Accumulation Factor
NOAEL –No observable adverse effect level

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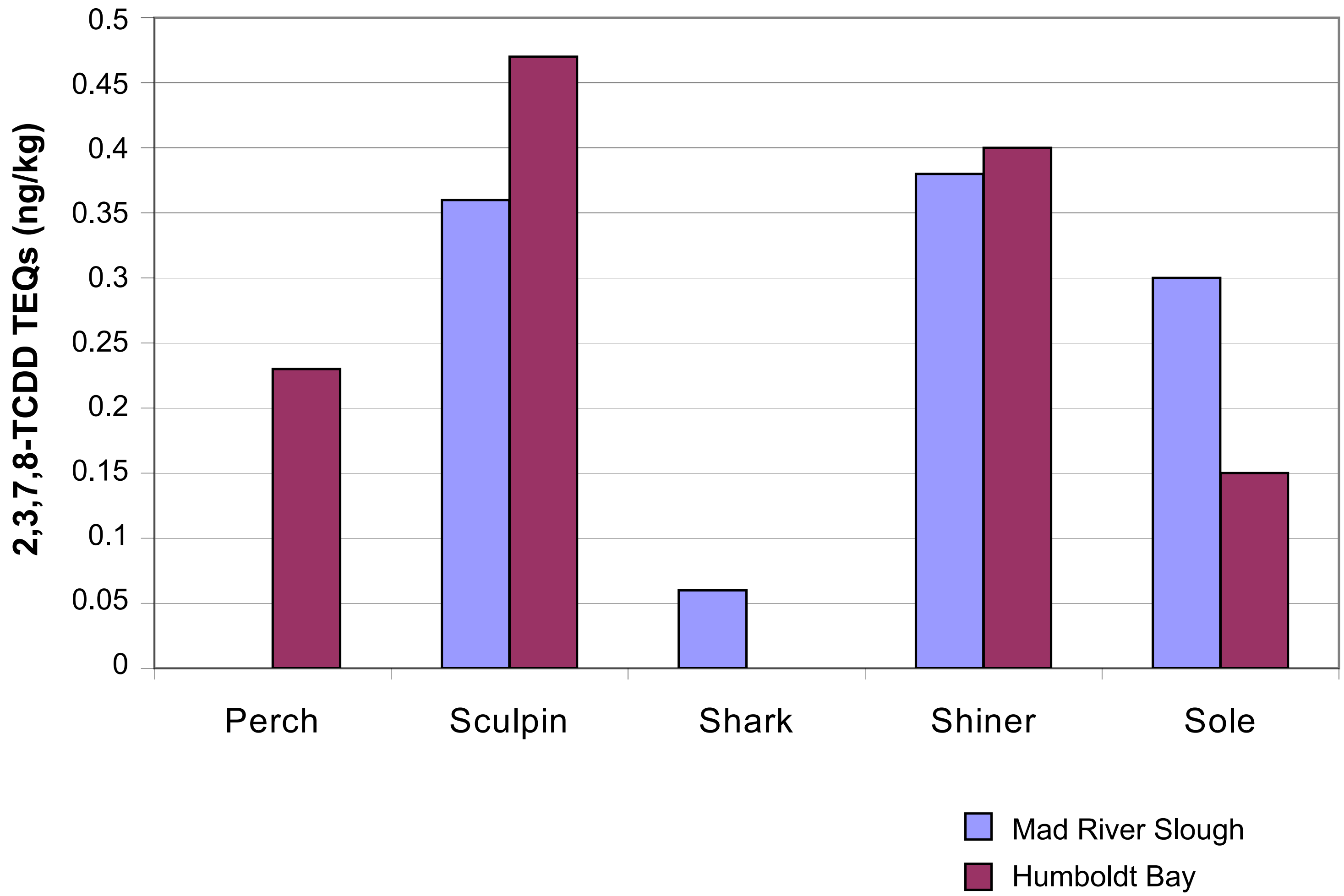
ARCATA DIVISION SAWMILL
Arcata, California

Figure 3-28 Mammal NOAEL Hazard Quotients for Toxicity Equivalents in Mad River Slough and Humboldt Bay

GEOMATRIX



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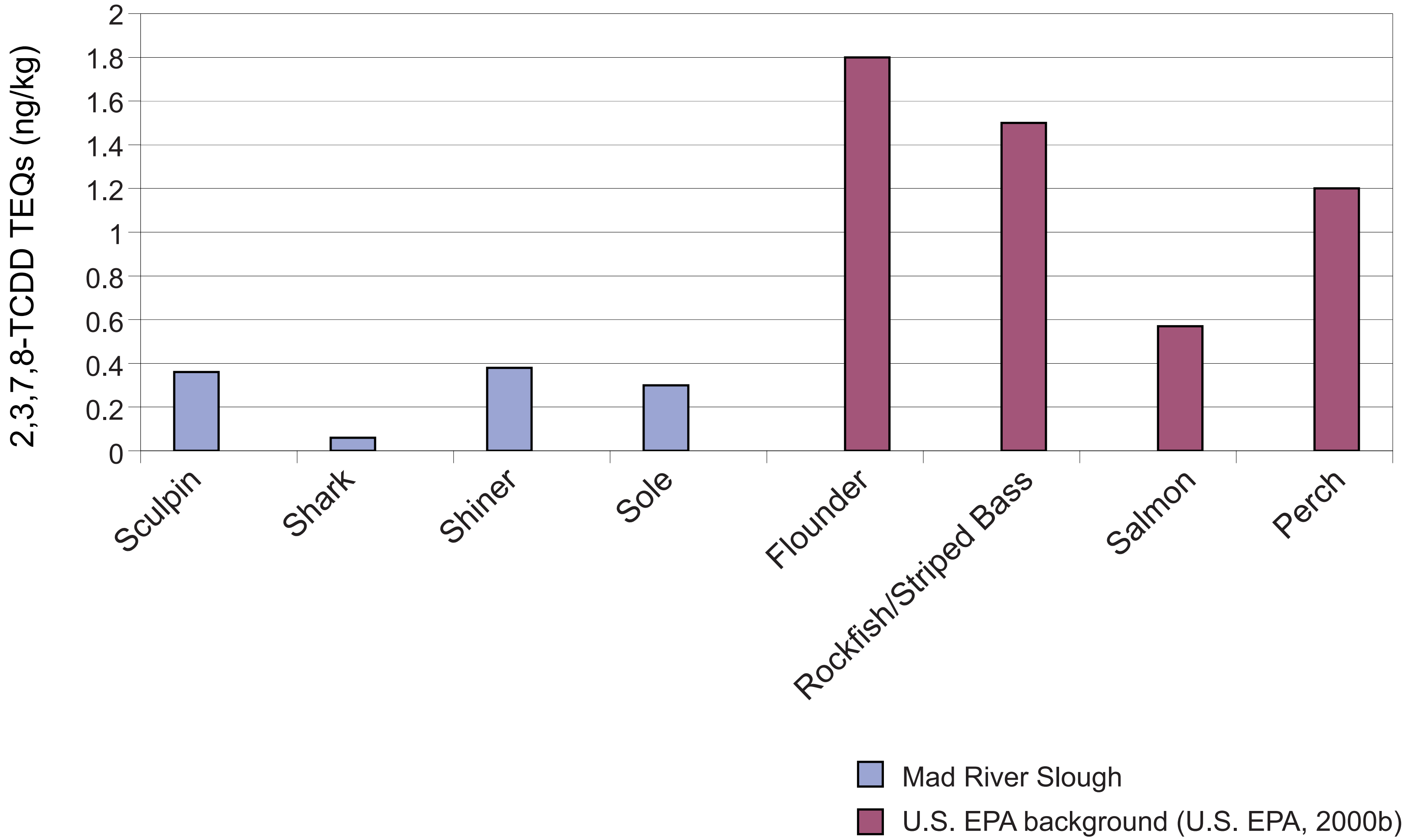
ARCATA DIVISION SAWMILL
Arcata, California

Figure 4-1 Comparision of Average Toxicity Equivalents in Fish Tissue from Mad River Slough and Humboldt Bay

GEOMATRIX



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Arcata, California

Figure 4-2 Comparison of Average Toxicity Equivalents in Fish Tissue from Mad River Slough to Background Concentrations in the United States

consulting scientists and engineers

GEOMATRIX

APPENDIX A

Data Summary

Table A-1	Summary of Semivolatile Organic Compound Analytical Results
Table A-2	Summary of Pesticide Analytical Results
Table A-3	Summary of Polychlorinated Biphenyl Analytical Results
Table A-4A	Summary of Polycyclic Aromatic Hydrocarbon Analytical Results – Sediment and Tissue
Table A-4B	Summary of Polycyclic Aromatic Hydrocarbon Analytical Results – Water
Table A-5	Summary of Dioxin/Furan Analytical Results
Table A-6	Summary of Metal Analytical Results
Table A-7A	Summary of Total Petroleum Hydrocarbon Analytical Results – Sediment
Table A-7B	Summary of Total Petroleum Hydrocarbon Analytical Results – Water
Table A-8A	Summary of Volatile Organic Compound Analytical Results – Sediment
Table A8-B	Summary of Volatile Organic Compound Analytical Results – Water

TABLE A-1

SUMMARY OF SEMIVOLATILE ORGANIC COMPOUND ANALYTICAL RESULTS
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	1,2,4-Trichloro-benzene	1,2-Dichloro-benzene	1,2-Diphenyl-hydrazine	1,3-Dichloro-benzene	1,4-Dichloro-benzene	2,3,4,5-Tetra-chloro-phenol	2,3,4,6-Tetra-chloro-phenol	2,3,5,6-Tetra-chloro-phenol	2,4,5-Trichloro-phenol	2,4,6-Trichloro-phenol	2,4-Dichloro-phenol	2,4-Dimethyl-phenol	2,4-Dinitro-phenol	2,4-Dinitro-toluene	2,6-Dinitro-toluene	2-Chloro-naph-thalene	2-Chloro-phenol
					Number Detected	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STAR 1	DM-0032	Humboldt Bay	Crab	Wet	10/24/2002	<20	<20	<20	<20	<20	NA	NA	NA	<20	<20	<20	<20	<20	<20	<20	<20	<20
STAR 10	DM-0074	Humboldt Bay	Crab	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
STAR 2	DM-0033	Mill Area	Crab	Wet	10/24/2002	<20	<20	<20	<20	<20	NA	NA	NA	<20	<20	<20	<20	<20	<20	<20	<20	<20
STAR 3	DM-0034	Mill Area	Crab	Wet	10/24/2002	<20	<20	<20	<20	<20	NA	NA	NA	<20	<20	<20	<20	<20	<20	<20	<20	<20
STAR 4	DM-0035	Mill Area	Crab	Wet	10/24/2002	<20	<20	<20	<20	<20	NA	NA	NA	<20	<20	<20	<20	<20	<20	<20	<20	<20
STAR 6	DM-0061	Humboldt Bay	Crab	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
STAR 7	DM-0059	Mill Area	Crab	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
STAR 8	DM-0058	Mill Area	Crab	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 4	020621-NBSCM	Mill Area	Mussel	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 4	DM-0023	Mill Area	Mussel	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 1	020621-EBAY-6-2	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 1	DM-0003	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 10a	DM-0007	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 10b	020621-BIS	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 10b	DM-0009	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 2	020621-EBAY-1-2	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 2	DM-0001	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 3	020621-NBSC	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 3	DM-0015a	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 3	DM-0015b	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 4	020621-NBSC 02	Mill Area	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 4	DM-0021	Mill Area	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 4	DM-0025	Mill Area	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 5	020621-MR-7-1	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 5	DM-0017	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 6	020621-MR-7-2	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 6	DM-0019	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 7	020621-SIN	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 7	DM-0013	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 8	020621-SIN-1-2	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 8	DM-0011	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 9	020621-BIN	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 9	DM-0005	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
TRAWL 18	DM-0079	Humboldt Bay	Perch	Wet	10/25/2002	<6.6	<6.6	<6.6	<6.6	<6.6	NA	NA	NA	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6
STAR 5	DM-0036	Humboldt Bay	Sculpin	Wet	10/24/2002	<20	<20	<20	<20	<20	NA	NA	NA	<20	<20	<20	<20	<20	<20	<20	<20	<20
C-02	C2-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-02	C2-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-03	C3-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-03	C3-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-04	C4-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-04	C4-1.0-1.8	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-05	C5-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-05	C5-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-06	C6-0-0.5	Mill Area	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-15	C15-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-18	C18-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-18	C18-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-19	C19-0.0-0.5	Mill Area	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-31	C31-0.0-0.5	Mill Area	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-32	C32-0.0-0.5	Mill Area	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99

TABLE A-1

SUMMARY OF SEMIVOLATILE ORGANIC COMPOUND ANALYTICAL RESULTS
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	1,2,4-Trichloro-benzene	1,2-Dichloro-benzene	1,2-Diphenyl-hydrazine	1,3-Dichloro-benzene	1,4-Dichloro-benzene	2,3,4,5-Tetra-chloro-phenol	2,3,4,6-Tetra-chloro-phenol	2,3,5,6-Tetra-chloro-phenol	2,4,5-Trichloro-phenol	2,4,6-Trichloro-phenol	2,4-Dichloro-phenol	2,4-Dimethyl-phenol	2,4-Dinitro-phenol	2,4-Dinitro-toluene	2,6-Dinitro-toluene	2-Chloro-naph-thalene	2-Chloro-phenol
					Number Detected	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C-35	C35-0-0.5	Mill Area	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-39	C39-0-0.5	Mill Area	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-40-2	C40-2-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-40-2	C40-2-1.5-2.0	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-41	C41-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-41	C41-1.5-2.0	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-42	C42-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-42	C42-1.0-1.8	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-43	C43-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-43	C43-1.0-1.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-44	C44-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-44	C44-1.5-2.0	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
D6-1	D6-1-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D6-10	D6-10-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D6-11	D6-11-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D6-12	D6-12-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D6-13	D6-13-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D6-14	D6-14-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D6-15	D6-15-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D6-16	D6-16-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D6-17	D6-17-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D6-18	D6-18-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D6-19	D6-19-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D6-2	D6-2-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D6-20	D6-20-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D6-21	D6-21-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D6-22	D6-22-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D6-23	D6-23-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D6-24	D6-24-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D6-3	D6-3-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D6-4	D6-4-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D6-5	D6-5-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D6-6	D6-6-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D6-7	D6-7-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D6-8	D6-8-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D6-9	D6-9-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D6-10B	D6-10B-1.0	Upland Mill Area	Sediment	Wet	6/8/2004	<0.05	<0.05	NA	<0.05	<0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-15B	D6-15B-1.0	Upland Mill Area	Sediment	Wet	6/8/2004	<0.05	<0.05	NA	<0.05	<0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-23B	D6-23B-1.0	Upland Mill Area	Sediment	Wet	6/8/2004	<0.05	<0.05	NA	<0.05	<0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-25B	D6-25B-1.0	Upland Mill Area	Sediment	Wet	6/8/2004	<0.05	<0.05	NA	<0.05	<0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-2B	D6-2B-1.0	Upland Mill Area	Sediment	Wet	6/8/2004	<0.05	<0.05	NA	<0.05	<0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-6B	D6-6B-1.0	Upland Mill Area	Sediment	Wet	6/8/2004	<0.05	<0.05	NA	<0.05	<0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-1	D7-1-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D7-10	D7-10-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D7-11	D7-11-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D7-12	D7-12-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D7-13	D7-13-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D7-14	D7-14-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D7-15	D7-15-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D7-16	D7-16-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA

TABLE A-1

SUMMARY OF SEMIVOLATILE ORGANIC COMPOUND ANALYTICAL RESULTS
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	1,2,4-Trichloro-benzene	1,2-Dichloro-benzene	1,2-Diphenyl-hydrazine	1,3-Dichloro-benzene	1,4-Dichloro-benzene	2,3,4,5-Tetra-chloro-phenol	2,3,4,6-Tetra-chloro-phenol	2,3,5,6-Tetra-chloro-phenol	2,4,5-Trichloro-phenol	2,4,6-Trichloro-phenol	2,4-Dichloro-phenol	2,4-Dimethyl-phenol	2,4-Dinitro-phenol	2,4-Dinitro-toluene	2,6-Dinitro-toluene	2-Chloro-naph-thalene	2-Chloro-phenol
					Number Detected	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D7-17	D7-17-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D7-2	D7-2-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D7-3	D7-3-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D7-4	D7-4-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D7-5	D7-5-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D7-6	D7-6-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D7-7	D7-7-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D7-8	D7-8-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
D7-9	D7-9-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
Ditch-1 East	Ditch-1 @ East Entry	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
Ditch-1 Pipe	Ditch 1 @ Dry Shed	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
Ditch-4	Ditch 4 @ Crossing	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
Ditch-4	Ditch-4	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
Ditch-4-1	Ditch 4, 80 ft West of Crossing	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
Ditch-4-2	Ditch 4, 150 ft West of Crossing	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
Ditch-4-3	Ditch 4, 250 ft West of Crossing	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
DSA	Dry Shed Area	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
FGCA	Former Green Chain Area	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
LOC 1	DM-0004	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 10a	DM-0008	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 10b	DM-0010	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 11	DM-0026	Mill Area	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 12	DM-0027	Mill Area	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 13	DM-0028	Mill Area	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 14	DM-0029	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 15	DM-0081	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 16	DM-0082	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 17	DM-0083	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 18	DM-0084	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 19	DM-0085	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 2	DM-0002	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 20	DM-0086	Humboldt Bay	Sediment	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 21	DM-0087	Humboldt Bay	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 22	DM-0088	Humboldt Bay	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 3	DM-0016	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 4	DM-0022	Mill Area	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 4	DM-0024	Mill Area	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 5	DM-0018	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 6	DM-0020	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 7	DM-0014	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 8	DM-0012	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 9	DM-0006	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
Outfall-1	Outfall 1, Road Entrance	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
Outfall-1	Outfall-1	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
Outfall-2	Outfall 2	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
Outfall-2	Outfall-2	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
Outfall-3	Outfall-3	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
Outfall-3A	Outfall 3A	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
Outfall-4	Outfall 4	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
Outfall-4	Outfall-4	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA

TABLE A-1

SUMMARY OF SEMIVOLATILE ORGANIC COMPOUND ANALYTICAL RESULTS
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	1,2,4-Trichloro-benzene	1,2-Dichloro-benzene	1,2-Diphenyl-hydrazine	1,3-Dichloro-benzene	1,4-Dichloro-benzene	2,3,4,5-Tetra-chloro-phenol	2,3,4,6-Tetra-chloro-phenol	2,3,5,6-Tetra-chloro-phenol	2,4,5-Trichloro-phenol	2,4,6-Trichloro-phenol	2,4-Dichloro-phenol	2,4-Dimethyl-phenol	2,4-Dinitro-phenol	2,4-Dinitro-toluene	2,6-Dinitro-toluene	2-Chloro-naph-thalene	2-Chloro-phenol
					Number Detected	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RP-1	RP-1-0.0-0.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
RP-1	RP-1-0.5-1.0	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
RP-1	RP-1-1.0-1.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
RP-1	RP-1-1.5-2.0	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
RP-1	RP-1-2.0-2.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
RP-2	RP-2-0.0-0.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
RP-2	RP-2-0.5-1.0	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
RP-2	RP-2-1.0-1.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
RP-2	RP-2-1.5-2.0	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
RP-2	RP-2-2.0-2.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
SDP-1	SDP-1-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
SDP-1	SDP-1-2.0-2.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
SDP-1B	SDP-1B-1.0	Upland Mill Area	Sediment	--	6/8/2004	<0.05	<0.05	NA	<0.05	<0.05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRAWL 13	DM-0060	Mill Area	Shark	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
TRAWL 16	DM-0065	Humboldt Bay	Shiner	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
TRAWL 17	DM-0073	Humboldt Bay	Shiner	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
TRAWL 18	DM-0075	Humboldt Bay	Shiner	Wet	10/25/2002	<6.6	<6.6	<6.6	<6.6	<6.6	NA	NA	NA	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6
TRAWL 2	DM-0039	Upland Mill Area	Shiner	Wet	10/24/2002	<20	<20	<20	<20	<20	NA	NA	NA	<20	<20	<20	<20	<20	<20	<20	<20	<20
Outfall-2 DI	Outfall #2 D.I.	Mill Area	Soil	Wet	6/14/2001	NA	NA	NA	NA	NA	<1	<1	<1	NA	<1	NA	NA	NA	NA	NA	NA	NA
TRAWL 15	DM-0062 & DM-0068	Humboldt Bay	Sole	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
TRAWL 15	DM-0063 & DM-0069	Humboldt Bay	Sole	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	NA	NA	NA	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
TRAWL 2	DM-0038 & DM-0040	Humboldt Bay	Sole	Wet	10/24/2002	<20	<20	<20	<20	<20	NA	NA	NA	<20	<20	<20	<20	<20	<20	<20	<20	<20
TRAWL 4	DM-0042 & DM-0043	Humboldt Bay	Sole	Wet	10/24/2002	<20	<20	<20	<20	<20	NA	NA	NA	<20	<20	<20	<20	<20	<20	<20	<20	<20
TRAWL 5	DM-0047	Mill Area	Sole	Wet	10/25/2002	<20	<20	<20	<20	<20	NA	NA	NA	<20	<20	<20	<20	<20	<20	<20	<20	<20
TRAWL 6	DM-0049	Mill Area	Sole	Wet	10/25/2002	<20	<20	<20	<20	<20	NA	NA	NA	<20	<20	<20	<20	<20	<20	<20	<20	<20

Notes:
< = less than laboratory reporting limit indicated
Bold results are above laboratory reporting limit.

TABLE A-1

SUMMARY OF SEMIVOLATILE ORGANIC COMPOUND ANALYTICAL RESULTS
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	2-Methyl-4,6-dinitro-phenol	2-Methyl-phenol (o-Cresol)	2-Nitro-aniline	2-Nitro-phenol	3,3-Dichloro-benzidine	3-/4-Methyl-phenol (m/p-Cresol)	3-Nitro-aniline	4-Bromo-phenyl phenyl ether	4-Chloro-3-methyl-phenol	4-Chloro-aniline	4-Chloro-phenyl phenyl ether	4-Nitro-aniline	4-Nitro-phenol	Aniline	Benzidine	Benzoic Acid	Benzyl Alcohol
					Number Detected	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STAR 1	DM-0032	Humboldt Bay	Crab	Wet	10/24/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<41	<90	<20
STAR 10	DM-0074	Humboldt Bay	Crab	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2	<4.5	<0.99
STAR 2	DM-0033	Mill Area	Crab	Wet	10/24/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<41	<90	<20
STAR 3	DM-0034	Mill Area	Crab	Wet	10/24/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<41	<90	<20
STAR 4	DM-0035	Mill Area	Crab	Wet	10/24/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<41	<90	<20
STAR 6	DM-0061	Humboldt Bay	Crab	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
STAR 7	DM-0059	Mill Area	Crab	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
STAR 8	DM-0058	Mill Area	Crab	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 4	020621-NBSCM	Mill Area	Mussel	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 4	DM-0023	Mill Area	Mussel	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 1	020621-EBAY-6-2	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 1	DM-0003	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 10a	DM-0007	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 10b	020621-BIS	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 10b	DM-0009	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 2	020621-EBAY-1-2	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 2	DM-0001	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 3	020621-NBSC	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 3	DM-0015a	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 3	DM-0015b	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 4	020621-NBSC 02	Mill Area	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 4	DM-0021	Mill Area	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 4	DM-0025	Mill Area	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 5	020621-MR-7-1	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 5	DM-0017	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 6	020621-MR-7-2	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 6	DM-0019	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 7	020621-SIN	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 7	DM-0013	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 8	020621-SIN-1-2	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 8	DM-0011	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 9	020621-BIN	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 9	DM-0005	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
TRAWL 18	DM-0079	Humboldt Bay	Perch	Wet	10/25/2002	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<14	<30	<6.6
STAR 5	DM-0036	Humboldt Bay	Sculpin	Wet	10/24/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<41	<90	<20
C-02	C2-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
C-02	C2-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
C-03	C3-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
C-03	C3-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
C-04	C4-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
C-04	C4-1.0-1.8	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
C-05	C5-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
C-05	C5-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
C-06	C6-0-0.5	Mill Area	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
C-15	C15-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
C-18	C18-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
C-18	C18-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
C-19	C19-0.0-0.5	Mill Area	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
C-31	C31-0.0-0.5	Mill Area	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
C-32	C32-0.0-0.5	Mill Area	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99

TABLE A-1

SUMMARY OF SEMIVOLATILE ORGANIC COMPOUND ANALYTICAL RESULTS
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	2-Methyl-4,6-dinitro-phenol	2-Methyl-phenol (o-Cresol)	2-Nitro-aniline	2-Nitro-phenol	3,3-Dichloro-benzidine	3-/4-Methyl-phenol (m/p-Cresol)	3-Nitro-aniline	4-Bromo-phenyl phenyl ether	4-Chloro-3-methyl-phenol	4-Chloro-aniline	4-Chloro-phenyl phenyl ether	4-Nitro-aniline	4-Nitro-phenol	Aniline	Benzidine	Benzoic Acid	Benzyl Alcohol
					Number Detected	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C-35	C35-0-0.5	Mill Area	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
C-39	C39-0-0.5	Mill Area	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
C-40-2	C40-2-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
C-40-2	C40-2-1.5-2.0	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
C-41	C41-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
C-41	C41-1.5-2.0	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
C-42	C42-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
C-42	C42-1.0-1.8	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
C-43	C43-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
C-43	C43-1.0-1.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
C-44	C44-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
C-44	C44-1.5-2.0	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
D6-1	D6-1-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-10	D6-10-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-11	D6-11-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-12	D6-12-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-13	D6-13-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-14	D6-14-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-15	D6-15-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-16	D6-16-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-17	D6-17-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-18	D6-18-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-19	D6-19-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-2	D6-2-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-20	D6-20-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-21	D6-21-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-22	D6-22-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-23	D6-23-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-24	D6-24-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-3	D6-3-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-4	D6-4-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-5	D6-5-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-6	D6-6-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-7	D6-7-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-8	D6-8-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-9	D6-9-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-10B	D6-10B-1.0	Upland Mill Area	Sediment	Wet	6/8/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-15B	D6-15B-1.0	Upland Mill Area	Sediment	Wet	6/8/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-23B	D6-23B-1.0	Upland Mill Area	Sediment	Wet	6/8/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-25B	D6-25B-1.0	Upland Mill Area	Sediment	Wet	6/8/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-2B	D6-2B-1.0	Upland Mill Area	Sediment	Wet	6/8/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-6B	D6-6B-1.0	Upland Mill Area	Sediment	Wet	6/8/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-1	D7-1-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-10	D7-10-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-11	D7-11-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-12	D7-12-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-13	D7-13-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-14	D7-14-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-15	D7-15-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-16	D7-16-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE A-1

SUMMARY OF SEMIVOLATILE ORGANIC COMPOUND ANALYTICAL RESULTS
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	2-Methyl-4,6-dinitro-phenol	2-Methyl-phenol (o-Cresol)	2-Nitro-aniline	2-Nitro-phenol	3,3-Dichloro-benzidine	3-/4-Methyl-phenol (m/p-Cresol)	3-Nitro-aniline	4-Bromo-phenyl phenyl ether	4-Chloro-3-methyl-phenol	4-Chloro-aniline	4-Chloro-phenyl phenyl ether	4-Nitro-aniline	4-Nitro-phenol	Aniline	Benzidine	Benzoic Acid	Benzyl Alcohol
					Number Detected	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D7-17	D7-17-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-2	D7-2-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-3	D7-3-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-4	D7-4-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-5	D7-5-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-6	D7-6-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-7	D7-7-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-8	D7-8-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-9	D7-9-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ditch-1 East	Ditch-1 @ East Entry	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ditch-1 Pipe	Ditch 1 @ Dry Shed	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ditch-4	Ditch 4 @ Crossing	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ditch-4	Ditch-4	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ditch-4-1	Ditch 4, 80 ft West of Crossing	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ditch-4-2	Ditch 4, 150 ft West of Crossing	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ditch-4-3	Ditch 4, 250 ft West of Crossing	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DSA	Dry Shed Area	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FGCA	Former Green Chain Area	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 1	DM-0004	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 10a	DM-0008	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 10b	DM-0010	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 11	DM-0026	Mill Area	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 12	DM-0027	Mill Area	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 13	DM-0028	Mill Area	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 14	DM-0029	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2	<4.5	<0.99
LOC 15	DM-0081	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 16	DM-0082	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 17	DM-0083	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 18	DM-0084	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 19	DM-0085	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 2	DM-0002	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 20	DM-0086	Humboldt Bay	Sediment	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 21	DM-0087	Humboldt Bay	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 22	DM-0088	Humboldt Bay	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 3	DM-0016	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 4	DM-0022	Mill Area	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 4	DM-0024	Mill Area	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 5	DM-0018	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 6	DM-0020	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 7	DM-0014	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 8	DM-0012	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
LOC 9	DM-0006	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
Outfall-1	Outfall 1, Road Entrance	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Outfall-1	Outfall-1	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Outfall-2	Outfall 2	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Outfall-2	Outfall-2	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Outfall-3	Outfall-3	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Outfall-3A	Outfall 3A	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Outfall-4	Outfall 4	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Outfall-4	Outfall-4	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE A-1

SUMMARY OF SEMIVOLATILE ORGANIC COMPOUND ANALYTICAL RESULTS
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	2-Methyl-4,6-dinitro-phenol	2-Methyl-phenol (o-Cresol)	2-Nitro-aniline	2-Nitro-phenol	3,3-Dichloro-benzidine	3-/4-Methyl-phenol (m/p-Cresol)	3-Nitro-aniline	4-Bromo-phenyl phenyl ether	4-Chloro-3-methyl-phenol	4-Chloro-aniline	4-Chloro-phenyl phenyl ether	4-Nitro-aniline	4-Nitro-phenol	Aniline	Benzidine	Benzoic Acid	Benzyl Alcohol
					Number Detected	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
RP-1	RP-1-0.0-0.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RP-1	RP-1-0.5-1.0	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RP-1	RP-1-1.0-1.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RP-1	RP-1-1.5-2.0	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RP-1	RP-1-2.0-2.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RP-2	RP-2-0.0-0.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RP-2	RP-2-0.5-1.0	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RP-2	RP-2-1.0-1.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RP-2	RP-2-1.5-2.0	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RP-2	RP-2-2.0-2.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDP-1	SDP-1-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDP-1	SDP-1-2.0-2.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDP-1B	SDP-1B-1.0	Upland Mill Area	Sediment	--	6/8/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRAWL 13	DM-0060	Mill Area	Shark	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
TRAWL 16	DM-0065	Humboldt Bay	Shiner	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
TRAWL 17	DM-0073	Humboldt Bay	Shiner	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2	<4.5	<0.99
TRAWL 18	DM-0075	Humboldt Bay	Shiner	Wet	10/25/2002	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<14	<30	<6.6
TRAWL 2	DM-0039	Upland Mill Area	Shiner	Wet	10/24/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<41	<90	<20
Outfall-2 DI	Outfall #2 D.I.	Mill Area	Soil	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRAWL 15	DM-0062 & DM-0068	Humboldt Bay	Sole	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
TRAWL 15	DM-0063 & DM-0069	Humboldt Bay	Sole	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<2.1	<4.5	<0.99
TRAWL 2	DM-0038 & DM-0040	Humboldt Bay	Sole	Wet	10/24/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<41	<90	<20
TRAWL 4	DM-0042 & DM-0043	Humboldt Bay	Sole	Wet	10/24/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<41	<90	<20
TRAWL 5	DM-0047	Mill Area	Sole	Wet	10/25/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<41	<90	<20
TRAWL 6	DM-0049	Mill Area	Sole	Wet	10/25/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<41	<90	<20

Notes:
< = less than laboratory reporting limit indicated
Bold results are above laboratory reporting limit.

TABLE A-1

SUMMARY OF SEMIVOLATILE ORGANIC COMPOUND ANALYTICAL RESULTS
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	Benzyl-butyl-phthalate	bis(2-chloro-ethoxy) methane	bis(2-chloro-ethyl) ether	bis (2-chloro-isopropyl) ether	bis (2-Ethyl-hexyl) phthalate	Carbazole	Dibenzo-furan	Diethyl phthalate	Dimethyl phthalate	Di-n-butyl-phthalate	Di-n-octylph-thalate	Hexa-chloro-benzene	Hexa-chloro-butadiene	Hexa-chloro-cyclo-pentadiene	Hexa-chloro-ethane	Iso-phorone	Nitro-benzene
					Number Detected	0	0	0	0	3	0	0	2	0	7	0	0	0	0	0	0	0
STAR 1	DM-0032	Humboldt Bay	Crab	Wet	10/24/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
STAR 10	DM-0074	Humboldt Bay	Crab	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
STAR 2	DM-0033	Mill Area	Crab	Wet	10/24/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
STAR 3	DM-0034	Mill Area	Crab	Wet	10/24/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	Invalid	<20	<20	<20	<20	<20	<20	<20
STAR 4	DM-0035	Mill Area	Crab	Wet	10/24/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
STAR 6	DM-0061	Humboldt Bay	Crab	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
STAR 7	DM-0059	Mill Area	Crab	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
STAR 8	DM-0058	Mill Area	Crab	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 4	020621-NBSCM	Mill Area	Mussel	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 4	DM-0023	Mill Area	Mussel	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 1	020621-EBAY-6-2	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 1	DM-0003	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 10a	DM-0007	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 10b	020621-BIS	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 10b	DM-0009	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 2	020621-EBAY-1-2	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 2	DM-0001	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	**2.6**	<0.99	<0.99	<0.99	<0.99	**17**	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 3	020621-NBSC	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 3	DM-0015a	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 3	DM-0015b	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 4	020621-NBSC 02	Mill Area	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 4	DM-0021	Mill Area	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 4	DM-0025	Mill Area	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 5	020621-MR-7-1	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 5	DM-0017	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 6	020621-MR-7-2	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 6	DM-0019	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 7	020621-SIN	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 7	DM-0013	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 8	020621-SIN-1-2	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 8	DM-0011	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 9	020621-BIN	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 9	DM-0005	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
TRAWL 18	DM-0079	Humboldt Bay	Perch	Wet	10/25/2002	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6
STAR 5	DM-0036	Humboldt Bay	Sculpin	Wet	10/24/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
C-02	C2-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-02	C2-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	**8.7**	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-03	C3-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-03	C3-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	**3**	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-04	C4-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-04	C4-1.0-1.8	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-05	C5-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	**1**	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-05	C5-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-06	C6-0-0.5	Mill Area	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-15	C15-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-18	C18-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-18	C18-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-19	C19-0.0-0.5	Mill Area	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-31	C31-0.0-0.5	Mill Area	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-32	C32-0.0-0.5	Mill Area	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99

TABLE A-1

SUMMARY OF SEMIVOLATILE ORGANIC COMPOUND ANALYTICAL RESULTS
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	Benzyl-butyl-phthalate	bis(2-chloro-ethoxy) methane	bis(2-chloro-ethyl) ether	bis (2-chloro-isopropyl) ether	bis (2-Ethyl-hexyl) phthalate	Carbazole	Dibenzo-furan	Diethyl phthalate	Dimethyl phthalate	Di-n-butyl-phthalate	Di-n-octylph-thalate	Hexa-chloro-benzene	Hexa-chloro-butadiene	Hexa-chloro-cyclo-pentadiene	Hexa-chloro-ethane	Iso-phorone	Nitro-benzene
					Number Detected	0	0	0	0	3	0	0	2	0	7	0	0	0	0	0	0	0
C-35	C35-0-0.5	Mill Area	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-39	C39-0-0.5	Mill Area	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-40-2	C40-2-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-40-2	C40-2-1.5-2.0	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-41	C41-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-41	C41-1.5-2.0	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-42	C42-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-42	C42-1.0-1.8	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	**7.2**	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-43	C43-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-43	C43-1.0-1.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	**0.99**	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-44	C44-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-44	C44-1.5-2.0	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
D6-1	D6-1-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-10	D6-10-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-11	D6-11-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-12	D6-12-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-13	D6-13-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-14	D6-14-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-15	D6-15-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-16	D6-16-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-17	D6-17-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-18	D6-18-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-19	D6-19-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-2	D6-2-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-20	D6-20-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-21	D6-21-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-22	D6-22-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-23	D6-23-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-24	D6-24-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-3	D6-3-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-4	D6-4-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-5	D6-5-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-6	D6-6-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-7	D6-7-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-8	D6-8-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-9	D6-9-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-10B	D6-10B-1.0	Upland Mill Area	Sediment	Wet	6/8/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-15B	D6-15B-1.0	Upland Mill Area	Sediment	Wet	6/8/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-23B	D6-23B-1.0	Upland Mill Area	Sediment	Wet	6/8/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-25B	D6-25B-1.0	Upland Mill Area	Sediment	Wet	6/8/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-2B	D6-2B-1.0	Upland Mill Area	Sediment	Wet	6/8/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D6-6B	D6-6B-1.0	Upland Mill Area	Sediment	Wet	6/8/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-1	D7-1-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-10	D7-10-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-11	D7-11-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-12	D7-12-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-13	D7-13-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-14	D7-14-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-15	D7-15-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-16	D7-16-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE A-1

SUMMARY OF SEMIVOLATILE ORGANIC COMPOUND ANALYTICAL RESULTS
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	Benzyl-butyl-phthalate	bis(2-chloro-ethoxy) methane	bis(2-chloro-ethyl) ether	bis (2-chloro-isopropyl) ether	bis (2-Ethyl-hexyl) phthalate	Carbazole	Dibenzo-furan	Diethyl phthalate	Dimethyl phthalate	Di-n-butyl-phthalate	Di-n-octylph-thalate	Hexa-chloro-benzene	Hexa-chloro-butadiene	Hexa-chloro-cyclo-pentadiene	Hexa-chloro-ethane	Iso-phorone	Nitro-benzene
					Number Detected	0	0	0	0	3	0	0	2	0	7	0	0	0	0	0	0	0
D7-17	D7-17-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-2	D7-2-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-3	D7-3-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-4	D7-4-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-5	D7-5-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-6	D7-6-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-7	D7-7-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-8	D7-8-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
D7-9	D7-9-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ditch-1 East	Ditch-1 @ East Entry	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ditch-1 Pipe	Ditch 1 @ Dry Shed	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ditch-4	Ditch 4 @ Crossing	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ditch-4	Ditch-4	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ditch-4-1	Ditch 4, 80 ft West of Crossing	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ditch-4-2	Ditch 4, 150 ft West of Crossing	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Ditch-4-3	Ditch 4, 250 ft West of Crossing	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
DSA	Dry Shed Area	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
FGCA	Former Green Chain Area	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
LOC 1	DM-0004	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 10a	DM-0008	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	**5.4**	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 10b	DM-0010	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 11	DM-0026	Mill Area	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	**3.7**	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 12	DM-0027	Mill Area	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 13	DM-0028	Mill Area	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 14	DM-0029	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 15	DM-0081	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 16	DM-0082	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 17	DM-0083	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 18	DM-0084	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 19	DM-0085	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 2	DM-0002	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	**1.1**	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 20	DM-0086	Humboldt Bay	Sediment	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 21	DM-0087	Humboldt Bay	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 22	DM-0088	Humboldt Bay	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 3	DM-0016	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 4	DM-0022	Mill Area	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 4	DM-0024	Mill Area	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 5	DM-0018	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	**1.4**	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 6	DM-0020	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	**1.5**	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 7	DM-0014	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 8	DM-0012	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 9	DM-0006	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
Outfall-1	Outfall 1, Road Entrance	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Outfall-1	Outfall-1	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Outfall-2	Outfall 2	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Outfall-2	Outfall-2	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Outfall-3	Outfall-3	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Outfall-3A	Outfall 3A	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Outfall-4	Outfall 4	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Outfall-4	Outfall-4	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

TABLE A-1

SUMMARY OF SEMIVOLATILE ORGANIC COMPOUND ANALYTICAL RESULTS
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	Benzyl-butyl-phthalate	bis(2-chloro-ethoxy) methane	bis(2-chloro-ethyl) ether	bis (2-chloro-isopropyl) ether	bis (2-Ethyl-hexyl) phthalate	Carbazole	Dibenzo-furan	Diethyl phthalate	Dimethyl phthalate	Di-n-butyl-phthalate	Di-n-octylph-thalate	Hexa-chloro-benzene	Hexa-chloro-butadiene	Hexa-chloro-cyclo-pentadiene	Hexa-chloro-ethane	Iso-phorone	Nitro-benzene
					Number Detected	0	0	0	0	3	0	0	2	0	7	0	0	0	0	0	0	0
RP-1	RP-1-0.0-0.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RP-1	RP-1-0.5-1.0	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RP-1	RP-1-1.0-1.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RP-1	RP-1-1.5-2.0	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RP-1	RP-1-2.0-2.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RP-2	RP-2-0.0-0.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RP-2	RP-2-0.5-1.0	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RP-2	RP-2-1.0-1.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RP-2	RP-2-1.5-2.0	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
RP-2	RP-2-2.0-2.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDP-1	SDP-1-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDP-1	SDP-1-2.0-2.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDP-1B	SDP-1B-1.0	Upland Mill Area	Sediment	--	6/8/2004	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRAWL 13	DM-0060	Mill Area	Shark	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
TRAWL 16	DM-0065	Humboldt Bay	Shiner	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
TRAWL 17	DM-0073	Humboldt Bay	Shiner	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
TRAWL 18	DM-0075	Humboldt Bay	Shiner	Wet	10/25/2002	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6
TRAWL 2	DM-0039	Upland Mill Area	Shiner	Wet	10/24/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
Outfall-2 DI	Outfall #2 D.I.	Mill Area	Soil	Wet	6/14/2001	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TRAWL 15	DM-0062 & DM-0068	Humboldt Bay	Sole	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
TRAWL 15	DM-0063 & DM-0069	Humboldt Bay	Sole	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	Invalid	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
TRAWL 2	DM-0038 & DM-0040	Humboldt Bay	Sole	Wet	10/24/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
TRAWL 4	DM-0042 & DM-0043	Humboldt Bay	Sole	Wet	10/24/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
TRAWL 5	DM-0047	Mill Area	Sole	Wet	10/25/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
TRAWL 6	DM-0049	Mill Area	Sole	Wet	10/25/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20

Notes:
< = less than laboratory reporting limit indicated
Bold results are above laboratory reporting limit.

TABLE A-1

SUMMARY OF SEMIVOLATILE ORGANIC COMPOUND ANALYTICAL RESULTS
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	N-Nitrosodi-methyl-amine	N-Nitrosodi-n-propyl-amine	N-Nitro-sodi-phenyl-amine	Penta-chloro-phenol	Phenol	Pyridine
					Number Detected	0	0	0	0	2	22
STAR 1	DM-0032	Humboldt Bay	Crab	Wet	10/24/2002	<20	<20	<20	<20	<20	**40**
STAR 10	DM-0074	Humboldt Bay	Crab	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	**47**
STAR 2	DM-0033	Mill Area	Crab	Wet	10/24/2002	<20	<20	<20	<20	<20	**30**
STAR 3	DM-0034	Mill Area	Crab	Wet	10/24/2002	<20	<20	<20	<20	<20	**46**
STAR 4	DM-0035	Mill Area	Crab	Wet	10/24/2002	<20	<20	<20	<20	<20	**40**
STAR 6	DM-0061	Humboldt Bay	Crab	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	**1.2**	**36**
STAR 7	DM-0059	Mill Area	Crab	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	**19**
STAR 8	DM-0058	Mill Area	Crab	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	**3.9**	**29**
LOC 4	020621-NBSCM	Mill Area	Mussel	Wet	6/21/2002	NA	NA	NA	<1	NA	NA
LOC 4	DM-0023	Mill Area	Mussel	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	**34**
LOC 1	020621-EBAY-6-2	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	<1	NA	NA
LOC 1	DM-0003	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	**34**
LOC 10a	DM-0007	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	**26**
LOC 10b	020621-BIS	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	<1	NA	NA
LOC 10b	DM-0009	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	**33**
LOC 2	020621-EBAY-1-2	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	<1	NA	NA
LOC 2	DM-0001	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	**40**
LOC 3	020621-NBSC	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	<1	NA	NA
LOC 3	DM-0015a	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	**27**
LOC 3	DM-0015b	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	**25**
LOC 4	020621-NBSC 02	Mill Area	Oyster	Wet	6/21/2002	NA	NA	NA	<1	NA	NA
LOC 4	DM-0021	Mill Area	Oyster	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	<0.99
LOC 4	DM-0025	Mill Area	Oyster	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	**40**
LOC 5	020621-MR-7-1	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	<1	NA	NA
LOC 5	DM-0017	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	<0.99
LOC 6	020621-MR-7-2	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	<1	NA	NA
LOC 6	DM-0019	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	<0.99
LOC 7	020621-SIN	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	<1	NA	NA
LOC 7	DM-0013	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	**34**
LOC 8	020621-SIN-1-2	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	<1	NA	NA
LOC 8	DM-0011	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	**36**
LOC 9	020621-BIN	Humboldt Bay	Oyster	Wet	6/21/2002	NA	NA	NA	<1	NA	NA
LOC 9	DM-0005	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	**42**
TRAWL 18	DM-0079	Humboldt Bay	Perch	Wet	10/25/2002	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6
STAR 5	DM-0036	Humboldt Bay	Sculpin	Wet	10/24/2002	<20	<20	<20	<20	<20	<20
C-02	C2-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-02	C2-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-03	C3-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-03	C3-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-04	C4-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-04	C4-1.0-1.8	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-05	C5-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-05	C5-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-06	C6-0-0.5	Mill Area	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-15	C15-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-18	C18-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-18	C18-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-19	C19-0.0-0.5	Mill Area	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-31	C31-0.0-0.5	Mill Area	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-32	C32-0.0-0.5	Mill Area	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99

TABLE A-1

SUMMARY OF SEMIVOLATILE ORGANIC COMPOUND ANALYTICAL RESULTS
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	N-Nitrosodi-methyl-amine	N-Nitrosodi-n-propyl-amine	N-Nitro-sodi-phenyl-amine	Penta-chloro-phenol	Phenol	Pyridine
					Number Detected	0	0	0	0	2	22
C-35	C35-0-0.5	Mill Area	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-39	C39-0-0.5	Mill Area	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-40-2	C40-2-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-40-2	C40-2-1.5-2.0	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-41	C41-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-41	C41-1.5-2.0	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-42	C42-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-42	C42-1.0-1.8	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-43	C43-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-43	C43-1.0-1.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-44	C44-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-44	C44-1.5-2.0	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
D6-1	D6-1-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	<1	NA	NA
D6-10	D6-10-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	<1	NA	NA
D6-11	D6-11-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	<1	NA	NA
D6-12	D6-12-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	<1	NA	NA
D6-13	D6-13-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	<1	NA	NA
D6-14	D6-14-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	<1	NA	NA
D6-15	D6-15-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	<1	NA	NA
D6-16	D6-16-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	<1	NA	NA
D6-17	D6-17-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	<1	NA	NA
D6-18	D6-18-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	<1	NA	NA
D6-19	D6-19-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	<1	NA	NA
D6-2	D6-2-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	<1	NA	NA
D6-20	D6-20-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	<1	NA	NA
D6-21	D6-21-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	<1	NA	NA
D6-22	D6-22-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	<1	NA	NA
D6-23	D6-23-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	<1	NA	NA
D6-24	D6-24-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	<1	NA	NA
D6-3	D6-3-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	<1	NA	NA
D6-4	D6-4-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	<1	NA	NA
D6-5	D6-5-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	<1	NA	NA
D6-6	D6-6-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	<1	NA	NA
D6-7	D6-7-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	<1	NA	NA
D6-8	D6-8-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	<1	NA	NA
D6-9	D6-9-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	<1	NA	NA
D6-10B	D6-10B-1.0	Upland Mill Area	Sediment	Wet	6/8/2004	NA	NA	NA	NA		
D6-15B	D6-15B-1.0	Upland Mill Area	Sediment	Wet	6/8/2004	NA	NA	NA	NA		
D6-23B	D6-23B-1.0	Upland Mill Area	Sediment	Wet	6/8/2004	NA	NA	NA	NA		
D6-25B	D6-25B-1.0	Upland Mill Area	Sediment	Wet	6/8/2004	NA	NA	NA	NA		
D6-2B	D6-2B-1.0	Upland Mill Area	Sediment	Wet	6/8/2004	NA	NA	NA	NA		
D6-6B	D6-6B-1.0	Upland Mill Area	Sediment	Wet	6/8/2004	NA	NA	NA	NA		
D7-1	D7-1-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	<1	NA	NA
D7-10	D7-10-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	<1	NA	NA
D7-11	D7-11-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	<1	NA	NA
D7-12	D7-12-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	<1	NA	NA
D7-13	D7-13-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	<1	NA	NA
D7-14	D7-14-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	<1	NA	NA
D7-15	D7-15-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	<1	NA	NA
D7-16	D7-16-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	<1	NA	NA

TABLE A-1

SUMMARY OF SEMIVOLATILE ORGANIC COMPOUND ANALYTICAL RESULTS
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	N-Nitrosodi-methyl-amine	N-Nitrosodi-n-propyl-amine	N-Nitro-sodi-phenyl-amine	Penta-chloro-phenol	Phenol	Pyridine
					Number Detected	0	0	0	0	2	22
D7-17	D7-17-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	<1	NA	NA
D7-2	D7-2-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	<1	NA	NA
D7-3	D7-3-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	<1	NA	NA
D7-4	D7-4-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	<1	NA	NA
D7-5	D7-5-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	<1	NA	NA
D7-6	D7-6-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	<1	NA	NA
D7-7	D7-7-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	<1	NA	NA
D7-8	D7-8-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	<1	NA	NA
D7-9	D7-9-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	<1	NA	NA
Ditch-1 East	Ditch-1 @ East Entry	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	<1	NA	NA
Ditch-1 Pipe	Ditch 1 @ Dry Shed	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	<1	NA	NA
Ditch-4	Ditch 4 @ Crossing	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	<1	NA	NA
Ditch-4	Ditch-4	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	<1	NA	NA
Ditch-4-1	Ditch 4, 80 ft West of Crossing	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	<1	NA	NA
Ditch-4-2	Ditch 4, 150 ft West of Crossing	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	<1	NA	NA
Ditch-4-3	Ditch 4, 250 ft West of Crossing	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	<1	NA	NA
DSA	Dry Shed Area	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	<1	NA	NA
FGCA	Former Green Chain Area	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	<1	NA	NA
LOC 1	DM-0004	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	<0.99
LOC 10a	DM-0008	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	<0.99
LOC 10b	DM-0010	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	<0.99
LOC 11	DM-0026	Mill Area	Sediment	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	<0.99
LOC 12	DM-0027	Mill Area	Sediment	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	<0.99
LOC 13	DM-0028	Mill Area	Sediment	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	<0.99
LOC 14	DM-0029	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 15	DM-0081	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<2	<0.99	<0.99	<0.99
LOC 16	DM-0082	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<2	<0.99	<0.99	<0.99
LOC 17	DM-0083	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<2	<0.99	<0.99	<0.99
LOC 18	DM-0084	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<2	<0.99	<0.99	**38**
LOC 19	DM-0085	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<2	<0.99	<0.99	**39**
LOC 2	DM-0002	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	<0.99
LOC 20	DM-0086	Humboldt Bay	Sediment	Wet	10/25/2002	<0.99	<0.99	<2	<0.99	<0.99	**8.6**
LOC 21	DM-0087	Humboldt Bay	Sediment	Wet	10/23/2002	<0.99	<0.99	<2	<0.99	<0.99	<0.99
LOC 22	DM-0088	Humboldt Bay	Sediment	Wet	10/23/2002	<0.99	<0.99	<2	<0.99	<0.99	<0.99
LOC 3	DM-0016	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	<0.99
LOC 4	DM-0022	Mill Area	Sediment	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	<0.99
LOC 4	DM-0024	Mill Area	Sediment	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	<0.99
LOC 5	DM-0018	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	<0.99
LOC 6	DM-0020	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	<0.99
LOC 7	DM-0014	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	<0.99
LOC 8	DM-0012	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	<0.99
LOC 9	DM-0006	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<2	<0.99	<0.99	<0.99
Outfall-1	Outfall 1, Road Entrance	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	<1	NA	NA
Outfall-1	Outfall-1	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	<1	NA	NA
Outfall-2	Outfall 2	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	<1	NA	NA
Outfall-2	Outfall-2	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	<1	NA	NA
Outfall-3	Outfall-3	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	<1	NA	NA
Outfall-3A	Outfall 3A	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	<1	NA	NA
Outfall-4	Outfall 4	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	<1	NA	NA
Outfall-4	Outfall-4	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	<1	NA	NA

TABLE A-1

SUMMARY OF SEMIVOLATILE ORGANIC COMPOUND ANALYTICAL RESULTS
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	N-Nitrosodi-methyl-amine	N-Nitrosodi-n-propyl-amine	N-Nitro-sodi-phenyl-amine	Penta-chloro-phenol	Phenol	Pyridine
					Number Detected	0	0	0	0	2	22
RP-1	RP-1-0.0-0.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	<1	NA	NA
RP-1	RP-1-0.5-1.0	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	<1	NA	NA
RP-1	RP-1-1.0-1.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	<1	NA	NA
RP-1	RP-1-1.5-2.0	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	<1	NA	NA
RP-1	RP-1-2.0-2.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	<1	NA	NA
RP-2	RP-2-0.0-0.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	<1	NA	NA
RP-2	RP-2-0.5-1.0	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	<1	NA	NA
RP-2	RP-2-1.0-1.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	<1	NA	NA
RP-2	RP-2-1.5-2.0	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	<1	NA	NA
RP-2	RP-2-2.0-2.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	<1	NA	NA
SDP-1	SDP-1-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	<1	NA	NA
SDP-1	SDP-1-2.0-2.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	<1	NA	NA
SDP-1B	SDP-1B-1.0	Upland Mill Area	Sediment	--	6/8/2004	NA	NA	NA	NA		
TRAWL 13	DM-0060	Mill Area	Shark	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
TRAWL 16	DM-0065	Humboldt Bay	Shiner	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
TRAWL 17	DM-0073	Humboldt Bay	Shiner	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
TRAWL 18	DM-0075	Humboldt Bay	Shiner	Wet	10/25/2002	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6
TRAWL 2	DM-0039	Upland Mill Area	Shiner	Wet	10/24/2002	<20	<20	<20	<20	<20	<20
Outfall-2 DI	Outfall #2 D.I.	Mill Area	Soil	Wet	6/14/2001	NA	NA	NA	<1	NA	NA
TRAWL 15	DM-0062 & DM-0068	Humboldt Bay	Sole	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
TRAWL 15	DM-0063 & DM-0069	Humboldt Bay	Sole	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
TRAWL 2	DM-0038 & DM-0040	Humboldt Bay	Sole	Wet	10/24/2002	<20	<20	<20	<20	<20	<20
TRAWL 4	DM-0042 & DM-0043	Humboldt Bay	Sole	Wet	10/24/2002	<20	<20	<20	<20	<20	<20
TRAWL 5	DM-0047	Mill Area	Sole	Wet	10/25/2002	<20	<20	<20	<20	<20	<20
TRAWL 6	DM-0049	Mill Area	Sole	Wet	10/25/2002	<20	<20	<20	<20	<20	<20

Notes:
< = less than laboratory reporting limit indicated
Bold results are above laboratory reporting limit.

Geomatrix

TABLE A-2

SUMMARY OF PESTICIDE ANALYTICAL RESULTS

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	Aldrin	alpha-BHC	beta-BHC	Chlordane	delta-BHC	Dieldrin	Endo-sulfan I	Endo-sulfan II	Endo-sulfan Sulfate	Endrin	Endrin Aldehyde	Endrin Ketone	gamma-BHC (Lindane)	Heptachlor	Heptachlor Epoxide	Methoxy-chlor	p,p'-DDD	p,p'-DDE	p,p'-DDT	Toxaphene
				Number Detected	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
STAR 1	Humboldt Bay	Crab	Wet	10/24/2002	<0.018	<0.018	<0.018	<0.036	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.12
STAR 10	Humboldt Bay	Crab	Wet	10/25/2002	<0.045	<0.045	<0.045	<0.09	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.3
STAR 2	Mill Area	Crab	Wet	10/24/2002	<0.045	<0.045	<0.045	<0.09	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.3
STAR 3	Mill Area	Crab	Wet	10/24/2002	<0.045	<0.045	<0.045	<0.09	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.3
STAR 4	Mill Area	Crab	Wet	10/24/2002	<0.045	<0.045	<0.045	<0.09	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.3
STAR 6	Humboldt Bay	Crab	Wet	10/25/2002	<0.045	<0.045	<0.045	<0.09	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.3
STAR 7	Mill Area	Crab	Wet	10/25/2002	<0.045	<0.045	<0.045	<0.09	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.3
STAR 8	Mill Area	Crab	Wet	10/25/2002	<0.045	<0.045	<0.045	<0.09	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.3
LOC 4	Mill Area	Mussel	Wet	10/21/2002	<0.018	<0.018	<0.018	<0.036	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.12
LOC 1	Humboldt Bay	Oyster	Wet	10/21/2002	<0.045	<0.045	<0.045	<0.09	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.3
LOC 10a	Humboldt Bay	Oyster	Wet	10/21/2002	<0.018	<0.018	<0.018	<0.036	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.12
LOC 10b	Humboldt Bay	Oyster	Wet	10/21/2002	<0.045	<0.045	<0.045	<0.09	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.3
LOC 2	Humboldt Bay	Oyster	Wet	10/21/2002	<0.045	<0.045	<0.045	<0.09	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.3
LOC 3	Humboldt Bay	Oyster	Wet	10/21/2002	<0.018	<0.018	<0.018	<0.036	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.12
LOC 3	Humboldt Bay	Oyster	Wet	10/21/2002	<0.018	<0.018	<0.018	<0.036	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.12
LOC 4	Mill Area	Oyster	Wet	10/21/2002	<0.018	<0.018	<0.018	<0.036	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.12
LOC 4	Mill Area	Oyster	Wet	10/21/2002	<0.018	<0.018	<0.018	<0.036	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.12
LOC 5	Humboldt Bay	Oyster	Wet	10/21/2002	<0.018	<0.018	<0.018	<0.036	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.12
LOC 6	Humboldt Bay	Oyster	Wet	10/21/2002	<0.045	<0.045	<0.045	<0.09	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.3
LOC 7	Humboldt Bay	Oyster	Wet	10/21/2002	<0.045	<0.045	<0.045	<0.09	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.3
LOC 8	Humboldt Bay	Oyster	Wet	10/21/2002	<0.045	<0.045	<0.045	<0.09	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.3
LOC 9	Humboldt Bay	Oyster	Wet	10/21/2002	<0.045	<0.045	<0.045	<0.09	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.3
TRAWL 18	Humboldt Bay	Perch	Wet	10/25/2002	<0.018	<0.018	<0.018	<0.036	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.12
STAR 5	Humboldt Bay	Sculpin	Wet	10/24/2002	<0.045	<0.045	<0.045	<0.09	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.045	<0.3
C-02	Mill Area	Sediment	Wet	10/22/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
C-02	Mill Area	Sediment	Wet	10/22/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
C-03	Mill Area	Sediment	Wet	10/22/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
C-03	Mill Area	Sediment	Wet	10/22/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
C-04	Mill Area	Sediment	Wet	10/22/2002	<0.018	<0.018	<0.018	<0.036	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.12
C-04	Mill Area	Sediment	Wet	10/22/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
C-05	Mill Area	Sediment	Wet	10/22/2002	<0.018	<0.018	<0.018	<0.036	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.12
C-05	Mill Area	Sediment	Wet	10/22/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
C-06	Mill Area	Sediment	Wet	10/24/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
C-15	Mill Area	Sediment	Wet	10/22/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
C-18	Mill Area	Sediment	Wet	10/22/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
C-18	Mill Area	Sediment	Wet	10/22/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
C-19	Mill Area	Sediment	Wet	10/23/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
C-31	Mill Area	Sediment	Wet	10/23/2002	<0.018	<0.018	<0.018	<0.036	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.12
C-32	Mill Area	Sediment	Wet	10/23/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
C-35	Mill Area	Sediment	Wet	10/23/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
C-39	Mill Area	Sediment	Wet	10/24/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
C-40-2	Humboldt Bay	Sediment	Wet	10/24/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
C-40-2	Humboldt Bay	Sediment	Wet	10/24/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
C-41	Humboldt Bay	Sediment	Wet	10/24/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
C-41	Humboldt Bay	Sediment	Wet	10/24/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
C-42	Humboldt Bay	Sediment	Wet	10/24/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
C-42	Humboldt Bay	Sediment	Wet	10/24/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
C-43	Humboldt Bay	Sediment	Wet	10/24/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
C-43	Humboldt Bay	Sediment	Wet	10/24/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
C-44	Humboldt Bay	Sediment	Wet	10/24/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06

TABLE A-2

SUMMARY OF PESTICIDE ANALYTICAL RESULTS
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	Aldrin	alpha-BHC	beta-BHC	Chlordane	delta-BHC	Dieldrin	Endo-sulfan I	Endo-sulfan II	Endo-sulfan Sulfate	Endrin	Endrin Aldehyde	Endrin Ketone	gamma-BHC (Lindane)	Heptachlor	Heptachlor Epoxide	Methoxy-chlor	p,p'-DDD	p,p'-DDE	p,p'-DDT	Toxaphene
				Number Detected	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
C-44	Humboldt Bay	Sediment	Wet	10/24/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.006
LOC 1	Humboldt Bay	Sediment	Wet	10/21/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
LOC 10a	Humboldt Bay	Sediment	Wet	10/21/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
LOC 10b	Humboldt Bay	Sediment	Wet	10/21/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
LOC 11	Mill Area	Sediment	Wet	10/21/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
LOC 12	Mill Area	Sediment	Wet	10/21/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
LOC 13	Mill Area	Sediment	Wet	10/21/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
LOC 14	Mill Area	Sediment	Wet	10/22/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
LOC 15	Humboldt Bay	Sediment	Wet	10/24/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
LOC 16	Humboldt Bay	Sediment	Wet	10/24/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
LOC 17	Humboldt Bay	Sediment	Wet	10/24/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
LOC 18	Humboldt Bay	Sediment	Wet	10/24/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
LOC 19	Humboldt Bay	Sediment	Wet	10/24/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
LOC 2	Humboldt Bay	Sediment	Wet	10/21/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
LOC 20	Humboldt Bay	Sediment	Wet	10/25/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
LOC 21	Humboldt Bay	Sediment	Wet	10/23/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	Invalid	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
LOC 22	Humboldt Bay	Sediment	Wet	10/23/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	Invalid	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
LOC 3	Humboldt Bay	Sediment	Wet	10/21/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
LOC 4	Mill Area	Sediment	Wet	10/21/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
LOC 4	Mill Area	Sediment	Wet	10/21/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
LOC 5	Humboldt Bay	Sediment	Wet	10/21/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
LOC 6	Humboldt Bay	Sediment	Wet	10/21/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
LOC 7	Humboldt Bay	Sediment	Wet	10/21/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
LOC 8	Humboldt Bay	Sediment	Wet	10/21/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
LOC 9	Humboldt Bay	Sediment	Wet	10/21/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
TRAWL 13	Mill Area	Shark	Wet	10/25/2002	<0.009	<0.009	<0.009	<0.018	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.009	<0.06
TRAWL 16	Humboldt Bay	Shiner	Wet	10/25/2002	<0.018	<0.018	<0.018	<0.036	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.12
TRAWL 17	Humboldt Bay	Shiner	Wet	10/25/2002	<0.018	<0.018	<0.018	<0.036	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.12
TRAWL 18	Humboldt Bay	Shiner	Wet	10/25/2002	<0.018	<0.018	<0.018	<0.036	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.12
TRAWL 2	Humboldt Bay	Shiner	Wet	10/24/2002	<0.018	<0.018	<0.018	<0.036	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.12
TRAWL 15	Humboldt Bay	Sole	Wet	10/25/2002	<0.018	<0.018	<0.018	<0.036	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.12
TRAWL 15	Humboldt Bay	Sole	Wet	10/25/2002	<0.018	<0.018	<0.018	<0.036	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.12
TRAWL 2	Humboldt Bay	Sole	Wet	10/24/2002	<0.018	<0.018	<0.018	<0.036	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.12
TRAWL 4	Humboldt Bay	Sole	Wet	10/24/2002	<0.018	<0.018	<0.018	<0.036	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.12
TRAWL 5	Mill Area	Sole	Wet	10/25/2002	<0.018	<0.018	<0.018	<0.036	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.12
TRAWL 6	Mill Area	Sole	Wet	10/25/2002	<0.018	<0.018	<0.018	<0.036	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.018	<0.12

Notes:
< = less than laboratory reporting limit indicated
Bold results are above laboratory reporting limit.

TABLE A-3

SUMMARY OF POLYCHLORINATED BIPHENYL ANALYTICAL RESULTS

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	PCB 1016	PCB 1221	PCB 1232	PCB 1242	PCB 1248	PCB 1254	PCB 1260
					Number Detected	0	0	0	0	0	0	0
STAR 1	DM-0032	Humboldt Bay	Crab	Wet	10/24/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
STAR 10	DM-0074	Humboldt Bay	Crab	Wet	10/25/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
STAR 2	DM-0033	Mill Area	Crab	Wet	10/24/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
STAR 3	DM-0034	Mill Area	Crab	Wet	10/24/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
STAR 4	DM-0035	Mill Area	Crab	Wet	10/24/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
STAR 6	DM-0061	Humboldt Bay	Crab	Wet	10/25/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
STAR 7	DM-0059	Mill Area	Crab	Wet	10/25/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
STAR 8	DM-0058	Mill Area	Crab	Wet	10/25/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
LOC 4	DM-0023	Mill Area	Mussel	Wet	10/21/2002	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
LOC 1	DM-0003	Humboldt Bay	Oyster	Wet	10/21/2002	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
LOC 10a	DM-0007	Humboldt Bay	Oyster	Wet	10/21/2002	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
LOC 10b	DM-0009	Humboldt Bay	Oyster	Wet	10/21/2002	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
LOC 2	DM-0001	Humboldt Bay	Oyster	Wet	10/21/2002	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
LOC 3	DM-0015a	Humboldt Bay	Oyster	Wet	10/21/2002	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
LOC 3	DM-0015b	Humboldt Bay	Oyster	Wet	10/21/2002	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
LOC 4	DM-0021	Mill Area	Oyster	Wet	10/21/2002	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
LOC 4	DM-0025	Mill Area	Oyster	Wet	10/21/2002	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
LOC 5	DM-0017	Humboldt Bay	Oyster	Wet	10/21/2002	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
LOC 6	DM-0019	Humboldt Bay	Oyster	Wet	10/21/2002	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
LOC 7	DM-0013	Humboldt Bay	Oyster	Wet	10/21/2002	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
LOC 8	DM-0011	Humboldt Bay	Oyster	Wet	10/21/2002	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
LOC 9	DM-0005	Humboldt Bay	Oyster	Wet	10/21/2002	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
TRAWL 18	DM-0079	Humboldt Bay	Perch	Wet	10/25/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
STAR 5	DM-0036	Humboldt Bay	Sculpin	Wet	10/24/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-02	C2-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-02	C2-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-03	C3-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-03	C3-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-04	C4-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-04	C4-1.0-1.8	Mill Area	Sediment	Wet	10/22/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-05	C5-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-05	C5-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-06	C6-0-0.5	Mill Area	Sediment	Wet	10/24/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-15	C15-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-18	C18-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06

Geomatrix

TABLE A-3

SUMMARY OF POLYCHLORINATED BIPHENYL ANALYTICAL RESULTS

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	PCB 1016	PCB 1221	PCB 1232	PCB 1242	PCB 1248	PCB 1254	PCB 1260
					Number Detected	0	0	0	0	0	0	0
C-18	C18-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-19	C19-0.0-0.5	Mill Area	Sediment	Wet	10/23/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-31	C31-0.0-0.5	Mill Area	Sediment	Wet	10/23/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-32	C32-0.0-0.5	Mill Area	Sediment	Wet	10/23/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-35	C35-0-0.5	Mill Area	Sediment	Wet	10/23/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-39	C39-0-0.5	Mill Area	Sediment	Wet	10/24/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-40-2	C40-2-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-40-2	C40-2-1.5-2.0	Humboldt Bay	Sediment	Wet	10/24/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-41	C41-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-41	C41-1.5-2.0	Humboldt Bay	Sediment	Wet	10/24/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-42	C42-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-42	C42-1.0-1.8	Humboldt Bay	Sediment	Wet	10/24/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-43	C43-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-43	C43-1.0-1.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-44	C44-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
C-44	C44-1.5-2.0	Humboldt Bay	Sediment	Wet	10/24/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
LOC 1	DM-0004	Humboldt Bay	Sediment	Wet	10/21/2002	<0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.06
LOC 10a	DM-0008	Humboldt Bay	Sediment	Wet	10/21/2002	<0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.06
LOC 10b	DM-0010	Humboldt Bay	Sediment	Wet	10/21/2002	<0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.06
LOC 11	DM-0026	Mill Area	Sediment	Wet	10/21/2002	<0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.06
LOC 12	DM-0027	Mill Area	Sediment	Wet	10/21/2002	<0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.06
LOC 13	DM-0028	Mill Area	Sediment	Wet	10/21/2002	<0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.06
LOC 14	DM-0029	Mill Area	Sediment	Wet	10/22/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
LOC 15	DM-0081	Humboldt Bay	Sediment	Wet	10/24/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
LOC 16	DM-0082	Humboldt Bay	Sediment	Wet	10/24/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
LOC 17	DM-0083	Humboldt Bay	Sediment	Wet	10/24/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
LOC 18	DM-0084	Humboldt Bay	Sediment	Wet	10/24/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
LOC 19	DM-0085	Humboldt Bay	Sediment	Wet	10/24/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
LOC 2	DM-0002	Humboldt Bay	Sediment	Wet	10/21/2002	<0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.06
LOC 20	DM-0086	Humboldt Bay	Sediment	Wet	10/25/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
LOC 21	DM-0087	Humboldt Bay	Sediment	Wet	10/23/2002	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
LOC 22	DM-0088	Humboldt Bay	Sediment	Wet	10/23/2002	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36	<0.36
LOC 3	DM-0016	Humboldt Bay	Sediment	Wet	10/21/2002	<0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.06
LOC 4	DM-0022	Mill Area	Sediment	Wet	10/21/2002	<0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.06
LOC 4	DM-0024	Mill Area	Sediment	Wet	10/21/2002	<0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.06

TABLE A-3

SUMMARY OF POLYCHLORINATED BIPHENYL ANALYTICAL RESULTS

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	PCB 1016	PCB 1221	PCB 1232	PCB 1242	PCB 1248	PCB 1254	PCB 1260
					Number Detected	0	0	0	0	0	0	0
LOC 5	DM-0018	Humboldt Bay	Sediment	Wet	10/21/2002	<0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.06
LOC 6	DM-0020	Humboldt Bay	Sediment	Wet	10/21/2002	<0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.06
LOC 7	DM-0014	Humboldt Bay	Sediment	Wet	10/21/2002	<0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.06
LOC 8	DM-0012	Humboldt Bay	Sediment	Wet	10/21/2002	<0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.06
LOC 9	DM-0006	Humboldt Bay	Sediment	Wet	10/21/2002	<0.06	<0.02	<0.02	<0.02	<0.02	<0.02	<0.06
TRAWL 13	DM-0060	Mill Area	Shark	Wet	10/25/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
TRAWL 16	DM-0065	Humboldt Bay	Shiner	Wet	10/25/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
TRAWL 17	DM-0073	Humboldt Bay	Shiner	Wet	10/25/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
TRAWL 18	DM-0075	Humboldt Bay	Shiner	Wet	10/25/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
TRAWL 2	DM-0039	Humboldt Bay	Shiner	Wet	10/24/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
TRAWL 15	DM-0062 & DM-0068	Humboldt Bay	Sole	Wet	10/25/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
TRAWL 15	DM-0063 & DM-0069	Humboldt Bay	Sole	Wet	10/25/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
TRAWL 2	DM-0038 & DM-0040	Humboldt Bay	Sole	Wet	10/24/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
TRAWL 4	DM-0042 & DM-0043	Humboldt Bay	Sole	Wet	10/24/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
TRAWL 5	DM-0047	Mill Area	Sole	Wet	10/25/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
TRAWL 6	DM-0049	Mill Area	Sole	Wet	10/25/2002	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06

Notes:
< = less than laboratory reporting limit indicated
Bold results are above laboratory reporting limit.
PCB: polychlorinated biphenyl

Geomatrix

TABLE A-4A

SUMMARY OF POLYCYCLIC AROMATIC HYDROCARBON ANALYTICAL RESULTS - SEDIMENT AND TISSUE

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	Acenaph-thene	Acenaph-thylene	Anthracene	Benzo(a) anthracene	Benzo(a) pyrene	Benzo(b) fluoran-thene	Benzo (ghi) perylene	Benzo(k) fluoran-thene	Chrysene	Fluoran-thene	Fluorene	Pyrene	2-Methyl-naphtha-lene	Dibenzo (a,h) anthra-cene	Indeno (1,2,3-cd) pyrene	Naph-thalene	Phenan-threne
					Number Detected	0	0	0	0	0	1	0	0	1	1	1	3	0	0	0	1	3
STAR 1	DM-0032	Humboldt Bay	Crab	Wet	10/24/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
STAR 10	DM-0074	Humboldt Bay	Crab	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
STAR 2	DM-0033	Mill Area	Crab	Wet	10/24/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
STAR 3	DM-0034	Mill Area	Crab	Wet	10/24/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
STAR 4	DM-0035	Mill Area	Crab	Wet	10/24/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
STAR 6	DM-0061	Humboldt Bay	Crab	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
STAR 7	DM-0059	Mill Area	Crab	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
STAR 8	DM-0058	Mill Area	Crab	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 4	DM-0023	Mill Area	Mussel	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 1	DM-0003	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 10a	DM-0007	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 10b	DM-0009	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 2	DM-0001	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 3	DM-0015a	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 3	DM-0015b	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 4	DM-0021	Mill Area	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 4	DM-0025	Mill Area	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 5	DM-0017	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 6	DM-0019	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 7	DM-0013	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 8	DM-0011	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 9	DM-0005	Humboldt Bay	Oyster	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
TRAWL 18	DM-0079	Humboldt Bay	Perch	Wet	10/25/2002	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6
STAR 5	DM-0036	Humboldt Bay	Sculpin	Wet	10/24/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
C-02	C2-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-02	C2-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-03	C3-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-03	C3-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-04	C4-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-04	C4-1.0-1.8	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-05	C5-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-05	C5-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-06	C6-0-0.5	Mill Area	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-15	C15-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-18	C18-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-18	C18-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-19	C19-0.0-0.5	Mill Area	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-31	C31-0.0-0.5	Mill Area	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-32	C32-0.0-0.5	Mill Area	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-35	C35-0-0.5	Mill Area	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-39	C39-0-0.5	Mill Area	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-40-2	C40-2-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-40-2	C40-2-1.5-2.0	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-41	C41-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-41	C41-1.5-2.0	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-42	C42-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-42	C42-1.0-1.8	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-43	C43-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-43	C43-1.0-1.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-44	C44-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
C-44	C44-1.5-2.0	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
D6-10B	D6-10B-0.5	Upland Mill Area	Sediment	Wet	6/8/2004	<5	<5	<5	<5	<5	**6**	<5	<5	**7**	<5	**6**	**8**	NA	<5	<5	**9**	**23**
D6-10B	D6-10B-0.5	Upland Mill Area	Sediment	Wet	6/8/2004	<0.005	<0.005	<0.005	<0.005	<0.005	**0.006**	<0.005	<0.005	**0.007**	<0.005	**0.006**	**0.008**	NA	<0.005	<0.005	**0.009**	**0.023**
D6-15B	D6-15B-0.5	Upland Mill Area	Sediment	Wet	6/8/2004	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	**100**	NA	<50	<50	<50	**76**
D6-15B	D6-15B-0.5	Upland Mill Area	Sediment	Wet	6/8/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	**0.1**	NA	<0.05	<0.05	<0.05	**0.076**

TABLE A-4A

SUMMARY OF POLYCYCLIC AROMATIC HYDROCARBON ANALYTICAL RESULTS - SEDIMENT AND TISSUE

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	Acenaph-thene	Acenaph-thylene	Anthracene	Benzo(a) anthracene	Benzo(a) pyrene	Benzo(b) fluoran-thene	Benzo (ghi) perylene	Benzo(k) fluoran-thene	Chrysene	Fluoran-thene	Fluorene	Pyrene	2-Methyl-naphtha-lene	Dibenzo (a,h) anthra-cene	Indeno (1,2,3-cd) pyrene	Naph-thalene	Phenan-threne
					Number Detected	0	0	0	0	0	1	0	0	1	1	1	3	0	0	0	1	3
D6-23B	D6-23B-0.5	Upland Mill Area	Sediment	Wet	6/8/2004	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	NA	<5	<5	<5	<5
D6-23B	D6-23B-0.5	Upland Mill Area	Sediment	Wet	6/8/2004	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	NA	<0.005	<0.005	<0.005	<0.005
D6-25B	D6-25B-0.5	Upland Mill Area	Sediment	Wet	6/8/2004	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	NA	<5	<5	<5	<5
D6-25B	D6-25B-0.5	Upland Mill Area	Sediment	Wet	6/8/2004	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	NA	<0.005	<0.005	<0.005	<0.005
D6-2B	D6-2B-0.5	Upland Mill Area	Sediment	Wet	6/8/2004	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	NA	<250	<250	<250	<250
D6-2B	D6-2B-0.5	Upland Mill Area	Sediment	Wet	6/8/2004	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NA	<0.25	<0.25	<0.25	<0.25
D6-6B	D6-6B-0.5	Upland Mill Area	Sediment	Wet	6/8/2004	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	NA	<50	<50	<50	<50
D6-6B	D6-6B-0.5	Upland Mill Area	Sediment	Wet	6/8/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.05	<0.05
LOC 1	DM-0004	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 10a	DM-0008	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 10b	DM-0010	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 11	DM-0026	Mill Area	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 12	DM-0027	Mill Area	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 13	DM-0028	Mill Area	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 14	DM-0029	Mill Area	Sediment	Wet	10/22/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 15	DM-0081	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 16	DM-0082	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 17	DM-0083	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 18	DM-0084	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 19	DM-0085	Humboldt Bay	Sediment	Wet	10/24/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 2	DM-0002	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 20	DM-0086	Humboldt Bay	Sediment	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 21	DM-0087	Humboldt Bay	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	**6.6**	<0.99	**3.9**	<0.99	<0.99	<0.99	<0.99	**6.6**
LOC 22	DM-0088	Humboldt Bay	Sediment	Wet	10/23/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 3	DM-0016	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 4	DM-0022	Mill Area	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 4	DM-0024	Mill Area	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 5	DM-0018	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 6	DM-0020	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 7	DM-0014	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 8	DM-0012	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
LOC 9	DM-0006	Humboldt Bay	Sediment	Wet	10/21/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
SDP-1B	SDP-1B-0.5	Upland Mill Area	Sediment	Wet	6/8/2004	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	<250	NA	<250	<250	<250	<250
SDP-1B	SDP-1B-0.5	Upland Mill Area	Sediment	Wet	6/8/2004	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25	NA	<0.25	<0.25	<0.25	<0.25
TRAWL 13	DM-0060	Mill Area	Shark	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
TRAWL 16	DM-0065	Humboldt Bay	Shiner	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
TRAWL 17	DM-0073	Humboldt Bay	Shiner	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
TRAWL 18	DM-0075	Humboldt Bay	Shiner	Wet	10/25/2002	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6	<6.6
TRAWL 2	DM-0039	Humboldt Bay	Shiner	Wet	10/24/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
TRAWL 15	DM-0062 & DM-0068	Humboldt Bay	Sole	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
TRAWL 15	DM-0063 & DM-0069	Humboldt Bay	Sole	Wet	10/25/2002	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99	<0.99
TRAWL 2	DM-0038 & DM-0040	Humboldt Bay	Sole	Wet	10/24/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
TRAWL 4	DM-0042 & DM-0043	Humboldt Bay	Sole	Wet	10/24/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
TRAWL 5	DM-0047	Mill Area	Sole	Wet	10/25/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20
TRAWL 6	DM-0049	Mill Area	Sole	Wet	10/25/2002	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20	<20

Notes:
< = less than laboratory reporting limit indicated
Bold results are above laboratory reporting limit.

TABLE A-4B

SUMMARY OF POLYCYCLIC AROMATIC HYDROCARBON ANALYTICAL RESULTS - WATER
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in micrograms per liter (µg/L)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Date	Acenaph-thene	Acenaph-thylene	Anthra-cene	Benzo(a) anthra-cene	Benzo(a) pyrene	Benzo(b) fluoran-thene	Benzo (ghi) perylene	Benzo(k) fluoran-thene	Chrysene	Fluoran-thene	Fluorene	Pyrene	2-Methyl-naphtha-lene	Dibenzo (a,h) anthracene	Indeno (1,2,3-cd) pyrene	Naph-thalene	Phenan-threne
				Number Detected	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
D6-10B	D6-10B	Upland Mill Area	Water	6/8/2004	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1
D6-15B	D6-15B	Upland Mill Area	Water	6/8/2004	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1
D6-23B	D6-23B	Upland Mill Area	Water	6/8/2004	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1
D6-25B	D6-25B	Upland Mill Area	Water	6/8/2004	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1
D6-2B	D6-2B	Upland Mill Area	Water	6/8/2004	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1
D6-6B	D6-6B	Upland Mill Area	Water	6/8/2004	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1
SDP-1B	SDP-1B	Upland Mill Area	Water	6/8/2004	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NA	<0.1	<0.1	<0.1	<0.1

Notes:
< = less than laboratory reporting limit indicated
Bold results are above laboratory reporting limit.

TABLE A-5

SUMMARY OF DIOXIN/FURAN ANALYTICAL RESULTS

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	2,3,4,6,7,8-HxCDF	OCDF	2,3,7,8-TCDD TEQ (Fish)	2,3,7,8-TCDD TEQ (Mammals)	2,3,7,8-TCDD TEQ (Bird)
					Number Detected	178	179	179	179	179	179	192	179	179	179	179	179	179	179	179	179	179	--	--	--
Lappe_HS-2	14H0031415032402	Humboldt Bay	Crab	Wet	3/24/2002	<0.38	<0.96	<1.5	<1.3	<1.3	<1.8	**12**	<0.42	<0.64	<0.67	<0.74	<0.81	<0.73	<0.65	<0.88	<0.81	<1	1.42	1.25	1.52
STAR 1	DM-0031	Humboldt Bay	Crab	Wet	10/24/2002	<0.0559	<0.122	<0.0427	**0.0652**	<0.0421	**0.139**	**0.65**	**0.292**	<0.0464	<0.0506	<0.0724	<0.0194	**0.0663**	<0.0339	<0.0497	<0.0377	**0.138**	0.142	0.157	0.426
STAR 1	DM-0032	Humboldt Bay	Crab	Wet	10/24/2002	<0.0752	**0.266**	**4.89**	**0.669**	**0.22**	**1.2**	**1.06**	**0.225**	**0.229**	**0.0759**	**0.505**	**2.26**	**0.0746**	**0.174**	**0.419**	**0.193**	**2.42**	2.93	1.08	1.02
STAR 6	DM-0061	Humboldt Bay	Crab	Wet	10/25/2002	<0.112	<0.22	**0.154**	**0.488**	**0.178**	**0.852**	<1.12	**0.466**	**0.0925**	**0.171**	**0.241**	<0.0362	<0.0871	<0.0619	<0.0265	**0.0723**	**0.138**	0.383	0.412	0.862
STAR 10	DM-0074	Humboldt Bay	Crab	Wet	10/25/2002	<0.132	<0.203	<0.295	<0.419	<0.275	**3.33**	**7.27**	**0.227**	<0.276	<0.224	**0.416**	<0.207	<0.0994	<0.0986	<0.154	<0.107	<0.11	0.351	0.365	0.576
Lappe_Mill	1R011015032402	Mill Area	Crab	Wet	3/24/2002	<0.32	<0.57	<0.62	<1.3	<0.62	**38**	**120**	<0.27	<0.29	<0.3	<1.5	<0.23	<0.33	<0.3	<0.4	<0.37	<1.6	0.827	1.14	0.926
Lappe_Mill	3RC011230032402	Mill Area	Crab	Wet	3/24/2002	<0.17	<0.34	<0.47	<0.89	<0.41	**12**	**99**	<0.32	<0.28	<0.29	<1.5	<0.19	<0.4	<0.2	<0.28	<0.26	<2.5	0.554	0.634	0.698
Lappe_Mill	41H0011700032402	Mill Area	Crab	Wet	3/24/2002	<0.28	<2	<1.4	**12**	**2.9**	**71**	**300**	**0.83**	<0.43	<0.76	**9.8**	<0.32	<1.5	<1.2	<0.68	<0.68	**6.2**	2.29	4.03	3.22
STAR 2	DM-0033	Mill Area	Crab	Wet	10/24/2002	<0.0465	**0.121**	**0.125**	**0.356**	**0.0926**	**0.701**	**1.3**	**0.12**	<0.0481	**0.062**	**0.157**	**0.0387**	**0.0632**	**0.0432**	<0.0205	**0.0311**	**0.107**	0.267	0.270	0.365
STAR 3	DM-0034	Mill Area	Crab	Wet	10/24/2002	<0.05	<0.075	<0.0589	**0.196**	<0.0491	**0.392**	<0.989	**0.111**	<0.048	**0.059**	**0.113**	<0.0337	**0.0481**	**0.0318**	<0.031	<0.0184	<0.114	0.128	0.145	0.253
STAR 3	DM-0034 (Whole)	Mill Area	Crab	Wet	10/24/2002	<0.0322	<0.0662	**0.0531**	**0.194**	<0.0474	**0.553**	**2.02**	**0.0625**	<0.0749	<0.0594	**0.136**	<0.0124	**0.0458**	**0.0341**	<0.0137	<0.01	**0.141**	0.109	0.116	0.163
STAR 4	DM-0035	Mill Area	Crab	Wet	10/24/2002	<0.0516	<0.0914	**0.0618**	**0.316**	**0.0946**	**0.861**	**1.99**	**0.136**	<0.0746	<0.0583	**0.195**	<0.0194	**0.0531**	<0.031	<0.024	**0.0369**	**0.116**	0.145	0.171	0.271
STAR 7	DM-0059	Mill Area	Crab	Wet	10/25/2002	<0.0577	<0.119	**0.135**	**0.56**	**0.165**	**2.89**	**2.51**	**0.13**	**0.048**	**0.0646**	**0.369**	<0.0482	**0.106**	<0.0569	<0.0289	**0.0511**	**0.126**	0.231	0.275	0.344
STAR 8	DM-0058	Mill Area	Crab	Wet	10/25/2002	**0.0554**	<0.0857	**0.088**	**0.307**	**0.117**	**0.752**	<1.12	**0.12**	<0.052	**0.0608**	**0.146**	<0.0293	<0.0452	**0.0368**	<0.0174	**0.0341**	**0.0813**	0.197	0.213	0.313
Lappe_HS-2	12M031415034202	Humboldt Bay	Mussel	Wet	3/24/2002	<0.13	<0.33	<0.43	<0.38	<0.38	<0.2	<1.8	<0.15	<0.18	<0.18	<0.19	<0.14	<0.19	<0.17	<0.22	<0.21	<0.34	0.436	0.389	0.477
Lappe_Mill	31M011700032402	Mill Area	Mussel	Wet	3/24/2002	<0.21	<0.49	<0.54	<0.89	<0.48	**4.4**	**49**	<0.2	<0.37	<0.38	<0.4	<0.19	<0.34	<0.3	<0.41	<0.38	<0.68	0.685	0.683	0.784
LOC 4	020621-NBSCM	Mill Area	Mussel	Wet	6/21/2002	**0.0455**	**0.767**	**0.136**	**0.124**	<0.0639	**1.01**	**4.81**	**0.0842**	<0.209	<0.175	**0.236**	<0.0228	**0.314**	<0.0762	<0.115	<0.0914	**0.412**	0.985	0.958	1.06
LOC 4	DM-0023	Mill Area	Mussel	Wet	10/21/2002	<0.0429	<0.0502	<0.0531	**0.116**	<0.0549	**0.539**	<2.01	<0.106	<0.079	<0.0634	**0.0885**	<0.0315	<0.04	<0.0195	<0.032	<0.0243	<0.22	0.089	0.099	0.148
LOC 1	DM-0003	Humboldt Bay	Oyster	Wet	10/21/2002	<0.0736	<0.0954	<0.0623	**0.155**	**0.0862**	**0.332**	<0.771	**0.296**	<0.0822	**0.0892**	<0.0377	<0.0424	<0.0301	<0.0282	<0.0418	<0.0322	<0.112	0.171	0.198	0.493
LOC 1	020621-EBAY-6-2	Humboldt Bay	Oyster	Wet	6/21/2002	<0.0301	**0.773**	**0.084**	**0.0941**	**0.0735**	**0.209**	**0.431**	**0.109**	<0.107	<0.0951	<0.0262	<0.0271	**0.198**	<0.0525	<0.0777	<0.0637	**0.107**	0.894	0.882	0.992
LOC 2	DM-0001	Humboldt Bay	Oyster	Wet	10/21/2002	**0.0996**	<0.111	<0.0545	**0.136**	**0.0756**	**0.261**	<0.793	**0.303**	<0.0867	<0.073	<0.0417	<0.0458	<0.0556	<0.0402	<0.0184	<0.0429	<0.112	0.215	0.241	0.518
LOC 2	020621-EBAY-1-2	Humboldt Bay	Oyster	Wet	6/21/2002	<0.035	**1.21**	**0.108**	**0.143**	**0.0887**	**0.274**	**0.876**	**0.243**	<0.144	<0.13	<0.0383	<0.0444	**0.274**	<0.0476	<0.0685	<0.0569	**0.144**	1.37	1.36	1.60
LOC 3	DM-0015a	Humboldt Bay	Oyster	Wet	10/21/2002	**0.078**	**0.0952**	<0.0331	**0.121**	**0.0581**	**0.281**	<0.623	**0.19**	<0.0874	<0.0612	<0.0272	<0.0312	<0.0222	<0.0221	<0.0332	<0.0253	<0.0975	0.216	0.238	0.412
LOC 3	DM-0015b	Humboldt Bay	Oyster	Wet	10/21/2002	<0.0917	<0.0967	<0.0543	**0.16**	**0.0921**	**0.376**	<0.864	**0.226**	<0.0862	**0.0818**	<0.0271	<0.0445	<0.0178	<0.0166	<0.0299	**0.0508**	<0.155	0.174	0.200	0.428
LOC 3	020621-NBSC	Humboldt Bay	Oyster	Wet	6/21/2002	<0.0492	**4.04**	**0.178**	**0.33**	**0.214**	**0.586**	**1.3**	**0.361**	<0.257	<0.241	<0.0285	<0.0287	**0.568**	<0.0682	<0.109	<0.0902	**0.11**	4.31	4.32	4.66
LOC 5	DM-0017	Humboldt Bay	Oyster	Wet	10/21/2002	**0.148**	<0.0598	<0.0886	<0.0905	<0.0892	**0.204**	<0.754	<0.133	<0.0612	<0.0513	**0.0286**	<0.0154	<0.0245	<0.0241	<0.049	<0.0343	<0.102	0.226	0.221	0.287
LOC 5	020621-MR-7-1	Humboldt Bay	Oyster	Wet	6/21/2002	**0.0565**	**1.34**	**0.0798**	**0.176**	**0.0911**	**0.476**	**1.69**	**0.176**	<0.164	<0.141	**0.0754**	<0.0155	**0.264**	<0.05	<0.0721	<0.06	**0.169**	1.52	1.53	1.70
LOC 6	DM-0019	Humboldt Bay	Oyster	Wet	10/21/2002	<0.0582	**0.105**	**0.0722**	<0.172	<0.0717	**0.482**	<1.46	**0.172**	<0.0576	**0.0814**	**0.0506**	<0.023	<0.0232	<0.0227	<0.0351	<0.0261	<0.125	0.229	0.224	0.405
LOC 6	020621-MR-7-2	Humboldt Bay	Oyster	Wet	6/21/2002	**0.0531**	**1.48**	**0.118**	**0.163**	**0.0834**	**0.476**	**1.33**	**0.188**	<0.246	<0.215	**0.0641**	<0.0228	**0.366**	<0.0609	<0.0829	<0.0707	**0.151**	1.71	1.70	1.91
LOC 7	DM-0013	Humboldt Bay	Oyster	Wet	10/21/2002	**0.0742**	<0.108	<0.0604	**0.129**	<0.0615	**0.293**	<1.02	**0.249**	<0.0943	<0.0798	<0.0546	<0.0624	<0.0297	<0.0278	<0.0454	<0.0341	<0.13	0.187	0.205	0.435
LOC 7	020621-SIN	Humboldt Bay	Oyster	Wet	6/21/2002	**0.0636**	**1.97**	**0.128**	**0.173**	**0.0754**	**0.287**	**0.735**	**0.23**	<0.273	<0.257	<0.0286	<0.0308	**0.333**	<0.0621	<0.0791	<0.0706	**0.0978**	2.23	2.21	2.47
LOC 8	DM-0011	Humboldt Bay	Oyster	Wet	10/21/2002	<0.0703	**0.105**	<0.048	**0.153**	**0.062**	**0.316**	<0.83	**0.226**	<0.0773	**0.0784**	<0.0304	<0.0344	<0.0291	<0.0289	<0.0422	<0.0342	<0.106	0.214	0.238	0.465
LOC 8	020621-SIN-1-2	Humboldt Bay	Oyster	Wet	6/21/2002	<0.0493	**1.11**	**0.119**	**0.126**	<0.0605	**0.213**	**0.536**	**0.174**	<0.104	<0.0914	<0.0199	<0.0203	**0.281**	**0.0855**	<0.0528	<0.0416	**0.09**	1.27	1.25	1.41
LOC 9	DM-0005	Humboldt Bay	Oyster	Wet	10/21/2002	**0.0987**	<0.09	<0.0537	**0.118**	<0.0531	<0.188	<0.706	**0.286**	<0.0877	<0.0703	<0.0323	<0.0364	<0.0246	<0.022	<0.0345	<0.0266	<0.0936	0.199	0.216	0.480
LOC 9	020621-BIN	Humboldt Bay	Oyster	Wet	6/21/2002	<0.0167	**0.679**	**0.118**	**0.0908**	<0.0429	**0.242**	**0.693**	**0.123**	<0.116	<0.107	<0.0209	<0.0212	**0.15**	<0.0407	<0.0579	<0.0464	**0.114**	0.806	0.777	0.901
LOC 10a	DM-0007	Humboldt Bay	Oyster	Wet	10/21/2002	<0.0606	**0.0699**	<0.0461	**0.0852**	<0.0475	**0.272**	<1.06	**0.216**	<0.0781	<0.0624	<0.041	<0.036	<0.0293	<0.0252	<0.0414	<0.0321	<0.157	0.148	0.162	0.363
LOC 10b	DM-0009	Humboldt Bay	Oyster	Wet	10/21/2002	<0.0747	**0.114**	<0.0433	**0.165**	**0.0793**	**0.334**	<0.726	**0.274**	<0.0711	<0.0584	<0.04	<0.0407	<0.0283	<0.0259	<0.0381	<0.0319	<0.0921	0.202	0.232	0.476
LOC 10b	020621-BIS	Humboldt Bay	Oyster	Wet	6/21/2002	<0.0217	**1.15**	**0.324**	**0.118**	<0.0816	**0.248**	**0.705**	**0.193**	<0.128	<0.108	<0.0237	<0.0247	**0.334**	**0.103**	<0.0665	<0.057	**0.102**	1.41	1.31	1.49
LOC 4	020621-NBSC 02	Mill Area	Oyster	Wet	6/21/2002	**0.0519**	**2**	**0.125**	**0.193**	<0.0823	**0.404**	**1.2**	**0.209**	<0.27	<0.219	<0.034	<0.0198	**0.368**	<0.0612	<0.0877	<0.0699	**0.129**	2.24	2.22	2.44
LOC 4	DM-0021	Mill Area	Oyster	Wet	10/21/2002	<0.0436	**0.0956**	**0.14**	**0.139**	**0.0763**	**0.319**	<1.18	**0.184**	<0.0447	**0.0608**	**0.0644**	<0.0258	<0.0338	<0.0312	<0.0512	<0.038	<0.142	0.239	0.215	0.389
LOC 4	DM-0025	Mill Area	Oyster	Wet	10/21/2002	<0.0548	<0.0501	<0.0625	**0.15**	<0.063	**0.388**	<1.58	**0.125**	<0.105	<0.0902	**0.075**	<0.033	<0.0226	<0.0211	<0.0326	<0.027	<0.163	0.108	0.121	0.241
TRAWL 4	DM-0044	Humboldt Bay	Perch	Wet	10/25/2002	<0.0395	**0.0692**	<0.0248	**0.0657**	<0.024	**0.136**	**0.306**	**0.161**	<0.0513	<0.0395	**0.0348**	<0.0133	<0.0309	<0.0167	<0.00833	<0.0063	**0.0745**	0.119	0.130	0.278
TRAWL 15	DM-0064 & DM-0066 &	Humboldt Bay	Perch	Wet	10/25/2002	<0.121	<0.149	<0.268	<0.293	<0.268	**0.3**	**0.492**	**0.296**	<0.239	<0.189	<0.0896	<0.114	<0.13	<0.126	<0.21	<0.143	<0.207	0.305	0.294	0.591
TRAWL 18	DM-0079	Humboldt Bay	Perch	Wet	10/25/2002	<0.139	<0.126	<0.143	<0.139	<0.134	**0.196**	**0.801**	**0.243**	<0.202	<0.175	<0.0851	<0.105	<0.103	<0.105	<0.17	<0.116	<0.227	0.257	0.254	0.510
STAR 5	DM-0036	Humboldt Bay	Sculpin	Wet	10/24/2002	<0.0444	**0.103**	<0.0501	<0.081	<0.0261	**0.102**	**0.335**	**0.145**	**0.0355**	**0.0666**	**0.039**	<0.0115	**0.0711**	**0.0341**	<0.0207	<0.0161	<0.219	0.194	0.197	0.356
TRAWL 2	DM-0037	Humboldt Bay	Sculpin	Wet	10/24/2002	<0.0847	<0.15	<0.112	<0.111	<0.109	<0.154	**0.988**	**0.204**	<0.125	<0.103	<0.0655	<0.0866	**0.0832**	<0.0383	<0.0544	<0.0411	**0.355**	0.202	0.200	0.404
TRAWL 17	DM-0071	Humboldt Bay	Sculpin	Wet	10/25/2002	<0.551	<0.65	<1	<0.975	<0.937	<1.18	<1.29	<1.13	<1.26	<0.963	<0.34	<0.467	<0.5	<0.478	<0.755	<0.523	<1.15	1.28	1.20	1.90
TRAWL 18	DM-0078	Humboldt Bay	Sculpin	Wet	10/25/2002	<0.166	<0.173	<0.255	<0.264	<0.247	**0.453**	**2.7**	<0.176	<0.257	<0.218	<0.0959	<0.132	<0.0801	<0.0795	<0.122	<0.0846	<0.282	0.321	0.302	0.420
TRAWL 10/11	DM-0054	Mill Area	Sculpin	Wet	10/25/2002	<0.0944	<0.0995	<0.0712	<0.0678	<0.0691	**0.231**	<1.24	**0.13**	<0.0639	<0.0548	<0.0545	<0.0595	**0.0701**	<0.029	<0.0439	<0.0312	**0.222**	0.150	0.151	0.276
TRAWL 13	DM-0080	Mill Area	Sculpin	Wet	10/25/2002	<0.13	<0.225	<0.292	<0.308	<0.286	**0.883**	<4.81	<0.163	<0.393	<0.341	<0.14	<0.167	<0.103	<0.105	<0.164	<0.116	<0.429	0.380	0.360	0.499
Arcata Bay Ref	Arcata Bay Ref	Humboldt Bay	Sediment	Dry	10/24/2002	<0.173	<0.446	<0.433	**0.823**	**0.465**	**9.41**	**48.4**	**0.229**	<0.323	**0.418**	**2.71**	<0.229	**0.791**	**0.307**	<0.176	**0.289**	**3.98**	0.850	0.975	1.23
C-40-2	C40-2-0-0.5	Humboldt Bay	Sediment	Dry	10/24/2002	<0.214	**0.586**	**0.848**	<2.36	**1.34**	**30.1**	**178**	**0.758**	<0.359	**0.521**	**8.27**	<0.636	<0.79	<0.791	**0.25**	**0.709**	**13.9**	1.76	1.96	2.49
C-40-2	C40-2-1.5-2.0	Humboldt Bay	Sediment	Dry	10/24/2002	**0.229**	<0.426	**0.622**	<1.12	**0.828**	**10.2**	**59.2**	**1.11**	<0.451	**0.557**	**2.53**	<0.228	<0.495	<0.5	**0.15**	**0.478**	<4.01	1.27	1.29	2.41
C-41	C41-0-0.5	Humboldt Bay	Sediment	Dry	10/24/2002	**0.523**	**1.53**	**1.56**	**5.93**	**3.54**	**78.5**	**467**	**1.88**	<0.995	**1.19**	**14.1**	<1.07	<1.94	<1.82	**0.454**	**1.32**	**30.5**	4.28	5.31	6.30
C-41	C41-1.5-2.0	Humboldt Bay	Sediment	Dry	10/24/2002	**0.837**	**3.22**	**3.75**	**17.1**	**8.9**	**314**	**1720**	**2.13**	**1.54**	**2.67**	**85.5**	**4.57**	**4.32**	**3.49**	**1.35**	**5.38**	**157**	10.6	14.3	13.1

TABLE A-5

SUMMARY OF DIOXIN/FURAN ANALYTICAL RESULTS

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	2,3,4,6,7,8-HxCDF	OCDF	2,3,7,8-TCDD TEQ (Fish)	2,3,7,8-TCDD TEQ (Mammals)	2,3,7,8-TCDD TEQ (Bird)
					Number Detected	178	179	179	179	179	179	192	179	179	179	179	179	179	179	179	179	179	--	--	--
C-42	C42-0-0.5	Humboldt Bay	Sediment	Dry	10/24/2002	<0.256	<0.362	0.345	1.43	<0.778	17.6	97.6	0.788	<0.155	0.335	3	0.26	<0.386	0.212	<0.0892	0.308	8.52	0.847	1.07	1.65
C-42	C42-1.0-1.8	Humboldt Bay	Sediment	Dry	10/24/2002	0.604	1.61	1.52	3.92	2.5	55.7	317	1.75	1.46	2.17	12.2	1.04	<2.14	1.36	<0.488	1.84	24	4.96	5.52	7.32
C-43	C43-0-0.5	Humboldt Bay	Sediment	Dry	10/24/2002	<0.678	1.62	2.08	9.53	4.61	357	3830	1.72	1.44	2.96	49.1	3.87	4.01	2.78	1.06	4.4	253	7.30	11.0	9.96
C-43	C43-1.0-1.5	Humboldt Bay	Sediment	Dry	10/24/2002	<0.328	1.41	1.86	11.4	4.69	346	3100	1.16	0.683	1.38	64.7	3.97	<2.33	1.48	0.777	2.79	386	5.45	9.33	6.86
C-44	C44-0-0.5	Humboldt Bay	Sediment	Dry	10/24/2002	<0.23	0.644	0.562	3.36	1.57	46.8	247	1.46	<0.609	0.84	6.58	<0.61	<1.25	<0.869	0.448	0.764	13	1.97	2.68	3.68
C-44	C44-1.5-2.0	Humboldt Bay	Sediment	Dry	10/24/2002	1.19	2.16	<1.31	15.3	6.81	91.5	443	3.34	<1.76	1.89	16.9	<1.29	2.63	2.73	0.941	1.77	25.7	6.18	8.89	10.7
Channel 1	Channel 1 Comp	Humboldt Bay	Sediment	Dry	10/23/2002	<0.162	0.486	0.614	3.02	1.49	34.1	131	0.487	0.215	0.464	4.89	<0.264	0.669	0.346	<0.169	0.588	8.08	1.45	1.94	2.02
Channel 2	Channel 2 Comp	Humboldt Bay	Sediment	Dry	10/23/2002	<0.191	0.423	0.435	1.99	1	23.1	112	0.401	<0.258	0.401	4.49	<0.325	0.655	0.334	<0.203	0.458	7.43	1.23	1.55	1.71
LOC 1	DM-0004	Humboldt Bay	Sediment	Dry	10/21/2002	<0.208	0.592	0.615	2.35	1.53	29	148	0.744	0.323	0.58	5.25	0.447	<0.973	0.547	0.198	0.625	9.11	1.67	2.07	2.55
LOC 2	DM-0002	Humboldt Bay	Sediment	Dry	10/21/2002	<0.153	0.469	0.541	1.68	1.19	20.1	103	0.659	0.282	0.504	3.59	0.335	<0.655	<0.428	0.174	0.479	6.44	1.33	1.59	2.09
LOC 3	DM-0016	Humboldt Bay	Sediment	Dry	10/21/2002	<0.236	0.982	0.971	4.12	2.56	58.9	308	1.07	0.811	1.2	12.4	0.999	2.52	1.49	0.535	1.37	19.7	3.16	3.96	4.61
LOC 5	DM-0018	Humboldt Bay	Sediment	Dry	10/21/2002	0.281	0.717	0.834	3.58	2.1	46.5	231	0.825	0.473	0.773	8.86	0.699	<1.32	0.902	<0.247	<0.848	14.8	2.30	2.94	3.31
LOC 6	DM-0020	Humboldt Bay	Sediment	Dry	10/21/2002	<0.208	0.76	<0.682	3.35	1.93	37.6	175	0.753	0.438	0.694	6.82	0.596	<1.19	0.71	<0.265	0.908	11.2	1.86	2.57	2.96
LOC 7	DM-0014	Humboldt Bay	Sediment	Dry	10/21/2002	<0.248	0.92	1.09	3.57	2.38	46.1	231	0.991	0.658	0.994	8.26	0.926	<1.87	1.02	0.524	1.27	14.2	2.77	3.33	3.96
LOC 8	DM-0012	Humboldt Bay	Sediment	Dry	10/21/2002	<0.189	0.528	0.55	2.05	1.28	27.9	158	<0.544	0.441	0.522	5.57	0.488	<0.943	0.755	0.218	0.571	10.4	1.53	1.88	1.94
LOC 9	DM-0006	Humboldt Bay	Sediment	Dry	10/21/2002	0	0.423	<0.373	1.56	1.01	17.4	91.3	0.538	0.336	0.549	3.54	0.373	<0.79	0.502	0.21	0.538	5.5	1.09	1.43	1.90
LOC 10a	DM-0008	Humboldt Bay	Sediment	Dry	10/21/2002	<0.117	0.31	0.268	1.16	0.626	13.3	74.3	0.395	<0.196	0.294	2.53	<0.188	<0.481	0.281	<0.084	0.293	4.14	0.825	1.02	1.29
LOC 10b	DM-0010	Humboldt Bay	Sediment	Dry	10/21/2002	<0.264	0.741	0.625	2.41	1.43	31.2	176	0.77	0.32	0.587	5.4	0.434	<0.947	0.496	0.216	<0.593	9.23	1.83	2.24	2.72
LOC 15	DM-0081	Humboldt Bay	Sediment	Dry	10/24/2002	<0.358	1.11	1.23	4.16	2.7	54.1	310	1.63	<0.761	0.937	10.4	<0.884	1.42	<0.454	0.362	1.09	25.3	3.05	3.74	4.77
LOC 16	DM-0082	Humboldt Bay	Sediment	Dry	10/24/2002	0.33	0.966	0.924	3.18	2.04	39	221	0.863	<0.59	0.799	6.76	<0.588	1.1	<0.413	0.27	0.825	13.6	2.64	3.14	3.64
LOC 17	DM-0083	Humboldt Bay	Sediment	Dry	10/24/2002	0.322	0.857	0.974	3.13	2.02	47.7	278	0.92	<0.616	0.795	7.82	<0.579	1.18	<0.609	0.321	0.835	15.1	2.60	3.15	3.63
LOC 18	DM-0084	Humboldt Bay	Sediment	Dry	10/24/2002	<0.34	1.24	1.18	3.83	2.51	54.4	383	0.857	<0.616	0.699	10.3	<0.754	1.22	<0.54	0.297	0.772	22.6	2.93	3.56	3.80
LOC 19	DM-0085	Humboldt Bay	Sediment	Dry	10/24/2002	<0.258	0.505	0.554	<1.8	1.28	27.6	193	0.437	<0.341	0.414	5.27	<0.397	0.559	<0.303	0.125	0.377	13.6	1.39	1.64	1.89
LOC 20	DM-0086	Humboldt Bay	Sediment	Dry	10/25/2002	0.42	1.47	1.91	5.66	4.18	79.9	500	0.93	<0.762	1.27	16	<1.21	2.25	<0.864	0.516	1.65	25.6	4.43	5.31	5.48
LOC 21	DM-0087	Humboldt Bay	Sediment	Dry	10/23/2002	<0.294	<1.1	1.17	3.77	2.46	55.4	439	0.994	<0.579	1.19	10.4	<0.716	1.22	<0.712	0.313	1.1	19.9	2.51	3.15	3.76
LOC 22	DM-0088	Humboldt Bay	Sediment	Dry	10/23/2002	1.16	<5	3.34	8.52	6.19	129	995	5.26	3.68	6.42	24.1	<2.43	6.23	6.94	1.77	5.96	35.5	11.7	13.1	19.2
North Arcata Bay	North Arcata Bay Ref	Humboldt Bay	Sediment	Dry	10/24/2002	0.326	0.808	0.911	5.01	2.36	52.5	201	1.11	0.462	0.846	7.45	<0.595	1.33	0.621	0.354	1.08	11.2	2.65	3.48	3.96
Old Eureka Wharf	Old Eureka Wharf Comp	Humboldt Bay	Sediment	Dry	10/24/2002	0.196	0.532	0.583	2.2	1.42	40.8	293	0.559	0.229	0.449	5.59	0.503	0.759	0.35	0.176	0.592	13.9	1.64	2.13	2.27
BC	BC Comp	Mill Area	Sediment	Dry	10/23/2002	0.455	1.54	1.5	9.94	4.94	114	527	1.13	0.603	1.34	13.7	1.11	1.69	1.11	0.503	1.69	19	4.47	6.29	6.01
C-01	C1-0.0-0.5	Mill Area	Sediment	Dry	10/22/2002	1.27	6.42	9.33	74.5	32.3	964	4510	3.14	2.7	5.55	131	6.14	<6.28	5.1	<2.35	10.2	168	21.3	36.0	25.9
C-01	C1-0.5-1.0	Mill Area	Sediment	Dry	10/22/2002	1.3	11.5	12.9	329	60.8	3610	20800	9.22	9.47	25.8	462	15.2	24.1	21.7	11.4	42.2	411	57.4	120	79.2
C-02	C2-0.0-0.5	Mill Area	Sediment	Dry	10/22/2002	0.945	3.94	4.46	38.1	13.3	354	1610	3.79	2.54	4.63	44.6	2.72	4.05	3.5	<1.19	5.6	55.7	12.6	18.8	17.9
C-02	C2-1.0-1.5	Mill Area	Sediment	Dry	10/22/2002	1.37	9.9	15.6	211	67.1	2320	6520	4.06	4.27	9.66	765	29.8	20.4	19.8	5.53	35.3	1140	46.2	86.1	54.2
C-02	C2-1.5-2.3	Mill Area	Sediment	Dry	10/22/2002	0.842	4.73	6.2	51	19.1	804	4050	1.16	8.51	3.97	288	14.9	12.6	25.6	2.7	14.7	503	21.7	32.8	24.1
C-03	C3-0.0-0.5	Mill Area	Sediment	Dry	10/22/2002	0.835	4.9	5.88	92.8	25.7	1030	3530	3.2	2.39	6.28	148	6.32	6.31	5.53	2.83	10.9	171	18.8	36.5	24.7
C-03	C3-1.0-1.5	Mill Area	Sediment	Dry	10/22/2002	1.89	17.5	18.6	242	62.3	2260	8460	6.74	7.3	17.2	1080	41.7	36.5	33.6	8.3	58.1	1230	69.1	110	81.7
C-03	C3-1.5-2.0	Mill Area	Sediment	Dry	10/22/2002	1.2	8.54	13.2	113	43.5	1690	8160	1.49	5.71	5.86	654	29.6	22.3	26	4.67	27	1010	38.6	62.7	41.2
C-04	C-4 Comp	Mill Area	Sediment	Dry	10/22/2002	0.581	2.91	4.29	37.5	13.8	498	2180	1.57	1.12	2.58	54.9	3.04	3.34	2.99	1.04	4.75	75.6	10.1	17.5	12.2
C-04	C4-0.0-0.5	Mill Area	Sediment	Dry	10/22/2002	0.78	5.06	7.29	70.2	19.2	832	4430	2.33	2.36	5.7	176	6.91	7.41	7.14	<2.19	11.6	194	19.3	32.0	22.9
C-04	C4-1.0-1.8	Mill Area	Sediment	Dry	10/22/2002	1.34	15.2	19.1	293	64.3	3100	16900	12	10.5	27.8	382	12	22.9	30.2	9.93	44.3	241	64.2	117.2	87.2
C-05	C5-0.0-0.5	Mill Area	Sediment	Dry	10/22/2002	0.448	2.79	3.49	33.7	9.73	371	1810	2.12	1.23	3.07	75.1	3.55	3.75	3.44	<1.22	5.88	82.5	9.83	15.8	12.8
C-05	C5-1.0-1.5	Mill Area	Sediment	Dry	10/22/2002	<0.539	5	8.79	91.1	26.7	1070	5910	4.62	4.51	10.4	139	<2.37	9.73	6.89	5.45	15.4	117	23.3	40.3	31.6
C-05	C5-1.5-2.0	Mill Area	Sediment	Dry	10/22/2002	0.952	10.6	15.4	307	52.4	3460	19000	9.12	12.5	26.2	357	9.85	20.8	26.6	13.7	43.2	169	56.5	114	76.7
C-06	C-6 Comp	Mill Area	Sediment	Dry	10/22/2002	0.406	1.57	1.65	17.9	7.15	167	545	1.57	0.679	1.69	15.8	1.26	2.08	1.38	0.658	2.28	22.2	5.04	8.22	7.31
C-06	C6-0-0.5	Mill Area	Sediment	Dry	10/24/2002	0.399	1.71	1.89	11	4.87	133	672	1.19	<0.986	1.22	22.6	<1.27	2.01	2.54	0.513	1.99	33.4	5.05	6.98	6.40
C-06	C6-1.0-1.5	Mill Area	Sediment	Dry	10/24/2002	0.617	3.91	4.55	69.5	17.9	694	3450	3.28	3.21	6.02	83.2	3.55	6.04	7.32	2.7	10.2	74.2	15.6	28.0	21.4
C-07	C7-0.0-0.9	Mill Area	Sediment	Dry	10/23/2002	0.67	4.39	4.17	93	18.4	659	2970	7.87	3.36	9.45	125	3.81	5.14	5.42	2.4	12.5	103	18.3	33.0	30.5
C-08	C8-0.0-0.5	Mill Area	Sediment	Dry	10/22/2002	0.77	3.05	3.87	31.2	11.4	398	2000	2.41	1.22	2.77	51.5	2.58	3.77	2.87	1.12	4.88	62.7	10.2	16.1	13.2
C-08	C8-0.5-1.4	Mill Area	Sediment	Dry	10/22/2002	0.558	4.13	6.22	95.3	18.5	982	4660	3.71	3.38	7.66	119	3.7	7.19	7.96	3.29	12.5	78.7	18.9	35.7	25.3
C-09	C9-1-0.0-0.8	Mill Area	Sediment	Dry	10/23/2002	<0.553	3.34	4.47	21.4	13.9	284	1390	0.91	0.558	1.1	29.5	1.59	1.44	1.19	0.547	2	50.2	8.08	12.1	8.77
C-09	C9-2 0.0-0.8	Mill Area	Sediment	Dry	10/24/2002	NA	NA	NA	NA	NA	NA	1710	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.171	0.171	0.171
C-10	C10-0.0-0.5	Mill Area	Sediment	Dry	10/22/2002	<0.428	1.72	1.95	10.7	4.77	133	634	1.32	0.678	1.41	20.4	1.7	2.25	1.37	0.581	2.1	36	4.92	6.80	6.46
C-10	C10-1.0-1.5	Mill Area	Sediment	Dry	10/22/2002	0.761	6.1	10.7	151	28.2	1610	8100	5.33	7.32	14.5	168	5.86	13	14.4	6.95	23.1	128	31.8	58.4	42.2
C-11	C11-0.0-0.5	Mill Area	Sediment	Dry	10/22/2002	0.402	1.03	1.17	4.98	2.91	68.1	328	0.958	0.456	0.893	11.5	0.933	<1.61	0.888	0.436	1.3	19.6	3.18	4.09	4.30
C-12	C12-0.-0.5	Mill Area	Sediment	Dry	10/22/2002	0.502	2.06	2.69	14.2	6.06	147	753	1.51	0.84	1.97	26.3	1.98	3.09	1.85	0.882	2.87	41.8	6.59	8.74	8.39

TABLE A-5

SUMMARY OF DIOXIN/FURAN ANALYTICAL RESULTS

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Geomatrix

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	2,3,4,6,7,8-HxCDF	OCDF	2,3,7,8-TCDD TEQ (Fish)	2,3,7,8-TCDD TEQ (Mammals)	2,3,7,8-TCDD TEQ (Bird)
					Number Detected	178	179	179	179	179	179	192	179	179	179	179	179	179	179	179	179	179	--	--	--
C-13	C13-0.0-0.5	Mill Area	Sediment	Dry	10/22/2002	0.504	1.83	2.18	18.5	6.35	217	1090	1.41	0.87	1.89	27	1.65	2.59	1.73	0.881	3.28	33.6	6.20	9.58	8.11
C-14	C14-0.0-0.5	Mill Area	Sediment	Dry	10/22/2002	NA	NA	NA	NA	NA	NA	6.1	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0006	0.0006	0.0006
C-15	C15-0.0-0.5	Mill Area	Sediment	Dry	10/22/2002	NA	NA	NA	NA	NA	NA	4.9	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.0005	0.0005	0.0005
C-15	C15-1.0-1.5	Mill Area	Sediment	Dry	10/22/2002	<0.172	<0.175	<0.384	<0.393	<0.387	<0.162	<0.758	<0.201	<0.233	<0.209	<0.074	<0.078	<0.0638	<0.0613	<0.105	<0.071	<0.143	0.352	0.316	0.437
C-16	C16-0-0.5	Mill Area	Sediment	Dry	10/22/2002	0.272	0.844	1.08	4.91	2.67	70.7	370	0.831	0.676	0.756	12.6	0.855	<1.57	1.47	0.328	1.18	21.4	2.81	3.73	3.76
C-16	C16-1.0-1.5	Mill Area	Sediment	Dry	10/22/2002	0.57	2.36	2.42	29.2	8.81	305	1480	2.07	2.17	2.77	56.7	2.67	4	4.24	1.17	4.86	75.1	8.60	13.9	11.8
C-17	C17-0-0.5	Mill Area	Sediment	Dry	10/23/2002	0.486	2.44	3.91	22.7	10.5	406	2460	1.34	1.3	2.9	105	5.64	6.71	3.68	1.82	6.04	166	10.4	15.5	12.4
C-17	C17-1.0-1.5	Mill Area	Sediment	Dry	10/23/2002	0.239	0.508	0.437	0.866	0.678	7.21	28.3	0.79	0.574	0.598	1.12	<0.105	<0.365	0.366	<0.0961	0.315	<1.38	1.46	1.53	2.40
C-18	C18-0.0-0.5	Mill Area	Sediment	Dry	10/22/2002	0.667	4.33	4.79	80.8	20.9	731	3440	3.88	2.69	6.41	78.7	3.35	6.5	5.93	3.02	10.5	55.8	16.4	30.4	23.2
C-18	C18-1.0-1.5	Mill Area	Sediment	Dry	10/22/2002	1.29	6.99	7.98	81.2	31.3	933	3010	1.32	1.78	3.92	448	21.2	14.2	11.6	2.6	18.8	682	26.2	41.6	28.8
C-18	C18-1.5-2.1	Mill Area	Sediment	Dry	10/22/2002	<0.53	2.48	3.7	18.7	8.31	388	2370	0.877	1.63	3.4	76.4	5.8	6.99	3.66	1.91	5.72	165	9.98	14.5	11.7
C-19	C19-0.0-0.5	Mill Area	Sediment	Dry	10/23/2002	0.272	0.451	0.366	0.886	0.58	6.94	22.6	0.877	0.442	0.486	<0.943	0.11	<0.354	<0.23	<0.107	<0.285	<1.19	1.29	1.39	2.28
C-19	C19-0.5-1.2	Mill Area	Sediment	Dry	10/23/2002	<0.104	<0.0981	<0.163	<0.159	<0.16	0.611	<1.39	0.227	0.128	<0.1	<0.0601	<0.0585	<0.0959	<0.0446	<0.0692	<0.0497	<0.267	0.200	0.199	0.418
C-20	C20-0.0-0.3	Mill Area	Sediment	Dry	10/24/2002	NA	NA	NA	NA	NA	NA	254	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.025	0.025	0.025
C-21	C21-0-0.5	Mill Area	Sediment	Dry	10/23/2002	NA	NA	NA	NA	NA	NA	172	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.017	0.017	0.017
C-22	C22-0.0-0.5	Mill Area	Sediment	Dry	10/23/2002	NA	NA	NA	NA	NA	NA	259	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.026	0.026	0.026
C-23	C23-0-0.5	Mill Area	Sediment	Dry	10/23/2002	<0.371	0.622	<0.45	1.43	0.848	11.6	38.4	0.825	0.483	1.24	3.26	<0.312	0.605	0.537	<0.241	0.868	4.83	1.89	2.15	3.29
C-23	C23-1.0-1.5	Mill Area	Sediment	Dry	10/23/2002	0.246	0.48	0.359	0.665	0.626	3.19	<3.99	0.762	0.579	0.596	0.518	<0.138	<0.259	0.387	<0.0544	0.306	<0.402	1.38	1.42	2.32
C-24	C24-0.0-0.5	Mill Area	Sediment	Dry	10/23/2002	0.259	0.738	0.888	3.51	1.85	39.5	221	0.974	0.348	0.712	7.02	0.556	1.2	0.587	0.345	0.955	11.3	2.36	2.90	3.43
C-24	C24-1.0-1.5	Mill Area	Sediment	Dry	10/23/2002	0.596	2.56	2.35	31.1	9.04	257	909	2.36	2.68	3.34	46.8	2.48	3.81	4.73	1.31	5.26	56.8	9.01	14.1	12.8
C-25-1	C25-1-0.0-0.5	Mill Area	Sediment	Dry	10/23/2002	NA	NA	NA	NA	NA	NA	1200	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.120	0.120	0.120
C-25-2	C25-2-0.0-0.5	Mill Area	Sediment	Dry	10/23/2002	0.584	2.59	2.99	29	9.62	308	1330	2	1.22	2.93	91.9	3.49	5.03	3.48	1.14	5.9	97.1	9.64	14.8	12.6
C-25-2	C25-2-0.5-1.3	Mill Area	Sediment	Dry	10/23/2002	0.561	2.69	4.07	32.1	12.2	443	1590	0.84	1.37	2.07	158	6.58	6.35	7.12	1.09	7.12	203	11.3	17.7	12.5
C-26	C26-0.0-0.8	Mill Area	Sediment	Dry	10/23/2002	0.555	3.36	4.39	54.9	16.6	680	3010	0.923	1.16	3.5	330	13.1	9.71	6.68	1.88	12.4	569	16.2	27.1	18.4
C-27-1	C27-1-0.0-0.5	Mill Area	Sediment	Dry	10/23/2002	0.335	1.11	1.4	7.64	3.26	82.3	427	1.2	0.479	1.01	13.1	0.954	1.57	0.907	0.402	1.53	19.7	3.55	4.77	4.88
C-27-1	C27-1-1.0-1.5	Mill Area	Sediment	Dry	10/23/2002	<0.374	1.39	2.07	7.41	4.11	187	870	1.03	2.28	2.2	30.1	3.05	4.54	2.68	1.04	2.7	56.8	5.70	7.64	7.33
C-27-2	C27-0.0-0.5	Mill Area	Sediment	Dry	10/23/2002	NA	NA	NA	NA	NA	NA	386	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.039	0.039	0.039
C-28	C28-0.0-0.5	Mill Area	Sediment	Dry	10/23/2002	NA	NA	NA	NA	NA	NA	606	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.061	0.061	0.061
C-28	C28-1.0-1.8	Mill Area	Sediment	Dry	10/23/2002	0.457	2.23	2.3	29.9	7.56	245	823	2.15	3.25	2.94	64.1	3.38	3.22	4.73	0.967	5.53	80.2	8.41	13.2	11.7
C-29	C29-0-0.5	Mill Area	Sediment	Dry	10/23/2002	NA	NA	NA	NA	NA	NA	539	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.054	0.054	0.054
C-30	C30-0-0.5	Mill Area	Sediment	Dry	10/23/2002	NA	NA	NA	NA	NA	NA	540	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.054	0.054	0.054
C-31	C31-0.0-0.5	Mill Area	Sediment	Dry	10/23/2002	0.505	2.61	3.34	26.4	9.31	264	1440	1.59	0.96	<2.18	54.3	2.69	3.11	2.76	<0.873	4.62	64.5	7.89	12.2	9.33
C-31	C31-0.5-1.0	Mill Area	Sediment	Dry	10/23/2002	0.607	3.08	4.14	41.7	13.2	454	2400	2.86	1.64	4.17	90.9	3.69	5.08	4.26	1.47	7.39	111	12.1	19.6	16.3
C-32	C32-0.0-0.5	Mill Area	Sediment	Dry	10/23/2002	0.612	2.94	3.23	39	11	451	2740	1.41	0.992	2.33	59.7	3.42	3.36	2.74	<0.931	4.63	107	9.44	16.8	11.5
C-32	C32-0.5-1.0	Mill Area	Sediment	Dry	10/23/2002	0.813	6.31	14.5	156	38.9	1550	7820	5.24	4.88	11.3	190	6.12	10.8	14.3	4.58	19.7	124	31.7	57.7	39.6
C-33	C33-0-0.5	Mill Area	Sediment	Dry	10/23/2002	0.421	2.24	2.36	24	7.74	253	1350	1.73	1.04	2.32	31	1.75	2.58	2.02	0.946	3.61	40.3	7.09	11.4	9.58
C-33	C33-1.0-1.5	Mill Area	Sediment	Dry	10/23/2002	<0.128	0.586	0.764	6.6	2.33	77.3	311	0.406	1.91	0.713	32	1.46	<1.25	2.03	0.269	1.84	51.3	2.52	3.73	3.22
C-34	C34-0-0.5	Mill Area	Sediment	Dry	10/23/2002	NA	NA	NA	NA	NA	NA	265	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.027	0.027	0.027
C-35	C35-0-0.5	Mill Area	Sediment	Dry	10/23/2002	<0.401	1.54	1.74	9.66	4.35	94	515	1.5	<0.834	1.18	17	<1.19	2.03	<1	0.497	1.66	26.1	4.23	5.72	5.87
C-36	C36-0-0.5	Mill Area	Sediment	Dry	10/23/2002	0.463	1.59	1.74	12.2	5.1	153	840	1.42	0.693	1.4	23	1.44	2.33	1.36	0.611	2.22	35.9	5.04	7.35	6.80
C-37	C37-0.0-0.3	Mill Area	Sediment	Dry	10/24/2002	0.247	0.784	0.94	6.6	2.69	103	682	0.676	0.361	0.749	16.9	0.922	1.37	0.791	0.394	1.35	28.7	2.76	4.18	3.62
C-38	C38-0-0.5	Mill Area	Sediment	Dry	10/24/2002	NA	NA	NA	NA	NA	NA	192	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.019	0.019	0.019
C-39	C39-0-0.5	Mill Area	Sediment	Dry	10/24/2002	<0.0941	<0.138	<0.209	<0.211	<0.204	<1.19	5.64	0.179	<0.181	<0.144	0.287	<0.0504	0.118	<0.0852	<0.0475	<0.0386	<0.644	0.245	0.236	0.417
DSS	DSS Comp	Mill Area	Sediment	Dry	10/23/2002	0.452	1.48	1.91	21.8	7.71	258	812	1.4	0.988	1.69	17.2	1.21	1.87	1.28	0.667	2.15	25.8	5.27	9.55	7.33
Lappe_LB	S021850032402	Mill Area	Sediment	Dry	3/24/2002	<0.4	<1.3	<1.5	6.7	4.3	84	560	0.65	<0.73	<0.76	15	<0.77	<1.7	<0.68	<0.92	<0.85	18	2.08	3.56	2.95
Lappe_OF2	2S011800032402	Mill Area	Sediment	Dry	3/24/2002	3.3	20	32	240	100	2500	14000	5.5	6.4	7.8	340	16	16	15	<1.7	16	430	59.5	100	63.5
Lappe_OF4	4S01735032402	Mill Area	Sediment	Dry	3/24/2002	<0.7	<5.2	6.5	71	28	680	3300	2.8	<2.1	<3.2	96	<4.3	<5.7	<5	<1.9	<5.3	110	11.1	23.7	14.2
LOC 4	DM-0022	Mill Area	Sediment	Dry	10/21/2002	0.379	1.16	1.24	6.42	3.19	85.1	439	1.2	0.769	1.06	15.2	1.01	<1.77	1.27	0.405	1.47	24.3	3.58	4.77	5.02
LOC 4	DM-0024	Mill Area	Sediment	Dry	10/21/2002	<0.135	<0.157	<0.205	0.391	0.279	4.16	20.9	0.25	<0.164	<0.138	<0.811	<0.0947	<0.157	<0.0765	<0.105	<0.0927	1.61	0.288	0.357	0.543
LOC 11	DM-0026	Mill Area	Sediment	Dry	10/21/2002	<0.126	0.247	0.305	1.19	0.632	15.7	82.7	0.249	0.151	0.286	2.79	<0.224	<0.298	0.234	<0.0584	0.342	4.12	0.773	0.968	1.08
LOC 12	DM-0027	Mill Area	Sediment	Dry	10/21/2002	<0.138	0.296	0.252	1.46	0.705	15.3	65.8	0.226	0.263	0.227	2.9	<0.185	<0.31	0.355	<0.0645	0.397	4.53	0.797	1.04	1.09
LOC 13	DM-0028	Mill Area	Sediment	Dry	10/21/2002	<0.124	0.438	0.485	2.26	1.04	29.9	159	0.378	0.281	0.356	4.56	0.316	<0.452	0.454	<0.079	0.505	7.42	1.20	1.60	1.63
LOC 14	DM-0029	Mill Area	Sediment	Dry	10/22/2002	<0.267	1.12	1.06	4.94	2.48	49.4	227	1.23	<1.04	1.53	11.2	<0.88	<1.62	<1.83	0.481	1.74	16.6	3.29	4.04	5.00
Outfall-1	Outfall-1	Mill Area	Sediment	Dry	6/14/2001	<1	<1.6	<1.3	6	<1.7	40	120	<0.77	<0.92	<0.9	<3.3	<0.68	<1.2	<1.1	<1.4	<1.3	<4.6	2.28	3.02	2.68
Outfall-4	Outfall-4	Mill Area	Sediment	Dry	6/14/2001	<0.7	<1.9	<2.9	19	8.3	260	1700	1.4	<0.79	<0.76	31	<2.3	<1.8	<1.1	<1.4	<1.3	68	3.62	7.90	5.25

TABLE A-5

SUMMARY OF DIOXIN/FURAN ANALYTICAL RESULTS

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	2,3,4,6,7,8-HxCDF	OCDF	2,3,7,8-TCDD TEQ (Fish)	2,3,7,8-TCDD TEQ (Mammals)	2,3,7,8-TCDD TEQ (Bird)
					Number Detected	178	179	179	179	179	179	192	179	179	179	179	179	179	179	179	179	179	--	--	--
USS	USS Comp	Mill Area	Sediment	Dry	10/22/2002	**0.391**	**1.72**	**1.93**	**16**	**6.94**	**168**	**682**	**1.55**	**0.671**	**1.54**	**15.9**	**1.11**	**2.11**	**1.23**	**0.58**	**2.06**	**25**	5.19	8.08	7.23
USS-2	USS-2 Comp	Mill Area	Sediment	Dry	10/23/2002	**0.391**	**1.29**	**1.4**	**7.81**	**3.89**	**88.8**	**414**	**1.25**	**0.571**	**1.22**	**14.4**	**1.13**	**1.83**	**1.04**	**0.603**	**1.64**	**23.4**	4.00	5.35	5.54
USS-3	USS-3 Comp	Mill Area	Sediment	Dry	10/23/2002	**0.325**	**1.26**	**1.56**	**6.97**	**3.81**	**88.3**	**405**	**1.19**	**0.513**	**1.1**	**13.6**	**1.04**	**1.91**	**0.961**	**0.45**	**1.59**	**21.4**	3.88	5.08	5.22
Ditch-4	Ditch-4	Upland Mill Area	Sediment	Dry	6/14/2001	**1**	**5.8**	**5.7**	**62**	**18**	**680**	**3900**	**1.9**	<1.4	<1.9	**92**	<4.3	<3.8	<4.3	<1.4	<3.3	**170**	13.7	24.9	15.1
TRAWL 13	DM-0060	Mill Area	Shark	Wet	10/25/2002	<0.0393	<0.0331	<0.0397	<0.0414	<0.0404	**0.0897**	<0.448	**0.101**	<0.0369	<0.0298	<0.0236	<0.0248	<0.0125	<0.0128	<0.0178	<0.0135	**0.12**	0.063	0.065	0.160
TRAWL 2	DM-0039	Humboldt Bay	Shiner	Wet	10/24/2002	<0.0204	<0.0435	<0.0324	<0.0321	<0.0316	**0.0796**	**0.406**	**0.0568**	<0.0498	<0.0394	**0.034**	<0.0296	**0.029**	**0.0218**	<0.0183	<0.0135	**0.0783**	0.062	0.062	0.121
TRAWL 16	DM-0065	Humboldt Bay	Shiner	Wet	10/25/2002	**0.14**	<0.12	<0.408	<0.38	<0.372	<0.3	<0.458	**0.321**	<0.223	<0.126	<0.124	<0.171	<0.162	<0.154	<0.262	<0.174	<0.243	0.398	0.368	0.665
TRAWL 17	DM-0073	Humboldt Bay	Shiner	Wet	10/25/2002	**0.152**	<0.321	<0.313	<0.288	<0.284	<0.303	**0.8**	**0.526**	<0.325	<0.251	<0.0789	<0.106	<0.125	<0.128	<0.189	<0.134	<0.313	0.521	0.512	1.03
TRAWL 18	DM-0075	Humboldt Bay	Shiner	Wet	10/25/2002	**0.163**	<0.307	<0.258	<0.249	<0.24	**1.15**	**6.77**	**0.765**	<0.314	**0.327**	**0.219**	<0.155	<0.107	<0.0996	<0.153	<0.115	**0.559**	0.622	0.641	1.47
TRAWL 10/11	DM-0055	Mill Area	Shiner	Wet	10/25/2002	<0.287	<0.19	<0.297	<0.291	<0.292	**0.543**	<2.93	<0.276	<0.256	<0.209	<0.198	<0.198	<0.155	<0.0758	<0.124	<0.0859	**0.624**	0.406	0.385	0.542
TRAWL 2	DM-0041	Humboldt Bay	Shrimp	Wet	10/25/2002	<0.0425	**0.0696**	<0.0341	<0.0543	<0.0337	<0.148	**0.622**	**0.138**	<0.0275	**0.0382**	<0.0401	<0.0187	**0.0307**	<0.0109	<0.0167	<0.0124	**0.1**	0.132	0.137	0.277
TRAWL 4	DM-0045	Humboldt Bay	Shrimp	Wet	10/25/2002	<0.123	**0.406**	<0.299	<0.298	<0.284	**0.609**	**2.32**	**1.04**	<0.266	<0.219	**0.161**	<0.116	<0.0796	<0.0816	<0.135	<0.0901	<0.321	0.681	0.705	1.68
TRAWL 5	DM-0048	Mill Area	Shrimp	Wet	10/25/2002	<0.0356	<0.0587	<0.0505	**0.0764**	<0.0477	**0.247**	<1.2	**0.0689**	<0.0541	<0.0442	<0.035	<0.0312	<0.0344	<0.0144	<0.0249	<0.0151	<0.105	0.082	0.086	0.150
TRAWL 7/8	DM-0052	Mill Area	Shrimp	Wet	10/25/2002	<0.0434	<0.0414	**0.0666**	**0.0638**	<0.0456	**0.342**	<2	**0.0565**	<0.149	<0.132	**0.0432**	<0.0406	**0.0295**	<0.00851	<0.0126	<0.00857	**0.129**	0.122	0.109	0.184
TRAWL 10/11	DM-0056	Mill Area	Shrimp	Wet	10/25/2002	<0.148	<0.115	<0.201	<0.207	<0.203	**0.918**	<6.23	<0.198	<0.233	<0.182	<0.114	<0.112	<0.0585	<0.0553	<0.0912	<0.0665	**0.357**	0.256	0.248	0.365
TRAWL 2	DM-0038 & DM-0040	Humboldt Bay	Sole	Wet	10/24/2002	<0.0175	<0.0508	<0.0253	**0.0288**	<0.024	**0.105**	**0.569**	**0.0633**	<0.0423	<0.034	**0.0225**	<0.0229	**0.0236**	<0.0217	<0.0319	<0.0241	**0.109**	0.060	0.063	0.125
TRAWL 4	DM-0042 & DM-0043	Humboldt Bay	Sole	Wet	10/24/2002	<0.0252	**0.0214**	<0.0291	**0.0422**	<0.0286	**0.111**	**0.417**	**0.0719**	<0.0293	<0.0238	**0.0847**	<0.0162	<0.0331	<0.0134	<0.0198	<0.0144	**0.348**	0.057	0.061	0.127
TRAWL 15	DM-0062 & DM-0068	Humboldt Bay	Sole	Wet	10/25/2002	**0.0316**	<0.0317	<0.0356	**0.0537**	<0.0344	**0.11**	**0.435**	**0.0784**	<0.0282	<0.0334	<0.0412	<0.0111	<0.0295	**0.0138**	<0.0122	<0.00899	**0.0898**	0.074	0.079	0.151
TRAWL 15	DM-0063 & DM-0069	Humboldt Bay	Sole	Wet	10/25/2002	<0.141	<0.15	<0.174	<0.167	<0.162	<0.202	**0.865**	<0.124	<0.198	<0.163	<0.077	<0.102	<0.047	<0.0485	<0.0793	<0.0545	<0.294	0.252	0.236	0.325
TRAWL 17	DM-0070 & DM-0072	Humboldt Bay	Sole	Wet	10/25/2002	<0.127	<0.134	<0.205	<0.189	<0.186	<0.35	**0.576**	<0.191	<0.211	<0.165	<0.105	<0.147	<0.0868	<0.0791	<0.132	<0.0899	<0.208	0.256	0.238	0.355
TRAWL 18	DM-0076 & DM-0077	Humboldt Bay	Sole	Wet	10/25/2002	<0.131	<0.095	<0.15	<0.153	<0.144	<0.186	**0.438**	<0.193	<0.205	<0.167	<0.0829	<0.108	<0.0523	<0.0532	<0.0841	<0.0577	**0.2**	0.217	0.206	0.328
TRAWL 5	DM-0046	Mill Area	Sole	Wet	10/25/2002	<0.0345	**0.0525**	<0.0246	<0.0432	<0.0245	**0.166**	**0.478**	**0.0892**	<0.0229	**0.0286**	**0.0699**	<0.0214	**0.032**	<0.0112	<0.0165	<0.012	**0.199**	0.102	0.106	0.197
TRAWL 5	DM-0047	Mill Area	Sole	Wet	10/25/2002	<0.0646	**0.0952**	<0.0384	**0.17**	<0.0337	**0.686**	**5.98**	**0.197**	<0.0471	**0.0595**	**0.103**	<0.0392	<0.0535	<0.0352	<0.0228	<0.0149	**0.226**	0.189	0.214	0.400
TRAWL 6	DM-0049	Mill Area	Sole	Wet	10/25/2002	<0.0615	<0.117	<0.051	<0.177	<0.0325	**0.39**	<1.36	**0.209**	<0.0669	**0.0923**	**0.183**	<0.0328	<0.0564	<0.055	<0.0274	<0.0196	**0.154**	0.172	0.185	0.408
TRAWL 6	DM-0050	Mill Area	Sole	Wet	10/25/2002	<0.0794	<0.143	<0.105	**0.147**	<0.104	**0.283**	<1.03	**0.158**	<0.0873	<0.073	**0.0856**	<0.0448	**0.0517**	<0.0357	<0.0334	<0.0236	**0.184**	0.179	0.186	0.331
TRAWL 7/8	DM-0051	Mill Area	Sole	Wet	10/25/2002	<0.0541	**0.0781**	<0.0666	**0.13**	<0.0652	**0.338**	<1.38	**0.127**	<0.0528	**0.0635**	**0.135**	<0.0289	**0.0456**	<0.0351	<0.0143	**0.0257**	<0.138	0.174	0.185	0.316
TRAWL 10/11	DM-0053	Mill Area	Sole	Wet	10/25/2002	<0.0992	**0.182**	<0.139	**0.294**	<0.144	**0.911**	<3.96	**0.321**	<0.175	<0.157	**0.403**	<0.128	**0.0829**	**0.0815**	<0.0963	<0.0698	**0.426**	0.360	0.390	0.684
TRAWL 13	DM-0057	Mill Area	Sole	Wet	10/25/2002	<0.0497	<0.0942	**0.108**	**0.449**	**0.131**	**3.04**	**5.4**	**0.153**	**0.0484**	<0.0661	**0.365**	<0.0328	<0.0771	**0.0459**	<0.0226	**0.042**	**0.136**	0.180	0.224	0.307

Abbreviations:

TCDD = tetrachlorodibenzo-p-dioxin
PeCDD = pentachlorodibenzo-p-dioxin
HxCDD = hexachlorodibenzo-p-dioxin
HpCDD = heptachlorodibenzo-p-dioxin
OCDD = octachlorodibenzo-p-dioxin
TCDF = tetrachlorodibenzofuran
PeCDF = pentachlorodibenzofuran
HxCDF = hexachlorodibenzofuran
HpCDF = heptachlorodibenzofuran
OCDF = octachlorodibenzofuran
2,3,7,8-TCDD TEQs = 2,3,7,8 tetrachlorodibenzo-p-dioxin toxicity equivalents
Fish TEFs = calculated using toxicity equivalency factors for fish
Mammal TEFs = calculated using toxicity equivalency factors for mammals
Bird TEFs = calculated using toxicity equivalency factors for fish
< = less than laboratory reporting limit indicated
Bold results are above laboratory reporting limit.
-- = not applicable

Geomatrix

TABLE A-6

SUMMARY OF METAL ANALYTICAL RESULTS

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
					Number Detected	0	81	53	0	27	110	59	83	8	103	84	18	110	1	6	0	58	148
STAR 1	DM-0032	Humboldt Bay	Crab	Wet	10/24/2002	< 2	5	< 1	< 0.2	3.1	< 1	0.4	43	NA	< 1	0.08	< 1	< 1	< 2	< 0.6	< 2	< 0.4	41
STAR 10	DM-0074	Humboldt Bay	Crab	Wet	10/25/2002	< 2	3	< 1	< 0.2	2.4	< 1	0.6	43	NA	< 1	0.04	< 1	< 1	< 2	< 0.6	< 2	< 0.4	29
STAR 2	DM-0033	Mill Area	Crab	Wet	10/24/2002	< 2	6	< 1	< 0.2	1.6	< 1	0.6	41	NA	< 1	0.07	< 1	< 1	< 2	< 0.6	< 2	< 0.4	30
STAR 3	DM-0034	Mill Area	Crab	Wet	10/24/2002	< 2	5	2	< 0.2	1.3	< 1	0.9	35	NA	< 1	0.06	< 1	< 1	< 2	< 0.6	< 2	< 0.4	25
STAR 4	DM-0035	Mill Area	Crab	Wet	10/24/2002	< 2	5	< 1	< 0.2	2.3	< 1	0.7	66	NA	< 1	0.05	< 1	< 1	2	< 0.6	< 2	< 0.4	45
STAR 6	DM-0061	Humboldt Bay	Crab	Wet	10/25/2002	< 2	5	< 1	< 0.2	4.8	< 1	0.7	57	NA	< 1	0.04	< 1	< 1	< 2	0.9	< 2	< 0.4	43
STAR 7	DM-0059	Mill Area	Crab	Wet	10/25/2002	< 2	4	< 1	< 0.2	2.1	< 1	0.8	49	NA	< 1	0.03	< 1	1	< 2	0.6	< 2	1.9	27
STAR 8	DM-0058	Mill Area	Crab	Wet	10/25/2002	< 2	6	< 1	< 0.2	4.2	< 1	0.7	79	NA	< 1	0.05	< 1	< 1	< 2	0.7	< 2	< 0.4	34
LOC 4	DM-0023	Mill Area	Mussel	Wet	10/21/2002	< 2	2	< 1	< 0.2	0.4	< 1	< 0.4	< 1	NA	< 1	0.02	< 1	< 1	< 2	< 0.6	< 2	< 0.4	12
LOC 1	DM-0003	Humboldt Bay	Oyster	Wet	10/21/2002	< 2	2	< 1	< 0.2	0.8	< 1	< 0.4	16	NA	< 1	0.02	< 1	< 1	< 2	< 0.6	< 2	< 0.4	96
LOC 10a	DM-0007	Humboldt Bay	Oyster	Wet	10/21/2002	< 2	2	< 1	< 0.2	0.8	< 1	< 0.4	6	NA	< 1	0.02	< 1	< 1	< 2	< 0.6	< 2	< 0.4	63
LOC 10b	DM-0009	Humboldt Bay	Oyster	Wet	10/21/2002	< 2	2	< 1	< 0.2	0.8	< 1	< 0.4	11	NA	< 1	0.03	< 1	< 1	< 2	< 0.6	< 2	< 0.4	110
LOC 2	DM-0001	Humboldt Bay	Oyster	Wet	10/21/2002	< 2	2	< 1	< 0.2	0.7	< 1	< 0.4	12	NA	< 1	0.02	< 1	< 1	< 2	< 0.6	< 2	< 0.4	79
LOC 3	DM-0015a	Humboldt Bay	Oyster	Wet	10/21/2002	< 2	2	< 1	< 0.2	0.7	< 1	< 0.4	22	NA	< 1	0.03	< 1	< 1	< 2	0.6	< 2	< 0.4	130
LOC 3	DM-0015b	Humboldt Bay	Oyster	Wet	10/21/2002	< 2	2	< 1	< 0.2	0.8	< 1	< 0.4	20	NA	< 1	0.03	< 1	< 1	< 2	< 0.6	< 2	< 0.4	100
LOC 4	DM-0021	Mill Area	Oyster	Wet	10/21/2002	< 2	2	< 1	< 0.2	0.7	< 1	< 0.4	17	NA	< 1	0.02	< 1	< 1	< 2	< 0.6	< 2	< 0.4	78
LOC 4	DM-0025	Mill Area	Oyster	Wet	10/21/2002	< 2	1	< 1	< 0.2	0.4	< 1	< 0.4	30	NA	< 1	0.02	< 1	< 1	< 2	< 0.6	< 2	< 0.4	110
LOC 5	DM-0017	Humboldt Bay	Oyster	Wet	10/21/2002	< 2	1	< 1	< 0.2	0.8	< 1	< 0.4	39	NA	< 1	0.03	< 1	< 1	< 2	1.8	< 2	< 0.4	110
LOC 6	DM-0019	Humboldt Bay	Oyster	Wet	10/21/2002	< 2	2	< 1	< 0.2	1.3	< 1	< 0.4	51	NA	< 1	0.03	< 1	< 1	< 2	2.2	< 2	< 0.4	140
LOC 7	DM-0013	Humboldt Bay	Oyster	Wet	10/21/2002	< 2	2	< 1	< 0.2	0.8	< 1	< 0.4	6	NA	< 1	0.03	< 1	< 1	< 2	< 0.6	< 2	< 0.4	60
LOC 8	DM-0011	Humboldt Bay	Oyster	Wet	10/21/2002	< 2	2	< 1	< 0.2	0.9	< 1	< 0.4	13	NA	< 1	0.03	< 1	< 1	< 2	< 0.6	< 2	< 0.4	130
LOC 9	DM-0005	Humboldt Bay	Oyster	Wet	10/21/2002	< 2	2	< 1	< 0.2	0.7	< 1	< 0.4	5	NA	< 1	0.03	< 1	< 1	< 2	< 0.6	< 2	< 0.4	58
TRAWL 18	DM-0079	Humboldt Bay	Perch	Wet	10/25/2002	< 2	1	< 1	< 0.2	< 0.2	< 1	< 0.4	< 1	NA	< 1	0.07	< 1	< 1	< 2	< 0.6	< 2	< 0.4	40
STAR 5	DM-0036	Humboldt Bay	Sculpin	Wet	10/24/2002	< 2	< 1	< 1	< 0.2	< 0.2	< 1	< 0.4	1	NA	< 1	0.05	< 1	< 1	< 2	< 0.6	< 2	< 0.4	11
C-02	C2-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	Invalid	3	28	< 0.4	< 1	40	7.5	17	NA	7	0.04	2	52	< 2	< 0.6	< 2	26	46
C-02	C2-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	Invalid	4	31	< 0.4	< 1	48	9.6	23	NA	10	0.07	2	64	< 2	< 0.6	< 2	30	53
C-03	C3-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	Invalid	3	29	< 0.4	< 1	40	7.4	18	NA	8	0.04	5	52	< 2	< 0.6	< 2	27	44
C-03	C3-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	Invalid	4	27	< 0.4	< 1	45	9	23	NA	10	0.09	3	61	< 2	< 0.6	< 2	30	56
C-04	C4-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	Invalid	3	23	< 0.4	< 1	32	5.7	20	NA	8	0.03	2	38	< 2	< 0.6	< 2	21	43
C-04	C4-1.0-1.8	Mill Area	Sediment	Wet	10/22/2002	Invalid	2	19	< 0.4	< 1	35	6.3	19	NA	8	0.04	2	42	< 2	< 0.6	< 2	23	50
C-05	C5-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	Invalid	2	25	< 0.4	< 1	28	5.3	13	NA	5	0.03	1	35	< 2	< 0.6	< 2	19	30
C-05	C5-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	Invalid	4	25	< 0.4	< 1	46	9.1	21	NA	9	0.04	1	60	< 2	< 0.6	< 2	28	48
C-06	C6-0-0.5	Mill Area	Sediment	Wet	10/24/2002	< 2	4	36	< 0.5	< 1	53	11	25	NA	9	0.05	1	71	< 2	< 0.6	< 2	34	53
C-15	C15-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	Invalid	5	60	< 0.4	< 1	61	11	24	NA	7	0.05	< 1	81	< 2	< 0.6	< 2	34	51
C-18	C18-0.0-0.5	Mill Area	Sediment	Wet	10/22/2002	Invalid	4	32	< 0.4	< 1	51	9.8	21	NA	9	0.05	< 1	67	< 2	< 0.6	< 2	31	54
C-18	C18-1.0-1.5	Mill Area	Sediment	Wet	10/22/2002	Invalid	4	26	< 0.4	< 1	42	8.2	19	NA	8	0.07	< 1	55	< 2	< 0.6	< 2	27	46
C-19	C19-0.0-0.5	Mill Area	Sediment	Wet	10/23/2002	Invalid	4	36	< 0.4	< 1	51	11	19	NA	8	0.05	< 1	72	< 2	< 0.6	< 2	29	53
C-31	C31-0.0-0.5	Mill Area	Sediment	Wet	10/23/2002	Invalid	2	23	< 0.4	< 1	31	6.1	14	NA	6	0.03	2	40	< 2	< 0.6	< 2	21	37
C-32	C32-0.0-0.5	Mill Area	Sediment	Wet	10/23/2002	Invalid	2	23	< 0.4	< 1	31	6.1	14	NA	6	0.04	4	41	< 2	< 0.6	< 2	21	39
C-35	C35-0-0.5	Mill Area	Sediment	Wet	10/23/2002	< 2	4	38	< 0.5	< 1	52	9.6	20	NA	8	0.05	< 1	66	< 2	< 0.6	< 2	32	52
C-39	C39-0-0.5	Mill Area	Sediment	Wet	10/24/2002	< 2	3	16	< 0.5	< 1	32	4.7	11	NA	4	0.04	2	36	< 2	< 0.6	< 2	20	29
C-40-2	C40-2-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	Invalid	4	57	< 0.4	< 1	47	8.9	19	NA	8	0.05	1	64	< 2	< 0.6	< 2	29	49
C-40-2	C40-2-1.5-2.0	Humboldt Bay	Sediment	Wet	10/24/2002	Invalid	4	45	< 0.4	< 1	48	8.8	20	NA	17	0.2	1	63	< 2	< 0.6	< 2	27	62
C-41	C41-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	Invalid	4	48	< 0.4	< 1	50	9.1	21	NA	8	0.05	2	67	< 2	< 0.6	< 2	31	53
C-41	C41-1.5-2.0	Humboldt Bay	Sediment	Wet	10/24/2002	< 2	6	48	< 0.5	< 1	57	12	32	NA	11	0.07	< 1	77	< 2	< 0.6	< 2	36	60
C-42	C42-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	< 2	4	53	< 0.5	< 1	38	7.1	14	NA	5	0.09	< 1	51	< 2	< 0.6	< 2	23	38
C-42	C42-1.0-1.8	Humboldt Bay	Sediment	Wet	10/24/2002	< 2	4	45	< 0.5	< 1	45	8.6	19	NA	7	0.06	1	60	< 2	< 0.6	< 2	28	44
C-43	C43-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	< 2	4	44	< 0.5	< 1	44	8	95	NA	10	0.23	< 1	56	< 2	< 0.6	< 2	27	68
C-43	C43-1.0-1.5	Humboldt Bay	Sediment	Wet	10/24/2002	< 2	5	25	< 0.5	< 1	41	7.6	35	NA	7	0.28	< 1	47	< 2	< 0.6	< 2	24	41
C-44	C44-0-0.5	Humboldt Bay	Sediment	Wet	10/24/2002	Invalid	4	53	< 0.4	< 1	50	9.1	20	NA	7	0.05	< 1	68	< 2	< 0.6	< 2	30	50
C-44	C44-1.5-2.0	Humboldt Bay	Sediment	Wet	10/24/2002	Invalid	4	44	< 0.4	< 1	51	9.5	23	NA	8	0.06	< 1	69	< 2	< 0.6	< 2	32	49
D6-1	D6-1-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	< 1	42	NA	NA	NA	31	NA	NA	56	NA	NA	NA	NA	110
D6-10	D6-10-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	< 1	33	NA	NA	NA	13	NA	NA	35	NA	NA	NA	NA	51
D6-11	D6-11-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	< 1	51	NA	NA	NA	12	NA	NA	61	NA	NA	NA	NA	56
D6-12	D6-12-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	< 1	37	NA	NA	NA	31	NA	NA	42	NA	NA	NA	NA	240
D6-13	D6-13-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	< 1	29	NA	NA	NA	15	NA	NA	32	NA	NA	NA	NA	58

TABLE A-6

SUMMARY OF METAL ANALYTICAL RESULTS
Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
					Number Detected	0	81	53	0	27	110	59	83	8	103	84	18	110	1	6	0	58	148
D6-14	D6-14-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	< 1	22	NA	NA	NA	18	NA	NA	22	NA	NA	NA	NA	110
D6-15	D6-15-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	< 1	17	NA	NA	NA	11	NA	NA	18	NA	NA	NA	NA	110
D6-16	D6-16-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	< 1	20	NA	NA	NA	9.5	NA	NA	24	NA	NA	NA	NA	78
D6-17	D6-17-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	< 1	34	NA	NA	NA	12	NA	NA	23	NA	NA	NA	NA	19
D6-18	D6-18-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	< 1	25	NA	NA	NA	5.2	NA	NA	< 10	NA	NA	NA	NA	30
D6-19	D6-19-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	< 1	19	NA	NA	NA	8.1	NA	NA	17	NA	NA	NA	NA	49
D6-2	D6-2-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	< 1	48	NA	NA	NA	59	NA	NA	63	NA	NA	NA	NA	190
D6-20	D6-20-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	< 1	28	NA	NA	NA	9.8	NA	NA	27	NA	NA	NA	NA	37
D6-21	D6-21-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	< 1	29	NA	NA	NA	< 5	NA	NA	10	NA	NA	NA	NA	14
D6-22	D6-22-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	< 1	31	NA	NA	NA	< 5	NA	NA	28	NA	NA	NA	NA	21
D6-23	D6-23-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	< 1	32	NA	NA	NA	< 5	NA	NA	29	NA	NA	NA	NA	17
D6-24	D6-24-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	NA	NA	< 1	35	NA	NA	NA	8.8	NA	NA	25	NA	NA	NA	NA	48
D6-3	D6-3-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	< 1	44	NA	NA	NA	37	NA	NA	58	NA	NA	NA	NA	280
D6-4	D6-4-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	< 1	40	NA	NA	NA	29	NA	NA	49	NA	NA	NA	NA	160
D6-5	D6-5-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	< 1	37	NA	NA	NA	24	NA	NA	44	NA	NA	NA	NA	76
D6-6	D6-6-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	< 1	34	NA	NA	NA	23	NA	NA	41	NA	NA	NA	NA	120
D6-7	D6-7-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	NA	NA	< 1	25	NA	NA	NA	8.6	NA	NA	30	NA	NA	NA	NA	39
D6-8	D6-8-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	< 1	23	NA	NA	NA	18	NA	NA	31	NA	NA	NA	NA	58
D6-9	D6-9-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	NA	NA	< 1	22	NA	NA	NA	7.9	NA	NA	22	NA	NA	NA	NA	46
D7-1	D7-1-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	< 1	18	NA	NA	NA	12	NA	NA	23	NA	NA	NA	NA	170
D7-10	D7-10-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	< 1	20	NA	NA	NA	23	NA	NA	46	NA	NA	NA	NA	370
D7-11	D7-11-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	< 1	38	NA	NA	NA	35	NA	NA	38	NA	NA	NA	NA	120
D7-12	D7-12-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	< 1	44	NA	NA	NA	13	NA	NA	38	NA	NA	NA	NA	75
D7-13	D7-13-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	< 1	10	NA	NA	NA	6.2	NA	NA	17	NA	NA	NA	NA	70
D7-14	D7-14-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	< 1	16	NA	NA	NA	7.6	NA	NA	24	NA	NA	NA	NA	110
D7-15	D7-15-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	< 1	27	NA	NA	NA	12	NA	NA	36	NA	NA	NA	NA	100
D7-16	D7-16-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	< 1	32	NA	NA	NA	25	NA	NA	39	NA	NA	NA	NA	210
D7-17	D7-17-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	5.1	31	NA	NA	NA	27	NA	NA	35	NA	NA	NA	NA	460
D7-2	D7-2-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	< 1	44	NA	NA	NA	18	NA	NA	42	NA	NA	NA	NA	140
D7-3	D7-3-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	< 1	16	NA	NA	NA	13	NA	NA	21	NA	NA	NA	NA	60
D7-4	D7-4-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	< 1	13	NA	NA	NA	14	NA	NA	18	NA	NA	NA	NA	150
D7-5	D7-5-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	< 1	11	NA	NA	NA	12	NA	NA	11	NA	NA	NA	NA	39
D7-6	D7-6-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	< 1	44	NA	NA	NA	< 5	NA	NA	35	NA	NA	NA	NA	23
D7-7	D7-7-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	< 1	46	NA	NA	NA	< 5	NA	NA	35	NA	NA	NA	NA	27
D7-8	D7-8-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	< 1	36	NA	NA	NA	5.8	NA	NA	29	NA	NA	NA	NA	34
D7-9	D7-9-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	NA	NA	< 1	40	NA	NA	NA	20	NA	NA	41	NA	NA	NA	NA	140
Ditch-1 Pipe	Ditch-1 @ Dry Shed Pipe	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	< 2	< 2	NA	8.8	1700	< 2	NA	NA	< 5	NA	NA	NA	NA	270
Ditch-1 West	Ditch-1 West of Dry Shed Pipe	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	< 2	11	NA	29	9000	8	NA	NA	11	NA	NA	NA	NA	330
Ditch-4	Ditch-4	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	< 2	12	NA	7.7	8000	2.1	NA	NA	13	NA	NA	NA	NA	28
LOC 1	DM-0004	Humboldt Bay	Sediment	Wet	10/21/2002	Invalid	4	35	< 0.2	< 1	39	7.7	14	NA	6	0.04	< 1	51	< 2	< 0.6	< 2	24	40
LOC 10a	DM-0008	Humboldt Bay	Sediment	Wet	10/21/2002	Invalid	3	27	< 0.2	< 1	33	6.3	10	NA	4	0.03	< 1	42	< 2	< 0.6	< 2	19	31
LOC 10b	DM-0010	Humboldt Bay	Sediment	Wet	10/21/2002	Invalid	4	37	< 0.2	< 1	46	8	16	NA	6	0.04	< 1	59	< 2	< 0.6	< 2	26	44
LOC 11	DM-0026	Mill Area	Sediment	Wet	10/21/2002	Invalid	5	29	< 0.2	< 1	48	13	18	NA	6	0.04	< 1	70	< 2	< 0.6	< 2	31	50
LOC 12	DM-0027	Mill Area	Sediment	Wet	10/21/2002	Invalid	4	43	< 0.2	< 1	50	11	21	NA	7	0.04	< 1	68	< 2	< 0.6	< 2	30	50
LOC 13	DM-0028	Mill Area	Sediment	Wet	10/21/2002	Invalid	4	47	< 0.2	< 1	46	11	19	NA	7	0.04	< 1	58	< 2	< 0.6	< 2	29	47
LOC 14	DM-0029	Mill Area	Sediment	Wet	10/22/2002	< 2	5	35	< 0.2	< 0.8	49	9.8	24	NA	66	0.05	1	61	< 2	< 0.6	< 2	29	54
LOC 15	DM-0081	Humboldt Bay	Sediment	Wet	10/24/2002	Invalid	4	21	< 0.2	< 1	31	5.5	13	NA	6	0.04	< 1	37	< 2	< 0.6	< 2	20	34
LOC 16	DM-0082	Humboldt Bay	Sediment	Wet	10/24/2002	Invalid	3	20	< 0.2	< 1	26	4.7	10	NA	4	0.03	< 1	32	< 2	< 0.6	< 2	16	28
LOC 17	DM-0083	Humboldt Bay	Sediment	Wet	10/24/2002	Invalid	4	33	< 0.2	< 1	39	7.6	19	NA	7	0.04	< 1	53	< 2	< 0.6	< 2	26	43
LOC 18	DM-0084	Humboldt Bay	Sediment	Wet	10/24/2002	Invalid	2	16	< 0.2	< 1	20	3.7	8	NA	5	0.02	< 1	26	< 2	< 0.6	< 2	13	23
LOC 19	DM-0085	Humboldt Bay	Sediment	Wet	10/24/2002	Invalid	2	13	< 0.2	< 1	22	4.9	6	NA	4	0.03	< 1	28	< 2	< 0.6	< 2	14	25
LOC 2	DM-0002	Humboldt Bay	Sediment	Wet	10/21/2002	Invalid	3	30	< 0.2	< 1	35	6.8	12	NA	5	0.04	< 1	44	< 2	< 0.6	< 2	21	35
LOC 20	DM-0086	Humboldt Bay	Sediment	Wet	10/25/2002	Invalid	2	25	< 0.2	< 1	42	8	14	NA	7	0.04	< 1	55	< 2	< 0.6	< 2	26	44
LOC 21	DM-0087	Humboldt Bay	Sediment	Wet	10/23/2002	Invalid	4	40	< 0.2	< 1	44	8.3	24	NA	13	0.05	< 1	58	< 2	< 0.6	< 2	28	60
LOC 22	DM-0088	Humboldt Bay	Sediment	Wet	10/23/2002	Invalid	4	33	< 0.2	< 1	38	6.7	34	NA	28	0.05	< 1	49	< 2	< 0.6	< 2	23	120
LOC 3	DM-0016	Humboldt Bay	Sediment	Wet	10/21/2002	Invalid	3	35	< 0.2	< 1	42	8	15	NA	6	0.04	< 1	53	< 2	< 0.6	< 2	25	41

TABLE A-6

SUMMARY OF METAL ANALYTICAL RESULTS

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	Antimony	Arsenic	Barium	Beryllium	Cadmium	Chromium	Cobalt	Copper	Iron	Lead	Mercury	Molyb-denum	Nickel	Selenium	Silver	Thallium	Vanadium	Zinc
					Number Detected	0	81	53	0	27	110	59	83	8	103	84	18	110	1	6	0	58	148
LOC 4	DM-0022	Mill Area	Sediment	Wet	10/21/2002	Invalid	**3**	**33**	< 0.2	< 1	**47**	**9.6**	**20**	NA	**7**	**0.04**	< 1	**62**	< 2	< 0.6	< 2	**28**	**48**
LOC 4	DM-0024	Mill Area	Sediment	Wet	10/21/2002	Invalid	**4**	**24**	< 0.2	< 1	**37**	**6.5**	**13**	NA	**5**	**0.02**	**2**	**47**	< 2	< 0.6	< 2	**24**	**32**
LOC 5	DM-0018	Humboldt Bay	Sediment	Wet	10/21/2002	< 2	**3**	**31**	< 0.2	< 1	**36**	**7.9**	**12**	NA	**5**	**0.04**	< 1	**47**	< 2	< 0.6	< 2	**23**	**36**
LOC 6	DM-0020	Humboldt Bay	Sediment	Wet	10/21/2002	Invalid	**3**	**31**	< 0.2	< 1	**34**	**7.1**	**11**	NA	**5**	**0.03**	< 1	**44**	< 2	< 0.6	< 2	**21**	**35**
LOC 7	DM-0014	Humboldt Bay	Sediment	Wet	10/21/2002	Invalid	**3**	**36**	< 0.2	< 1	**44**	**7.7**	**16**	NA	**6**	**0.03**	< 1	**57**	< 2	< 0.6	< 2	**27**	**45**
LOC 8	DM-0012	Humboldt Bay	Sediment	Wet	10/21/2002	Invalid	**3**	**40**	< 0.2	< 1	**42**	**7.6**	**15**	NA	**5**	**0.03**	< 1	**55**	< 2	< 0.6	< 2	**24**	**42**
LOC 9	DM-0006	Humboldt Bay	Sediment	Wet	10/21/2002	Invalid	**3**	**36**	< 0.2	< 1	**36**	**6.6**	**12**	NA	**4**	**0.03**	< 1	**47**	< 2	< 0.6	< 2	**21**	**36**
Outfall-1	Outfall-1	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	< 2	**51**	NA	**24**	**19000**	**5.9**	NA	NA	**56**	NA	NA	NA	NA	**49**
Outfall-2	Outfall 2	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	< 1	**25**	NA	NA	**11000**	**7**	NA	NA	**31**	NA	NA	NA	NA	**63**
Outfall-2	Outfall-2	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	< 2	**33**	NA	**22**	**13000**	**8.7**	NA	NA	**37**	NA	NA	NA	NA	**61**
Outfall-3	Outfall-3	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	< 2	**35**	NA	**20**	**14000**	**6.7**	NA	NA	**41**	NA	NA	NA	NA	**49**
Outfall-4	Outfall-4	Upland Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	NA	< 2	**27**	NA	**12**	**37000**	**5.5**	NA	NA	**27**	NA	NA	NA	NA	**44**
RP-1	RP-1-0.0-0.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	**1.3**	**48**	NA	NA	NA	**17**	NA	NA	**58**	NA	NA	NA	NA	**150**
RP-1	RP-1-0.5-1.0	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	< 1	**110**	NA	NA	NA	**17**	NA	NA	**210**	NA	NA	NA	NA	**140**
RP-1	RP-1-1.0-1.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	**1.2**	**49**	NA	NA	NA	**22**	NA	NA	**86**	NA	NA	NA	NA	**140**
RP-1	RP-1-1.5-2.0	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	< 1	**50**	NA	NA	NA	**27**	NA	NA	**72**	NA	NA	NA	NA	**100**
RP-1	RP-1-2.0-2.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	< 1	**43**	NA	NA	NA	**14**	NA	NA	**68**	NA	NA	NA	NA	**63**
RP-2	RP-2-0.0-0.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	< 1	< 5	NA	NA	NA	**28**	NA	NA	< 10	NA	NA	NA	NA	**61**
RP-2	RP-2-0.5-1.0	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	< 1	**25**	NA	NA	NA	**8.8**	NA	NA	**22**	NA	NA	NA	NA	**55**
RP-2	RP-2-1.0-1.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	< 1	**18**	NA	NA	NA	**12**	NA	NA	**18**	NA	NA	NA	NA	**53**
RP-2	RP-2-1.5-2.0	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	< 1	**19**	NA	NA	NA	< 5	NA	NA	**16**	NA	NA	NA	NA	**18**
RP-2	RP-2-2.0-2.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	NA	NA	< 1	**18**	NA	NA	NA	< 5	NA	NA	**16**	NA	NA	NA	NA	**19**
SDP-1	SDP-1-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	< 1	**44**	NA	NA	NA	**31**	NA	NA	**61**	NA	NA	NA	NA	**160**
SDP-1	SDP-1-2.0-2.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	NA	NA	< 1	**21**	NA	NA	NA	< 5	NA	NA	**49**	NA	NA	NA	NA	**37**
TRAWL 13	DM-0060	Mill Area	Shark	Wet	10/25/2002	< 2	**6**	< 1	< 0.2	< 0.2	< 1	< 0.4	< 1	NA	< 1	**1.1**	< 1	< 1	< 2	< 0.6	< 2	< 0.4	**4**
TRAWL 16	DM-0065	Humboldt Bay	Shiner	Wet	10/25/2002	< 2	< 1	< 1	< 0.2	< 0.2	< 1	< 0.4	< 1	NA	< 1	**0.03**	< 1	< 1	< 2	< 0.6	< 2	< 0.4	**19**
TRAWL 17	DM-0073	Humboldt Bay	Shiner	Wet	10/25/2002	< 2	< 1	< 1	< 0.2	< 0.2	< 1	< 0.4	< 1	NA	< 1	**0.05**	< 1	< 1	< 2	< 0.6	< 2	< 0.4	**27**
TRAWL 18	DM-0075	Humboldt Bay	Shiner	Wet	10/25/2002	< 2	< 1	< 1	< 0.2	< 0.2	< 1	< 0.4	< 1	NA	< 1	**0.09**	< 1	< 1	< 2	< 0.6	< 2	< 0.4	**17**
TRAWL 2	DM-0039	Humboldt Bay	Shiner	Wet	10/24/2002	< 2	**1**	< 1	< 0.2	< 0.2	< 1	< 0.4	< 1	NA	< 1	**0.03**	< 1	< 1	< 2	< 0.6	< 2	**0.4**	**11**
TRAWL 7/8	DM-0052	Mill Area	Shrimp	Wet	10/25/2002	< 2	**2**	**1**	< 0.2	**0.2**	< 1	< 0.4	**22**	NA	< 1	**0.03**	< 1	< 1	< 2	< 0.6	< 2	< 0.4	**11**
TRAWL 15	DM-0062 & DM-0068	Humboldt Bay	Sole	Wet	10/25/2002	< 2	**1**	< 1	< 0.2	< 0.2	< 1	< 0.4	< 1	NA	< 1	< 0.02	< 1	< 1	< 2	< 0.6	< 2	**2.4**	**11**
TRAWL 15	DM-0063 & DM-0069	Humboldt Bay	Sole	Wet	10/25/2002	< 2	< 1	< 1	< 0.2	< 0.2	< 1	< 0.4	**1**	NA	< 1	**0.03**	< 1	< 1	< 2	< 0.6	< 2	**2.7**	**13**
TRAWL 2	DM-0038 & DM-0040	Humboldt Bay	Sole	Wet	10/24/2002	< 2	**1**	< 1	< 0.2	**0.2**	< 1	< 0.4	**5**	NA	< 1	< 0.02	< 1	< 1	< 2	< 0.6	< 2	< 0.4	**17**
TRAWL 4	DM-0042 & DM-0043	Humboldt Bay	Sole	Wet	10/24/2002	< 2	< 1	< 1	< 0.2	< 0.2	< 1	< 0.4	< 1	NA	< 1	**0.03**	< 1	< 1	< 2	< 0.6	< 2	**1.6**	**11**
TRAWL 5	DM-0047	Mill Area	Sole	Wet	10/25/2002	< 2	**2**	< 1	< 0.2	< 0.2	< 1	< 0.4	< 1	NA	< 1	< 0.02	< 1	< 1	< 2	< 0.6	< 2	**3.6**	**13**
TRAWL 6	DM-0049	Mill Area	Sole	Wet	10/25/2002	< 2	**3**	< 1	< 0.2	< 0.2	< 1	< 0.4	< 1	NA	< 1	**0.02**	< 1	< 1	< 2	< 0.6	< 2	**2.4**	**15**

Notes:
Invalid = Sample analysis did not meet QA/QC criteria and was rejected.
< = less than laboratory reporting limit indicated
Bold results are above laboratory reporting limit.

TABLE A-7A

SUMMARY OF TOTAL PETROLEUM HYDROCARBON ANALYTICAL RESULTS - SEDIMENT

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	Diesel Range Organics	Grease & Oil (TPH fraction)	Oil & Grease (HEM)	Oil & Grease (HEM-SG)	Oil & Grease, Hydro-carbons	Residual Range Organics	TPH Diesel	TPH Motor Oil	TPH Motor Oil (SG)	TPH Diesel (SG)
					Number Detected	11	4	59	55	0	14	13	13	6	6
C-02	C2-0.0-0.5	Mill Area	Sediment	Dry	10/22/2002	**120**	NA	NA	NA	NA	**760**	NA	NA	NA	NA
C-04	C4-1.0-1.8	Mill Area	Sediment	Dry	10/22/2002	**380**	NA	NA	NA	NA	**1700**	NA	NA	NA	NA
C-06	C6-0-0.5	Mill Area	Sediment	Dry	10/24/2002	**36**	NA	NA	NA	NA	**230**	NA	NA	NA	NA
C-15	C15-1.0-1.5	Mill Area	Sediment	Dry	10/22/2002	<29	NA	NA	NA	NA	<72	NA	NA	NA	NA
C-18	C18-0.0-0.5	Mill Area	Sediment	Dry	10/22/2002	**64**	NA	NA	NA	NA	**260**	NA	NA	NA	NA
C-18	C18-1.0-1.5	Mill Area	Sediment	Dry	10/22/2002	**1100**	NA	NA	NA	NA	**920**	NA	NA	NA	NA
C-19	C19-0.0-0.5	Mill Area	Sediment	Dry	10/23/2002	<39	NA	NA	NA	NA	<97	NA	NA	NA	NA
C-31	C31-0.0-0.5	Mill Area	Sediment	Dry	10/23/2002	**220**	NA	NA	NA	NA	**1400**	NA	NA	NA	NA
C-32	C32-0.0-0.5	Mill Area	Sediment	Dry	10/23/2002	**200**	NA	NA	NA	NA	**1100**	NA	NA	NA	NA
C-35	C35-0-0.5	Mill Area	Sediment	Dry	10/23/2002	<36	NA	NA	NA	NA	<90	NA	NA	NA	NA
C-39	C39-0-0.5	Mill Area	Sediment	Dry	10/24/2002	<33	NA	NA	NA	NA	**110**	NA	NA	NA	NA
C-40-2	C40-2-0-0.5	Larger Bay Area	Sediment	Dry	10/24/2002	<28	NA	NA	NA	NA	<70	NA	NA	NA	NA
C-40-2	C40-2-1.5-2.0	Larger Bay Area	Sediment	Dry	10/24/2002	**44**	NA	NA	NA	NA	**93**	NA	NA	NA	NA
C-41	C41-0-0.5	Larger Bay Area	Sediment	Dry	10/24/2002	<30	NA	NA	NA	NA	<74	NA	NA	NA	NA
C-41	C41-1.5-2.0	Larger Bay Area	Sediment	Dry	10/24/2002	**150**	NA	NA	NA	NA	**450**	NA	NA	NA	NA
C-42	C42-0-0.5	Larger Bay Area	Sediment	Dry	10/24/2002	<29	NA	NA	NA	NA	<71	NA	NA	NA	NA
C-42	C42-1.0-1.8	Larger Bay Area	Sediment	Dry	10/24/2002	**48**	NA	NA	NA	NA	**190**	NA	NA	NA	NA
C-43	C43-0-0.5	Larger Bay Area	Sediment	Dry	10/24/2002	<28	NA	NA	NA	NA	**72**	NA	NA	NA	NA
C-43	C43-1.0-1.5	Larger Bay Area	Sediment	Dry	10/24/2002	<24	NA	NA	NA	NA	<60	NA	NA	NA	NA
C-44	C44-0-0.5	Larger Bay Area	Sediment	Dry	10/24/2002	<30	NA	NA	NA	NA	<74	NA	NA	NA	NA
C-44	C44-1.5-2.0	Larger Bay Area	Sediment	Dry	10/24/2002	**41**	NA	NA	NA	NA	**130**	NA	NA	NA	NA
D6-1	D6-1-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	**3700**	**1600**	NA	NA	NA	NA	NA	NA
D6-10	D6-10-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	**1100**	**340**	NA	NA	NA	NA	NA	NA
D6-11	D6-11-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	**2400**	**1000**	NA	NA	NA	NA	NA	NA
D6-12	D6-12-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	**9800**	**4300**	NA	NA	NA	NA	NA	NA
D6-13	D6-13-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	**1500**	**650**	NA	NA	NA	NA	NA	NA
D6-14	D6-14-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	**4800**	**1800**	NA	NA	NA	NA	NA	NA
D6-15	D6-15-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	**4300**	**2000**	NA	NA	NA	NA	NA	NA
D6-16	D6-16-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	**4900**	**2400**	NA	NA	NA	NA	NA	NA
D6-17	D6-17-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	**1200**	**320**	NA	NA	NA	NA	NA	NA
D6-18	D6-18-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	**1400**	**130**	NA	NA	NA	NA	NA	NA
D6-19	D6-19-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	**2600**	**1400**	NA	NA	NA	NA	NA	NA
D6-2	D6-2-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	**12000**	**6000**	NA	NA	NA	NA	NA	NA
D6-20	D6-20-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	**2100**	**890**	NA	NA	NA	NA	NA	NA
D6-21	D6-21-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	**530**	**180**	NA	NA	NA	NA	NA	NA
D6-22	D6-22-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	**380**	<20	NA	NA	NA	NA	NA	NA

Geomatrix

TABLE A-7A

SUMMARY OF TOTAL PETROLEUM HYDROCARBON ANALYTICAL RESULTS - SEDIMENT

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	Diesel Range Organics	Grease & Oil (TPH fraction)	Oil & Grease (HEM)	Oil & Grease (HEM-SG)	Oil & Grease, Hydro-carbons	Residual Range Organics	TPH Diesel	TPH Motor Oil	TPH Motor Oil (SG)	TPH Diesel (SG)
					Number Detected	11	4	59	55	0	14	13	13	6	6
D6-23	D6-23-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	**280**	**170**	NA	NA	NA	NA	NA	NA
D6-24	D6-24-0.0-0.5	Upland Mill Area	Sediment	Wet	7/24/2003	NA	NA	**140**	**110**	NA	NA	NA	NA	NA	NA
D6-3	D6-3-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	**10000**	**4000**	NA	NA	NA	NA	NA	NA
D6-4	D6-4-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	**5800**	**1600**	NA	NA	NA	NA	NA	NA
D6-5	D6-5-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	**3800**	**1900**	NA	NA	NA	NA	NA	NA
D6-6	D6-6-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	**3700**	**1500**	NA	NA	NA	NA	NA	NA
D6-7	D6-7-0.0-0.5	Upland Mill Area	Sediment	Wet	7/22/2003	NA	NA	**1200**	**540**	NA	NA	NA	NA	NA	NA
D6-8	D6-8-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	**1200**	**580**	NA	NA	NA	NA	NA	NA
D6-9	D6-9-0.0-0.5	Upland Mill Area	Sediment	Wet	7/23/2003	NA	NA	**660**	**180**	NA	NA	NA	NA	NA	NA
D6-10B	D6-10B-0.5	Upland Mill Area	Sediment	Wet	6/8/2004	NA	NA	**143**	NA	NA	NA	**61**	**430**	**430**	**61**
D6-15B	D6-15B-0.5	Upland Mill Area	Sediment	Wet	6/8/2004	NA	NA	**3830**	NA	NA	NA	**990**	**3600**	**3200**	**990**
D6-23B	D6-23B-0.5	Upland Mill Area	Sediment	Wet	6/8/2004	NA	NA	**777**	NA	NA	NA	**37**	**190**	**110**	**26**
D6-25B	D6-25B-0.5	Upland Mill Area	Sediment	Wet	6/8/2004	NA	NA	<100	NA	NA	NA	**15**	**67**	<50	<10
D6-2B	D6-2B-0.5	Upland Mill Area	Sediment	Wet	6/8/2004	NA	NA	**2910**	NA	NA	NA	**300**	**2300**	**1900**	**290**
D6-6B	D6-6B-0.5	Upland Mill Area	Sediment	Wet	6/8/2004	NA	NA	**1660**	NA	NA	NA	**77**	**620**	**540**	**74**
D7-1	D7-1-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	**1900**	**400**	NA	NA	NA	NA	NA	NA
D7-10	D7-10-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	**1400**	**630**	NA	NA	NA	NA	NA	NA
D7-11	D7-11-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	**17000**	**6100**	NA	NA	NA	NA	NA	NA
D7-12	D7-12-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	**1100**	**120**	NA	NA	NA	NA	NA	NA
D7-13	D7-13-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	**4100**	**960**	NA	NA	NA	NA	NA	NA
D7-14	D7-14-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	**2800**	**840**	NA	NA	NA	NA	NA	NA
D7-15	D7-15-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	**3100**	**1100**	NA	NA	NA	NA	NA	NA
D7-16	D7-16-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	**8000**	**7200**	NA	NA	NA	NA	NA	NA
D7-17	D7-17-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	**26000**	**11000**	NA	NA	NA	NA	NA	NA
D7-2	D7-2-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	**3100**	**780**	NA	NA	NA	NA	NA	NA
D7-3	D7-3-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	**1900**	**1100**	NA	NA	NA	NA	NA	NA
D7-4	D7-4-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	**4100**	**1500**	NA	NA	NA	NA	NA	NA
D7-5	D7-5-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	**8800**	**3200**	NA	NA	NA	NA	NA	NA
D7-6	D7-6-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	**160**	**100**	NA	NA	NA	NA	NA	NA
D7-7	D7-7-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	**130**	**160**	NA	NA	NA	NA	NA	NA
D7-8	D7-8-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	**1800**	**1200**	NA	NA	NA	NA	NA	NA
D7-9	D7-9-0.0-0.5	Upland Mill Area	Sediment	Wet	7/10/2003	NA	NA	**2300**	**320**	NA	NA	NA	NA	NA	NA
Ditch-4	Ditch-4	Mill Area	Sediment	Wet	6/14/2001	NA	**1500**	NA	NA	NA	NA	**10**	**260**	NA	NA
LOC 14	DM-0029	Mill Area	Sediment	Dry	10/22/2002	<30	NA	NA	NA	NA	**86**	NA	NA	NA	NA
Outfall-1	Outfall-1	Mill Area	Sediment	Wet	6/14/2001	NA	<250	NA	NA	NA	NA	<1	<1	NA	NA
Outfall-2	Outfall 2	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	**2000**	NA	NA	**25**	**210**	NA	NA

TABLE A-7A

SUMMARY OF TOTAL PETROLEUM HYDROCARBON ANALYTICAL RESULTS - SEDIMENT

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Basis	Sample Date	Diesel Range Organics	Grease & Oil (TPH fraction)	Oil & Grease (HEM)	Oil & Grease (HEM-SG)	Oil & Grease, Hydro-carbons	Residual Range Organics	TPH Diesel	TPH Motor Oil	TPH Motor Oil (SG)	TPH Diesel (SG)
					Number Detected	11	4	59	55	0	14	13	13	6	6
Outfall-2	Outfall-2	Mill Area	Sediment	Wet	6/14/2001	NA	**890**	NA	NA	NA	NA	**8.1**	**250**	NA	NA
Outfall-3	Outfall-3	Mill Area	Sediment	Wet	6/14/2001	NA	**480**	NA	NA	NA	NA	**9.1**	**200**	NA	NA
Outfall-3A	Outfall 3A	Mill Area	Sediment	Wet	6/14/2001	NA	NA	NA	**1000**	NA	NA	**11**	**82**	NA	NA
Outfall-4	Outfall-4	Mill Area	Sediment	Wet	6/14/2001	NA	**380**	NA	NA	NA	NA	<1.1	<28	NA	NA
RP-1	RP-1-0.0-0.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	**12000**	**6400**	NA	NA	NA	NA	NA	NA
RP-1	RP-1-0.5-1.0	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	**16000**	**13000**	NA	NA	NA	NA	NA	NA
RP-1	RP-1-1.0-1.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	**40000**	**25000**	NA	NA	NA	NA	NA	NA
RP-1	RP-1-1.5-2.0	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	**11000**	**5000**	NA	NA	NA	NA	NA	NA
RP-1	RP-1-2.0-2.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	**6200**	**7100**	NA	NA	NA	NA	NA	NA
RP-2	RP-2-0.0-0.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	**1400**	**75**	NA	NA	NA	NA	NA	NA
RP-2	RP-2-0.5-1.0	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	**120**	**130**	NA	NA	NA	NA	NA	NA
RP-2	RP-2-1.0-1.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	**300**	**160**	NA	NA	NA	NA	NA	NA
RP-2	RP-2-1.5-2.0	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	**260**	**50**	NA	NA	NA	NA	NA	NA
RP-2	RP-2-2.0-2.5	Upland Mill Area	Sediment	Wet	7/8/2003	NA	NA	**260**	**70**	NA	NA	NA	NA	NA	NA
SDP-1	SDP-1-0.0-0.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	**8100**	**3600**	NA	NA	NA	NA	NA	NA
SDP-1	SDP-1-2.0-2.5	Upland Mill Area	Sediment	Wet	7/9/2003	NA	NA	**460**	**150**	NA	NA	NA	NA	NA	NA
SDP-1B	SDP-1B-0.5	Upland Mill Area	Sediment	Wet	6/8/2004	NA	NA	**3110**	NA	NA	NA	**660**	**4500**	**3800**	**650**
Outfall-2 DI	Outfall #2 D.I.	Upland Mill Area	Soil	Wet	6/14/2001	NA	NA	NA	**4600**	NA	NA	**300**	**2400**	NA	NA

Notes:

< = less than laboratory reporting limit indicated
Bold results are above laboratory reporting limit.

TABLE A-7B

SUMMARY OF TOTAL PETROLEUM HYDROCARBON ANALYTICAL RESULTS - WATER

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in micrograms per liter (µg/L)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Date	Diesel Range Organics	Grease & Oil (TPH fraction)	Oil & Grease (HEM)	Oil & Grease (HEM-SG)	Oil & Grease, Hydrocarbons	Residual Range Organics	TPH Diesel	TPH Motor Oil	TPH Motor Oil (SG)	TPH Diesel (SG)
				Number Detected	0	0	6	0	0	0	7	7	4	1
D6-10B	D6-10B-0.5	Upland Mill Area	Water	6/8/2004	NA	<5	**143**	NA	NA	NA	**620**	**880**	<250	<50
D6-15B	D6-15B-0.5	Upland Mill Area	Water	6/8/2004	NA	<5	**3830**	NA	NA	NA	**340**	**730**	**340**	<50
D6-23B	D6-23B-0.5	Upland Mill Area	Water	6/8/2004	NA	<5	**777**	NA	NA	NA	**140**	**650**	**260**	<50
D6-25B	D6-25B-0.5	Upland Mill Area	Water	6/8/2004	NA	<5	<100	NA	NA	NA	**100**	**280**	<250	<50
D6-2B	D6-2B-0.5	Upland Mill Area	Water	6/8/2004	NA	<5	**2910**	NA	NA	NA	**1300**	**810**	<250	<50
D6-6B	D6-6B-0.5	Upland Mill Area	Water	6/8/2004	NA	<5	**1660**	NA	NA	NA	**1100**	**2100**	**930**	**360**
SDP-1B	SDP-1B-0.5	Upland Mill Area	Water	6/8/2004	NA	<5	**3110**	NA	NA	NA	**170**	**800**	**370**	<50

Notes:

< = less than laboratory reporting limit indicated
Bold results are above laboratory reporting limit.

TABLE A-8A

SUMMARY OF VOLATILE ORGANIC COMPOUND ANALYTICAL RESULTS - SEDIMENT

Sierra Pacific Industries

Arcata Division Sawmill

Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Date	1,1,1,2-Tetra-chloro-ethane	1,1,1-Trichloro-ethane	1,1,2,2-Tetra-chloro-ethane	1,1,2-Trichloro-ethane	1,1-Dichloro-ethane	1,1-Dichloro-ethene	1,1-Dichloro-propene	1,2,3-Trichloro-benzene	1,2,3-Trichloro-propane	1,2,4-Trimethyl-benzene	1,2-Dibromo-3-chloro-propane	1,2-Dibromo-ethane (EDB)	1,2-Dichloro-ethane (EDC)	1,2-Dichloro-propane	1,3,5-Trimethyl-benzene
D6-10B	D6-10B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.06	<0.05	<0.05	<0.05	<0.05
D6-15B	D6-15B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.06	<0.05	<0.05	<0.05	<0.05
D6-23B	D6-23B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.06	<0.05	<0.05	<0.05	<0.05
D6-25B	D6-25B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.06	<0.05	<0.05	<0.05	<0.05
D6-2B	D6-2B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.06	<0.05	<0.05	<0.05	<0.05
D6-6B	D6-6B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.06	<0.05	<0.05	<0.05	<0.05
SDP-1B	SDP-1B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.06	<0.05	<0.05	<0.05	<0.05

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Date	1,3-Dichloro-propane	2,2-Dichloro-propane	2-Buta-none (MEK)	2-Chloro-toluene	2-Hexa-none	4-Chloro-toluene	4-Methyl-2-penta-none	Acetone	Benzene	Bromo-benzene	Bromo-dichloro-methane	Bromo-form	Bromo-methane	Carbon Tetra-chloride	Chloro-benzene
D6-10B	D6-10B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.05	<0.05	<1	<0.05	<0.5	<0.05	<0.5	<2	<0.03	<0.05	<0.05	<0.06	<0.5	<0.05	<0.05
D6-15B	D6-15B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.05	<0.05	<1	<0.05	<0.5	<0.05	<0.5	<2	<0.03	<0.05	<0.05	<0.06	<0.5	<0.05	<0.05
D6-23B	D6-23B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.05	<0.05	<1	<0.05	<0.5	<0.05	<0.5	<2	<0.03	<0.05	<0.05	<0.06	<0.5	<0.05	<0.05
D6-25B	D6-25B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.05	<0.05	<1	<0.05	<0.5	<0.05	<0.5	<2	<0.03	<0.05	<0.05	<0.06	<0.5	<0.05	<0.05
D6-2B	D6-2B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.05	<0.05	<1	<0.05	<0.5	<0.05	<0.5	<2	<0.03	<0.05	<0.05	<0.06	<0.5	<0.05	<0.05
D6-6B	D6-6B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.05	<0.05	<1	<0.05	<0.5	<0.05	<0.5	<2	<0.03	<0.05	<0.05	<0.06	<0.5	<0.05	<0.05
SDP-1B	SDP-1B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.05	<0.05	<1	<0.05	<0.5	<0.05	<0.5	<2	<0.03	<0.05	<0.05	<0.06	<0.5	<0.05	<0.05

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Date	Chloro-ethane	Chloro-form	Chloro-methane	cis-1,2-Dichloro-ethene	cis-1,3-Dichloro-propene	Dibromo-chloro-methane	Dibromo-methane	Dichloro-difluoro-methane	Ethyl-benzene	Hexa-chloro-buta-diene	Iso-propyl-benzene	m,p-Xylene	Methy-lene chloride	Naph-thalene	n-Propyl-benzene
D6-10B	D6-10B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.5	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.1	<0.5	<0.05	<0.05
D6-15B	D6-15B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.5	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.1	<0.5	<0.05	<0.05
D6-23B	D6-23B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.5	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.1	<0.5	<0.05	<0.05
D6-25B	D6-25B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.5	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.1	<0.5	<0.05	<0.05
D6-2B	D6-2B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.5	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.1	<0.5	<0.05	<0.05
D6-6B	D6-6B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.5	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.1	<0.5	<0.05	<0.05
SDP-1B	SDP-1B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.5	<0.05	<0.5	<0.05	<0.05	<0.05	<0.05	<0.5	<0.05	<0.05	<0.05	<0.1	<0.5	<0.05	<0.05

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Date	o-Xylene	p-Iso-propyl-toluene	sec-Butyl-benzene	Styrene	tert-Butyl-benzene	Tetra-chloro-ethene	Toluene	trans-1,2-Dichloro-ethene	trans-1,3-Di-chloro-propene	Tri-chloro-ethene	Tri-chloro-fluoro-methane	Vinyl chloride
D6-10B	D6-10B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.03	<1	<0.5
D6-15B	D6-15B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.03	<1	<0.5
D6-23B	D6-23B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.03	<1	<0.5
D6-25B	D6-25B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.03	<1	<0.5
D6-2B	D6-2B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.03	<1	<0.5
D6-6B	D6-6B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.03	<1	<0.5
SDP-1B	SDP-1B-1.0	Upland Mill Area	Sediment	6/8/2004	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.03	<1	<0.5

Note: < = less than laboratory reporting limit indicated

TABLE A-8B

SUMMARY OF VOLATILE ORGANIC COMPOUND ANALYTICAL RESULTS - WATER

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in micrograms per liter (µg/L)

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Date	1,1,1,2-Tetra-chloro-ethane	1,1,1-Trichloro-ethane	1,1,2,2-Tetra-chloro-ethane	1,1,2-Trichloro-ethane	1,1-Dichloro-ethane	1,1-Dichloro-ethene	1,1-Dichloropr opene	1,2,3-Trichlorob enzene	1,2,3-Trichlorop ropane	1,2,4-Trichlorob enzene	1,2,4-Trimethyl benzene	1,2-Dibromo-3-chloropro pane	1,2-Dibromoet hane (EDB)	1,2-Dichlorobe nzene	1,2-Dichloro-ethane (EDC)	1,2-Dichloropr opane	1,3,5-Trimethyl benzene
D6-10B	D6-10B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<1
D6-15B	D6-15B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<1
D6-23B	D6-23B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<1
D6-25B	D6-25B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<1
D6-2B	D6-2B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<1
D6-6B	D6-6B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<1
SDP-1B	SDP-1B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<1	<1	<1	<1	<1

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Date	1,3-Dichlorobe nzene	1,3-Dichloropr opane	1,4-Dichlorobe nzene	2,2-Dichloropr opane	2-Buta-none (MEK)	2-Chloro-toluene	2-Hexa-none	4-Chloro-toluene	4-Methyl-2-penta-none	Acetone	Benzene	Bromo-benzene	Bromo-dichloro-methane	Bromo-form	Bromo-methane	Carbon Tetra-chloride	Chloro-benzene
D6-10B	D6-10B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<10	<1	<10	<1	<10	<10	<1	<1	<1	<1	<1	<1	<1
D6-15B	D6-15B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<10	<1	<10	<1	<10	<10	<1	<1	<1	<1	<1	<1	<1
D6-23B	D6-23B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<10	<1	<10	<1	<10	<10	<1	<1	<1	<1	<1	<1	<1
D6-25B	D6-25B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<10	<1	<10	<1	<10	<10	<1	<1	<1	<1	<1	<1	<1
D6-2B	D6-2B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<10	<1	<10	<1	<10	<10	<1	<1	<1	<1	<1	<1	<1
D6-6B	D6-6B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<10	<1	<10	<1	<10	<10	<1	<1	<1	<1	<1	<1	<1
SDP-1B	SDP-1B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<10	<1	<10	<1	<10	<10	<1	<1	<1	<1	<1	<1	<1

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Date	Chloro-ethane	Chloro-form	Chloro-methane	cis-1,2-Dichloro-ethene	cis-1,3-Dichloro-propene	Dibromo-chloro-methane	Dibromo-methane	Dichloro-difluoro-methane	Ethyl-benzene	Hexa-chloro-buta-diene	Iso-propyl-benzene	m,p-Xylene	Methy-lene chloride	Naph-thalene	n-Propyl-benzene	o-Xylene	p-Iso-propyl-toluene
D6-10B	D6-10B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<5	<1	<1	<1	<1
D6-15B	D6-15B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<17	<1	<1	<1	<1
D6-23B	D6-23B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<5	<1	<1	<1	<1
D6-25B	D6-25B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<5	<1	<1	<1	<1
D6-2B	D6-2B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<10	<1	<1	<1	<1
D6-6B	D6-6B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<12	<1	<1	<1	<1
SDP-1B	SDP-1B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<2	<18	<1	<1	<1	<1

Station Identifier	Sample Identifier	General Location	Sample Matrix	Sample Date	sec-Butyl-benzene	Styrene	tert-Butyl-benzene	Tetra-chloro-ethene	Toluene	trans-1,2-Dichloroet hene	trans-1,3-Di-chloro-propene	Tri-chloro-ethene	Tri-chloro-fluoro-methane	Vinyl chloride
D6-10B	D6-10B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
D6-15B	D6-15B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
D6-23B	D6-23B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
D6-25B	D6-25B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
D6-2B	D6-2B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
D6-6B	D6-6B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
SDP-1B	SDP-1B	Upland Mill Area	Water	6/8/2004	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

Notes:
< = less than laboratory reporting limit indicated
Bold results are above laboratory reporting limit.

APPENDIX B

Benthic Infaunal Survey Results

Group	Species	Station - Replicate																								Species Total
		1			2			3			4			5			6			7			8			
		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	
POLYCHAETES	*Amaeana occidentalis*	8	7		2									1	1	2	26	26	29	74	34	49	1	1		[illegible]
	Aphelochaeta monilaris	14	58	12	22	26	20	1						9	13	12				58	36	120	4		2	407
	Aphelochaeta petersenae																						126	104	80	310
	Arcteobia sp																		1							1
	Aricidea (Acmira) catherinae	1				6			3		1	1		3	1	1										17
	Armandia brevis				1	1										2		1		4	1		5	4	2	21
	Boccardiella hamata										9	31	28													68
	Capitella 'capitata'		4	3	16	8		7	2		1	1	3	3	15	15	5	2	1	11	12	7	27	30	32	205
	Caulleriella apicula																					1				1
	Chaetozone 'setosa'					1																				1
	Chone minuta																								1	1
	Cirratulidae																							1		1
	Cirratulus sp															1		1		1						3
	Dipolydora socialis	3	3	6							8	4	16	1			3	8	13	20	5	25				115
	Dorvillea (Schistomeringos) longicornis			1	1				1						2			1	1	10		1				18
	Driloneres filum																						1	5	1	7
	Drilonereis sp	1	1													1		1	1	1		1			1	8
	Eteone longa							1			1	5	5									1				13
	Eteone sp	1		2			1											1								5
	Euchone limnicola	19	36	31	6	6	3		1					7	16	8	15	8	7	47	37	56				307
	Euclymeninae sp A (SCAMIT1987)					1														5	9					15
	Eumida longicornuta																			1	1					2
	Exogone lourei	39	71	48	104	129	69	7	73	27	13	62	151	145	148	91	100	69	51	94	29	31	2	1	4	1558
	Glycera americana																						1			1
	Glycinde picta	2	4	3		4	2		4	4	1		1	1	6	6	12	17	11	25	20	17	53	32	36	261
	Heteromastus filiformis				3	17	39	9	11	5	98	82	148													412
	Heteromastus filobranchus																	·					30	16	12	58
	Leitoscoloplos pugettensis	2	4	4	20	10	5	1	3	2				2	2	2	3			7	3		4	4	7	85
	Lumbrineridae																		1			1				2
	Lumbrineris cruzensis								1																	1
	Lumbrineris sp	1																								1
	Maldanidae	4												15	14	7				5	9	10				64
	Malmgreniella sp																	1		6	5	7	1	2	1	23
	Mediomastus californiensis	61	135	47	55	59	10							56	60	72	136	164	183	501	241	296	791	1024	882	4773
	Mediomastus sp							2	42	22			1													67
	Monticellina cryptica														1			23	12							36
	Neanthes brandti					1	1		1	1			1													5
	Nephtys caecoides	8	6	8	4	4	4			1	1			5	3		8	7	8	4	4	3	1			79
	Nephtys ferruginea						1																			1
	Nephtys sp																								2	2
	Oligochaeta	2	8	6	30	49	64	4	15	5	5	15	21	3	4	2	11	5	3	32	10	7	22	13	37	373
	Owenia collaris																				2		48	57	81	188
	Petaloclymene sp A	15	23	15		3	2	2		2				118	125	93	1	22	7	45	42	32				547
	Pholoe glabra																1			1		1			3	6
	Platynereis bicanaliculata				15	8	4							1						24	17	13				82
	Podarkeopsis glabrus																						1			1
	Polycirrus californicus	25	12	10	8	2		1	1	1				11	7	11	31	21	21	46	21	52	1	1	1	284
	Polydora cornuta				14	16	4	5	7	4	4	3	1				13	4	1	2						78
	Prionospio jubata					1								1												2
	Pseudopolydora kempi	17	15	8	10	4	1	1	3	1		1	1	19	35	34	24	16	14	5	3	8				220
	Pseudopolydora paucibranchiata	440	326	350	42	55	75	47	26	43	16	16	9	191	255	187	298	759	640	296	197	422	5		1	4696
	Scoletoma luti																						11	7	15	33
	Scoletoma sp																							3		3
	Scoletoma sp C				1									3	1					5	1	2				13
	Sphaerosyllis californiensis		5	1	3	2	3	2	3					1	1	2	1	2	2	11	6	1			1	47
	Spiophanes berkeleyorum																					1		1		2
	Str[illegible]pio benedicti	26	72	33	11	3	3		2				1	39	90	107	93	45	49	39	19	35				667
	Total Polychaetes	689	790	586	370	416	311	90	199	118	158	221	387	635	800	656	781	1204	1056	1380	764	1202	1135	1306	1202	16458

Group	Species	[illegible]																								Species
		1			2			3			4			5			6			7			8			Total
		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	
CRUSTACEANS	*Ampithoe plumulosa*				2																					2
	Aoroides inermis/intermedia																			2	1					3
	Aoroides sp					1																				1
	Bemlos sp																							2		2
	Cancer magister																			1						1
	Cancer productus				1																					1
	Caprella augusta	2																								2
	Caprella californica					1															5	1	1			8
	Caprella drepanochir						2		1		1			1						1	3	3				12
	Caprella sp				2			1										1		2	1	[illegible]				8
	cf *Paracorophium* sp	1			24	32	2	5	5	1	5	9	9	2	5	1	3	1								105
	Cirripedia				1	1																				2
	Corophium sp		1		1	2									1	2				1		2				10
	Crangon alaskensis		1	1		1								1			3	1	5		7	5			1	26
	Crangon nigricauda																								1	1
	Eudorella sp															1	4	11	10	19	9	2				56
	Euphilomedes carcharodonta																								1	1
	Grandidierella japonica	1	1		17	14	19	2	3	5	18	1		3	16	10	12				3	4				129
	Jassa slatteryi																			1						1
	Leptochelia dubia	1	3	4	19	8	10	4	17	5	53	106	127	2	4	3	9	11	15	14	7	18		1		441
	Photis brevipes														2	1	3	23	6	12	8	24	2	1	1	83
	Photis sp			1											1											2
	Sarsiella zostericola	4	5	12	3	1			1						10	7	11	11		24	5	10				104
	Stenothoe frecanda				1	2																				3
	[illegible] sp		1		20	17			1								1				2	3				55
	Total Crustaceans	9	12	18	[illegible]	80	33	12	28	11	77	116	136	9	39	25	46	59	36	77	51	73	3	4	4	1059
ECHINODERMS	[illegible]																2									2
	Total Echinoderms																2									2
MOLLUSCS	*Astyris gausapata*																			1						1
	cf Doridacea						1																			1
	Chione californiensis	1		1												1	3	2	5	4		3	3	8	8	39
	Crepidula sp		1			1	2											1			1					6
	Lyonsia californica	18	20	10	2	6	11	22	51	20	8	1	1	7	8	12	54	136	118	65	64	80				714
	Macoma carlottensis		1																							1
	Macoma nasuta				3	7	8	2	2	2							3	2	1	5	10	4	74	63	80	274
	Macoma sp																			1		2				3
	Melanochlamys diomedea																							1		1
	Mitrella tuberosa																							2		2
	Modiolus sp																				1	2	12	18	17	50
	Musculus sp																	1								1
	Nassarius rhinetes																						1		1	2
	Neolepton salmonea	86	63	87	4	9	10	5		3	20	5	2	31	66	53	12	18	9	3	2	4				492
	Nutricola sp		1		7	2	1			1			1													13
	Odostomia sp																			1	1					2
	Olivella pycna																						1	4	1	6
	Rochefortia coani	11	11													1	41	34	28	28	14	22			2	192
	Rochefortia tumida																			6	1		17	13	32	69
	Saxidomus sp														1											1
	Solen sicarius																								1	1
	Trachycardium quadragenarium																2				1	[illegible]	3	6	3	18
	Total Molluscs	116	97	98	16	25	33	29	63	26	28	6	4	38	75	67	115	194	161	114	95	[illegible]	111	115	153	1889

Group	Species	Station / Replicate																								Species Total
		1			2			3			4			5			6			7			8			
		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	
MINOR PHYLA	*Anemonactis* sp A										1					1			1							3
	Bugula californica (colonial)				1																					1
	Campanulariidae (colonial)																		1							1
	Carinoma mutabilis				4	3																				7
	Celleporella sp (colonial)				1																					1
	Enteropneusta		4	4	9	3		1	2	6				84	55	77	7	13	10	4	7	3	2	1	1	293
	Lineidae																	1		13	6	5	25	28	19	98
	Lineus rubescens																							1		1
	Mesomyaria																			3	1	1				5
	Molgula sp				6																			1		7
	Nematoda		10												26		1	4	4			1	2			48
	Nemertea																					1				1
	Nipponemertes pacificus								1				1									1				3
	Paranemertes californica				2																			1		4
	Phoronopsis viridis																				1	1	1014	930	1080	3026
	Platyhelminthes								1																	1
	Rhabdocoela									1																1
	Scrupocellaria sp (colonial)					1																				1
	Stylochoplana sp				3	5	1																			9
	Tubulanus polymorphus/pellucidus																								1	1
	[illegible]lulus a[illegible]tus	10	9	2	5	3	1			1				23	5	7	4	5	1							76
	Total Minor Phyla	12	23	6	31	15	2	[illegible]	4	6	1		1	107	86	85	12	23	17	20	15	13	1043	962	1101	3588
	Total Infauna	826	922	710	518	536	379	132	284	163	264	343	528	789	1000	833	956	1480	1270	1591	925	1408	2292	2387	2460	22[illegible]46

APPENDIX C

Quality Assurance/ Quality Control

APPENDIX C
QUALITY ASSURANCE/QUALITY CONTROL

The purpose of the quality assurance/quality control (QA/QC) procedures is to assess the quality of the data by evaluating the accuracy and precision of the data. It is essential that the data be accurate and reflective of actual conditions. To ensure data quality was acceptable for decision-making purposes, data relevant to this Scoping Risk Assessment (sampling data) were reviewed. As discussed in this section, this process identified limitations for the use of the data for decision-making purposes.

Quality control samples consisted of laboratory analyzed method blanks, laboratory control sample/laboratory control sample duplicate (LCS/LCSD), and matrix spike/matrix spike duplicate (MS/MSD) samples to provide internal quality control. The QA/QC results were evaluated in accordance with *U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review* (October 1999), *U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (July 2002), and *U.S. EPA Analytical Operations/Data Quality Center, National Functional Guidelines for Chlorinated Dioxin/Furan Data Review* (August 2002).

Geomatrix reviewed data for compliance with the following assurance/quality control (QA/QC) project and/or method prescribed criteria (described later in this section):

- Holding time and preservation: the period of time between collection of the sample and preparation/analysis, and acceptable temperature range of the sample upon receipt in the laboratory. Analyses performed for this project have method prescribed holding times and temperature ranges.

- Blank sample: the preparation and analysis of reagent (contaminant free) water or soil. Blank samples for this investigation include method blanks. Detection in a method blank may indicate possible laboratory contamination.

- Spike samples: the preparation and analysis of an environmental sample or a sample of reagent water spiked with a subset of target compounds at known concentrations. The results of the spike analysis measure laboratory accuracy in the reagent sample, and results from the environmental sample spike measure potential interference from the matrix.

- Surrogate spikes: the addition of compounds similar to target compounds of interest that are added to sample aliquots for organic analysis. Surrogate spikes measure possible interference from the sample matrix for the analysis of target compounds.
- Mass spectrometer initial calibration: the objective of the initial calibration is to establish a linear range or curve, the mean Relative Responses and the mean Relative Response Factors for the instrumentation.
- Identification criteria: main objectives are to unambiguously identify a Gas Chromatograph (GC) peak as a target analyte.

The qualifiers applied during this review process were as follows:

U: The reported analyte was not detected above the reported quantitation limit.

J: The analyte was positively identified; the associated numerical value is an approximate concentration of the analyte in the sample. The detected sample result is considered estimated. In some cases, a "+" or "-" is added to suggest the direction of bias in the estimated value.

UJ: The analyte was not detected above the reported sample quantitation limit; however, the reported quantitation limit was approximate and may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample and is considered estimated.

R: The data are unusable. The sample results are rejected due to serious deficiencies in meeting QC criteria. The analyte may or may not be present in the sample.

HOLDING TIME AND PRESERVATION

The U.S. Environmental Protection Agency (US E.P.A.) has established the maximum holding time that can elapse between sampling, preparation, and analysis of samples. The USEPA has also defined the acceptable temperature range that samples must be stored to maintain sample preservation. Holding times and sample temperatures that exceed the USEPA limits can negatively affect sample integrity (e.g., loss of volatile compounds, biodegradation), and samples may be qualified depending on the severity of the problem and the compounds of concern.

Each sample was reviewed for compliance with the method-prescribed preparation and analysis holding times. The sample preparations and analysis for the Sierra Pacific Industries (SPI) Sampling Investigation were performed within the method prescribed holding times, with the exception of samples identified in Table F-1, Laboratory QA/QC Summary.

BLANK SAMPLES

A blank sample that is theoretically contaminant free is prepared in the laboratory and carried through the analytical process. The purpose of a blank sample is to determine the presence and magnitude of contamination resulting from laboratory, shipping, or other sample-handling activities. Blank samples are analyzed and evaluated for detections of target compounds. If target compounds are detected in a blank sample that was initially intended to be contaminant free, these detections indicate some element of sample collection, transportation , or analysis activities has introduced contaminants not present in the original environmental sample aliquot. If target compounds are detected in a blank sample, then all associated data must be carefully evaluated to determine whether those results have been similarly impacted or if the blank problem is an isolated occurrence not representative of other data.

The one type of blank sample analyzed and reported with the data relevant to the Scoping Risk Assessment was a method blank. Preparation and analysis of this blank sample is summarized below.

- Method blank samples were prepared by the laboratory by taking an aliquot of environmental matrix through all preparation and analysis steps. A method blank was prepared and analyzed with each batch of environmental samples. Method blank samples monitor for potential contamination of sample from the laboratory.

Method blank detections for data relevant to the Scoping Risk Assessment were limited to dioxin/furan congeners and the common laboratory contaminant di-n-butyl phthalate found in dioxin/furan and semi-volatile organic compound (SVOC) analyses (USEPA Methods 1613 and 8270), respectively.

- Dioxin/Congener Analysis: Dioxin/congeners were detected in multiple method blanks below the respective method detection limits (MDL). Detected target compounds in both the method blank sample and the primary sample were not qualified if the sample concentrations were above the MDL. However, if the sample concentrations were below the MDL but reported as a positive value (low end of the calibration curve), the results were qualified with a "U", and the value reported as the MDL.

- SVOC Analysis: Di-n-butyl phthalate was detected in multiple method blanks. Sample concentrations that were less than 10 times the method blank concentrations were qualified "U" by elevating the sample quantitation limit to the reported sample concentration.

The limited blank contamination found indicates that the sample preparation and analysis procedures were generally free of contamination, with the exception for the contaminants stated above, and were acceptable. The method blank contamination issue is summarized in Table F-1.

SPIKE SAMPLES

A spike sample is a QC sample that is prepared and analyzed by the laboratory. The laboratory prepares, analyzes, and reports spike sample results to demonstrate their ability to properly analyze, detect, and quantify target compounds. A spike sample result is typically reported as the amount of compound detected divided by the amount spiked into the sample and is commonly referred to as a percent recovery. The percent recovery is then compared to an established limit range. The two types of spike samples analyzed with the data relevant to the Scoping Risk Assessment were matrix and blank spikes.

- A matrix spike (MS) sample consists of an aliquot of an environmental sample that is spiked with known concentrations of a subset of target compounds. A matrix spike duplicate (MSD) sample is a second sample that is prepared and analyzed along with the MS sample, and the relative percent difference (RPD) is calculated between MS and MSD. MS/MSDs are used to monitor potential interference from the sample matrix for target compounds. A low MS percent recovery may indicate low biased sample results; a high MS percent recovery may indicate high biased sample results. A high RPD can also be indicative of a matrix problem.

- A blank spike, which is commonly referred to as a laboratory control sample (LCS), is an environmental matrix that is spiked with known concentrations of a subset of target compounds. The LSC sample is used to monitor laboratory accuracy without the bias of a sample matrix. LCS percent recoveries outside the acceptable limits may indicate poor laboratory accuracy.

For the reviewed data sets, all LCS recoveries were within control limits. MS recoveries were generally within control limits; all spike results that did not meet control criteria are summarized in Table F-1. The remaining matrix spike data were within acceptable limits, indicating minimal interference from the sample matrix in the other analyses.

Surrogate Spikes

A surrogate spike is used in the organic analyses and is similar to the target compounds. A surrogate spike is used to assess interference from the sample matrix during the analysis. Surrogate spikes results are typically reported in terms of percent recovery, based on the concentration of the surrogate detected divided by the known amount of surrogate added to the sample aliquot.

For the data relevant to the scoping risk assessment, surrogate recoveries were compared to the laboratory-generated limits of acceptance. All surrogate recovery results that were out control limits are summarized in Table F-1.

Mass Spectrometer Initial Calibration (Dioxin/Furan Analysis)

The objective of the initial calibration is to establish a linear range or curve, the mean Relative Responses and the mean Relative Response Factors for the instrumentation. The initial calibration criteria are strict because the initial calibration is used for the quantitation of sample data and is not frequently performed. Thus, the initial calibration affects the quality of the data based on it for an extended period of time.

The majority of samples analyzed for dioxin/furan congeners had sample values from the low end of the calibration curve. Data points from the low or high end of the calibration curve were qualified with a "J" flag as an estimated.

Identification Criteria (Dioxin/Furan Analysis)

Identification criteria's main objectives are to unambiguously identify a Gas Chromatograph (GC) peak as a Chlorinated Dibenzo-p-Dioxin (CDD) or a Chlorinated Dibenzofuran (CDF). For a GC peak to be unambiguously identified as a CDD or CDF, it must meet certain criteria. All criteria were met for dioxin/furan analyses associated with the SPI sampling program, with the exception of samples and target compounds qualified in the database with a "D", which indicate there were possible polychlorinated diphenyl ether (PCDPE) interferences. In the event that PCDPE was identified within a sample, all CDF sample results with coeluting PCDPE interference were qualified with a "J".

OVERALL ASSESSMENT

All qualified data can be used for decision-making purposes, with the exception of the sample data qualified "R" summarized in Table F-1. However, the limitations identified by the other applied qualifiers should be considered when using the data. Overall, the results of the quality assurance/quality control review indicate that the test results are valid and useable, except as noted above.

Geomatrix

APPENDIX D

Calculation of Dioxin / Furan Toxic Equivalents

APPENDIX D
CALCULATION OF DIOXIN/FURAN TOXICITY EQUIVALENTS (2,3,7,8-TCDD TEQs)[1,2]

Geomatrix

Sierra Pacific Industries Arcata Division Sawmill

Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Matrix	Area Name	Station Location	Sample ID	Sample Result / Toxic Equivalents	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	2,3,4,6,7,8-HxCDF	OCDF	2,3,7,8-TCDD TEQ
				Fish Toxic Equivalency Factor (Fish TEF)[3]	**1**	**1**	**0.5**	**0.01**	**0.01**	**0.001**	**0.0001**	**0.05**	**0.05**	**0.5**	**0.01**	**0.01**	**0.1**	**0.1**	**0.1**	**0.1**	**0.0001**	**--**
				Mammal Toxic Equivalency Factor (Mammal TEF)[3]	**1**	**1**	**0.1**	**0.1**	**0.1**	**0.01**	**0.0001**	**0.1**	**0.05**	**0.5**	**0.01**	**0.01**	**0.1**	**0.1**	**0.1**	**0.1**	**0.0001**	**--**
				Bird Toxic Equivalency Factor (Bird TEF)[3]	**1**	**1**	**0.05**	**0.01**	**0.1**	**0.001**	**0.0001**	**1**	**0.1**	**1**	**0.01**	**0.01**	**0.1**	**0.1**	**0.1**	**0.1**	**0.0001**	**--**
Crab	Humboldt Bay	Lappe_HS-2	14H0031415032402	Sample Result	0.19	0.48	0.75	0.65	0.65	0.9	12	0.21	0.32	0.335	0.37	0.405	0.365	0.325	0.44	0.405	0.5	--
				2,3,7,8-TCDD TEQ (Fish)	0.19	0.48	0.375	0.0065	0.0065	0.0009	0.0012	0.0105	0.016	0.1675	0.0037	0.00405	0.0365	0.0325	0.044	0.0405	0.00005	1.42
				2,3,7,8-TCDD TEQ (Mammal)	0.19	0.48	0.075	0.065	0.065	0.009	0.0012	0.021	0.016	0.1675	0.0037	0.00405	0.0365	0.0325	0.044	0.0405	0.00005	1.25
				2,3,7,8-TCDD TEQ (Bird)	0.19	0.48	0.0375	0.0065	0.065	0.0009	0.0012	0.21	0.032	0.335	0.0037	0.00405	0.0365	0.0325	0.044	0.0405	0.00005	1.52
Crab	Humboldt Bay	STAR 1	DM-0031	Sample Result	0.02795	0.061	0.02135	0.0652	0.02105	0.139	0.65	0.292	0.0232	0.0253	0.0362	0.0097	0.0663	0.01695	0.02485	0.01885	0.138	--
				2,3,7,8-TCDD TEQ (Fish)	0.02795	0.061	0.010675	0.000652	0.0002105	0.000139	0.000065	0.0146	0.00116	0.01265	0.000362	0.000097	0.00663	0.001695	0.002485	0.001885	0.0000138	0.142
				2,3,7,8-TCDD TEQ (Mammal)	0.02795	0.061	0.002135	0.00652	0.002105	0.00139	0.000065	0.0292	0.00116	0.01265	0.000362	0.000097	0.00663	0.001695	0.002485	0.001885	0.0000138	0.157
				2,3,7,8-TCDD TEQ (Bird)	0.02795	0.061	0.0010675	0.000652	0.002105	0.000139	0.000065	0.292	0.00232	0.0253	0.000362	0.000097	0.00663	0.001695	0.002485	0.001885	0.0000138	0.426
Crab	Humboldt Bay	STAR 1	DM-0032	Sample Result	0.0376	0.266	4.89	0.669	0.22	1.2	1.06	0.225	0.229	0.0759	0.505	2.26	0.0746	0.174	0.419	0.193	2.42	--
				2,3,7,8-TCDD TEQ (Fish)	0.0376	0.266	2.445	0.00669	0.0022	0.0012	0.000106	0.01125	0.01145	0.03795	0.00505	0.0226	0.00746	0.0174	0.0419	0.0193	0.000242	2.93
				2,3,7,8-TCDD TEQ (Mammal)	0.0376	0.266	0.489	0.0669	0.022	0.012	0.000106	0.0225	0.01145	0.03795	0.00505	0.0226	0.00746	0.0174	0.0419	0.0193	0.000242	1.08
				2,3,7,8-TCDD TEQ (Bird)	0.0376	0.266	0.2445	0.00669	0.022	0.0012	0.000106	0.225	0.0229	0.0759	0.00505	0.0226	0.00746	0.0174	0.0419	0.0193	0.000242	1.02
Crab	Humboldt Bay	STAR 6	DM-0061	Sample Result	0.056	0.11	0.154	0.488	0.178	0.852	0.56	0.466	0.0925	0.171	0.241	0.0181	0.04355	0.03095	0.01325	0.0723	0.138	--
				2,3,7,8-TCDD TEQ (Fish)	0.056	0.11	0.077	0.00488	0.00178	0.000852	0.000056	0.0233	0.004625	0.0855	0.00241	0.000181	0.004355	0.003095	0.001325	0.00723	0.0000138	0.383
				2,3,7,8-TCDD TEQ (Mammal)	0.056	0.11	0.0154	0.0488	0.0178	0.00852	0.000056	0.0466	0.004625	0.0855	0.00241	0.000181	0.004355	0.003095	0.001325	0.00723	0.0000138	0.412
				2,3,7,8-TCDD TEQ (Bird)	0.056	0.11	0.0077	0.00488	0.0178	0.000852	0.000056	0.466	0.00925	0.171	0.00241	0.000181	0.004355	0.003095	0.001325	0.00723	0.0000138	0.862
Crab	Humboldt Bay	STAR 10	DM-0074	Sample Result	0.066	0.1015	0.1475	0.2095	0.1375	3.33	7.27	0.227	0.138	0.112	0.416	0.1035	0.0497	0.0493	0.077	0.0535	0.055	--
				2,3,7,8-TCDD TEQ (Fish)	0.066	0.1015	0.07375	0.002095	0.001375	0.00333	0.000727	0.01135	0.0069	0.056	0.00416	0.001035	0.00497	0.00493	0.0077	0.00535	0.0000055	0.351
				2,3,7,8-TCDD TEQ (Mammal)	0.066	0.1015	0.01475	0.02095	0.01375	0.0333	0.000727	0.0227	0.0069	0.056	0.00416	0.001035	0.00497	0.00493	0.0077	0.00535	0.0000055	0.365
				2,3,7,8-TCDD TEQ (Bird)	0.066	0.1015	0.007375	0.002095	0.01375	0.00333	0.000727	0.227	0.0138	0.112	0.00416	0.001035	0.00497	0.00493	0.0077	0.00535	0.0000055	0.576
Crab	Mill Area	Lappe_Mill	1R011015032402	Sample Result	0.16	0.285	0.31	0.65	0.31	38	120	0.135	0.145	0.15	0.75	0.115	0.165	0.15	0.2	0.185	0.8	--
				2,3,7,8-TCDD TEQ (Fish)	0.16	0.285	0.155	0.0065	0.0031	0.038	0.012	0.00675	0.00725	0.075	0.0075	0.00115	0.0165	0.015	0.02	0.0185	0.00008	0.827
				2,3,7,8-TCDD TEQ (Mammal)	0.16	0.285	0.031	0.065	0.031	0.38	0.012	0.0135	0.00725	0.075	0.0075	0.00115	0.0165	0.015	0.02	0.0185	0.00008	1.14
				2,3,7,8-TCDD TEQ (Bird)	0.16	0.285	0.0155	0.0065	0.031	0.038	0.012	0.135	0.0145	0.15	0.0075	0.00115	0.0165	0.015	0.02	0.0185	0.00008	0.926
Crab	Mill Area	Lappe_Mill	3RC011230032402	Sample Result	0.085	0.17	0.235	0.445	0.205	12	99	0.16	0.14	0.145	0.75	0.095	0.2	0.1	0.14	0.13	1.25	--
				2,3,7,8-TCDD TEQ (Fish)	0.085	0.17	0.1175	0.00445	0.00205	0.012	0.0099	0.008	0.007	0.0725	0.0075	0.00095	0.02	0.01	0.014	0.013	0.000125	0.554
				2,3,7,8-TCDD TEQ (Mammal)	0.085	0.17	0.0235	0.0445	0.0205	0.12	0.0099	0.016	0.007	0.0725	0.0075	0.00095	0.02	0.01	0.014	0.013	0.000125	0.634
				2,3,7,8-TCDD TEQ (Bird)	0.085	0.17	0.01175	0.00445	0.0205	0.012	0.0099	0.16	0.014	0.145	0.0075	0.00095	0.02	0.01	0.014	0.013	0.000125	0.698
Crab	Mill Area	Lappe_Mill	41H0011700032402	Sample Result	0.14	1	0.7	12	2.9	71	300	0.83	0.215	0.38	9.8	0.16	0.75	0.6	0.34	0.34	6.2	--
				2,3,7,8-TCDD TEQ (Fish)	0.14	1	0.35	0.12	0.029	0.071	0.03	0.0415	0.01075	0.19	0.098	0.0016	0.075	0.06	0.034	0.034	0.00062	2.29
				2,3,7,8-TCDD TEQ (Mammal)	0.14	1	0.07	1.2	0.29	0.71	0.03	0.083	0.01075	0.19	0.098	0.0016	0.075	0.06	0.034	0.034	0.00062	4.03
				2,3,7,8-TCDD TEQ (Bird)	0.14	1	0.035	0.12	0.29	0.071	0.03	0.83	0.0215	0.38	0.098	0.0016	0.075	0.06	0.034	0.034	0.00062	3.22
Crab	Mill Area	STAR 2	DM-0033	Sample Result	0.02325	0.121	0.125	0.356	0.0926	0.701	1.3	0.12	0.02405	0.062	0.157	0.0387	0.0632	0.0432	0.01025	0.0311	0.107	--
				2,3,7,8-TCDD TEQ (Fish)	0.02325	0.121	0.0625	0.00356	0.000926	0.000701	0.00013	0.006	0.0012025	0.031	0.00157	0.000387	0.00632	0.00432	0.001025	0.00311	0.0000107	0.267
				2,3,7,8-TCDD TEQ (Mammal)	0.02325	0.121	0.0125	0.0356	0.00926	0.00701	0.00013	0.012	0.0012025	0.031	0.00157	0.000387	0.00632	0.00432	0.001025	0.00311	0.0000107	0.270
				2,3,7,8-TCDD TEQ (Bird)	0.02325	0.121	0.00625	0.00356	0.00926	0.000701	0.00013	0.12	0.002405	0.062	0.00157	0.000387	0.00632	0.00432	0.001025	0.00311	0.0000107	0.365
Crab	Mill Area	STAR 3	DM-0034	Sample Result	0.025	0.0375	0.02945	0.196	0.02455	0.392	0.4945	0.111	0.024	0.059	0.113	0.01685	0.0481	0.0318	0.0155	0.0092	0.057	--
				2,3,7,8-TCDD TEQ (Fish)	0.025	0.0375	0.014725	0.00196	0.0002455	0.000392	0.00004945	0.00555	0.0012	0.0295	0.00113	0.0001685	0.00481	0.00318	0.00155	0.00092	0.0000057	0.128
				2,3,7,8-TCDD TEQ (Mammal)	0.025	0.0375	0.002945	0.0196	0.002455	0.00392	0.00004945	0.0111	0.0012	0.0295	0.00113	0.0001685	0.00481	0.00318	0.00155	0.00092	0.0000057	0.145
				2,3,7,8-TCDD TEQ (Bird)	0.025	0.0375	0.0014725	0.00196	0.002455	0.000392	0.00004945	0.111	0.0024	0.059	0.00113	0.0001685	0.00481	0.00318	0.00155	0.00092	0.0000057	0.253
Crab	Mill Area	STAR 3	DM-0034 (Whole)	Sample Result	0.0161	0.0331	0.0531	0.194	0.0237	0.553	2.02	0.0625	0.03745	0.0297	0.136	0.0062	0.0458	0.0341	0.00685	0.005	0.141	--
				2,3,7,8-TCDD TEQ (Fish)	0.0161	0.0331	0.02655	0.00194	0.000237	0.000553	0.000202	0.003125	0.0018725	0.01485	0.00136	0.000062	0.00458	0.00341	0.000685	0.0005	0.0000141	0.109
				2,3,7,8-TCDD TEQ (Mammal)	0.0161	0.0331	0.00531	0.0194	0.00237	0.00553	0.000202	0.00625	0.0018725	0.01485	0.00136	0.000062	0.00458	0.00341	0.000685	0.0005	0.0000141	0.116
				2,3,7,8-TCDD TEQ (Bird)	0.0161	0.0331	0.002655	0.00194	0.00237	0.000553	0.000202	0.0625	0.003745	0.0297	0.00136	0.000062	0.00458	0.00341	0.000685	0.0005	0.0000141	0.163
Crab	Mill Area	STAR 4	DM-0035	Sample Result	0.0258	0.0457	0.0618	0.316	0.0946	0.861	1.99	0.136	0.0373	0.02915	0.195	0.0097	0.0531	0.0155	0.012	0.0369	0.116	--
				2,3,7,8-TCDD TEQ (Fish)	0.0258	0.0457	0.0309	0.00316	0.000946	0.000861	0.000199	0.0068	0.001865	0.014575	0.00195	0.000097	0.00531	0.00155	0.0012	0.00369	0.0000116	0.145
				2,3,7,8-TCDD TEQ (Mammal)	0.0258	0.0457	0.00618	0.0316	0.00946	0.00861	0.000199	0.0136	0.001865	0.014575	0.00195	0.000097	0.00531	0.00155	0.0012	0.00369	0.0000116	0.171
				2,3,7,8-TCDD TEQ (Bird)	0.0258	0.0457	0.00309	0.00316	0.00946	0.000861	0.000199	0.136	0.00373	0.02915	0.00195	0.000097	0.00531	0.00155	0.0012	0.00369	0.0000116	0.271
Crab	Mill Area	STAR 7	DM-0059	Sample Result	0.02885	0.0595	0.135	0.56	0.165	2.89	2.51	0.13	0.048	0.0646	0.369	0.0241	0.106	0.02845	0.01445	0.0511	0.126	--
				2,3,7,8-TCDD TEQ (Fish)	0.02885	0.0595	0.0675	0.0056	0.00165	0.00289	0.000251	0.0065	0.0024	0.0323	0.00369	0.000241	0.0106	0.002845	0.001445	0.00511	0.0000126	0.231
				2,3,7,8-TCDD TEQ (Mammal)	0.02885	0.0595	0.0135	0.056	0.0165	0.0289	0.000251	0.013	0.0024	0.0323	0.00369	0.000241	0.0106	0.002845	0.001445	0.00511	0.0000126	0.275
				2,3,7,8-TCDD TEQ (Bird)	0.02885	0.0595	0.00675	0.0056	0.0165	0.00289	0.000251	0.13	0.0048	0.0646	0.00369	0.000241	0.0106	0.002845	0.001445	0.00511	0.0000126	0.344
Crab	Mill Area	STAR 8	DM-0058	Sample Result	0.0554	0.04285	0.088	0.307	0.117	0.752	0.56	0.12	0.026	0.0608	0.146	0.01465	0.0226	0.0368	0.0087	0.0341	0.0813	--
				2,3,7,8-TCDD TEQ (Fish)	0.0554	0.04285	0.044	0.00307	0.00117	0.000752	0.000056	0.006	0.0013	0.0304	0.00146	0.0001465	0.00226	0.00368	0.00087	0.00341	0.00000813	0.197
				2,3,7,8-TCDD TEQ (Mammal)	0.0554	0.04285	0.0088	0.0307	0.0117	0.00752	0.000056	0.012	0.0013	0.0304	0.00146	0.0001465	0.00226	0.00368	0.00087	0.00341	0.00000813	0.213
				2,3,7,8-TCDD TEQ (Bird)	0.0554	0.04285	0.0044	0.00307	0.0117	0.000752	0.000056	0.12	0.0026	0.0608	0.00146	0.0001465	0.00226	0.00368	0.00087	0.00341	0.00000813	0.313
Mussel	Humboldt Bay	Lappe_HS-2	12M031415034202	Sample Result	0.065	0.165	0.215	0.19	0.19	0.1	0.9	0.075	0.09	0.09	0.095	0.07	0.095	0.085	0.11	0.105	0.17	--
				2,3,7,8-TCDD TEQ (Fish)	0.065	0.165	0.1075	0.0019	0.0019	0.0001	0.00009	0.00375	0.0045	0.045	0.00095	0.0007	0.0095	0.0085	0.011	0.0105	0.000017	0.436
				2,3,7,8-TCDD TEQ (Mammal)	0.065	0.165	0.0215	0.019	0.019	0.001	0.00009	0.0075	0.0045	0.045	0.00095	0.0007	0.0095	0.0085	0.011	0.0105	0.000017	0.389
				2,3,7,8-TCDD TEQ (Bird)	0.065	0.165	0.01075	0.0019	0.019	0.0001	0.00009	0.075	0.009	0.09	0.00095	0.0007	0.0095	0.0085	0.011	0.0105	0.000017	0.477

APPENDIX D

CALCULATION OF DIOXIN/FURAN TOXICITY EQUIVALENTS (2,3,7,8-TCDD TEQs)[1,2]

Sierra Pacific Industries Arcata Division Sawmill

Arcata, California

Geomatrix

Concentrations are presented in nanograms per kilogram (ng/kg)

Matrix	Area Name	Station Location	Sample ID	Sample Result / Toxic Equivalents	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	2,3,4,6,7,8-HxCDF	OCDF	2,3,7,8-TCDD TEQ
Fish Toxic Equivalency Factor (Fish TEF)[3]					**1**	**1**	**0.5**	**0.01**	**0.01**	**0.001**	**0.0001**	**0.05**	**0.05**	**0.5**	**0.01**	**0.01**	**0.1**	**0.1**	**0.1**	**0.1**	**0.0001**	--
Mammal Toxic Equivalency Factor (Mammal TEF)[3]					**1**	**1**	**0.1**	**0.1**	**0.1**	**0.01**	**0.0001**	**0.1**	**0.05**	**0.5**	**0.01**	**0.01**	**0.1**	**0.1**	**0.1**	**0.1**	**0.0001**	--
Bird Toxic Equivalency Factor (Bird TEF)[3]					**1**	**1**	**0.05**	**0.01**	**0.1**	**0.001**	**0.0001**	**1**	**0.1**	**1**	**0.01**	**0.01**	**0.1**	**0.1**	**0.1**	**0.1**	**0.0001**	--
Mussel	Mill Area	LOC 4	020621-NBSCM	Sample Result	0.0455	0.767	0.136	0.124	0.03195	1.01	4.81	0.0842	0.1045	0.0875	0.236	0.0114	0.314	0.0381	0.0575	0.0457	0.412	--
				2,3,7,8-TCDD TEQ (Fish)	0.0455	0.767	0.068	0.00124	0.0003195	0.00101	0.000481	0.00421	0.005225	0.04375	0.00236	0.000114	0.0314	0.00381	0.00575	0.00457	0.0000412	0.985
				2,3,7,8-TCDD TEQ (Mammal)	0.0455	0.767	0.0136	0.0124	0.003195	0.0101	0.000481	0.00842	0.005225	0.04375	0.00236	0.000114	0.0314	0.00381	0.00575	0.00457	0.0000412	0.958
				2,3,7,8-TCDD TEQ (Bird)	0.0455	0.767	0.0068	0.00124	0.003195	0.00101	0.000481	0.0842	0.01045	0.0875	0.00236	0.000114	0.0314	0.00381	0.00575	0.00457	0.0000412	1.06
Mussel	Mill Area	LOC 4	DM-0023	Sample Result	0.02145	0.0251	0.02655	0.116	0.02745	0.539	1.005	0.053	0.0395	0.0317	0.0885	0.01575	0.02	0.00975	0.016	0.01215	0.11	--
				2,3,7,8-TCDD TEQ (Fish)	0.02145	0.0251	0.013275	0.00116	0.0002745	0.000539	0.0001005	0.00265	0.001975	0.01585	0.000885	0.0001575	0.002	0.000975	0.0016	0.001215	0.000011	0.089
				2,3,7,8-TCDD TEQ (Mammal)	0.02145	0.0251	0.002655	0.0116	0.002745	0.00539	0.0001005	0.0053	0.001975	0.01585	0.000885	0.0001575	0.002	0.000975	0.0016	0.001215	0.000011	0.099
				2,3,7,8-TCDD TEQ (Bird)	0.02145	0.0251	0.0013275	0.00116	0.002745	0.000539	0.0001005	0.053	0.00395	0.0317	0.000885	0.0001575	0.002	0.000975	0.0016	0.001215	0.000011	0.148
Mussel	Mill Area	Lappe_Mill	31M011700032402	Sample Result	0.105	0.245	0.27	0.445	0.24	4.4	49	0.1	0.185	0.19	0.2	0.095	0.17	0.15	0.205	0.19	0.34	--
				2,3,7,8-TCDD TEQ (Fish)	0.105	0.245	0.135	0.00445	0.0024	0.0044	0.0049	0.005	0.00925	0.095	0.002	0.00095	0.017	0.015	0.0205	0.019	0.000034	0.685
				2,3,7,8-TCDD TEQ (Mammal)	0.105	0.245	0.027	0.0445	0.024	0.044	0.0049	0.01	0.00925	0.095	0.002	0.00095	0.017	0.015	0.0205	0.019	0.000034	0.683
				2,3,7,8-TCDD TEQ (Bird)	0.105	0.245	0.0135	0.00445	0.024	0.0044	0.0049	0.1	0.0185	0.19	0.002	0.00095	0.017	0.015	0.0205	0.019	0.000034	0.784
Oyster	Humboldt Bay	LOC 1	020621-EBAY-6-2	Sample Result	0.01505	0.773	0.084	0.0941	0.0735	0.209	0.431	0.109	0.0535	0.04755	0.0131	0.01355	0.198	0.02625	0.03885	0.03185	0.107	--
				2,3,7,8-TCDD TEQ (Fish)	0.01505	0.773	0.042	0.000941	0.000735	0.000209	0.0000431	0.00545	0.002675	0.023775	0.000131	0.0001355	0.0198	0.002625	0.003885	0.003185	0.0000107	0.894
				2,3,7,8-TCDD TEQ (Mammal)	0.01505	0.773	0.0084	0.00941	0.00735	0.00209	0.0000431	0.0109	0.002675	0.023775	0.000131	0.0001355	0.0198	0.002625	0.003885	0.003185	0.0000107	0.882
				2,3,7,8-TCDD TEQ (Bird)	0.01505	0.773	0.0042	0.000941	0.00735	0.000209	0.0000431	0.109	0.00535	0.04755	0.000131	0.0001355	0.0198	0.002625	0.003885	0.003185	0.0000107	0.992
Oyster	Humboldt Bay	LOC 1	DM-0003	Sample Result	0.0368	0.0477	0.03115	0.155	0.0862	0.332	0.3855	0.296	0.0411	0.0892	0.01885	0.0212	0.01505	0.0141	0.0209	0.0161	0.056	--
				2,3,7,8-TCDD TEQ (Fish)	0.0368	0.0477	0.015575	0.00155	0.000862	0.000332	0.00003855	0.0148	0.002055	0.0446	0.0001885	0.000212	0.001505	0.00141	0.00209	0.00161	0.0000056	0.171
				2,3,7,8-TCDD TEQ (Mammal)	0.0368	0.0477	0.003115	0.0155	0.00862	0.00332	0.00003855	0.0296	0.002055	0.0446	0.0001885	0.000212	0.001505	0.00141	0.00209	0.00161	0.0000056	0.198
				2,3,7,8-TCDD TEQ (Bird)	0.0368	0.0477	0.0015575	0.00155	0.00862	0.000332	0.00003855	0.296	0.00411	0.0892	0.0001885	0.000212	0.001505	0.00141	0.00209	0.00161	0.0000056	0.493
Oyster	Humboldt Bay	LOC 2	020621-EBAY-1-2	Sample Result	0.0175	1.21	0.108	0.143	0.0887	0.274	0.876	0.243	0.072	0.065	0.01915	0.0222	0.274	0.0238	0.03425	0.02845	0.144	--
				2,3,7,8-TCDD TEQ (Fish)	0.0175	1.21	0.054	0.00143	0.000887	0.000274	0.0000876	0.01215	0.0036	0.0325	0.0001915	0.000222	0.0274	0.00238	0.003425	0.002845	0.0000144	1.37
				2,3,7,8-TCDD TEQ (Mammal)	0.0175	1.21	0.0108	0.0143	0.00887	0.00274	0.0000876	0.0243	0.0036	0.0325	0.0001915	0.000222	0.0274	0.00238	0.003425	0.002845	0.0000144	1.36
				2,3,7,8-TCDD TEQ (Bird)	0.0175	1.21	0.0054	0.00143	0.00887	0.000274	0.0000876	0.243	0.0072	0.065	0.0001915	0.000222	0.0274	0.00238	0.003425	0.002845	0.0000144	1.60
Oyster	Humboldt Bay	LOC 2	DM-0001	Sample Result	0.0996	0.0555	0.02725	0.136	0.0756	0.261	0.3965	0.303	0.04335	0.0365	0.02085	0.0229	0.0278	0.0201	0.0092	0.02145	0.056	--
				2,3,7,8-TCDD TEQ (Fish)	0.0996	0.0555	0.013625	0.00136	0.000756	0.000261	0.00003965	0.01515	0.0021675	0.01825	0.0002085	0.000229	0.00278	0.00201	0.00092	0.002145	0.0000056	0.215
				2,3,7,8-TCDD TEQ (Mammal)	0.0996	0.0555	0.002725	0.0136	0.00756	0.00261	0.00003965	0.0303	0.0021675	0.01825	0.0002085	0.000229	0.00278	0.00201	0.00092	0.002145	0.0000056	0.241
				2,3,7,8-TCDD TEQ (Bird)	0.0996	0.0555	0.0013625	0.00136	0.00756	0.000261	0.00003965	0.303	0.004335	0.0365	0.0002085	0.000229	0.00278	0.00201	0.00092	0.002145	0.0000056	0.518
Oyster	Humboldt Bay	LOC 3	020621-NBSC	Sample Result	0.0246	4.04	0.178	0.33	0.214	0.586	1.3	0.361	0.1285	0.1205	0.01425	0.01435	0.568	0.0341	0.0545	0.0451	0.11	--
				2,3,7,8-TCDD TEQ (Fish)	0.0246	4.04	0.089	0.0033	0.00214	0.000586	0.00013	0.01805	0.006425	0.06025	0.0001425	0.0001435	0.0568	0.00341	0.00545	0.00451	0.000011	4.31
				2,3,7,8-TCDD TEQ (Mammal)	0.0246	4.04	0.0178	0.033	0.0214	0.00586	0.00013	0.0361	0.006425	0.06025	0.0001425	0.0001435	0.0568	0.00341	0.00545	0.00451	0.000011	4.32
				2,3,7,8-TCDD TEQ (Bird)	0.0246	4.04	0.0089	0.0033	0.0214	0.000586	0.00013	0.361	0.01285	0.1205	0.0001425	0.0001435	0.0568	0.00341	0.00545	0.00451	0.000011	4.66
Oyster	Humboldt Bay	LOC 3	DM-0015a	Sample Result	0.078	0.0952	0.01655	0.121	0.0581	0.281	0.3115	0.19	0.0437	0.0306	0.0136	0.0156	0.0111	0.01105	0.0166	0.01265	0.04875	--
				2,3,7,8-TCDD TEQ (Fish)	0.078	0.0952	0.008275	0.00121	0.000581	0.000281	0.00003115	0.0095	0.002185	0.0153	0.000136	0.000156	0.00111	0.001105	0.00166	0.001265	0.000004875	0.216
				2,3,7,8-TCDD TEQ (Mammal)	0.078	0.0952	0.001655	0.0121	0.00581	0.00281	0.00003115	0.019	0.002185	0.0153	0.000136	0.000156	0.00111	0.001105	0.00166	0.001265	0.000004875	0.238
				2,3,7,8-TCDD TEQ (Bird)	0.078	0.0952	0.0008275	0.00121	0.00581	0.000281	0.00003115	0.19	0.00437	0.0306	0.000136	0.000156	0.00111	0.001105	0.00166	0.001265	0.000004875	0.412
Oyster	Humboldt Bay	LOC 3	DM-0015b	Sample Result	0.04585	0.04835	0.02715	0.16	0.0921	0.376	0.432	0.226	0.0431	0.0818	0.01355	0.02225	0.0089	0.0083	0.01495	0.0508	0.0775	--
				2,3,7,8-TCDD TEQ (Fish)	0.04585	0.04835	0.013575	0.0016	0.000921	0.000376	0.0000432	0.0113	0.002155	0.0409	0.0001355	0.0002225	0.00089	0.00083	0.001495	0.00508	0.00000775	0.174
				2,3,7,8-TCDD TEQ (Mammal)	0.04585	0.04835	0.002715	0.016	0.00921	0.00376	0.0000432	0.0226	0.002155	0.0409	0.0001355	0.0002225	0.00089	0.00083	0.001495	0.00508	0.00000775	0.200
				2,3,7,8-TCDD TEQ (Bird)	0.04585	0.04835	0.0013575	0.0016	0.00921	0.000376	0.0000432	0.226	0.00431	0.0818	0.0001355	0.0002225	0.00089	0.00083	0.001495	0.00508	0.00000775	0.428
Oyster	Humboldt Bay	LOC 5	020621-MR-7-1	Sample Result	0.0565	1.34	0.0798	0.176	0.0911	0.476	1.69	0.176	0.082	0.0705	0.0754	0.00775	0.264	0.025	0.03605	0.03	0.169	--
				2,3,7,8-TCDD TEQ (Fish)	0.0565	1.34	0.0399	0.00176	0.000911	0.000476	0.000169	0.0088	0.0041	0.03525	0.000754	0.0000775	0.0264	0.0025	0.003605	0.003	0.0000169	1.52
				2,3,7,8-TCDD TEQ (Mammal)	0.0565	1.34	0.00798	0.0176	0.00911	0.00476	0.000169	0.0176	0.0041	0.03525	0.000754	0.0000775	0.0264	0.0025	0.003605	0.003	0.0000169	1.53
				2,3,7,8-TCDD TEQ (Bird)	0.0565	1.34	0.00399	0.00176	0.00911	0.000476	0.000169	0.176	0.0082	0.0705	0.000754	0.0000775	0.0264	0.0025	0.003605	0.003	0.0000169	1.70
Oyster	Humboldt Bay	LOC 5	DM-0017	Sample Result	0.148	0.0299	0.0443	0.04525	0.0446	0.204	0.377	0.0665	0.0306	0.02565	0.0286	0.0077	0.01225	0.01205	0.0245	0.01715	0.051	--
				2,3,7,8-TCDD TEQ (Fish)	0.148	0.0299	0.02215	0.0004525	0.000446	0.000204	0.0000377	0.003325	0.00153	0.012825	0.000286	0.000077	0.001225	0.001205	0.00245	0.001715	0.0000051	0.226
				2,3,7,8-TCDD TEQ (Mammal)	0.148	0.0299	0.00443	0.004525	0.00446	0.00204	0.0000377	0.00665	0.00153	0.012825	0.000286	0.000077	0.001225	0.001205	0.00245	0.001715	0.0000051	0.221
				2,3,7,8-TCDD TEQ (Bird)	0.148	0.0299	0.002215	0.0004525	0.00446	0.000204	0.0000377	0.0665	0.00306	0.02565	0.000286	0.000077	0.001225	0.001205	0.00245	0.001715	0.0000051	0.287
Oyster	Humboldt Bay	LOC 6	020621-MR-7-2	Sample Result	0.0531	1.48	0.118	0.163	0.0834	0.476	1.33	0.188	0.123	0.1075	0.0641	0.0114	0.366	0.03045	0.04145	0.03535	0.151	--
				2,3,7,8-TCDD TEQ (Fish)	0.0531	1.48	0.059	0.00163	0.000834	0.000476	0.000133	0.0094	0.00615	0.05375	0.000641	0.000114	0.0366	0.003045	0.004145	0.003535	0.0000151	1.71
				2,3,7,8-TCDD TEQ (Mammal)	0.0531	1.48	0.0118	0.0163	0.00834	0.00476	0.000133	0.0188	0.00615	0.05375	0.000641	0.000114	0.0366	0.003045	0.004145	0.003535	0.0000151	1.70
				2,3,7,8-TCDD TEQ (Bird)	0.0531	1.48	0.0059	0.00163	0.00834	0.000476	0.000133	0.188	0.0123	0.1075	0.000641	0.000114	0.0366	0.003045	0.004145	0.003535	0.0000151	1.91
Oyster	Humboldt Bay	LOC 6	DM-0019	Sample Result	0.0291	0.105	0.0722	0.086	0.03585	0.482	0.73	0.172	0.0288	0.0814	0.0506	0.0115	0.0116	0.01135	0.01755	0.01305	0.0625	--
				2,3,7,8-TCDD TEQ (Fish)	0.0291	0.105	0.0361	0.00086	0.0003585	0.000482	0.000073	0.0086	0.00144	0.0407	0.000506	0.000115	0.00116	0.001135	0.001755	0.001305	0.00000625	0.229
				2,3,7,8-TCDD TEQ (Mammal)	0.0291	0.105	0.00722	0.0086	0.003585	0.00482	0.000073	0.0172	0.00144	0.0407	0.000506	0.000115	0.00116	0.001135	0.001755	0.001305	0.00000625	0.224
				2,3,7,8-TCDD TEQ (Bird)	0.0291	0.105	0.00361	0.00086	0.003585	0.000482	0.000073	0.172	0.00288	0.0814	0.000506	0.000115	0.00116	0.001135	0.001755	0.001305	0.00000625	0.405
Oyster	Humboldt Bay	LOC 7	DM-0013	Sample Result	0.0742	0.054	0.0302	0.129	0.03075	0.293	0.51	0.249	0.04715	0.0399	0.0273	0.0312	0.01485	0.0139	0.0227	0.01705	0.065	--
				2,3,7,8-TCDD TEQ (Fish)	0.0742	0.054	0.0151	0.00129	0.0003075	0.000293	0.000051	0.01245	0.0023575	0.01995	0.000273	0.000312	0.001485	0.00139	0.00227	0.001705	0.0000065	0.187
				2,3,7,8-TCDD TEQ (Mammal)	0.0742	0.054	0.00302	0.0129	0.003075	0.00293	0.000051	0.0249	0.0023575	0.01995	0.000273	0.000312	0.001485	0.00139	0.00227	0.001705	0.0000065	0.205
				2,3,7,8-TCDD TEQ (Bird)	0.0742	0.054	0.00151	0.00129	0.003075	0.000293	0.000051	0.249	0.004715	0.0399	0.000273	0.000312	0.001485	0.00139	0.00227	0.001705	0.0000065	0.435

APPENDIX D
CALCULATION OF DIOXIN/FURAN TOXICITY EQUIVALENTS (2,3,7,8-TCDD TEQs)[1,2]

Sierra Pacific Industries Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Matrix	Area Name	Station Location	Sample ID	Sample Result / Toxic Equivalents	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	2,3,4,6,7,8-HxCDF	OCDF	2,3,7,8-TCDD TEQ
				Fish Toxic Equivalency Factor (Fish TEF)[3]	1	1	0.5	0.01	0.01	0.001	0.0001	0.05	0.05	0.5	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
				Mammal Toxic Equivalency Factor (Mammal TEF)[3]	1	1	0.1	0.1	0.1	0.01	0.0001	0.1	0.05	0.5	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
				Bird Toxic Equivalency Factor (Bird TEF)[3]	1	1	0.05	0.01	0.1	0.001	0.0001	1	0.1	1	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
Oyster	Humboldt Bay	LOC 7	020621-SIN	Sample Result	0.0636	1.97	0.128	0.173	0.0754	0.287	0.735	0.23	0.1365	0.1285	0.0143	0.0154	0.333	0.03105	0.03955	0.0353	0.0978	--
				2,3,7,8-TCDD TEQ (Fish)	0.0636	1.97	0.064	0.00173	0.000754	0.000287	0.0000735	0.0115	0.006825	0.06425	0.000143	0.000154	0.0333	0.003105	0.003955	0.00353	0.00000978	2.23
				2,3,7,8-TCDD TEQ (Mammal)	0.0636	1.97	0.0128	0.0173	0.00754	0.00287	0.0000735	0.023	0.006825	0.06425	0.000143	0.000154	0.0333	0.003105	0.003955	0.00353	0.00000978	2.21
				2,3,7,8-TCDD TEQ (Bird)	0.0636	1.97	0.0064	0.00173	0.00754	0.000287	0.0000735	0.23	0.01365	0.1285	0.000143	0.000154	0.0333	0.003105	0.003955	0.00353	0.00000978	2.47
Oyster	Humboldt Bay	LOC 8	020621-SIN-1-2	Sample Result	0.02465	1.11	0.119	0.126	0.03025	0.213	0.536	0.174	0.052	0.0457	0.00995	0.01015	0.281	0.0855	0.0264	0.0208	0.09	--
				2,3,7,8-TCDD TEQ (Fish)	0.02465	1.11	0.0595	0.00126	0.0003025	0.000213	0.0000536	0.0087	0.0026	0.02285	0.0000995	0.0001015	0.0281	0.00855	0.00264	0.00208	0.000009	1.27
				2,3,7,8-TCDD TEQ (Mammal)	0.02465	1.11	0.0119	0.0126	0.003025	0.00213	0.0000536	0.0174	0.0026	0.02285	0.0000995	0.0001015	0.0281	0.00855	0.00264	0.00208	0.000009	1.25
				2,3,7,8-TCDD TEQ (Bird)	0.02465	1.11	0.00595	0.00126	0.003025	0.000213	0.0000536	0.174	0.0052	0.0457	0.0000995	0.0001015	0.0281	0.00855	0.00264	0.00208	0.000009	1.41
Oyster	Humboldt Bay	LOC 8	DM-0011	Sample Result	0.03515	0.105	0.024	0.153	0.062	0.316	0.415	0.226	0.03865	0.0784	0.0152	0.0172	0.01455	0.01445	0.0211	0.0171	0.053	--
				2,3,7,8-TCDD TEQ (Fish)	0.03515	0.105	0.012	0.00153	0.00062	0.000316	0.0000415	0.0113	0.0019325	0.0392	0.000152	0.000172	0.001455	0.001445	0.00211	0.00171	0.0000053	0.214
				2,3,7,8-TCDD TEQ (Mammal)	0.03515	0.105	0.0024	0.0153	0.0062	0.00316	0.0000415	0.0226	0.0019325	0.0392	0.000152	0.000172	0.001455	0.001445	0.00211	0.00171	0.0000053	0.238
				2,3,7,8-TCDD TEQ (Bird)	0.03515	0.105	0.0012	0.00153	0.0062	0.000316	0.0000415	0.226	0.003865	0.0784	0.000152	0.000172	0.001455	0.001445	0.00211	0.00171	0.0000053	0.465
Oyster	Humboldt Bay	LOC 9	020621-BIN	Sample Result	0.00835	0.679	0.118	0.0908	0.02145	0.242	0.693	0.123	0.058	0.0535	0.01045	0.0106	0.15	0.02035	0.02895	0.0232	0.114	--
				2,3,7,8-TCDD TEQ (Fish)	0.00835	0.679	0.059	0.000908	0.0002145	0.000242	0.0000693	0.00615	0.0029	0.02675	0.0001045	0.000106	0.015	0.002035	0.002895	0.00232	0.0000114	0.806
				2,3,7,8-TCDD TEQ (Mammal)	0.00835	0.679	0.0118	0.00908	0.002145	0.00242	0.0000693	0.0123	0.0029	0.02675	0.0001045	0.000106	0.015	0.002035	0.002895	0.00232	0.0000114	0.777
				2,3,7,8-TCDD TEQ (Bird)	0.00835	0.679	0.0059	0.000908	0.002145	0.000242	0.0000693	0.123	0.0058	0.0535	0.0001045	0.000106	0.015	0.002035	0.002895	0.00232	0.0000114	0.901
Oyster	Humboldt Bay	LOC 9	DM-0005	Sample Result	0.0987	0.045	0.02685	0.118	0.02655	0.094	0.353	0.286	0.04385	0.03515	0.01615	0.0182	0.0123	0.011	0.01725	0.0133	0.0468	--
				2,3,7,8-TCDD TEQ (Fish)	0.0987	0.045	0.013425	0.00118	0.0002655	0.000094	0.0000353	0.0143	0.0021925	0.017575	0.0001615	0.000182	0.00123	0.0011	0.001725	0.00133	0.00000468	0.199
				2,3,7,8-TCDD TEQ (Mammal)	0.0987	0.045	0.002685	0.0118	0.002655	0.00094	0.0000353	0.0286	0.0021925	0.017575	0.0001615	0.000182	0.00123	0.0011	0.001725	0.00133	0.00000468	0.216
				2,3,7,8-TCDD TEQ (Bird)	0.0987	0.045	0.0013425	0.00118	0.002655	0.000094	0.0000353	0.286	0.004385	0.03515	0.0001615	0.000182	0.00123	0.0011	0.001725	0.00133	0.00000468	0.480
Oyster	Humboldt Bay	LOC 10a	DM-0007	Sample Result	0.0303	0.0699	0.02305	0.0852	0.02375	0.272	0.53	0.216	0.03905	0.0312	0.0205	0.018	0.01465	0.0126	0.0207	0.01605	0.0785	--
				2,3,7,8-TCDD TEQ (Fish)	0.0303	0.0699	0.011525	0.000852	0.0002375	0.000272	0.000053	0.0108	0.0019525	0.0156	0.000205	0.00018	0.001465	0.00126	0.00207	0.001605	0.00000785	0.148
				2,3,7,8-TCDD TEQ (Mammal)	0.0303	0.0699	0.002305	0.00852	0.002375	0.00272	0.000053	0.0216	0.0019525	0.0156	0.000205	0.00018	0.001465	0.00126	0.00207	0.001605	0.00000785	0.162
				2,3,7,8-TCDD TEQ (Bird)	0.0303	0.0699	0.0011525	0.000852	0.002375	0.000272	0.000053	0.216	0.003905	0.0312	0.000205	0.00018	0.001465	0.00126	0.00207	0.001605	0.00000785	0.363
Oyster	Humboldt Bay	LOC 10b	020621-BIS	Sample Result	0.01085	1.15	0.324	0.118	0.0408	0.248	0.705	0.193	0.064	0.054	0.01185	0.01235	0.334	0.103	0.03325	0.0285	0.102	--
				2,3,7,8-TCDD TEQ (Fish)	0.01085	1.15	0.162	0.00118	0.000408	0.000248	0.0000705	0.00965	0.0032	0.027	0.0001185	0.0001235	0.0334	0.0103	0.003325	0.00285	0.0000102	1.41
				2,3,7,8-TCDD TEQ (Mammal)	0.01085	1.15	0.0324	0.0118	0.00408	0.00248	0.0000705	0.0193	0.0032	0.027	0.0001185	0.0001235	0.0334	0.0103	0.003325	0.00285	0.0000102	1.31
				2,3,7,8-TCDD TEQ (Bird)	0.01085	1.15	0.0162	0.00118	0.00408	0.000248	0.0000705	0.193	0.0064	0.054	0.0001185	0.0001235	0.0334	0.0103	0.003325	0.00285	0.0000102	1.49
Oyster	Humboldt Bay	LOC 10b	DM-0009	Sample Result	0.03735	0.114	0.02165	0.165	0.0793	0.334	0.363	0.274	0.03555	0.0292	0.02	0.02035	0.01415	0.01295	0.01905	0.01595	0.04605	--
				2,3,7,8-TCDD TEQ (Fish)	0.03735	0.114	0.010825	0.00165	0.000793	0.000334	0.0000363	0.0137	0.0017775	0.0146	0.0002	0.0002035	0.001415	0.001295	0.001905	0.001595	0.000004605	0.202
				2,3,7,8-TCDD TEQ (Mammal)	0.03735	0.114	0.002165	0.0165	0.00793	0.00334	0.0000363	0.0274	0.0017775	0.0146	0.0002	0.0002035	0.001415	0.001295	0.001905	0.001595	0.000004605	0.232
				2,3,7,8-TCDD TEQ (Bird)	0.03735	0.114	0.0010825	0.00165	0.00793	0.000334	0.0000363	0.274	0.003555	0.0292	0.0002	0.0002035	0.001415	0.001295	0.001905	0.001595	0.000004605	0.476
Oyster	Mill Area	LOC 4	020621-NBSC 02	Sample Result	0.0519	2	0.125	0.193	0.04115	0.404	1.2	0.209	0.135	0.1095	0.017	0.0099	0.368	0.0306	0.04385	0.03495	0.129	--
				2,3,7,8-TCDD TEQ (Fish)	0.0519	2	0.0625	0.00193	0.0004115	0.000404	0.00012	0.01045	0.00675	0.05475	0.00017	0.000099	0.0368	0.00306	0.004385	0.003495	0.0000129	2.24
				2,3,7,8-TCDD TEQ (Mammal)	0.0519	2	0.0125	0.0193	0.004115	0.00404	0.00012	0.0209	0.00675	0.05475	0.00017	0.000099	0.0368	0.00306	0.004385	0.003495	0.0000129	2.22
				2,3,7,8-TCDD TEQ (Bird)	0.0519	2	0.00625	0.00193	0.004115	0.000404	0.00012	0.209	0.0135	0.1095	0.00017	0.000099	0.0368	0.00306	0.004385	0.003495	0.0000129	2.44
Oyster	Mill Area	LOC 4	DM-0021	Sample Result	0.0218	0.0956	0.14	0.139	0.0763	0.319	0.59	0.184	0.02235	0.0608	0.0644	0.0129	0.0169	0.0156	0.0256	0.019	0.071	--
				2,3,7,8-TCDD TEQ (Fish)	0.0218	0.0956	0.07	0.00139	0.000763	0.000319	0.000059	0.0092	0.0011175	0.0304	0.000644	0.000129	0.00169	0.00156	0.00256	0.0019	0.0000071	0.239
				2,3,7,8-TCDD TEQ (Mammal)	0.0218	0.0956	0.014	0.0139	0.00763	0.00319	0.000059	0.0184	0.0011175	0.0304	0.000644	0.000129	0.00169	0.00156	0.00256	0.0019	0.0000071	0.215
				2,3,7,8-TCDD TEQ (Bird)	0.0218	0.0956	0.007	0.00139	0.00763	0.000319	0.000059	0.184	0.002235	0.0608	0.000644	0.000129	0.00169	0.00156	0.00256	0.0019	0.0000071	0.389
Oyster	Mill Area	LOC 4	DM-0025	Sample Result	0.0274	0.02505	0.03125	0.15	0.0315	0.388	0.79	0.125	0.0525	0.0451	0.075	0.0165	0.0113	0.01055	0.0163	0.0135	0.0815	--
				2,3,7,8-TCDD TEQ (Fish)	0.0274	0.02505	0.015625	0.0015	0.000315	0.000388	0.000079	0.00625	0.002625	0.02255	0.00075	0.000165	0.00113	0.001055	0.00163	0.00135	0.00000815	0.108
				2,3,7,8-TCDD TEQ (Mammal)	0.0274	0.02505	0.003125	0.015	0.00315	0.00388	0.000079	0.0125	0.002625	0.02255	0.00075	0.000165	0.00113	0.001055	0.00163	0.00135	0.00000815	0.121
				2,3,7,8-TCDD TEQ (Bird)	0.0274	0.02505	0.0015625	0.0015	0.00315	0.000388	0.000079	0.125	0.00525	0.0451	0.00075	0.000165	0.00113	0.001055	0.00163	0.00135	0.00000815	0.241
Perch	Humboldt Bay	TRAWL 4	DM-0044	Sample Result	0.01975	0.0692	0.0124	0.0657	0.012	0.136	0.306	0.161	0.02565	0.01975	0.0348	0.00665	0.01545	0.00835	0.004165	0.00315	0.0745	--
				2,3,7,8-TCDD TEQ (Fish)	0.01975	0.0692	0.0062	0.000657	0.00012	0.000136	0.0000306	0.00805	0.0012825	0.009875	0.000348	0.0000665	0.001545	0.000835	0.0004165	0.000315	0.00000745	0.119
				2,3,7,8-TCDD TEQ (Mammal)	0.01975	0.0692	0.00124	0.00657	0.0012	0.00136	0.0000306	0.0161	0.0012825	0.009875	0.000348	0.0000665	0.001545	0.000835	0.0004165	0.000315	0.00000745	0.130
				2,3,7,8-TCDD TEQ (Bird)	0.01975	0.0692	0.00062	0.000657	0.0012	0.000136	0.0000306	0.161	0.002565	0.01975	0.000348	0.0000665	0.001545	0.000835	0.0004165	0.000315	0.00000745	0.278
Perch	Humboldt Bay	TRAWL 15	DM-0064 & DM-0066 & DM-0067	Sample Result	0.0605	0.0745	0.134	0.1465	0.134	0.3	0.492	0.296	0.1195	0.0945	0.0448	0.057	0.065	0.063	0.105	0.0715	0.1035	--
				2,3,7,8-TCDD TEQ (Fish)	0.0605	0.0745	0.067	0.001465	0.00134	0.0003	0.0000492	0.0148	0.005975	0.04725	0.000448	0.00057	0.0065	0.0063	0.0105	0.00715	0.00001035	0.305
				2,3,7,8-TCDD TEQ (Mammal)	0.0605	0.0745	0.0134	0.01465	0.0134	0.003	0.0000492	0.0296	0.005975	0.04725	0.000448	0.00057	0.0065	0.0063	0.0105	0.00715	0.00001035	0.294
				2,3,7,8-TCDD TEQ (Bird)	0.0605	0.0745	0.0067	0.001465	0.0134	0.0003	0.0000492	0.296	0.01195	0.0945	0.000448	0.00057	0.0065	0.0063	0.0105	0.00715	0.00001035	0.591
Perch	Humboldt Bay	TRAWL 18	DM-0079	Sample Result	0.0695	0.063	0.0715	0.0695	0.067	0.196	0.801	0.243	0.101	0.0875	0.04255	0.0525	0.0515	0.0525	0.085	0.058	0.1135	--
				2,3,7,8-TCDD TEQ (Fish)	0.0695	0.063	0.03575	0.000695	0.00067	0.000196	0.0000801	0.01215	0.00505	0.04375	0.0004255	0.000525	0.00515	0.00525	0.0085	0.0058	0.00001135	0.257
				2,3,7,8-TCDD TEQ (Mammal)	0.0695	0.063	0.00715	0.00695	0.0067	0.00196	0.0000801	0.0243	0.00505	0.04375	0.0004255	0.000525	0.00515	0.00525	0.0085	0.0058	0.00001135	0.254
				2,3,7,8-TCDD TEQ (Bird)	0.0695	0.063	0.003575	0.000695	0.0067	0.000196	0.0000801	0.243	0.0101	0.0875	0.0004255	0.000525	0.00515	0.00525	0.0085	0.0058	0.00001135	0.510
Sculpin	Humboldt Bay	STAR 5	DM-0036	Sample Result	0.0222	0.103	0.02505	0.0405	0.01305	0.102	0.335	0.145	0.0355	0.0666	0.039	0.00575	0.0711	0.0341	0.01035	0.00805	0.1095	--
				2,3,7,8-TCDD TEQ (Fish)	0.0222	0.103	0.012525	0.000405	0.0001305	0.000102	0.0000335	0.00725	0.001775	0.0333	0.00039	0.0000575	0.00711	0.00341	0.001035	0.000805	0.00001095	0.194
				2,3,7,8-TCDD TEQ (Mammal)	0.0222	0.103	0.002505	0.00405	0.001305	0.00102	0.0000335	0.0145	0.001775	0.0333	0.00039	0.0000575	0.00711	0.00341	0.001035	0.000805	0.00001095	0.197
				2,3,7,8-TCDD TEQ (Bird)	0.0222	0.103	0.0012525	0.000405	0.001305	0.000102	0.0000335	0.145	0.00355	0.0666	0.00039	0.0000575	0.00711	0.00341	0.001035	0.000805	0.00001095	0.356

CALCULATION OF DIOXIN/FURAN TOXICITY EQUIVALENTS (2,3,7,8-TCDD TEQs)[1,2]

Sierra Pacific Industries Arcata Division Sawmill

Arcata, California

Geomatrix

Concentrations are presented in nanograms per kilogram (ng/kg)

Matrix	Area Name	Station Location	Sample ID	Sample Result / Toxic Equivalents	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	2,3,4,6,7,8-HxCDF	OCDF	2,3,7,8-TCDD TEQ
				Fish Toxic Equivalency Factor (Fish TEF)[3]	1	1	0.5	0.01	0.01	0.001	0.0001	0.05	0.05	0.5	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
				Mammal Toxic Equivalency Factor (Mammal TEF)[3]	1	1	0.1	0.1	0.1	0.01	0.0001	0.1	0.05	0.5	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
				Bird Toxic Equivalency Factor (Bird TEF)[3]	1	1	0.05	0.01	0.1	0.001	0.0001	1	0.1	1	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
Sculpin	Humboldt Bay	TRAWL 2	DM-0037	Sample Result	0.04235	0.075	0.056	0.0555	0.0545	0.077	0.988	0.204	0.0625	0.0515	0.03275	0.0433	0.0832	0.01915	0.0272	0.02055	0.355	--
				2,3,7,8-TCDD TEQ (Fish)	0.04235	0.075	0.028	0.000555	0.000545	0.000077	0.0000988	0.0102	0.003125	0.02575	0.0003275	0.000433	0.00832	0.001915	0.00272	0.002055	0.0000355	0.202
				2,3,7,8-TCDD TEQ (Mammal)	0.04235	0.075	0.0056	0.00555	0.00545	0.00077	0.0000988	0.0204	0.003125	0.02575	0.0003275	0.000433	0.00832	0.001915	0.00272	0.002055	0.0000355	0.200
				2,3,7,8-TCDD TEQ (Bird)	0.04235	0.075	0.0028	0.000555	0.00545	0.000077	0.0000988	0.204	0.00625	0.0515	0.0003275	0.000433	0.00832	0.001915	0.00272	0.002055	0.0000355	0.404
Sculpin	Humboldt Bay	TRAWL 17	DM-0071	Sample Result	0.2755	0.325	0.5	0.4875	0.4685	0.59	0.645	0.565	0.63	0.4815	0.17	0.2335	0.25	0.239	0.3775	0.2615	0.575	--
				2,3,7,8-TCDD TEQ (Fish)	0.2755	0.325	0.25	0.004875	0.004685	0.00059	0.0000645	0.02825	0.0315	0.24075	0.0017	0.002335	0.025	0.0239	0.03775	0.02615	0.0000575	1.28
				2,3,7,8-TCDD TEQ (Mammal)	0.2755	0.325	0.05	0.04875	0.04685	0.0059	0.0000645	0.0565	0.0315	0.24075	0.0017	0.002335	0.025	0.0239	0.03775	0.02615	0.0000575	1.20
				2,3,7,8-TCDD TEQ (Bird)	0.2755	0.325	0.025	0.004875	0.04685	0.00059	0.0000645	0.565	0.063	0.4815	0.0017	0.002335	0.025	0.0239	0.03775	0.02615	0.0000575	1.90
Sculpin	Humboldt Bay	TRAWL 18	DM-0078	Sample Result	0.083	0.0865	0.1275	0.132	0.1235	0.453	2.7	0.088	0.1285	0.109	0.04795	0.066	0.04005	0.03975	0.061	0.0423	0.141	--
				2,3,7,8-TCDD TEQ (Fish)	0.083	0.0865	0.06375	0.00132	0.001235	0.000453	0.00027	0.0044	0.006425	0.0545	0.0004795	0.00066	0.004005	0.003975	0.0061	0.00423	0.0000141	0.321
				2,3,7,8-TCDD TEQ (Mammal)	0.083	0.0865	0.01275	0.0132	0.01235	0.00453	0.00027	0.0088	0.006425	0.0545	0.0004795	0.00066	0.004005	0.003975	0.0061	0.00423	0.0000141	0.302
				2,3,7,8-TCDD TEQ (Bird)	0.083	0.0865	0.006375	0.00132	0.01235	0.000453	0.00027	0.088	0.01285	0.109	0.0004795	0.00066	0.004005	0.003975	0.0061	0.00423	0.0000141	0.420
Sculpin	Mill Area	TRAWL 10/11	DM-0054	Sample Result	0.0472	0.04975	0.0356	0.0339	0.03455	0.231	0.62	0.13	0.03195	0.0274	0.02725	0.02975	0.0701	0.0145	0.02195	0.0156	0.222	--
				2,3,7,8-TCDD TEQ (Fish)	0.0472	0.04975	0.0178	0.000339	0.0003455	0.000231	0.000062	0.0065	0.0015975	0.0137	0.0002725	0.0002975	0.00701	0.00145	0.002195	0.00156	0.0000222	0.150
				2,3,7,8-TCDD TEQ (Mammal)	0.0472	0.04975	0.00356	0.00339	0.003455	0.00231	0.000062	0.013	0.0015975	0.0137	0.0002725	0.0002975	0.00701	0.00145	0.002195	0.00156	0.0000222	0.151
				2,3,7,8-TCDD TEQ (Bird)	0.0472	0.04975	0.00178	0.000339	0.003455	0.000231	0.000062	0.13	0.003195	0.0274	0.0002725	0.0002975	0.00701	0.00145	0.002195	0.00156	0.0000222	0.276
Sculpin	Mill Area	TRAWL 13	DM-0080	Sample Result	0.065	0.1125	0.146	0.154	0.143	0.883	2.405	0.0815	0.1965	0.1705	0.07	0.0835	0.0515	0.0525	0.082	0.058	0.2145	--
				2,3,7,8-TCDD TEQ (Fish)	0.065	0.1125	0.073	0.00154	0.00143	0.000883	0.0002405	0.004075	0.009825	0.08525	0.0007	0.000835	0.00515	0.00525	0.0082	0.0058	0.00002145	0.380
				2,3,7,8-TCDD TEQ (Mammal)	0.065	0.1125	0.0146	0.0154	0.0143	0.00883	0.0002405	0.00815	0.009825	0.08525	0.0007	0.000835	0.00515	0.00525	0.0082	0.0058	0.00002145	0.360
				2,3,7,8-TCDD TEQ (Bird)	0.065	0.1125	0.0073	0.00154	0.0143	0.000883	0.0002405	0.0815	0.01965	0.1705	0.0007	0.000835	0.00515	0.00525	0.0082	0.0058	0.00002145	0.499
Sediment	Humboldt Bay	Arcata Bay Ref	Arcata Bay Ref	Sample Result	0.0865	0.223	0.2165	0.823	0.465	9.41	48.4	0.229	0.1615	0.418	2.71	0.1145	0.791	0.307	0.088	0.289	3.98	--
				2,3,7,8-TCDD TEQ (Fish)	0.0865	0.223	0.10825	0.00823	0.00465	0.00941	0.00484	0.01145	0.008075	0.209	0.0271	0.001145	0.0791	0.0307	0.0088	0.0289	0.000398	0.850
				2,3,7,8-TCDD TEQ (Mammal)	0.0865	0.223	0.02165	0.0823	0.0465	0.0941	0.00484	0.0229	0.008075	0.209	0.0271	0.001145	0.0791	0.0307	0.0088	0.0289	0.000398	0.975
				2,3,7,8-TCDD TEQ (Bird)	0.0865	0.223	0.010825	0.00823	0.0465	0.00941	0.00484	0.229	0.01615	0.418	0.0271	0.001145	0.0791	0.0307	0.0088	0.0289	0.000398	1.23
Sediment	Humboldt Bay	C-40-2	C40-2-0-0.5	Sample Result	0.107	0.586	0.848	1.18	1.34	30.1	178	0.758	0.1795	0.521	8.27	0.318	0.395	0.3955	0.25	0.709	13.9	--
				2,3,7,8-TCDD TEQ (Fish)	0.107	0.586	0.424	0.0118	0.0134	0.0301	0.0178	0.0379	0.008975	0.2605	0.0827	0.00318	0.0395	0.03955	0.025	0.0709	0.00139	1.76
				2,3,7,8-TCDD TEQ (Mammal)	0.107	0.586	0.0848	0.118	0.134	0.301	0.0178	0.0758	0.008975	0.2605	0.0827	0.00318	0.0395	0.03955	0.025	0.0709	0.00139	1.96
				2,3,7,8-TCDD TEQ (Bird)	0.107	0.586	0.0424	0.0118	0.134	0.0301	0.0178	0.758	0.01795	0.521	0.0827	0.00318	0.0395	0.03955	0.025	0.0709	0.00139	2.49
Sediment	Humboldt Bay	C-40-2	C40-2-1.5-2.0	Sample Result	0.229	0.213	0.622	0.56	0.828	10.2	59.2	1.11	0.2255	0.557	2.53	0.114	0.2475	0.25	0.15	0.478	2.005	--
				2,3,7,8-TCDD TEQ (Fish)	0.229	0.213	0.311	0.0056	0.00828	0.0102	0.00592	0.0555	0.011275	0.2785	0.0253	0.00114	0.02475	0.025	0.015	0.0478	0.0002005	1.27
				2,3,7,8-TCDD TEQ (Mammal)	0.229	0.213	0.0622	0.056	0.0828	0.102	0.00592	0.111	0.011275	0.2785	0.0253	0.00114	0.02475	0.025	0.015	0.0478	0.0002005	1.29
				2,3,7,8-TCDD TEQ (Bird)	0.229	0.213	0.0311	0.0056	0.0828	0.0102	0.00592	1.11	0.02255	0.557	0.0253	0.00114	0.02475	0.025	0.015	0.0478	0.0002005	2.41
Sediment	Humboldt Bay	C-41	C41-0-0.5	Sample Result	0.523	1.53	1.56	5.93	3.54	78.5	467	1.88	0.4975	1.19	14.1	0.535	0.97	0.91	0.454	1.32	30.5	--
				2,3,7,8-TCDD TEQ (Fish)	0.523	1.53	0.78	0.0593	0.0354	0.0785	0.0467	0.094	0.024875	0.595	0.141	0.00535	0.097	0.091	0.0454	0.132	0.00305	4.28
				2,3,7,8-TCDD TEQ (Mammal)	0.523	1.53	0.156	0.593	0.354	0.785	0.0467	0.188	0.024875	0.595	0.141	0.00535	0.097	0.091	0.0454	0.132	0.00305	5.31
				2,3,7,8-TCDD TEQ (Bird)	0.523	1.53	0.078	0.0593	0.354	0.0785	0.0467	1.88	0.04975	1.19	0.141	0.00535	0.097	0.091	0.0454	0.132	0.00305	6.30
Sediment	Humboldt Bay	C-41	C41-1.5-2.0	Sample Result	0.837	3.22	3.75	17.1	8.9	314	1720	2.13	1.54	2.67	85.5	4.57	4.32	3.49	1.35	5.38	157	--
				2,3,7,8-TCDD TEQ (Fish)	0.837	3.22	1.875	0.171	0.089	0.314	0.172	0.1065	0.077	1.335	0.855	0.0457	0.432	0.349	0.135	0.538	0.0157	10.6
				2,3,7,8-TCDD TEQ (Mammal)	0.837	3.22	0.375	1.71	0.89	3.14	0.172	0.213	0.077	1.335	0.855	0.0457	0.432	0.349	0.135	0.538	0.0157	14.3
				2,3,7,8-TCDD TEQ (Bird)	0.837	3.22	0.1875	0.171	0.89	0.314	0.172	2.13	0.154	2.67	0.855	0.0457	0.432	0.349	0.135	0.538	0.0157	13.1
Sediment	Humboldt Bay	C-42	C42-0-0.5	Sample Result	0.128	0.181	0.345	1.43	0.389	17.6	97.6	0.788	0.0775	0.335	3	0.26	0.193	0.212	0.0446	0.308	8.52	--
				2,3,7,8-TCDD TEQ (Fish)	0.128	0.181	0.1725	0.0143	0.00389	0.0176	0.00976	0.0394	0.003875	0.1675	0.03	0.0026	0.0193	0.0212	0.00446	0.0308	0.000852	0.847
				2,3,7,8-TCDD TEQ (Mammal)	0.128	0.181	0.0345	0.143	0.0389	0.176	0.00976	0.0788	0.003875	0.1675	0.03	0.0026	0.0193	0.0212	0.00446	0.0308	0.000852	1.07
				2,3,7,8-TCDD TEQ (Bird)	0.128	0.181	0.01725	0.0143	0.0389	0.0176	0.00976	0.788	0.00775	0.335	0.03	0.0026	0.0193	0.0212	0.00446	0.0308	0.000852	1.65
Sediment	Humboldt Bay	C-42	C42-1.0-1.8	Sample Result	0.604	1.61	1.52	3.92	2.5	55.7	317	1.75	1.46	2.17	12.2	1.04	1.07	1.36	0.244	1.84	24	--
				2,3,7,8-TCDD TEQ (Fish)	0.604	1.61	0.76	0.0392	0.025	0.0557	0.0317	0.0875	0.073	1.085	0.122	0.0104	0.107	0.136	0.0244	0.184	0.0024	4.96
				2,3,7,8-TCDD TEQ (Mammal)	0.604	1.61	0.152	0.392	0.25	0.557	0.0317	0.175	0.073	1.085	0.122	0.0104	0.107	0.136	0.0244	0.184	0.0024	5.52
				2,3,7,8-TCDD TEQ (Bird)	0.604	1.61	0.076	0.0392	0.25	0.0557	0.0317	1.75	0.146	2.17	0.122	0.0104	0.107	0.136	0.0244	0.184	0.0024	7.32
Sediment	Humboldt Bay	C-43	C43-0-0.5	Sample Result	0.339	1.62	2.08	9.53	4.61	357	3830	1.72	1.44	2.96	49.1	3.87	4.01	2.78	1.06	4.4	253	--
				2,3,7,8-TCDD TEQ (Fish)	0.339	1.62	1.04	0.0953	0.0461	0.357	0.383	0.086	0.072	1.48	0.491	0.0387	0.401	0.278	0.106	0.44	0.0253	7.30
				2,3,7,8-TCDD TEQ (Mammal)	0.339	1.62	0.208	0.953	0.461	3.57	0.383	0.172	0.072	1.48	0.491	0.0387	0.401	0.278	0.106	0.44	0.0253	11.0
				2,3,7,8-TCDD TEQ (Bird)	0.339	1.62	0.104	0.0953	0.461	0.357	0.383	1.72	0.144	2.96	0.491	0.0387	0.401	0.278	0.106	0.44	0.0253	9.96
Sediment	Humboldt Bay	C-43	C43-1.0-1.5	Sample Result	0.164	1.41	1.86	11.4	4.69	346	3100	1.16	0.683	1.38	64.7	3.97	1.165	1.48	0.777	2.79	386	--
				2,3,7,8-TCDD TEQ (Fish)	0.164	1.41	0.93	0.114	0.0469	0.346	0.31	0.058	0.03415	0.69	0.647	0.0397	0.1165	0.148	0.0777	0.279	0.0386	5.45
				2,3,7,8-TCDD TEQ (Mammal)	0.164	1.41	0.186	1.14	0.469	3.46	0.31	0.116	0.03415	0.69	0.647	0.0397	0.1165	0.148	0.0777	0.279	0.0386	9.33
				2,3,7,8-TCDD TEQ (Bird)	0.164	1.41	0.093	0.114	0.469	0.346	0.31	1.16	0.0683	1.38	0.647	0.0397	0.1165	0.148	0.0777	0.279	0.0386	6.86
Sediment	Humboldt Bay	C-44	C44-0-0.5	Sample Result	0.115	0.644	0.562	3.36	1.57	46.8	247	1.46	0.3045	0.84	6.58	0.305	0.625	0.4345	0.448	0.764	13	--
				2,3,7,8-TCDD TEQ (Fish)	0.115	0.644	0.281	0.0336	0.0157	0.0468	0.0247	0.073	0.015225	0.42	0.0658	0.00305	0.0625	0.04345	0.0448	0.0764	0.0013	1.97
				2,3,7,8-TCDD TEQ (Mammal)	0.115	0.644	0.0562	0.336	0.157	0.468	0.0247	0.146	0.015225	0.42	0.0658	0.00305	0.0625	0.04345	0.0448	0.0764	0.0013	2.68
				2,3,7,8-TCDD TEQ (Bird)	0.115	0.644	0.0281	0.0336	0.157	0.0468	0.0247	1.46	0.03045	0.84	0.0658	0.00305	0.0625	0.04345	0.0448	0.0764	0.0013	3.68

CALCULATION OF DIOXIN/FURAN TOXICITY EQUIVALENTS (2,3,7,8-TCDD TEQs)[1,2]

Sierra Pacific Industries Arcata Division Sawmill

Arcata, California

Geomatrix

Concentrations are presented in nanograms per kilogram (ng/kg)

Matrix	Area Name	Station Location	Sample ID	Sample Result / Toxic Equivalents	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	2,3,4,6,7,8-HxCDF	OCDF	2,3,7,8-TCDD TEQ
				Fish Toxic Equivalency Factor (Fish TEF)[3]	1	1	0.5	0.01	0.01	0.001	0.0001	0.05	0.05	0.5	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
				Mammal Toxic Equivalency Factor (Mammal TEF)[3]	1	1	0.1	0.1	0.1	0.01	0.0001	0.1	0.05	0.5	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
				Bird Toxic Equivalency Factor (Bird TEF)[3]	1	1	0.05	0.01	0.1	0.001	0.0001	1	0.1	1	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
Sediment	Humboldt Bay	C-44	C44-1.5-2.0	Sample Result	1.19	2.16	0.655	15.3	6.81	91.5	443	3.34	0.88	1.89	16.9	0.645	2.63	2.73	0.941	1.77	25.7	--
				2,3,7,8-TCDD TEQ (Fish)	1.19	2.16	0.3275	0.153	0.0681	0.0915	0.0443	0.167	0.044	0.945	0.169	0.00645	0.263	0.273	0.0941	0.177	0.00257	6.18
				2,3,7,8-TCDD TEQ (Mammal)	1.19	2.16	0.0655	1.53	0.681	0.915	0.0443	0.334	0.044	0.945	0.169	0.00645	0.263	0.273	0.0941	0.177	0.00257	8.89
				2,3,7,8-TCDD TEQ (Bird)	1.19	2.16	0.03275	0.153	0.681	0.0915	0.0443	3.34	0.088	1.89	0.169	0.00645	0.263	0.273	0.0941	0.177	0.00257	10.7
Sediment	Humboldt Bay	Channel 1	Channel 1 Comp	Sample Result	0.081	0.486	0.614	3.02	1.49	34.1	131	0.487	0.215	0.464	4.89	0.132	0.669	0.346	0.0845	0.588	8.08	--
				2,3,7,8-TCDD TEQ (Fish)	0.081	0.486	0.307	0.0302	0.0149	0.0341	0.0131	0.02435	0.01075	0.232	0.0489	0.00132	0.0669	0.0346	0.00845	0.0588	0.000808	1.45
				2,3,7,8-TCDD TEQ (Mammal)	0.081	0.486	0.0614	0.302	0.149	0.341	0.0131	0.0487	0.01075	0.232	0.0489	0.00132	0.0669	0.0346	0.00845	0.0588	0.000808	1.94
				2,3,7,8-TCDD TEQ (Bird)	0.081	0.486	0.0307	0.0302	0.149	0.0341	0.0131	0.487	0.0215	0.464	0.0489	0.00132	0.0669	0.0346	0.00845	0.0588	0.000808	2.02
Sediment	Humboldt Bay	Channel 2	Channel 2 Comp	Sample Result	0.0955	0.423	0.435	1.99	1	23.1	112	0.401	0.129	0.401	4.49	0.1625	0.655	0.334	0.1015	0.458	7.43	--
				2,3,7,8-TCDD TEQ (Fish)	0.0955	0.423	0.2175	0.0199	0.01	0.0231	0.0112	0.02005	0.00645	0.2005	0.0449	0.001625	0.0655	0.0334	0.01015	0.0458	0.000743	1.23
				2,3,7,8-TCDD TEQ (Mammal)	0.0955	0.423	0.0435	0.199	0.1	0.231	0.0112	0.0401	0.00645	0.2005	0.0449	0.001625	0.0655	0.0334	0.01015	0.0458	0.000743	1.55
				2,3,7,8-TCDD TEQ (Bird)	0.0955	0.423	0.02175	0.0199	0.1	0.0231	0.0112	0.401	0.0129	0.401	0.0449	0.001625	0.0655	0.0334	0.01015	0.0458	0.000743	1.71
Sediment	Humboldt Bay	LOC 1	DM-0004	Sample Result	0.104	0.592	0.615	2.35	1.53	29	148	0.744	0.323	0.58	5.25	0.447	0.4865	0.547	0.198	0.625	9.11	--
				2,3,7,8-TCDD TEQ (Fish)	0.104	0.592	0.3075	0.0235	0.0153	0.029	0.0148	0.0372	0.01615	0.29	0.0525	0.00447	0.04865	0.0547	0.0198	0.0625	0.000911	1.67
				2,3,7,8-TCDD TEQ (Mammal)	0.104	0.592	0.0615	0.235	0.153	0.29	0.0148	0.0744	0.01615	0.29	0.0525	0.00447	0.04865	0.0547	0.0198	0.0625	0.000911	2.07
				2,3,7,8-TCDD TEQ (Bird)	0.104	0.592	0.03075	0.0235	0.153	0.029	0.0148	0.744	0.0323	0.58	0.0525	0.00447	0.04865	0.0547	0.0198	0.0625	0.000911	2.55
Sediment	Humboldt Bay	LOC 2	DM-0002	Sample Result	0.0765	0.469	0.541	1.68	1.19	20.1	103	0.659	0.282	0.504	3.59	0.335	0.3275	0.214	0.174	0.479	6.44	--
				2,3,7,8-TCDD TEQ (Fish)	0.0765	0.469	0.2705	0.0168	0.0119	0.0201	0.0103	0.03295	0.0141	0.252	0.0359	0.00335	0.03275	0.0214	0.0174	0.0479	0.000644	1.33
				2,3,7,8-TCDD TEQ (Mammal)	0.0765	0.469	0.0541	0.168	0.119	0.201	0.0103	0.0659	0.0141	0.252	0.0359	0.00335	0.03275	0.0214	0.0174	0.0479	0.000644	1.59
				2,3,7,8-TCDD TEQ (Bird)	0.0765	0.469	0.02705	0.0168	0.119	0.0201	0.0103	0.659	0.0282	0.504	0.0359	0.00335	0.03275	0.0214	0.0174	0.0479	0.000644	2.09
Sediment	Humboldt Bay	LOC 3	DM-0016	Sample Result	0.118	0.982	0.971	4.12	2.56	58.9	308	1.07	0.811	1.2	12.4	0.999	2.52	1.49	0.535	1.37	19.7	--
				2,3,7,8-TCDD TEQ (Fish)	0.118	0.982	0.4855	0.0412	0.0256	0.0589	0.0308	0.0535	0.04055	0.6	0.124	0.00999	0.252	0.149	0.0535	0.137	0.00197	3.16
				2,3,7,8-TCDD TEQ (Mammal)	0.118	0.982	0.0971	0.412	0.256	0.589	0.0308	0.107	0.04055	0.6	0.124	0.00999	0.252	0.149	0.0535	0.137	0.00197	3.96
				2,3,7,8-TCDD TEQ (Bird)	0.118	0.982	0.04855	0.0412	0.256	0.0589	0.0308	1.07	0.0811	1.2	0.124	0.00999	0.252	0.149	0.0535	0.137	0.00197	4.61
Sediment	Humboldt Bay	LOC 5	DM-0018	Sample Result	0.281	0.717	0.834	3.58	2.1	46.5	231	0.825	0.473	0.773	8.86	0.699	0.66	0.902	0.1235	0.424	14.8	--
				2,3,7,8-TCDD TEQ (Fish)	0.281	0.717	0.417	0.0358	0.021	0.0465	0.0231	0.04125	0.02365	0.3865	0.0886	0.00699	0.066	0.0902	0.01235	0.0424	0.00148	2.30
				2,3,7,8-TCDD TEQ (Mammal)	0.281	0.717	0.0834	0.358	0.21	0.465	0.0231	0.0825	0.02365	0.3865	0.0886	0.00699	0.066	0.0902	0.01235	0.0424	0.00148	2.94
				2,3,7,8-TCDD TEQ (Bird)	0.281	0.717	0.0417	0.0358	0.21	0.0465	0.0231	0.825	0.0473	0.773	0.0886	0.00699	0.066	0.0902	0.01235	0.0424	0.00148	3.31
Sediment	Humboldt Bay	LOC 6	DM-0020	Sample Result	0.104	0.76	0.341	3.35	1.93	37.6	175	0.753	0.438	0.694	6.82	0.596	0.595	0.71	0.1325	0.908	11.2	--
				2,3,7,8-TCDD TEQ (Fish)	0.104	0.76	0.1705	0.0335	0.0193	0.0376	0.0175	0.03765	0.0219	0.347	0.0682	0.00596	0.0595	0.071	0.01325	0.0908	0.00112	1.86
				2,3,7,8-TCDD TEQ (Mammal)	0.104	0.76	0.0341	0.335	0.193	0.376	0.0175	0.0753	0.0219	0.347	0.0682	0.00596	0.0595	0.071	0.01325	0.0908	0.00112	2.57
				2,3,7,8-TCDD TEQ (Bird)	0.104	0.76	0.01705	0.0335	0.193	0.0376	0.0175	0.753	0.0438	0.694	0.0682	0.00596	0.0595	0.071	0.01325	0.0908	0.00112	2.96
Sediment	Humboldt Bay	LOC 7	DM-0014	Sample Result	0.124	0.92	1.09	3.57	2.38	46.1	231	0.991	0.658	0.994	8.26	0.926	0.935	1.02	0.524	1.27	14.2	--
				2,3,7,8-TCDD TEQ (Fish)	0.124	0.92	0.545	0.0357	0.0238	0.0461	0.0231	0.04955	0.0329	0.497	0.0826	0.00926	0.0935	0.102	0.0524	0.127	0.00142	2.77
				2,3,7,8-TCDD TEQ (Mammal)	0.124	0.92	0.109	0.357	0.238	0.461	0.0231	0.0991	0.0329	0.497	0.0826	0.00926	0.0935	0.102	0.0524	0.127	0.00142	3.33
				2,3,7,8-TCDD TEQ (Bird)	0.124	0.92	0.0545	0.0357	0.238	0.0461	0.0231	0.991	0.0658	0.994	0.0826	0.00926	0.0935	0.102	0.0524	0.127	0.00142	3.96
Sediment	Humboldt Bay	LOC 8	DM-0012	Sample Result	0.0945	0.528	0.55	2.05	1.28	27.9	158	0.272	0.441	0.522	5.57	0.488	0.4715	0.755	0.218	0.571	10.4	--
				2,3,7,8-TCDD TEQ (Fish)	0.0945	0.528	0.275	0.0205	0.0128	0.0279	0.0158	0.0136	0.02205	0.261	0.0557	0.00488	0.04715	0.0755	0.0218	0.0571	0.00104	1.53
				2,3,7,8-TCDD TEQ (Mammal)	0.0945	0.528	0.055	0.205	0.128	0.279	0.0158	0.0272	0.02205	0.261	0.0557	0.00488	0.04715	0.0755	0.0218	0.0571	0.00104	1.88
				2,3,7,8-TCDD TEQ (Bird)	0.0945	0.528	0.0275	0.0205	0.128	0.0279	0.0158	0.272	0.0441	0.522	0.0557	0.00488	0.04715	0.0755	0.0218	0.0571	0.00104	1.94
Sediment	Humboldt Bay	LOC 9	DM-0006	Sample Result	0	0.423	0.1865	1.56	1.01	17.4	91.3	0.538	0.336	0.549	3.54	0.373	0.395	0.502	0.21	0.538	5.5	--
				2,3,7,8-TCDD TEQ (Fish)	0	0.423	0.09325	0.0156	0.0101	0.0174	0.00913	0.0269	0.0168	0.2745	0.0354	0.00373	0.0395	0.0502	0.021	0.0538	0.00055	1.09
				2,3,7,8-TCDD TEQ (Mammal)	0	0.423	0.01865	0.156	0.101	0.174	0.00913	0.0538	0.0168	0.2745	0.0354	0.00373	0.0395	0.0502	0.021	0.0538	0.00055	1.43
				2,3,7,8-TCDD TEQ (Bird)	0	0.423	0.009325	0.0156	0.101	0.0174	0.00913	0.538	0.0336	0.549	0.0354	0.00373	0.0395	0.0502	0.021	0.0538	0.00055	1.90
Sediment	Humboldt Bay	LOC 10a	DM-0008	Sample Result	0.0585	0.31	0.268	1.16	0.626	13.3	74.3	0.395	0.098	0.294	2.53	0.094	0.2405	0.281	0.042	0.293	4.14	--
				2,3,7,8-TCDD TEQ (Fish)	0.0585	0.31	0.134	0.0116	0.00626	0.0133	0.00743	0.01975	0.0049	0.147	0.0253	0.00094	0.02405	0.0281	0.0042	0.0293	0.000414	0.825
				2,3,7,8-TCDD TEQ (Mammal)	0.0585	0.31	0.0268	0.116	0.0626	0.133	0.00743	0.0395	0.0049	0.147	0.0253	0.00094	0.02405	0.0281	0.0042	0.0293	0.000414	1.02
				2,3,7,8-TCDD TEQ (Bird)	0.0585	0.31	0.0134	0.0116	0.0626	0.0133	0.00743	0.395	0.0098	0.294	0.0253	0.00094	0.02405	0.0281	0.0042	0.0293	0.000414	1.29
Sediment	Humboldt Bay	LOC 10b	DM-0010	Sample Result	0.132	0.741	0.625	2.41	1.43	31.2	176	0.77	0.32	0.587	5.4	0.434	0.4735	0.496	0.216	0.2965	9.23	--
				2,3,7,8-TCDD TEQ (Fish)	0.132	0.741	0.3125	0.0241	0.0143	0.0312	0.0176	0.0385	0.016	0.2935	0.054	0.00434	0.04735	0.0496	0.0216	0.02965	0.000923	1.83
				2,3,7,8-TCDD TEQ (Mammal)	0.132	0.741	0.0625	0.241	0.143	0.312	0.0176	0.077	0.016	0.2935	0.054	0.00434	0.04735	0.0496	0.0216	0.02965	0.000923	2.24
				2,3,7,8-TCDD TEQ (Bird)	0.132	0.741	0.03125	0.0241	0.143	0.0312	0.0176	0.77	0.032	0.587	0.054	0.00434	0.04735	0.0496	0.0216	0.02965	0.000923	2.72
Sediment	Humboldt Bay	LOC 15	DM-0081	Sample Result	0.179	1.11	1.23	4.16	2.7	54.1	310	1.63	0.3805	0.937	10.4	0.442	1.42	0.227	0.362	1.09	25.3	--
				2,3,7,8-TCDD TEQ (Fish)	0.179	1.11	0.615	0.0416	0.027	0.0541	0.031	0.0815	0.019025	0.4685	0.104	0.00442	0.142	0.0227	0.0362	0.109	0.00253	3.05
				2,3,7,8-TCDD TEQ (Mammal)	0.179	1.11	0.123	0.416	0.27	0.541	0.031	0.163	0.019025	0.4685	0.104	0.00442	0.142	0.0227	0.0362	0.109	0.00253	3.74
				2,3,7,8-TCDD TEQ (Bird)	0.179	1.11	0.0615	0.0416	0.27	0.0541	0.031	1.63	0.03805	0.937	0.104	0.00442	0.142	0.0227	0.0362	0.109	0.00253	4.77
Sediment	Humboldt Bay	LOC 16	DM-0082	Sample Result	0.33	0.966	0.924	3.18	2.04	39	221	0.863	0.295	0.799	6.76	0.294	1.1	0.2065	0.27	0.825	13.6	--
				2,3,7,8-TCDD TEQ (Fish)	0.33	0.966	0.462	0.0318	0.0204	0.039	0.0221	0.04315	0.01475	0.3995	0.0676	0.00294	0.11	0.02065	0.027	0.0825	0.00136	2.64
				2,3,7,8-TCDD TEQ (Mammal)	0.33	0.966	0.0924	0.318	0.204	0.39	0.0221	0.0863	0.01475	0.3995	0.0676	0.00294	0.11	0.02065	0.027	0.0825	0.00136	3.14
				2,3,7,8-TCDD TEQ (Bird)	0.33	0.966	0.0462	0.0318	0.204	0.039	0.0221	0.863	0.0295	0.799	0.0676	0.00294	0.11	0.02065	0.027	0.0825	0.00136	3.64

APPENDIX D

CALCULATION OF DIOXIN/FURAN TOXICITY EQUIVALENTS (2,3,7,8-TCDD TEQs)[1,2]

Sierra Pacific Industries Arcata Division Sawmill

Arcata, California

Geomatrix

Concentrations are presented in nanograms per kilogram (ng/kg)

Matrix	Area Name	Station Location	Sample ID	Sample Result / Toxic Equivalents	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	2,3,4,6,7,8-HxCDF	OCDF	2,3,7,8-TCDD TEQ
				Fish Toxic Equivalency Factor (Fish TEF)[3]	1	1	0.5	0.01	0.01	0.001	0.0001	0.05	0.05	0.5	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
				Mammal Toxic Equivalency Factor (Mammal TEF)[3]	1	1	0.1	0.1	0.1	0.01	0.0001	0.1	0.05	0.5	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
				Bird Toxic Equivalency Factor (Bird TEF)[3]	1	1	0.05	0.01	0.1	0.001	0.0001	1	0.1	1	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
Sediment	Humboldt Bay	LOC 17	DM-0083	Sample Result	0.322	0.857	0.974	3.13	2.02	47.7	278	0.92	0.308	0.795	7.82	0.2895	1.18	0.3045	0.321	0.835	15.1	--
				2,3,7,8-TCDD TEQ (Fish)	0.322	0.857	0.487	0.0313	0.0202	0.0477	0.0278	0.046	0.0154	0.3975	0.0782	0.002895	0.118	0.03045	0.0321	0.0835	0.00151	2.60
				2,3,7,8-TCDD TEQ (Mammal)	0.322	0.857	0.0974	0.313	0.202	0.477	0.0278	0.092	0.0154	0.3975	0.0782	0.002895	0.118	0.03045	0.0321	0.0835	0.00151	3.15
				2,3,7,8-TCDD TEQ (Bird)	0.322	0.857	0.0487	0.0313	0.202	0.0477	0.0278	0.92	0.0308	0.795	0.0782	0.002895	0.118	0.03045	0.0321	0.0835	0.00151	3.63
Sediment	Humboldt Bay	LOC 18	DM-0084	Sample Result	0.17	1.24	1.18	3.83	2.51	54.4	383	0.857	0.308	0.699	10.3	0.377	1.22	0.27	0.297	0.772	22.6	--
				2,3,7,8-TCDD TEQ (Fish)	0.17	1.24	0.59	0.0383	0.0251	0.0544	0.0383	0.04285	0.0154	0.3495	0.103	0.00377	0.122	0.027	0.0297	0.0772	0.00226	2.93
				2,3,7,8-TCDD TEQ (Mammal)	0.17	1.24	0.118	0.383	0.251	0.544	0.0383	0.0857	0.0154	0.3495	0.103	0.00377	0.122	0.027	0.0297	0.0772	0.00226	3.56
				2,3,7,8-TCDD TEQ (Bird)	0.17	1.24	0.059	0.0383	0.251	0.0544	0.0383	0.857	0.0308	0.699	0.103	0.00377	0.122	0.027	0.0297	0.0772	0.00226	3.80
Sediment	Humboldt Bay	LOC 19	DM-0085	Sample Result	0.129	0.505	0.554	0.9	1.28	27.6	193	0.437	0.1705	0.414	5.27	0.1985	0.559	0.1515	0.125	0.377	13.6	--
				2,3,7,8-TCDD TEQ (Fish)	0.129	0.505	0.277	0.009	0.0128	0.0276	0.0193	0.02185	0.008525	0.207	0.0527	0.001985	0.0559	0.01515	0.0125	0.0377	0.00136	1.39
				2,3,7,8-TCDD TEQ (Mammal)	0.129	0.505	0.0554	0.09	0.128	0.276	0.0193	0.0437	0.008525	0.207	0.0527	0.001985	0.0559	0.01515	0.0125	0.0377	0.00136	1.64
				2,3,7,8-TCDD TEQ (Bird)	0.129	0.505	0.0277	0.009	0.128	0.0276	0.0193	0.437	0.01705	0.414	0.0527	0.001985	0.0559	0.01515	0.0125	0.0377	0.00136	1.89
Sediment	Humboldt Bay	LOC 20	DM-0086	Sample Result	0.42	1.47	1.91	5.66	4.18	79.9	500	0.93	0.381	1.27	16	0.605	2.25	0.432	0.516	1.65	25.6	--
				2,3,7,8-TCDD TEQ (Fish)	0.42	1.47	0.955	0.0566	0.0418	0.0799	0.05	0.0465	0.01905	0.635	0.16	0.00605	0.225	0.0432	0.0516	0.165	0.00256	4.43
				2,3,7,8-TCDD TEQ (Mammal)	0.42	1.47	0.191	0.566	0.418	0.799	0.05	0.093	0.01905	0.635	0.16	0.00605	0.225	0.0432	0.0516	0.165	0.00256	5.31
				2,3,7,8-TCDD TEQ (Bird)	0.42	1.47	0.0955	0.0566	0.418	0.0799	0.05	0.93	0.0381	1.27	0.16	0.00605	0.225	0.0432	0.0516	0.165	0.00256	5.48
Sediment	Humboldt Bay	LOC 21	DM-0087	Sample Result	0.147	0.55	1.17	3.77	2.46	55.4	439	0.994	0.2895	1.19	10.4	0.358	1.22	0.356	0.313	1.1	19.9	--
				2,3,7,8-TCDD TEQ (Fish)	0.147	0.55	0.585	0.0377	0.0246	0.0554	0.0439	0.0497	0.014475	0.595	0.104	0.00358	0.122	0.0356	0.0313	0.11	0.00199	2.51
				2,3,7,8-TCDD TEQ (Mammal)	0.147	0.55	0.117	0.377	0.246	0.554	0.0439	0.0994	0.014475	0.595	0.104	0.00358	0.122	0.0356	0.0313	0.11	0.00199	3.15
				2,3,7,8-TCDD TEQ (Bird)	0.147	0.55	0.0585	0.0377	0.246	0.0554	0.0439	0.994	0.02895	1.19	0.104	0.00358	0.122	0.0356	0.0313	0.11	0.00199	3.76
Sediment	Humboldt Bay	LOC 22	DM-0088	Sample Result	1.16	2.5	3.34	8.52	6.19	129	995	5.26	3.68	6.42	24.1	1.215	6.23	6.94	1.77	5.96	35.5	--
				2,3,7,8-TCDD TEQ (Fish)	1.16	2.5	1.67	0.0852	0.0619	0.129	0.0995	0.263	0.184	3.21	0.241	0.01215	0.623	0.694	0.177	0.596	0.00355	11.7
				2,3,7,8-TCDD TEQ (Mammal)	1.16	2.5	0.334	0.852	0.619	1.29	0.0995	0.526	0.184	3.21	0.241	0.01215	0.623	0.694	0.177	0.596	0.00355	13.1
				2,3,7,8-TCDD TEQ (Bird)	1.16	2.5	0.167	0.0852	0.619	0.129	0.0995	5.26	0.368	6.42	0.241	0.01215	0.623	0.694	0.177	0.596	0.00355	19.2
Sediment	Humboldt Bay	North Arcata Bay	North Arcata Bay Ref	Sample Result	0.326	0.808	0.911	5.01	2.36	52.5	201	1.11	0.462	0.846	7.45	0.2975	1.33	0.621	0.354	1.08	11.2	--
				2,3,7,8-TCDD TEQ (Fish)	0.326	0.808	0.4555	0.0501	0.0236	0.0525	0.0201	0.0555	0.0231	0.423	0.0745	0.002975	0.133	0.0621	0.0354	0.108	0.00112	2.65
				2,3,7,8-TCDD TEQ (Mammal)	0.326	0.808	0.0911	0.501	0.236	0.525	0.0201	0.111	0.0231	0.423	0.0745	0.002975	0.133	0.0621	0.0354	0.108	0.00112	3.48
				2,3,7,8-TCDD TEQ (Bird)	0.326	0.808	0.04555	0.0501	0.236	0.0525	0.0201	1.11	0.0462	0.846	0.0745	0.002975	0.133	0.0621	0.0354	0.108	0.00112	3.96
Sediment	Humboldt Bay	Old Eureka Wharf	Old Eureka Wharf Comp	Sample Result	0.196	0.532	0.583	2.2	1.42	40.8	293	0.559	0.229	0.449	5.59	0.503	0.759	0.35	0.176	0.592	13.9	--
				2,3,7,8-TCDD TEQ (Fish)	0.196	0.532	0.2915	0.022	0.0142	0.0408	0.0293	0.02795	0.01145	0.2245	0.0559	0.00503	0.0759	0.035	0.0176	0.0592	0.00139	1.64
				2,3,7,8-TCDD TEQ (Mammal)	0.196	0.532	0.0583	0.22	0.142	0.408	0.0293	0.0559	0.01145	0.2245	0.0559	0.00503	0.0759	0.035	0.0176	0.0592	0.00139	2.13
				2,3,7,8-TCDD TEQ (Bird)	0.196	0.532	0.02915	0.022	0.142	0.0408	0.0293	0.559	0.0229	0.449	0.0559	0.00503	0.0759	0.035	0.0176	0.0592	0.00139	2.27
Sediment	Mill Area	BC	BC Comp	Sample Result	0.455	1.54	1.5	9.94	4.94	114	527	1.13	0.603	1.34	13.7	1.11	1.69	1.11	0.503	1.69	19	--
				2,3,7,8-TCDD TEQ (Fish)	0.455	1.54	0.75	0.0994	0.0494	0.114	0.0527	0.0565	0.03015	0.67	0.137	0.0111	0.169	0.111	0.0503	0.169	0.0019	4.47
				2,3,7,8-TCDD TEQ (Mammal)	0.455	1.54	0.15	0.994	0.494	1.14	0.0527	0.113	0.03015	0.67	0.137	0.0111	0.169	0.111	0.0503	0.169	0.0019	6.29
				2,3,7,8-TCDD TEQ (Bird)	0.455	1.54	0.075	0.0994	0.494	0.114	0.0527	1.13	0.0603	1.34	0.137	0.0111	0.169	0.111	0.0503	0.169	0.0019	6.01
Sediment	Mill Area	C-01	C1-0.0-0.5	Sample Result	1.27	6.42	9.33	74.5	32.3	964	4510	3.14	2.7	5.55	131	6.14	3.14	5.1	1.175	10.2	168	--
				2,3,7,8-TCDD TEQ (Fish)	1.27	6.42	4.665	0.745	0.323	0.964	0.451	0.157	0.135	2.775	1.31	0.0614	0.314	0.51	0.1175	1.02	0.0168	21.3
				2,3,7,8-TCDD TEQ (Mammal)	1.27	6.42	0.933	7.45	3.23	9.64	0.451	0.314	0.135	2.775	1.31	0.0614	0.314	0.51	0.1175	1.02	0.0168	36.0
				2,3,7,8-TCDD TEQ (Bird)	1.27	6.42	0.4665	0.745	3.23	0.964	0.451	3.14	0.27	5.55	1.31	0.0614	0.314	0.51	0.1175	1.02	0.0168	25.9
Sediment	Mill Area	C-01	C1-0.5-1.0	Sample Result	1.3	11.5	12.9	329	60.8	3610	20800	9.22	9.47	25.8	462	15.2	24.1	21.7	11.4	42.2	411	--
				2,3,7,8-TCDD TEQ (Fish)	1.3	11.5	6.45	3.29	0.608	3.61	2.08	0.461	0.4735	12.9	4.62	0.152	2.41	2.17	1.14	4.22	0.0411	57.4
				2,3,7,8-TCDD TEQ (Mammal)	1.3	11.5	1.29	32.9	6.08	36.1	2.08	0.922	0.4735	12.9	4.62	0.152	2.41	2.17	1.14	4.22	0.0411	120
				2,3,7,8-TCDD TEQ (Bird)	1.3	11.5	0.645	3.29	6.08	3.61	2.08	9.22	0.947	25.8	4.62	0.152	2.41	2.17	1.14	4.22	0.0411	79.2
Sediment	Mill Area	C-02	C2-0.0-0.5	Sample Result	0.945	3.94	4.46	38.1	13.3	354	1610	3.79	2.54	4.63	44.6	2.72	4.05	3.5	0.595	5.6	55.7	--
				2,3,7,8-TCDD TEQ (Fish)	0.945	3.94	2.23	0.381	0.133	0.354	0.161	0.1895	0.127	2.315	0.446	0.0272	0.405	0.35	0.0595	0.56	0.00557	12.6
				2,3,7,8-TCDD TEQ (Mammal)	0.945	3.94	0.446	3.81	1.33	3.54	0.161	0.379	0.127	2.315	0.446	0.0272	0.405	0.35	0.0595	0.56	0.00557	18.8
				2,3,7,8-TCDD TEQ (Bird)	0.945	3.94	0.223	0.381	1.33	0.354	0.161	3.79	0.254	4.63	0.446	0.0272	0.405	0.35	0.0595	0.56	0.00557	17.9
Sediment	Mill Area	C-02	C2-1.0-1.5	Sample Result	1.37	9.9	15.6	211	67.1	2320	6520	4.06	4.27	9.66	765	29.8	20.4	19.8	5.53	35.3	1140	--
				2,3,7,8-TCDD TEQ (Fish)	1.37	9.9	7.8	2.11	0.671	2.32	0.652	0.203	0.2135	4.83	7.65	0.298	2.04	1.98	0.553	3.53	0.114	46.2
				2,3,7,8-TCDD TEQ (Mammal)	1.37	9.9	1.56	21.1	6.71	23.2	0.652	0.406	0.2135	4.83	7.65	0.298	2.04	1.98	0.553	3.53	0.114	86.1
				2,3,7,8-TCDD TEQ (Bird)	1.37	9.9	0.78	2.11	6.71	2.32	0.652	4.06	0.427	9.66	7.65	0.298	2.04	1.98	0.553	3.53	0.114	54.2
Sediment	Mill Area	C-02	C2-1.5-2.3	Sample Result	0.842	4.73	6.2	51	19.1	804	4050	1.16	8.51	3.97	288	14.9	12.6	25.6	2.7	14.7	503	--
				2,3,7,8-TCDD TEQ (Fish)	0.842	4.73	3.1	0.51	0.191	0.804	0.405	0.058	0.4255	1.985	2.88	0.149	1.26	2.56	0.27	1.47	0.0503	21.7
				2,3,7,8-TCDD TEQ (Mammal)	0.842	4.73	0.62	5.1	1.91	8.04	0.405	0.116	0.4255	1.985	2.88	0.149	1.26	2.56	0.27	1.47	0.0503	32.8
				2,3,7,8-TCDD TEQ (Bird)	0.842	4.73	0.31	0.51	1.91	0.804	0.405	1.16	0.851	3.97	2.88	0.149	1.26	2.56	0.27	1.47	0.0503	24.1
Sediment	Mill Area	C-03	C3-0.0-0.5	Sample Result	0.835	4.9	5.88	92.8	25.7	1030	3530	3.2	2.39	6.28	148	6.32	6.31	5.53	2.83	10.9	171	--
				2,3,7,8-TCDD TEQ (Fish)	0.835	4.9	2.94	0.928	0.257	1.03	0.353	0.16	0.1195	3.14	1.48	0.0632	0.631	0.553	0.283	1.09	0.0171	18.8
				2,3,7,8-TCDD TEQ (Mammal)	0.835	4.9	0.588	9.28	2.57	10.3	0.353	0.32	0.1195	3.14	1.48	0.0632	0.631	0.553	0.283	1.09	0.0171	36.5
				2,3,7,8-TCDD TEQ (Bird)	0.835	4.9	0.294	0.928	2.57	1.03	0.353	3.2	0.239	6.28	1.48	0.0632	0.631	0.553	0.283	1.09	0.0171	24.7

APPENDIX D

CALCULATION OF DIOXIN/FURAN TOXICITY EQUIVALENTS (2,3,7,8-TCDD TEQs)[1,2]

Sierra Pacific Industries Arcata Division Sawmill

Arcata, California

Geomatrix

Concentrations are presented in nanograms per kilogram (ng/kg)

Matrix	Area Name	Station Location	Sample ID	Sample Result / Toxic Equivalents	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	2,3,4,6,7,8-HxCDF	OCDF	2,3,7,8-TCDD TEQ
				Fish Toxic Equivalency Factor (Fish TEF)[3]	1	1	0.5	0.01	0.01	0.001	0.0001	0.05	0.05	0.5	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
				Mammal Toxic Equivalency Factor (Mammal TEF)[3]	1	1	0.1	0.1	0.1	0.01	0.0001	0.1	0.05	0.5	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
				Bird Toxic Equivalency Factor (Bird TEF)[3]	1	1	0.05	0.01	0.1	0.001	0.0001	1	0.1	1	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
Sediment	Mill Area	C-03	C3-1.0-1.5	Sample Result	1.89	17.5	18.6	242	62.3	2260	8460	6.74	7.3	17.2	1080	41.7	36.5	33.6	8.3	58.1	1230	--
				2,3,7,8-TCDD TEQ (Fish)	1.89	17.5	9.3	2.42	0.623	2.26	0.846	0.337	0.365	8.6	10.8	0.417	3.65	3.36	0.83	5.81	0.123	69.1
				2,3,7,8-TCDD TEQ (Mammal)	1.89	17.5	1.86	24.2	6.23	22.6	0.846	0.674	0.365	8.6	10.8	0.417	3.65	3.36	0.83	5.81	0.123	110
				2,3,7,8-TCDD TEQ (Bird)	1.89	17.5	0.93	2.42	6.23	2.26	0.846	6.74	0.73	17.2	10.8	0.417	3.65	3.36	0.83	5.81	0.123	81.7
Sediment	Mill Area	C-03	C3-1.5-2.0	Sample Result	1.2	8.54	13.2	113	43.5	1690	8160	1.49	5.71	5.86	654	29.6	22.3	26	4.67	27	1010	--
				2,3,7,8-TCDD TEQ (Fish)	1.2	8.54	6.6	1.13	0.435	1.69	0.816	0.0745	0.2855	2.93	6.54	0.296	2.23	2.6	0.467	2.7	0.101	38.6
				2,3,7,8-TCDD TEQ (Mammal)	1.2	8.54	1.32	11.3	4.35	16.9	0.816	0.149	0.2855	2.93	6.54	0.296	2.23	2.6	0.467	2.7	0.101	62.7
				2,3,7,8-TCDD TEQ (Bird)	1.2	8.54	0.66	1.13	4.35	1.69	0.816	1.49	0.571	5.86	6.54	0.296	2.23	2.6	0.467	2.7	0.101	41.2
Sediment	Mill Area	C-04	C-4 Comp	Sample Result	0.581	2.91	4.29	37.5	13.8	498	2180	1.57	1.12	2.58	54.9	3.04	3.34	2.99	1.04	4.75	75.6	--
				2,3,7,8-TCDD TEQ (Fish)	0.581	2.91	2.145	0.375	0.138	0.498	0.218	0.0785	0.056	1.29	0.549	0.0304	0.334	0.299	0.104	0.475	0.00756	10.1
				2,3,7,8-TCDD TEQ (Mammal)	0.581	2.91	0.429	3.75	1.38	4.98	0.218	0.157	0.056	1.29	0.549	0.0304	0.334	0.299	0.104	0.475	0.00756	17.5
				2,3,7,8-TCDD TEQ (Bird)	0.581	2.91	0.2145	0.375	1.38	0.498	0.218	1.57	0.112	2.58	0.549	0.0304	0.334	0.299	0.104	0.475	0.00756	12.2
Sediment	Mill Area	C-04	C4-0.0-0.5	Sample Result	0.78	5.06	7.29	70.2	19.2	832	4430	2.33	2.36	5.7	176	6.91	7.41	7.14	1.095	11.6	194	--
				2,3,7,8-TCDD TEQ (Fish)	0.78	5.06	3.645	0.702	0.192	0.832	0.443	0.1165	0.118	2.85	1.76	0.0691	0.741	0.714	0.1095	1.16	0.0194	19.3
				2,3,7,8-TCDD TEQ (Mammal)	0.78	5.06	0.729	7.02	1.92	8.32	0.443	0.233	0.118	2.85	1.76	0.0691	0.741	0.714	0.1095	1.16	0.0194	32.0
				2,3,7,8-TCDD TEQ (Bird)	0.78	5.06	0.3645	0.702	1.92	0.832	0.443	2.33	0.236	5.7	1.76	0.0691	0.741	0.714	0.1095	1.16	0.0194	22.9
Sediment	Mill Area	C-04	C4-1.0-1.8	Sample Result	1.34	15.2	19.1	293	64.3	3100	16900	12	10.5	27.8	382	12	22.9	30.2	9.93	44.3	241	--
				2,3,7,8-TCDD TEQ (Fish)	1.34	15.2	9.55	2.93	0.643	3.1	1.69	0.6	0.525	13.9	3.82	0.12	2.29	3.02	0.993	4.43	0.0241	64.2
				2,3,7,8-TCDD TEQ (Mammal)	1.34	15.2	1.91	29.3	6.43	31	1.69	1.2	0.525	13.9	3.82	0.12	2.29	3.02	0.993	4.43	0.0241	117
				2,3,7,8-TCDD TEQ (Bird)	1.34	15.2	0.955	2.93	6.43	3.1	1.69	12	1.05	27.8	3.82	0.12	2.29	3.02	0.993	4.43	0.0241	87.2
Sediment	Mill Area	C-05	C5-0.0-0.5	Sample Result	0.448	2.79	3.49	33.7	9.73	371	1810	2.12	1.23	3.07	75.1	3.55	3.75	3.44	0.61	5.88	82.5	--
				2,3,7,8-TCDD TEQ (Fish)	0.448	2.79	1.745	0.337	0.0973	0.371	0.181	0.106	0.0615	1.535	0.751	0.0355	0.375	0.344	0.061	0.588	0.00825	9.83
				2,3,7,8-TCDD TEQ (Mammal)	0.448	2.79	0.349	3.37	0.973	3.71	0.181	0.212	0.0615	1.535	0.751	0.0355	0.375	0.344	0.061	0.588	0.00825	15.8
				2,3,7,8-TCDD TEQ (Bird)	0.448	2.79	0.1745	0.337	0.973	0.371	0.181	2.12	0.123	3.07	0.751	0.0355	0.375	0.344	0.061	0.588	0.00825	12.8
Sediment	Mill Area	C-05	C5-1.0-1.5	Sample Result	0.2695	5	8.79	91.1	26.7	1070	5910	4.62	4.51	10.4	139	1.185	9.73	6.89	5.45	15.4	117	--
				2,3,7,8-TCDD TEQ (Fish)	0.2695	5	4.395	0.911	0.267	1.07	0.591	0.231	0.2255	5.2	1.39	0.01185	0.973	0.689	0.545	1.54	0.0117	23.3
				2,3,7,8-TCDD TEQ (Mammal)	0.2695	5	0.879	9.11	2.67	10.7	0.591	0.462	0.2255	5.2	1.39	0.01185	0.973	0.689	0.545	1.54	0.0117	40.3
				2,3,7,8-TCDD TEQ (Bird)	0.2695	5	0.4395	0.911	2.67	1.07	0.591	4.62	0.451	10.4	1.39	0.01185	0.973	0.689	0.545	1.54	0.0117	31.6
Sediment	Mill Area	C-05	C5-1.5-2.0	Sample Result	0.952	10.6	15.4	307	52.4	3460	19000	9.12	12.5	26.2	357	9.85	20.8	26.6	13.7	43.2	169	--
				2,3,7,8-TCDD TEQ (Fish)	0.952	10.6	7.7	3.07	0.524	3.46	1.9	0.456	0.625	13.1	3.57	0.0985	2.08	2.66	1.37	4.32	0.0169	56.5
				2,3,7,8-TCDD TEQ (Mammal)	0.952	10.6	1.54	30.7	5.24	34.6	1.9	0.912	0.625	13.1	3.57	0.0985	2.08	2.66	1.37	4.32	0.0169	114
				2,3,7,8-TCDD TEQ (Bird)	0.952	10.6	0.77	3.07	5.24	3.46	1.9	9.12	1.25	26.2	3.57	0.0985	2.08	2.66	1.37	4.32	0.0169	76.7
Sediment	Mill Area	C-06	C-6 Comp	Sample Result	0.406	1.57	1.65	17.9	7.15	167	545	1.57	0.679	1.69	15.8	1.26	2.08	1.38	0.658	2.28	22.2	--
				2,3,7,8-TCDD TEQ (Fish)	0.406	1.57	0.825	0.179	0.0715	0.167	0.0545	0.0785	0.03395	0.845	0.158	0.0126	0.208	0.138	0.0658	0.228	0.00222	5.04
				2,3,7,8-TCDD TEQ (Mammal)	0.406	1.57	0.165	1.79	0.715	1.67	0.0545	0.157	0.03395	0.845	0.158	0.0126	0.208	0.138	0.0658	0.228	0.00222	8.22
				2,3,7,8-TCDD TEQ (Bird)	0.406	1.57	0.0825	0.179	0.715	0.167	0.0545	1.57	0.0679	1.69	0.158	0.0126	0.208	0.138	0.0658	0.228	0.00222	7.31
Sediment	Mill Area	C-06	C6-0-0.5	Sample Result	0.399	1.71	1.89	11	4.87	133	672	1.19	0.493	1.22	22.6	0.635	2.01	2.54	0.513	1.99	33.4	--
				2,3,7,8-TCDD TEQ (Fish)	0.399	1.71	0.945	0.11	0.0487	0.133	0.0672	0.0595	0.02465	0.61	0.226	0.00635	0.201	0.254	0.0513	0.199	0.00334	5.05
				2,3,7,8-TCDD TEQ (Mammal)	0.399	1.71	0.189	1.1	0.487	1.33	0.0672	0.119	0.02465	0.61	0.226	0.00635	0.201	0.254	0.0513	0.199	0.00334	6.98
				2,3,7,8-TCDD TEQ (Bird)	0.399	1.71	0.0945	0.11	0.487	0.133	0.0672	1.19	0.0493	1.22	0.226	0.00635	0.201	0.254	0.0513	0.199	0.00334	6.40
Sediment	Mill Area	C-06	C6-1.0-1.5	Sample Result	0.617	3.91	4.55	69.5	17.9	694	3450	3.28	3.21	6.02	83.2	3.55	6.04	7.32	2.7	10.2	74.2	--
				2,3,7,8-TCDD TEQ (Fish)	0.617	3.91	2.275	0.695	0.179	0.694	0.345	0.164	0.1605	3.01	0.832	0.0355	0.604	0.732	0.27	1.02	0.00742	15.6
				2,3,7,8-TCDD TEQ (Mammal)	0.617	3.91	0.455	6.95	1.79	6.94	0.345	0.328	0.1605	3.01	0.832	0.0355	0.604	0.732	0.27	1.02	0.00742	28.0
				2,3,7,8-TCDD TEQ (Bird)	0.617	3.91	0.2275	0.695	1.79	0.694	0.345	3.28	0.321	6.02	0.832	0.0355	0.604	0.732	0.27	1.02	0.00742	21.4
Sediment	Mill Area	C-07	C7-0.0-0.9	Sample Result	0.67	4.39	4.17	93	18.4	659	2970	7.87	3.36	9.45	125	3.81	5.14	5.42	2.4	12.5	103	--
				2,3,7,8-TCDD TEQ (Fish)	0.67	4.39	2.085	0.93	0.184	0.659	0.297	0.3935	0.168	4.725	1.25	0.0381	0.514	0.542	0.24	1.25	0.0103	18.3
				2,3,7,8-TCDD TEQ (Mammal)	0.67	4.39	0.417	9.3	1.84	6.59	0.297	0.787	0.168	4.725	1.25	0.0381	0.514	0.542	0.24	1.25	0.0103	33.0
				2,3,7,8-TCDD TEQ (Bird)	0.67	4.39	0.2085	0.93	1.84	0.659	0.297	7.87	0.336	9.45	1.25	0.0381	0.514	0.542	0.24	1.25	0.0103	30.5
Sediment	Mill Area	C-08	C8-0.0-0.5	Sample Result	0.77	3.05	3.87	31.2	11.4	398	2000	2.41	1.22	2.77	51.5	2.58	3.77	2.87	1.12	4.88	62.7	--
				2,3,7,8-TCDD TEQ (Fish)	0.77	3.05	1.935	0.312	0.114	0.398	0.2	0.1205	0.061	1.385	0.515	0.0258	0.377	0.287	0.112	0.488	0.00627	10.2
				2,3,7,8-TCDD TEQ (Mammal)	0.77	3.05	0.387	3.12	1.14	3.98	0.2	0.241	0.061	1.385	0.515	0.0258	0.377	0.287	0.112	0.488	0.00627	16.1
				2,3,7,8-TCDD TEQ (Bird)	0.77	3.05	0.1935	0.312	1.14	0.398	0.2	2.41	0.122	2.77	0.515	0.0258	0.377	0.287	0.112	0.488	0.00627	13.2
Sediment	Mill Area	C-08	C8-0.5-1.4	Sample Result	0.558	4.13	6.22	95.3	18.5	982	4660	3.71	3.38	7.66	119	3.7	7.19	7.96	3.29	12.5	78.7	--
				2,3,7,8-TCDD TEQ (Fish)	0.558	4.13	3.11	0.953	0.185	0.982	0.466	0.1855	0.169	3.83	1.19	0.037	0.719	0.796	0.329	1.25	0.00787	18.9
				2,3,7,8-TCDD TEQ (Mammal)	0.558	4.13	0.622	9.53	1.85	9.82	0.466	0.371	0.169	3.83	1.19	0.037	0.719	0.796	0.329	1.25	0.00787	35.7
				2,3,7,8-TCDD TEQ (Bird)	0.558	4.13	0.311	0.953	1.85	0.982	0.466	3.71	0.338	7.66	1.19	0.037	0.719	0.796	0.329	1.25	0.00787	25.3
Sediment	Mill Area	C-09	C9-1-0.0-0.8	Sample Result	0.2765	3.34	4.47	21.4	13.9	284	1390	0.91	0.558	1.1	29.5	1.59	1.44	1.19	0.547	2	50.2	--
				2,3,7,8-TCDD TEQ (Fish)	0.2765	3.34	2.235	0.214	0.139	0.284	0.139	0.0455	0.0279	0.55	0.295	0.0159	0.144	0.119	0.0547	0.2	0.00502	8.08
				2,3,7,8-TCDD TEQ (Mammal)	0.2765	3.34	0.447	2.14	1.39	2.84	0.139	0.091	0.0279	0.55	0.295	0.0159	0.144	0.119	0.0547	0.2	0.00502	12.1
				2,3,7,8-TCDD TEQ (Bird)	0.2765	3.34	0.2235	0.214	1.39	0.284	0.139	0.91	0.0558	1.1	0.295	0.0159	0.144	0.119	0.0547	0.2	0.00502	8.77

APPENDIX D

CALCULATION OF DIOXIN/FURAN TOXICITY EQUIVALENTS (2,3,7,8-TCDD TEQs)[1,2]

Sierra Pacific Industries Arcata Division Sawmill

Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Matrix	Area Name	Station Location	Sample ID	Sample Result / Toxic Equivalents	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	2,3,4,6,7,8-HxCDF	OCDF	2,3,7,8-TCDD TEQ
				Fish Toxic Equivalency Factor (Fish TEF)[3]	1	1	0.5	0.01	0.01	0.001	0.0001	0.05	0.05	0.5	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
				Mammal Toxic Equivalency Factor (Mammal TEF)[3]	1	1	0.1	0.1	0.1	0.01	0.0001	0.1	0.05	0.5	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
				Bird Toxic Equivalency Factor (Bird TEF)[3]	1	1	0.05	0.01	0.1	0.001	0.0001	1	0.1	1	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
Sediment	Mill Area	C-09	C9-2 0.0-0.8	Sample Result							1710											--
				2,3,7,8-TCDD TEQ (Fish)	0	0	0	0	0	0	0.171	0	0	0	0	0	0	0	0	0	0	0.171
				2,3,7,8-TCDD TEQ (Mammal)	0	0	0	0	0	0	0.171	0	0	0	0	0	0	0	0	0	0	0.171
				2,3,7,8-TCDD TEQ (Bird)	0	0	0	0	0	0	0.171	0	0	0	0	0	0	0	0	0	0	0.171
Sediment	Mill Area	C-10	C10-0.0-0.5	Sample Result	0.214	1.72	1.95	10.7	4.77	133	634	1.32	0.678	1.41	20.4	1.7	2.25	1.37	0.581	2.1	36	--
				2,3,7,8-TCDD TEQ (Fish)	0.214	1.72	0.975	0.107	0.0477	0.133	0.0634	0.066	0.0339	0.705	0.204	0.017	0.225	0.137	0.0581	0.21	0.0036	4.92
				2,3,7,8-TCDD TEQ (Mammal)	0.214	1.72	0.195	1.07	0.477	1.33	0.0634	0.132	0.0339	0.705	0.204	0.017	0.225	0.137	0.0581	0.21	0.0036	6.80
				2,3,7,8-TCDD TEQ (Bird)	0.214	1.72	0.0975	0.107	0.477	0.133	0.0634	1.32	0.0678	1.41	0.204	0.017	0.225	0.137	0.0581	0.21	0.0036	6.46
Sediment	Mill Area	C-10	C10-1.0-1.5	Sample Result	0.761	6.1	10.7	151	28.2	1610	8100	5.33	7.32	14.5	168	5.86	13	14.4	6.95	23.1	128	--
				2,3,7,8-TCDD TEQ (Fish)	0.761	6.1	5.35	1.51	0.282	1.61	0.81	0.2665	0.366	7.25	1.68	0.0586	1.3	1.44	0.695	2.31	0.0128	31.8
				2,3,7,8-TCDD TEQ (Mammal)	0.761	6.1	1.07	15.1	2.82	16.1	0.81	0.533	0.366	7.25	1.68	0.0586	1.3	1.44	0.695	2.31	0.0128	58.4
				2,3,7,8-TCDD TEQ (Bird)	0.761	6.1	0.535	1.51	2.82	1.61	0.81	5.33	0.732	14.5	1.68	0.0586	1.3	1.44	0.695	2.31	0.0128	42.2
Sediment	Mill Area	C-11	C11-0.0-0.5	Sample Result	0.402	1.03	1.17	4.98	2.91	68.1	328	0.958	0.456	0.893	11.5	0.933	0.805	0.888	0.436	1.3	19.6	--
				2,3,7,8-TCDD TEQ (Fish)	0.402	1.03	0.585	0.0498	0.0291	0.0681	0.0328	0.0479	0.0228	0.4465	0.115	0.00933	0.0805	0.0888	0.0436	0.13	0.00196	3.18
				2,3,7,8-TCDD TEQ (Mammal)	0.402	1.03	0.117	0.498	0.291	0.681	0.0328	0.0958	0.0228	0.4465	0.115	0.00933	0.0805	0.0888	0.0436	0.13	0.00196	4.09
				2,3,7,8-TCDD TEQ (Bird)	0.402	1.03	0.0585	0.0498	0.291	0.0681	0.0328	0.958	0.0456	0.893	0.115	0.00933	0.0805	0.0888	0.0436	0.13	0.00196	4.30
Sediment	Mill Area	C-12	C12-0.-0.5	Sample Result	0.502	2.06	2.69	14.2	6.06	147	753	1.51	0.84	1.97	26.3	1.98	3.09	1.85	0.882	2.87	41.8	--
				2,3,7,8-TCDD TEQ (Fish)	0.502	2.06	1.345	0.142	0.0606	0.147	0.0753	0.0755	0.042	0.985	0.263	0.0198	0.309	0.185	0.0882	0.287	0.00418	6.59
				2,3,7,8-TCDD TEQ (Mammal)	0.502	2.06	0.269	1.42	0.606	1.47	0.0753	0.151	0.042	0.985	0.263	0.0198	0.309	0.185	0.0882	0.287	0.00418	8.74
				2,3,7,8-TCDD TEQ (Bird)	0.502	2.06	0.1345	0.142	0.606	0.147	0.0753	1.51	0.084	1.97	0.263	0.0198	0.309	0.185	0.0882	0.287	0.00418	8.39
Sediment	Mill Area	C-13	C13-0.0-0.5	Sample Result	0.504	1.83	2.18	18.5	6.35	217	1090	1.41	0.87	1.89	27	1.65	2.59	1.73	0.881	3.28	33.6	--
				2,3,7,8-TCDD TEQ (Fish)	0.504	1.83	1.09	0.185	0.0635	0.217	0.109	0.0705	0.0435	0.945	0.27	0.0165	0.259	0.173	0.0881	0.328	0.00336	6.20
				2,3,7,8-TCDD TEQ (Mammal)	0.504	1.83	0.218	1.85	0.635	2.17	0.109	0.141	0.0435	0.945	0.27	0.0165	0.259	0.173	0.0881	0.328	0.00336	9.58
				2,3,7,8-TCDD TEQ (Bird)	0.504	1.83	0.109	0.185	0.635	0.217	0.109	1.41	0.087	1.89	0.27	0.0165	0.259	0.173	0.0881	0.328	0.00336	8.11
Sediment	Mill Area	C-14	C14-0.0-0.5	Sample Result							6.1											--
				2,3,7,8-TCDD TEQ (Fish)	0	0	0	0	0	0	0.00061	0	0	0	0	0	0	0	0	0	0	0.001
				2,3,7,8-TCDD TEQ (Mammal)	0	0	0	0	0	0	0.00061	0	0	0	0	0	0	0	0	0	0	0.001
				2,3,7,8-TCDD TEQ (Bird)	0	0	0	0	0	0	0.00061	0	0	0	0	0	0	0	0	0	0	0.001
Sediment	Mill Area	C-15	C15-0.0-0.5	Sample Result							4.9											--
				2,3,7,8-TCDD TEQ (Fish)	0	0	0	0	0	0	0.00049	0	0	0	0	0	0	0	0	0	0	0.000
				2,3,7,8-TCDD TEQ (Mammal)	0	0	0	0	0	0	0.00049	0	0	0	0	0	0	0	0	0	0	0.000
				2,3,7,8-TCDD TEQ (Bird)	0	0	0	0	0	0	0.00049	0	0	0	0	0	0	0	0	0	0	0.000
Sediment	Mill Area	C-15	C15-1.0-1.5	Sample Result	0.086	0.0875	0.192	0.1965	0.1935	0.081	0.379	0.1005	0.1165	0.1045	0.037	0.039	0.0319	0.03065	0.0525	0.0355	0.0715	--
				2,3,7,8-TCDD TEQ (Fish)	0.086	0.0875	0.096	0.001965	0.001935	0.000081	0.0000379	0.005025	0.005825	0.05225	0.00037	0.00039	0.00319	0.003065	0.00525	0.00355	0.00000715	0.352
				2,3,7,8-TCDD TEQ (Mammal)	0.086	0.0875	0.0192	0.01965	0.01935	0.00081	0.0000379	0.01005	0.005825	0.05225	0.00037	0.00039	0.00319	0.003065	0.00525	0.00355	0.00000715	0.316
				2,3,7,8-TCDD TEQ (Bird)	0.086	0.0875	0.0096	0.001965	0.01935	0.000081	0.0000379	0.1005	0.01165	0.1045	0.00037	0.00039	0.00319	0.003065	0.00525	0.00355	0.00000715	0.437
Sediment	Mill Area	C-16	C16-0-0.5	Sample Result	0.272	0.844	1.08	4.91	2.67	70.7	370	0.831	0.676	0.756	12.6	0.855	0.785	1.47	0.328	1.18	21.4	--
				2,3,7,8-TCDD TEQ (Fish)	0.272	0.844	0.54	0.0491	0.0267	0.0707	0.037	0.04155	0.0338	0.378	0.126	0.00855	0.0785	0.147	0.0328	0.118	0.00214	2.81
				2,3,7,8-TCDD TEQ (Mammal)	0.272	0.844	0.108	0.491	0.267	0.707	0.037	0.0831	0.0338	0.378	0.126	0.00855	0.0785	0.147	0.0328	0.118	0.00214	3.73
				2,3,7,8-TCDD TEQ (Bird)	0.272	0.844	0.054	0.0491	0.267	0.0707	0.037	0.831	0.0676	0.756	0.126	0.00855	0.0785	0.147	0.0328	0.118	0.00214	3.76
Sediment	Mill Area	C-16	C16-1.0-1.5	Sample Result	0.57	2.36	2.42	29.2	8.81	305	1480	2.07	2.17	2.77	56.7	2.67	4	4.24	1.17	4.86	75.1	--
				2,3,7,8-TCDD TEQ (Fish)	0.57	2.36	1.21	0.292	0.0881	0.305	0.148	0.1035	0.1085	1.385	0.567	0.0267	0.4	0.424	0.117	0.486	0.00751	8.60
				2,3,7,8-TCDD TEQ (Mammal)	0.57	2.36	0.242	2.92	0.881	3.05	0.148	0.207	0.1085	1.385	0.567	0.0267	0.4	0.424	0.117	0.486	0.00751	13.9
				2,3,7,8-TCDD TEQ (Bird)	0.57	2.36	0.121	0.292	0.881	0.305	0.148	2.07	0.217	2.77	0.567	0.0267	0.4	0.424	0.117	0.486	0.00751	11.8
Sediment	Mill Area	C-17	C17-0-0.5	Sample Result	0.486	2.44	3.91	22.7	10.5	406	2460	1.34	1.3	2.9	105	5.64	6.71	3.68	1.82	6.04	166	--
				2,3,7,8-TCDD TEQ (Fish)	0.486	2.44	1.955	0.227	0.105	0.406	0.246	0.067	0.065	1.45	1.05	0.0564	0.671	0.368	0.182	0.604	0.0166	10.4
				2,3,7,8-TCDD TEQ (Mammal)	0.486	2.44	0.391	2.27	1.05	4.06	0.246	0.134	0.065	1.45	1.05	0.0564	0.671	0.368	0.182	0.604	0.0166	15.5
				2,3,7,8-TCDD TEQ (Bird)	0.486	2.44	0.1955	0.227	1.05	0.406	0.246	1.34	0.13	2.9	1.05	0.0564	0.671	0.368	0.182	0.604	0.0166	12.4
Sediment	Mill Area	C-17	C17-1.0-1.5	Sample Result	0.239	0.508	0.437	0.866	0.678	7.21	28.3	0.79	0.574	0.598	1.12	0.0525	0.1825	0.366	0.04805	0.315	0.69	--
				2,3,7,8-TCDD TEQ (Fish)	0.239	0.508	0.2185	0.00866	0.00678	0.00721	0.00283	0.0395	0.0287	0.299	0.0112	0.000525	0.01825	0.0366	0.004805	0.0315	0.000069	1.46
				2,3,7,8-TCDD TEQ (Mammal)	0.239	0.508	0.0437	0.0866	0.0678	0.0721	0.00283	0.079	0.0287	0.299	0.0112	0.000525	0.01825	0.0366	0.004805	0.0315	0.000069	1.53
				2,3,7,8-TCDD TEQ (Bird)	0.239	0.508	0.02185	0.00866	0.0678	0.00721	0.00283	0.79	0.0574	0.598	0.0112	0.000525	0.01825	0.0366	0.004805	0.0315	0.000069	2.40
Sediment	Mill Area	C-18	C18-0.0-0.5	Sample Result	0.667	4.33	4.79	80.8	20.9	731	3440	3.88	2.69	6.41	78.7	3.35	6.5	5.93	3.02	10.5	55.8	--
				2,3,7,8-TCDD TEQ (Fish)	0.667	4.33	2.395	0.808	0.209	0.731	0.344	0.194	0.1345	3.205	0.787	0.0335	0.65	0.593	0.302	1.05	0.00558	16.4
				2,3,7,8-TCDD TEQ (Mammal)	0.667	4.33	0.479	8.08	2.09	7.31	0.344	0.388	0.1345	3.205	0.787	0.0335	0.65	0.593	0.302	1.05	0.00558	30.4
				2,3,7,8-TCDD TEQ (Bird)	0.667	4.33	0.2395	0.808	2.09	0.731	0.344	3.88	0.269	6.41	0.787	0.0335	0.65	0.593	0.302	1.05	0.00558	23.2
Sediment	Mill Area	C-18	C18-1.0-1.5	Sample Result	1.29	6.99	7.98	81.2	31.3	933	3010	1.32	1.78	3.92	448	21.2	14.2	11.6	2.6	18.8	682	--
				2,3,7,8-TCDD TEQ (Fish)	1.29	6.99	3.99	0.812	0.313	0.933	0.301	0.066	0.089	1.96	4.48	0.212	1.42	1.16	0.26	1.88	0.0682	26.2
				2,3,7,8-TCDD TEQ (Mammal)	1.29	6.99	0.798	8.12	3.13	9.33	0.301	0.132	0.089	1.96	4.48	0.212	1.42	1.16	0.26	1.88	0.0682	41.6
				2,3,7,8-TCDD TEQ (Bird)	1.29	6.99	0.399	0.812	3.13	0.933	0.301	1.32	0.178	3.92	4.48	0.212	1.42	1.16	0.26	1.88	0.0682	28.8

APPENDIX D

CALCULATION OF DIOXIN/FURAN TOXICITY EQUIVALENTS (2,3,7,8-TCDD TEQs)[1,2]

Sierra Pacific Industries Arcata Division Sawmill

Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Matrix	Area Name	Station Location	Sample ID	Sample Result / Toxic Equivalents	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	2,3,4,6,7,8-HxCDF	OCDF	2,3,7,8-TCDD TEQ
				Fish Toxic Equivalency Factor (Fish TEF)[3]	**1**	**1**	**0.5**	**0.01**	**0.01**	**0.001**	**0.0001**	**0.05**	**0.05**	**0.5**	**0.01**	**0.01**	**0.1**	**0.1**	**0.1**	**0.1**	**0.0001**	**--**
				Mammal Toxic Equivalency Factor (Mammal TEF)[3]	**1**	**1**	**0.1**	**0.1**	**0.1**	**0.01**	**0.0001**	**0.1**	**0.05**	**0.5**	**0.01**	**0.01**	**0.1**	**0.1**	**0.1**	**0.1**	**0.0001**	**--**
				Bird Toxic Equivalency Factor (Bird TEF)[3]	**1**	**1**	**0.05**	**0.01**	**0.1**	**0.001**	**0.0001**	**1**	**0.1**	**1**	**0.01**	**0.01**	**0.1**	**0.1**	**0.1**	**0.1**	**0.0001**	**--**
Sediment	Mill Area	C-18	C18-1.5-2.1	Sample Result	0.265	2.48	3.7	18.7	8.31	388	2370	0.877	1.63	3.4	76.4	5.8	6.99	3.66	1.91	5.72	165	--
				2,3,7,8-TCDD TEQ (Fish)	0.265	2.48	1.85	0.187	0.0831	0.388	0.237	0.04385	0.0815	1.7	0.764	0.058	0.699	0.366	0.191	0.572	0.0165	9.98
				2,3,7,8-TCDD TEQ (Mammal)	0.265	2.48	0.37	1.87	0.831	3.88	0.237	0.0877	0.0815	1.7	0.764	0.058	0.699	0.366	0.191	0.572	0.0165	14.5
				2,3,7,8-TCDD TEQ (Bird)	0.265	2.48	0.185	0.187	0.831	0.388	0.237	0.877	0.163	3.4	0.764	0.058	0.699	0.366	0.191	0.572	0.0165	11.7
Sediment	Mill Area	C-19	C19-0.0-0.5	Sample Result	0.272	0.451	0.366	0.886	0.58	6.94	22.6	0.877	0.442	0.486	0.4715	0.11	0.177	0.115	0.0535	0.1425	0.595	--
				2,3,7,8-TCDD TEQ (Fish)	0.272	0.451	0.183	0.00886	0.0058	0.00694	0.00226	0.04385	0.0221	0.243	0.004715	0.0011	0.0177	0.0115	0.00535	0.01425	0.0000595	1.29
				2,3,7,8-TCDD TEQ (Mammal)	0.272	0.451	0.0366	0.0886	0.058	0.0694	0.00226	0.0877	0.0221	0.243	0.004715	0.0011	0.0177	0.0115	0.00535	0.01425	0.0000595	1.39
				2,3,7,8-TCDD TEQ (Bird)	0.272	0.451	0.0183	0.00886	0.058	0.00694	0.00226	0.877	0.0442	0.486	0.004715	0.0011	0.0177	0.0115	0.00535	0.01425	0.0000595	2.28
Sediment	Mill Area	C-19	C19-0.5-1.2	Sample Result	0.052	0.04905	0.0815	0.0795	0.08	0.611	0.695	0.227	0.128	0.05	0.03005	0.02925	0.04795	0.0223	0.0346	0.02485	0.1335	--
				2,3,7,8-TCDD TEQ (Fish)	0.052	0.04905	0.04075	0.000795	0.0008	0.000611	0.0000695	0.01135	0.0064	0.025	0.0003005	0.0002925	0.004795	0.00223	0.00346	0.002485	0.00001335	0.200
				2,3,7,8-TCDD TEQ (Mammal)	0.052	0.04905	0.00815	0.00795	0.008	0.00611	0.0000695	0.0227	0.0064	0.025	0.0003005	0.0002925	0.004795	0.00223	0.00346	0.002485	0.00001335	0.199
				2,3,7,8-TCDD TEQ (Bird)	0.052	0.04905	0.004075	0.000795	0.008	0.000611	0.0000695	0.227	0.0128	0.05	0.0003005	0.0002925	0.004795	0.00223	0.00346	0.002485	0.00001335	0.418
Sediment	Mill Area	C-20	C20-0.0-0.3	Sample Result							254											--
				2,3,7,8-TCDD TEQ (Fish)	0	0	0	0	0	0	0.0254	0	0	0	0	0	0	0	0	0	0	0.025
				2,3,7,8-TCDD TEQ (Mammal)	0	0	0	0	0	0	0.0254	0	0	0	0	0	0	0	0	0	0	0.025
				2,3,7,8-TCDD TEQ (Bird)	0	0	0	0	0	0	0.0254	0	0	0	0	0	0	0	0	0	0	0.025
Sediment	Mill Area	C-21	C21-0-0.5	Sample Result							172											--
				2,3,7,8-TCDD TEQ (Fish)	0	0	0	0	0	0	0.0172	0	0	0	0	0	0	0	0	0	0	0.017
				2,3,7,8-TCDD TEQ (Mammal)	0	0	0	0	0	0	0.0172	0	0	0	0	0	0	0	0	0	0	0.017
				2,3,7,8-TCDD TEQ (Bird)	0	0	0	0	0	0	0.0172	0	0	0	0	0	0	0	0	0	0	0.017
Sediment	Mill Area	C-22	C22-0.0-0.5	Sample Result							259											--
				2,3,7,8-TCDD TEQ (Fish)	0	0	0	0	0	0	0.0259	0	0	0	0	0	0	0	0	0	0	0.026
				2,3,7,8-TCDD TEQ (Mammal)	0	0	0	0	0	0	0.0259	0	0	0	0	0	0	0	0	0	0	0.026
				2,3,7,8-TCDD TEQ (Bird)	0	0	0	0	0	0	0.0259	0	0	0	0	0	0	0	0	0	0	0.026
Sediment	Mill Area	C-23	C23-0-0.5	Sample Result	0.1855	0.622	0.225	1.43	0.848	11.6	38.4	0.825	0.483	1.24	3.26	0.156	0.605	0.537	0.1205	0.868	4.83	--
				2,3,7,8-TCDD TEQ (Fish)	0.1855	0.622	0.1125	0.0143	0.00848	0.0116	0.00384	0.04125	0.02415	0.62	0.0326	0.00156	0.0605	0.0537	0.01205	0.0868	0.000483	1.89
				2,3,7,8-TCDD TEQ (Mammal)	0.1855	0.622	0.0225	0.143	0.0848	0.116	0.00384	0.0825	0.02415	0.62	0.0326	0.00156	0.0605	0.0537	0.01205	0.0868	0.000483	2.15
				2,3,7,8-TCDD TEQ (Bird)	0.1855	0.622	0.01125	0.0143	0.0848	0.0116	0.00384	0.825	0.0483	1.24	0.0326	0.00156	0.0605	0.0537	0.01205	0.0868	0.000483	3.29
Sediment	Mill Area	C-23	C23-1.0-1.5	Sample Result	0.246	0.48	0.359	0.665	0.626	3.19	1.995	0.762	0.579	0.596	0.518	0.069	0.1295	0.387	0.0272	0.306	0.201	--
				2,3,7,8-TCDD TEQ (Fish)	0.246	0.48	0.1795	0.00665	0.00626	0.00319	0.0001995	0.0381	0.02895	0.298	0.00518	0.00069	0.01295	0.0387	0.00272	0.0306	0.0000201	1.38
				2,3,7,8-TCDD TEQ (Mammal)	0.246	0.48	0.0359	0.0665	0.0626	0.0319	0.0001995	0.0762	0.02895	0.298	0.00518	0.00069	0.01295	0.0387	0.00272	0.0306	0.0000201	1.42
				2,3,7,8-TCDD TEQ (Bird)	0.246	0.48	0.01795	0.00665	0.0626	0.00319	0.0001995	0.762	0.0579	0.596	0.00518	0.00069	0.01295	0.0387	0.00272	0.0306	0.0000201	2.32
Sediment	Mill Area	C-24	C24-0.0-0.5	Sample Result	0.259	0.738	0.888	3.51	1.85	39.5	221	0.974	0.348	0.712	7.02	0.556	1.2	0.587	0.345	0.955	11.3	--
				2,3,7,8-TCDD TEQ (Fish)	0.259	0.738	0.444	0.0351	0.0185	0.0395	0.0221	0.0487	0.0174	0.356	0.0702	0.00556	0.12	0.0587	0.0345	0.0955	0.00113	2.36
				2,3,7,8-TCDD TEQ (Mammal)	0.259	0.738	0.0888	0.351	0.185	0.395	0.0221	0.0974	0.0174	0.356	0.0702	0.00556	0.12	0.0587	0.0345	0.0955	0.00113	2.90
				2,3,7,8-TCDD TEQ (Bird)	0.259	0.738	0.0444	0.0351	0.185	0.0395	0.0221	0.974	0.0348	0.712	0.0702	0.00556	0.12	0.0587	0.0345	0.0955	0.00113	3.43
Sediment	Mill Area	C-24	C24-1.0-1.5	Sample Result	0.596	2.56	2.35	31.1	9.04	257	909	2.36	2.68	3.34	46.8	2.48	3.81	4.73	1.31	5.26	56.8	--
				2,3,7,8-TCDD TEQ (Fish)	0.596	2.56	1.175	0.311	0.0904	0.257	0.0909	0.118	0.134	1.67	0.468	0.0248	0.381	0.473	0.131	0.526	0.00568	9.01
				2,3,7,8-TCDD TEQ (Mammal)	0.596	2.56	0.235	3.11	0.904	2.57	0.0909	0.236	0.134	1.67	0.468	0.0248	0.381	0.473	0.131	0.526	0.00568	14.1
				2,3,7,8-TCDD TEQ (Bird)	0.596	2.56	0.1175	0.311	0.904	0.257	0.0909	2.36	0.268	3.34	0.468	0.0248	0.381	0.473	0.131	0.526	0.00568	12.8
Sediment	Mill Area	C-25-1	C25-1-0.0-0.5	Sample Result							1200											--
				2,3,7,8-TCDD TEQ (Fish)	0	0	0	0	0	0	0.12	0	0	0	0	0	0	0	0	0	0	0.120
				2,3,7,8-TCDD TEQ (Mammal)	0	0	0	0	0	0	0.12	0	0	0	0	0	0	0	0	0	0	0.120
				2,3,7,8-TCDD TEQ (Bird)	0	0	0	0	0	0	0.12	0	0	0	0	0	0	0	0	0	0	0.120
Sediment	Mill Area	C-25-2	C25-2-0.0-0.5	Sample Result	0.584	2.59	2.99	29	9.62	308	1330	2	1.22	2.93	91.9	3.49	5.03	3.48	1.14	5.9	97.1	--
				2,3,7,8-TCDD TEQ (Fish)	0.584	2.59	1.495	0.29	0.0962	0.308	0.133	0.1	0.061	1.465	0.919	0.0349	0.503	0.348	0.114	0.59	0.00971	9.64
				2,3,7,8-TCDD TEQ (Mammal)	0.584	2.59	0.299	2.9	0.962	3.08	0.133	0.2	0.061	1.465	0.919	0.0349	0.503	0.348	0.114	0.59	0.00971	14.8
				2,3,7,8-TCDD TEQ (Bird)	0.584	2.59	0.1495	0.29	0.962	0.308	0.133	2	0.122	2.93	0.919	0.0349	0.503	0.348	0.114	0.59	0.00971	12.6
Sediment	Mill Area	C-25-2	C25-2-0.5-1.3	Sample Result	0.561	2.69	4.07	32.1	12.2	443	1590	0.84	1.37	2.07	158	6.58	6.35	7.12	1.09	7.12	203	--
				2,3,7,8-TCDD TEQ (Fish)	0.561	2.69	2.035	0.321	0.122	0.443	0.159	0.042	0.0685	1.035	1.58	0.0658	0.635	0.712	0.109	0.712	0.0203	11.3
				2,3,7,8-TCDD TEQ (Mammal)	0.561	2.69	0.407	3.21	1.22	4.43	0.159	0.084	0.0685	1.035	1.58	0.0658	0.635	0.712	0.109	0.712	0.0203	17.7
				2,3,7,8-TCDD TEQ (Bird)	0.561	2.69	0.2035	0.321	1.22	0.443	0.159	0.84	0.137	2.07	1.58	0.0658	0.635	0.712	0.109	0.712	0.0203	12.5
Sediment	Mill Area	C-26	C26-0.0-0.8	Sample Result	0.555	3.36	4.39	54.9	16.6	680	3010	0.923	1.16	3.5	330	13.1	9.71	6.68	1.88	12.4	569	--
				2,3,7,8-TCDD TEQ (Fish)	0.555	3.36	2.195	0.549	0.166	0.68	0.301	0.04615	0.058	1.75	3.3	0.131	0.971	0.668	0.188	1.24	0.0569	16.2
				2,3,7,8-TCDD TEQ (Mammal)	0.555	3.36	0.439	5.49	1.66	6.8	0.301	0.0923	0.058	1.75	3.3	0.131	0.971	0.668	0.188	1.24	0.0569	27.1
				2,3,7,8-TCDD TEQ (Bird)	0.555	3.36	0.2195	0.549	1.66	0.68	0.301	0.923	0.116	3.5	3.3	0.131	0.971	0.668	0.188	1.24	0.0569	18.4
Sediment	Mill Area	C-27-1	C27-1-1.0-1.5	Sample Result	0.187	1.39	2.07	7.41	4.11	187	870	1.03	2.28	2.2	30.1	3.05	4.54	2.68	1.04	2.7	56.8	--
				2,3,7,8-TCDD TEQ (Fish)	0.187	1.39	1.035	0.0741	0.0411	0.187	0.087	0.0515	0.114	1.1	0.301	0.0305	0.454	0.268	0.104	0.27	0.00568	5.70
				2,3,7,8-TCDD TEQ (Mammal)	0.187	1.39	0.207	0.741	0.411	1.87	0.087	0.103	0.114	1.1	0.301	0.0305	0.454	0.268	0.104	0.27	0.00568	7.64
				2,3,7,8-TCDD TEQ (Bird)	0.187	1.39	0.1035	0.0741	0.411	0.187	0.087	1.03	0.228	2.2	0.301	0.0305	0.454	0.268	0.104	0.27	0.00568	7.33

APPENDIX D
CALCULATION OF DIOXIN/FURAN TOXICITY EQUIVALENTS (2,3,7,8-TCDD TEQs)[1,2]
Sierra Pacific Industries Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Matrix	Area Name	Station Location	Sample ID	Sample Result / Toxic Equivalents	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	2,3,4,6,7,8-HxCDF	OCDF	2,3,7,8-TCDD TEQ
				Fish Toxic Equivalency Factor (Fish TEF) [3]	**1**	**1**	**0.5**	**0.01**	**0.01**	**0.001**	**0.0001**	**0.05**	**0.05**	**0.5**	**0.01**	**0.01**	**0.1**	**0.1**	**0.1**	**0.1**	**0.0001**	--
				Mammal Toxic Equivalency Factor (Mammal TEF) [3]	**1**	**1**	**0.1**	**0.1**	**0.1**	**0.01**	**0.0001**	**0.1**	**0.05**	**0.5**	**0.01**	**0.01**	**0.1**	**0.1**	**0.1**	**0.1**	**0.0001**	--
				Bird Toxic Equivalency Factor (Bird TEF) [3]	**1**	**1**	**0.05**	**0.01**	**0.1**	**0.001**	**0.0001**	**1**	**0.1**	**1**	**0.01**	**0.01**	**0.1**	**0.1**	**0.1**	**0.1**	**0.0001**	--
Sediment	Mill Area	C-27-1	C27-1-0.0-0.5	Sample Result	0.335	1.11	1.4	7.64	3.26	82.3	427	1.2	0.479	1.01	13.1	0.954	1.57	0.907	0.402	1.53	19.7	--
				2,3,7,8-TCDD TEQ (Fish)	0.335	1.11	0.7	0.0764	0.0326	0.0823	0.0427	0.06	0.02395	0.505	0.131	0.00954	0.157	0.0907	0.0402	0.153	0.00197	3.55
				2,3,7,8-TCDD TEQ (Mammal)	0.335	1.11	0.14	0.764	0.326	0.823	0.0427	0.12	0.02395	0.505	0.131	0.00954	0.157	0.0907	0.0402	0.153	0.00197	4.77
				2,3,7,8-TCDD TEQ (Bird)	0.335	1.11	0.07	0.0764	0.326	0.0823	0.0427	1.2	0.0479	1.01	0.131	0.00954	0.157	0.0907	0.0402	0.153	0.00197	4.88
Sediment	Mill Area	C-27-2	C27-0.0-0.5	Sample Result							386											--
				2,3,7,8-TCDD TEQ (Fish)	0	0	0	0	0	0	0.0386	0	0	0	0	0	0	0	0	0	0	0.039
				2,3,7,8-TCDD TEQ (Mammal)	0	0	0	0	0	0	0.0386	0	0	0	0	0	0	0	0	0	0	0.039
				2,3,7,8-TCDD TEQ (Bird)	0	0	0	0	0	0	0.0386	0	0	0	0	0	0	0	0	0	0	0.039
Sediment	Mill Area	C-28	C28-0.0-0.5	Sample Result							606											--
				2,3,7,8-TCDD TEQ (Fish)	0	0	0	0	0	0	0.0606	0	0	0	0	0	0	0	0	0	0	0.061
				2,3,7,8-TCDD TEQ (Mammal)	0	0	0	0	0	0	0.0606	0	0	0	0	0	0	0	0	0	0	0.061
				2,3,7,8-TCDD TEQ (Bird)	0	0	0	0	0	0	0.0606	0	0	0	0	0	0	0	0	0	0	0.061
Sediment	Mill Area	C-28	C28-1.0-1.8	Sample Result	0.457	2.23	2.3	29.9	7.56	245	823	2.15	3.25	2.94	64.1	3.38	3.22	4.73	0.967	5.53	80.2	--
				2,3,7,8-TCDD TEQ (Fish)	0.457	2.23	1.15	0.299	0.0756	0.245	0.0823	0.1075	0.1625	1.47	0.641	0.0338	0.322	0.473	0.0967	0.553	0.00802	8.41
				2,3,7,8-TCDD TEQ (Mammal)	0.457	2.23	0.23	2.99	0.756	2.45	0.0823	0.215	0.1625	1.47	0.641	0.0338	0.322	0.473	0.0967	0.553	0.00802	13.2
				2,3,7,8-TCDD TEQ (Bird)	0.457	2.23	0.115	0.299	0.756	0.245	0.0823	2.15	0.325	2.94	0.641	0.0338	0.322	0.473	0.0967	0.553	0.00802	11.7
Sediment	Mill Area	C-29	C29-0-0.5	Sample Result							539											--
				2,3,7,8-TCDD TEQ (Fish)	0	0	0	0	0	0	0.0539	0	0	0	0	0	0	0	0	0	0	0.054
				2,3,7,8-TCDD TEQ (Mammal)	0	0	0	0	0	0	0.0539	0	0	0	0	0	0	0	0	0	0	0.054
				2,3,7,8-TCDD TEQ (Bird)	0	0	0	0	0	0	0.0539	0	0	0	0	0	0	0	0	0	0	0.054
Sediment	Mill Area	C-30	C30-0-0.5	Sample Result							540											--
				2,3,7,8-TCDD TEQ (Fish)	0	0	0	0	0	0	0.054	0	0	0	0	0	0	0	0	0	0	0.054
				2,3,7,8-TCDD TEQ (Mammal)	0	0	0	0	0	0	0.054	0	0	0	0	0	0	0	0	0	0	0.054
				2,3,7,8-TCDD TEQ (Bird)	0	0	0	0	0	0	0.054	0	0	0	0	0	0	0	0	0	0	0.054
Sediment	Mill Area	C-31	C31-0.0-0.5	Sample Result	0.505	2.61	3.34	26.4	9.31	264	1440	1.59	0.96	1.09	54.3	2.69	3.11	2.76	0.4365	4.62	64.5	--
				2,3,7,8-TCDD TEQ (Fish)	0.505	2.61	1.67	0.264	0.0931	0.264	0.144	0.0795	0.048	0.545	0.543	0.0269	0.311	0.276	0.04365	0.462	0.00645	7.89
				2,3,7,8-TCDD TEQ (Mammal)	0.505	2.61	0.334	2.64	0.931	2.64	0.144	0.159	0.048	0.545	0.543	0.0269	0.311	0.276	0.04365	0.462	0.00645	12.2
				2,3,7,8-TCDD TEQ (Bird)	0.505	2.61	0.167	0.264	0.931	0.264	0.144	1.59	0.096	1.09	0.543	0.0269	0.311	0.276	0.04365	0.462	0.00645	9.33
Sediment	Mill Area	C-31	C31-0.5-1.0	Sample Result	0.607	3.08	4.14	41.7	13.2	454	2400	2.86	1.64	4.17	90.9	3.69	5.08	4.26	1.47	7.39	111	--
				2,3,7,8-TCDD TEQ (Fish)	0.607	3.08	2.07	0.417	0.132	0.454	0.24	0.143	0.082	2.085	0.909	0.0369	0.508	0.426	0.147	0.739	0.0111	12.1
				2,3,7,8-TCDD TEQ (Mammal)	0.607	3.08	0.414	4.17	1.32	4.54	0.24	0.286	0.082	2.085	0.909	0.0369	0.508	0.426	0.147	0.739	0.0111	19.6
				2,3,7,8-TCDD TEQ (Bird)	0.607	3.08	0.207	0.417	1.32	0.454	0.24	2.86	0.164	4.17	0.909	0.0369	0.508	0.426	0.147	0.739	0.0111	16.3
Sediment	Mill Area	C-32	C32-0.0-0.5	Sample Result	0.612	2.94	3.23	39	11	451	2740	1.41	0.992	2.33	59.7	3.42	3.36	2.74	0.4655	4.63	107	--
				2,3,7,8-TCDD TEQ (Fish)	0.612	2.94	1.615	0.39	0.11	0.451	0.274	0.0705	0.0496	1.165	0.597	0.0342	0.336	0.274	0.04655	0.463	0.0107	9.44
				2,3,7,8-TCDD TEQ (Mammal)	0.612	2.94	0.323	3.9	1.1	4.51	0.274	0.141	0.0496	1.165	0.597	0.0342	0.336	0.274	0.04655	0.463	0.0107	16.8
				2,3,7,8-TCDD TEQ (Bird)	0.612	2.94	0.1615	0.39	1.1	0.451	0.274	1.41	0.0992	2.33	0.597	0.0342	0.336	0.274	0.04655	0.463	0.0107	11.5
Sediment	Mill Area	C-32	C32-0.5-1.0	Sample Result	0.813	6.31	14.5	156	38.9	1550	7820	5.24	4.88	11.3	190	6.12	10.8	14.3	4.58	19.7	124	--
				2,3,7,8-TCDD TEQ (Fish)	0.813	6.31	7.25	1.56	0.389	1.55	0.782	0.262	0.244	5.65	1.9	0.0612	1.08	1.43	0.458	1.97	0.0124	31.7
				2,3,7,8-TCDD TEQ (Mammal)	0.813	6.31	1.45	15.6	3.89	15.5	0.782	0.524	0.244	5.65	1.9	0.0612	1.08	1.43	0.458	1.97	0.0124	57.7
				2,3,7,8-TCDD TEQ (Bird)	0.813	6.31	0.725	1.56	3.89	1.55	0.782	5.24	0.488	11.3	1.9	0.0612	1.08	1.43	0.458	1.97	0.0124	39.6
Sediment	Mill Area	C-33	C33-0-0.5	Sample Result	0.421	2.24	2.36	24	7.74	253	1350	1.73	1.04	2.32	31	1.75	2.58	2.02	0.946	3.61	40.3	--
				2,3,7,8-TCDD TEQ (Fish)	0.421	2.24	1.18	0.24	0.0774	0.253	0.135	0.0865	0.052	1.16	0.31	0.0175	0.258	0.202	0.0946	0.361	0.00403	7.09
				2,3,7,8-TCDD TEQ (Mammal)	0.421	2.24	0.236	2.4	0.774	2.53	0.135	0.173	0.052	1.16	0.31	0.0175	0.258	0.202	0.0946	0.361	0.00403	11.4
				2,3,7,8-TCDD TEQ (Bird)	0.421	2.24	0.118	0.24	0.774	0.253	0.135	1.73	0.104	2.32	0.31	0.0175	0.258	0.202	0.0946	0.361	0.00403	9.58
Sediment	Mill Area	C-33	C33-1.0-1.5	Sample Result	0.064	0.586	0.764	6.6	2.33	77.3	311	0.406	1.91	0.713	32	1.46	0.625	2.03	0.269	1.84	51.3	--
				2,3,7,8-TCDD TEQ (Fish)	0.064	0.586	0.382	0.066	0.0233	0.0773	0.0311	0.0203	0.0955	0.3565	0.32	0.0146	0.0625	0.203	0.0269	0.184	0.00513	2.52
				2,3,7,8-TCDD TEQ (Mammal)	0.064	0.586	0.0764	0.66	0.233	0.773	0.0311	0.0406	0.0955	0.3565	0.32	0.0146	0.0625	0.203	0.0269	0.184	0.00513	3.73
				2,3,7,8-TCDD TEQ (Bird)	0.064	0.586	0.0382	0.066	0.233	0.0773	0.0311	0.406	0.191	0.713	0.32	0.0146	0.0625	0.203	0.0269	0.184	0.00513	3.22
Sediment	Mill Area	C-34	C34-0-0.5	Sample Result							265											--
				2,3,7,8-TCDD TEQ (Fish)	0	0	0	0	0	0	0.0265	0	0	0	0	0	0	0	0	0	0	0.027
				2,3,7,8-TCDD TEQ (Mammal)	0	0	0	0	0	0	0.0265	0	0	0	0	0	0	0	0	0	0	0.027
				2,3,7,8-TCDD TEQ (Bird)	0	0	0	0	0	0	0.0265	0	0	0	0	0	0	0	0	0	0	0.027
Sediment	Mill Area	C-35	C35-0-0.5	Sample Result	0.2005	1.54	1.74	9.66	4.35	94	515	1.5	0.417	1.18	17	0.595	2.03	0.5	0.497	1.66	26.1	--
				2,3,7,8-TCDD TEQ (Fish)	0.2005	1.54	0.87	0.0966	0.0435	0.094	0.0515	0.075	0.02085	0.59	0.17	0.00595	0.203	0.05	0.0497	0.166	0.00261	4.23
				2,3,7,8-TCDD TEQ (Mammal)	0.2005	1.54	0.174	0.966	0.435	0.94	0.0515	0.15	0.02085	0.59	0.17	0.00595	0.203	0.05	0.0497	0.166	0.00261	5.72
				2,3,7,8-TCDD TEQ (Bird)	0.2005	1.54	0.087	0.0966	0.435	0.094	0.0515	1.5	0.0417	1.18	0.17	0.00595	0.203	0.05	0.0497	0.166	0.00261	5.87
Sediment	Mill Area	C-36	C36-0-0.5	Sample Result	0.463	1.59	1.74	12.2	5.1	153	840	1.42	0.693	1.4	23	1.44	2.33	1.36	0.611	2.22	35.9	--
				2,3,7,8-TCDD TEQ (Fish)	0.463	1.59	0.87	0.122	0.051	0.153	0.084	0.071	0.03465	0.7	0.23	0.0144	0.233	0.136	0.0611	0.222	0.00359	5.04
				2,3,7,8-TCDD TEQ (Mammal)	0.463	1.59	0.174	1.22	0.51	1.53	0.084	0.142	0.03465	0.7	0.23	0.0144	0.233	0.136	0.0611	0.222	0.00359	7.35
				2,3,7,8-TCDD TEQ (Bird)	0.463	1.59	0.087	0.122	0.51	0.153	0.084	1.42	0.0693	1.4	0.23	0.0144	0.233	0.136	0.0611	0.222	0.00359	6.80

APPENDIX D

CALCULATION OF DIOXIN/FURAN TOXICITY EQUIVALENTS (2,3,7,8-TCDD TEQs)[1,2]

Sierra Pacific Industries Arcata Division Sawmill

Arcata, California

Geomatrix

Concentrations are presented in nanograms per kilogram (ng/kg)

Matrix	Area Name	Station Location	Sample ID	Sample Result / Toxic Equivalents	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	2,3,4,6,7,8-HxCDF	OCDF	2,3,7,8-TCDD TEQ
				Fish Toxic Equivalency Factor (Fish TEF)[3]	1	1	0.5	0.01	0.01	0.001	0.0001	0.05	0.05	0.5	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
				Mammal Toxic Equivalency Factor (Mammal TEF)[3]	1	1	0.1	0.1	0.1	0.01	0.0001	0.1	0.05	0.5	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
				Bird Toxic Equivalency Factor (Bird TEF)[3]	1	1	0.05	0.01	0.1	0.001	0.0001	1	0.1	1	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
Sediment	Mill Area	C-37	C37-0.0-0.3	Sample Result	0.247	0.784	0.94	6.6	2.69	103	682	0.676	0.361	0.749	16.9	0.922	1.37	0.791	0.394	1.35	28.7	--
				2,3,7,8-TCDD TEQ (Fish)	0.247	0.784	0.47	0.066	0.0269	0.103	0.0682	0.0338	0.01805	0.3745	0.169	0.00922	0.137	0.0791	0.0394	0.135	0.00287	2.76
				2,3,7,8-TCDD TEQ (Mammal)	0.247	0.784	0.094	0.66	0.269	1.03	0.0682	0.0676	0.01805	0.3745	0.169	0.00922	0.137	0.0791	0.0394	0.135	0.00287	4.18
				2,3,7,8-TCDD TEQ (Bird)	0.247	0.784	0.047	0.066	0.269	0.103	0.0682	0.676	0.0361	0.749	0.169	0.00922	0.137	0.0791	0.0394	0.135	0.00287	3.62
Sediment	Mill Area	C-38	C38-0-0.5	Sample Result							192											--
				2,3,7,8-TCDD TEQ (Fish)	0	0	0	0	0	0	0.0192	0	0	0	0	0	0	0	0	0	0	0.019
				2,3,7,8-TCDD TEQ (Mammal)	0	0	0	0	0	0	0.0192	0	0	0	0	0	0	0	0	0	0	0.019
				2,3,7,8-TCDD TEQ (Bird)	0	0	0	0	0	0	0.0192	0	0	0	0	0	0	0	0	0	0	0.019
Sediment	Mill Area	C-39	C39-0-0.5	Sample Result	0.04705	0.069	0.1045	0.1055	0.102	0.595	5.64	0.179	0.0905	0.072	0.287	0.0252	0.118	0.0426	0.02375	0.0193	0.322	--
				2,3,7,8-TCDD TEQ (Fish)	0.04705	0.069	0.05225	0.001055	0.00102	0.000595	0.000564	0.00895	0.004525	0.036	0.00287	0.000252	0.0118	0.00426	0.002375	0.00193	0.0000322	0.245
				2,3,7,8-TCDD TEQ (Mammal)	0.04705	0.069	0.01045	0.01055	0.0102	0.00595	0.000564	0.0179	0.004525	0.036	0.00287	0.000252	0.0118	0.00426	0.002375	0.00193	0.0000322	0.236
				2,3,7,8-TCDD TEQ (Bird)	0.04705	0.069	0.005225	0.001055	0.0102	0.000595	0.000564	0.179	0.00905	0.072	0.00287	0.000252	0.0118	0.00426	0.002375	0.00193	0.0000322	0.417
Sediment	Mill Area	DSS	DSS Comp	Sample Result	0.452	1.48	1.91	21.8	7.71	258	812	1.4	0.988	1.69	17.2	1.21	1.87	1.28	0.667	2.15	25.8	--
				2,3,7,8-TCDD TEQ (Fish)	0.452	1.48	0.955	0.218	0.0771	0.258	0.0812	0.07	0.0494	0.845	0.172	0.0121	0.187	0.128	0.0667	0.215	0.00258	5.27
				2,3,7,8-TCDD TEQ (Mammal)	0.452	1.48	0.191	2.18	0.771	2.58	0.0812	0.14	0.0494	0.845	0.172	0.0121	0.187	0.128	0.0667	0.215	0.00258	9.55
				2,3,7,8-TCDD TEQ (Bird)	0.452	1.48	0.0955	0.218	0.771	0.258	0.0812	1.4	0.0988	1.69	0.172	0.0121	0.187	0.128	0.0667	0.215	0.00258	7.33
Sediment	Mill Area	Lappe_LB	S021850032402	Sample Result	0.2	0.65	0.75	6.7	4.3	84	560	0.65	0.365	0.38	15	0.385	0.85	0.34	0.46	0.425	18	--
				2,3,7,8-TCDD TEQ (Fish)	0.2	0.65	0.375	0.067	0.043	0.084	0.056	0.0325	0.01825	0.19	0.15	0.00385	0.085	0.034	0.046	0.0425	0.0018	2.08
				2,3,7,8-TCDD TEQ (Mammal)	0.2	0.65	0.075	0.67	0.43	0.84	0.056	0.065	0.01825	0.19	0.15	0.00385	0.085	0.034	0.046	0.0425	0.0018	3.56
				2,3,7,8-TCDD TEQ (Bird)	0.2	0.65	0.0375	0.067	0.43	0.084	0.056	0.65	0.0365	0.38	0.15	0.00385	0.085	0.034	0.046	0.0425	0.0018	2.95
Sediment	Mill Area	Lappe_OF2	2S011800032402	Sample Result	3.3	20	32	240	100	2500	14000	5.5	6.4	7.8	340	16	16	15	0.85	16	430	--
				2,3,7,8-TCDD TEQ (Fish)	3.3	20	16	2.4	1	2.5	1.4	0.275	0.32	3.9	3.4	0.16	1.6	1.5	0.085	1.6	0.043	59.5
				2,3,7,8-TCDD TEQ (Mammal)	3.3	20	3.2	24	10	25	1.4	0.55	0.32	3.9	3.4	0.16	1.6	1.5	0.085	1.6	0.043	100
				2,3,7,8-TCDD TEQ (Bird)	3.3	20	1.6	2.4	10	2.5	1.4	5.5	0.64	7.8	3.4	0.16	1.6	1.5	0.085	1.6	0.043	63.5
Sediment	Mill Area	Lappe_OF4	4S01735032402	Sample Result	0.35	2.6	6.5	71	28	680	3300	2.8	1.05	1.6	96	2.15	2.85	2.5	0.95	2.65	110	--
				2,3,7,8-TCDD TEQ (Fish)	0.35	2.6	3.25	0.71	0.28	0.68	0.33	0.14	0.0525	0.8	0.96	0.0215	0.285	0.25	0.095	0.265	0.011	11.1
				2,3,7,8-TCDD TEQ (Mammal)	0.35	2.6	0.65	7.1	2.8	6.8	0.33	0.28	0.0525	0.8	0.96	0.0215	0.285	0.25	0.095	0.265	0.011	23.7
				2,3,7,8-TCDD TEQ (Bird)	0.35	2.6	0.325	0.71	2.8	0.68	0.33	2.8	0.105	1.6	0.96	0.0215	0.285	0.25	0.095	0.265	0.011	14.2
Sediment	Mill Area	LOC 4	DM-0022	Sample Result	0.379	1.16	1.24	6.42	3.19	85.1	439	1.2	0.769	1.06	15.2	1.01	0.885	1.27	0.405	1.47	24.3	--
				2,3,7,8-TCDD TEQ (Fish)	0.379	1.16	0.62	0.0642	0.0319	0.0851	0.0439	0.06	0.03845	0.53	0.152	0.0101	0.0885	0.127	0.0405	0.147	0.00243	3.58
				2,3,7,8-TCDD TEQ (Mammal)	0.379	1.16	0.124	0.642	0.319	0.851	0.0439	0.12	0.03845	0.53	0.152	0.0101	0.0885	0.127	0.0405	0.147	0.00243	4.77
				2,3,7,8-TCDD TEQ (Bird)	0.379	1.16	0.062	0.0642	0.319	0.0851	0.0439	1.2	0.0769	1.06	0.152	0.0101	0.0885	0.127	0.0405	0.147	0.00243	5.02
Sediment	Mill Area	LOC 4	DM-0024	Sample Result	0.0675	0.0785	0.1025	0.391	0.279	4.16	20.9	0.25	0.082	0.069	0.4055	0.04735	0.0785	0.03825	0.0525	0.04635	1.61	--
				2,3,7,8-TCDD TEQ (Fish)	0.0675	0.0785	0.05125	0.00391	0.00279	0.00416	0.00209	0.0125	0.0041	0.0345	0.004055	0.0004735	0.00785	0.003825	0.00525	0.004635	0.000161	0.288
				2,3,7,8-TCDD TEQ (Mammal)	0.0675	0.0785	0.01025	0.0391	0.0279	0.0416	0.00209	0.025	0.0041	0.0345	0.004055	0.0004735	0.00785	0.003825	0.00525	0.004635	0.000161	0.357
				2,3,7,8-TCDD TEQ (Bird)	0.0675	0.0785	0.005125	0.00391	0.0279	0.00416	0.00209	0.25	0.0082	0.069	0.004055	0.0004735	0.00785	0.003825	0.00525	0.004635	0.000161	0.543
Sediment	Mill Area	LOC 11	DM-0026	Sample Result	0.063	0.247	0.305	1.19	0.632	15.7	82.7	0.249	0.151	0.286	2.79	0.112	0.149	0.234	0.0292	0.342	4.12	--
				2,3,7,8-TCDD TEQ (Fish)	0.063	0.247	0.1525	0.0119	0.00632	0.0157	0.00827	0.01245	0.00755	0.143	0.0279	0.00112	0.0149	0.0234	0.00292	0.0342	0.000412	0.773
				2,3,7,8-TCDD TEQ (Mammal)	0.063	0.247	0.0305	0.119	0.0632	0.157	0.00827	0.0249	0.00755	0.143	0.0279	0.00112	0.0149	0.0234	0.00292	0.0342	0.000412	0.968
				2,3,7,8-TCDD TEQ (Bird)	0.063	0.247	0.01525	0.0119	0.0632	0.0157	0.00827	0.249	0.0151	0.286	0.0279	0.00112	0.0149	0.0234	0.00292	0.0342	0.000412	1.08
Sediment	Mill Area	LOC 12	DM-0027	Sample Result	0.069	0.296	0.252	1.46	0.705	15.3	65.8	0.226	0.263	0.227	2.9	0.0925	0.155	0.355	0.03225	0.397	4.53	--
				2,3,7,8-TCDD TEQ (Fish)	0.069	0.296	0.126	0.0146	0.00705	0.0153	0.00658	0.0113	0.01315	0.1135	0.029	0.000925	0.0155	0.0355	0.003225	0.0397	0.000453	0.797
				2,3,7,8-TCDD TEQ (Mammal)	0.069	0.296	0.0252	0.146	0.0705	0.153	0.00658	0.0226	0.01315	0.1135	0.029	0.000925	0.0155	0.0355	0.003225	0.0397	0.000453	1.04
				2,3,7,8-TCDD TEQ (Bird)	0.069	0.296	0.0126	0.0146	0.0705	0.0153	0.00658	0.226	0.0263	0.227	0.029	0.000925	0.0155	0.0355	0.003225	0.0397	0.000453	1.09
Sediment	Mill Area	LOC 13	DM-0028	Sample Result	0.062	0.438	0.485	2.26	1.04	29.9	159	0.378	0.281	0.356	4.56	0.316	0.226	0.454	0.0395	0.505	7.42	--
				2,3,7,8-TCDD TEQ (Fish)	0.062	0.438	0.2425	0.0226	0.0104	0.0299	0.0159	0.0189	0.01405	0.178	0.0456	0.00316	0.0226	0.0454	0.00395	0.0505	0.000742	1.20
				2,3,7,8-TCDD TEQ (Mammal)	0.062	0.438	0.0485	0.226	0.104	0.299	0.0159	0.0378	0.01405	0.178	0.0456	0.00316	0.0226	0.0454	0.00395	0.0505	0.000742	1.60
				2,3,7,8-TCDD TEQ (Bird)	0.062	0.438	0.02425	0.0226	0.104	0.0299	0.0159	0.378	0.0281	0.356	0.0456	0.00316	0.0226	0.0454	0.00395	0.0505	0.000742	1.63
Sediment	Mill Area	LOC 14	DM-0029	Sample Result	0.1335	1.12	1.06	4.94	2.48	49.4	227	1.23	0.52	1.53	11.2	0.44	0.81	0.915	0.481	1.74	16.6	--
				2,3,7,8-TCDD TEQ (Fish)	0.1335	1.12	0.53	0.0494	0.0248	0.0494	0.0227	0.0615	0.026	0.765	0.112	0.0044	0.081	0.0915	0.0481	0.174	0.00166	3.29
				2,3,7,8-TCDD TEQ (Mammal)	0.1335	1.12	0.106	0.494	0.248	0.494	0.0227	0.123	0.026	0.765	0.112	0.0044	0.081	0.0915	0.0481	0.174	0.00166	4.04
				2,3,7,8-TCDD TEQ (Bird)	0.1335	1.12	0.053	0.0494	0.248	0.0494	0.0227	1.23	0.052	1.53	0.112	0.0044	0.081	0.0915	0.0481	0.174	0.00166	5.00
Sediment	Mill Area	Outfall-1	Outfall-1	Sample Result	0.5	0.8	0.65	6	0.85	40	120	0.385	0.46	0.45	1.65	0.34	0.6	0.55	0.7	0.65	2.3	--
				2,3,7,8-TCDD TEQ (Fish)	0.5	0.8	0.325	0.06	0.0085	0.04	0.012	0.01925	0.023	0.225	0.0165	0.0034	0.06	0.055	0.07	0.065	0.00023	2.28
				2,3,7,8-TCDD TEQ (Mammal)	0.5	0.8	0.065	0.6	0.085	0.4	0.012	0.0385	0.023	0.225	0.0165	0.0034	0.06	0.055	0.07	0.065	0.00023	3.02
				2,3,7,8-TCDD TEQ (Bird)	0.5	0.8	0.0325	0.06	0.085	0.04	0.012	0.385	0.046	0.45	0.0165	0.0034	0.06	0.055	0.07	0.065	0.00023	2.68
Sediment	Mill Area	Outfall-4	Outfall-4	Sample Result	0.35	0.95	1.45	19	8.3	260	1700	1.4	0.395	0.38	31	1.15	0.9	0.55	0.7	0.65	68	--
				2,3,7,8-TCDD TEQ (Fish)	0.35	0.95	0.725	0.19	0.083	0.26	0.17	0.07	0.01975	0.19	0.31	0.0115	0.09	0.055	0.07	0.065	0.0068	3.62
				2,3,7,8-TCDD TEQ (Mammal)	0.35	0.95	0.145	1.9	0.83	2.6	0.17	0.14	0.01975	0.19	0.31	0.0115	0.09	0.055	0.07	0.065	0.0068	7.90
				2,3,7,8-TCDD TEQ (Bird)	0.35	0.95	0.0725	0.19	0.83	0.26	0.17	1.4	0.0395	0.38	0.31	0.0115	0.09	0.055	0.07	0.065	0.0068	5.25

APPENDIX D

CALCULATION OF DIOXIN/FURAN TOXICITY EQUIVALENTS (2,3,7,8-TCDD TEQs)[1,2]

Sierra Pacific Industries Arcata Division Sawmill

Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Matrix	Area Name	Station Location	Sample ID	Sample Result / Toxic Equivalents	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	2,3,4,6,7,8-HxCDF	OCDF	2,3,7,8-TCDD TEQ
				Fish Toxic Equivalency Factor (Fish TEF)[3]	**1**	**1**	**0.5**	**0.01**	**0.01**	**0.001**	**0.0001**	**0.05**	**0.05**	**0.5**	**0.01**	**0.01**	**0.1**	**0.1**	**0.1**	**0.1**	**0.0001**	--
				Mammal Toxic Equivalency Factor (Mammal TEF)[3]	**1**	**1**	**0.1**	**0.1**	**0.1**	**0.01**	**0.0001**	**0.1**	**0.05**	**0.5**	**0.01**	**0.01**	**0.1**	**0.1**	**0.1**	**0.1**	**0.0001**	--
				Bird Toxic Equivalency Factor (Bird TEF)[3]	**1**	**1**	**0.05**	**0.01**	**0.1**	**0.001**	**0.0001**	**1**	**0.1**	**1**	**0.01**	**0.01**	**0.1**	**0.1**	**0.1**	**0.1**	**0.0001**	--
Sediment	Mill Area	USS	USS Comp	Sample Result	0.391	1.72	1.93	16	6.94	168	682	1.55	0.671	1.54	15.9	1.11	2.11	1.23	0.58	2.06	25	--
				2,3,7,8-TCDD TEQ (Fish)	0.391	1.72	0.965	0.16	0.0694	0.168	0.0682	0.0775	0.03355	0.77	0.159	0.0111	0.211	0.123	0.058	0.206	0.0025	5.19
				2,3,7,8-TCDD TEQ (Mammal)	0.391	1.72	0.193	1.6	0.694	1.68	0.0682	0.155	0.03355	0.77	0.159	0.0111	0.211	0.123	0.058	0.206	0.0025	8.08
				2,3,7,8-TCDD TEQ (Bird)	0.391	1.72	0.0965	0.16	0.694	0.168	0.0682	1.55	0.0671	1.54	0.159	0.0111	0.211	0.123	0.058	0.206	0.0025	7.23
Sediment	Mill Area	USS-2	USS-2 Comp	Sample Result	0.391	1.29	1.4	7.81	3.89	88.8	414	1.25	0.571	1.22	14.4	1.13	1.83	1.04	0.603	1.64	23.4	--
				2,3,7,8-TCDD TEQ (Fish)	0.391	1.29	0.7	0.0781	0.0389	0.0888	0.0414	0.0625	0.02855	0.61	0.144	0.0113	0.183	0.104	0.0603	0.164	0.00234	4.00
				2,3,7,8-TCDD TEQ (Mammal)	0.391	1.29	0.14	0.781	0.389	0.888	0.0414	0.125	0.02855	0.61	0.144	0.0113	0.183	0.104	0.0603	0.164	0.00234	5.35
				2,3,7,8-TCDD TEQ (Bird)	0.391	1.29	0.07	0.0781	0.389	0.0888	0.0414	1.25	0.0571	1.22	0.144	0.0113	0.183	0.104	0.0603	0.164	0.00234	5.54
Sediment	Mill Area	USS-3	USS-3 Comp	Sample Result	0.325	1.26	1.56	6.97	3.81	88.3	405	1.19	0.513	1.1	13.6	1.04	1.91	0.961	0.45	1.59	21.4	--
				2,3,7,8-TCDD TEQ (Fish)	0.325	1.26	0.78	0.0697	0.0381	0.0883	0.0405	0.0595	0.02565	0.55	0.136	0.0104	0.191	0.0961	0.045	0.159	0.00214	3.88
				2,3,7,8-TCDD TEQ (Mammal)	0.325	1.26	0.156	0.697	0.381	0.883	0.0405	0.119	0.02565	0.55	0.136	0.0104	0.191	0.0961	0.045	0.159	0.00214	5.08
				2,3,7,8-TCDD TEQ (Bird)	0.325	1.26	0.078	0.0697	0.381	0.0883	0.0405	1.19	0.0513	1.1	0.136	0.0104	0.191	0.0961	0.045	0.159	0.00214	5.22
Sediment	Upland Mill Area	Ditch-4	Ditch-4	Sample Result	1	5.8	5.7	62	18	680	3900	1.9	0.7	0.95	92	2.15	1.9	2.15	0.7	1.65	170	--
				2,3,7,8-TCDD TEQ (Fish)	1	5.8	2.85	0.62	0.18	0.68	0.39	0.095	0.035	0.475	0.92	0.0215	0.19	0.215	0.07	0.165	0.017	13.7
				2,3,7,8-TCDD TEQ (Mammal)	1	5.8	0.57	6.2	1.8	6.8	0.39	0.19	0.035	0.475	0.92	0.0215	0.19	0.215	0.07	0.165	0.017	24.9
				2,3,7,8-TCDD TEQ (Bird)	1	5.8	0.285	0.62	1.8	0.68	0.39	1.9	0.07	0.95	0.92	0.0215	0.19	0.215	0.07	0.165	0.017	15.1
Shark	Mill Area	TRAWL 13	DM-0060	Sample Result	0.01965	0.01655	0.01985	0.0207	0.0202	0.0897	0.224	0.101	0.01845	0.0149	0.0118	0.0124	0.00625	0.0064	0.0089	0.00675	0.12	--
				2,3,7,8-TCDD TEQ (Fish)	0.01965	0.01655	0.009925	0.000207	0.000202	0.0000897	0.0000224	0.00505	0.0009225	0.00745	0.000118	0.000124	0.000625	0.00064	0.00089	0.000675	0.000012	0.063
				2,3,7,8-TCDD TEQ (Mammal)	0.01965	0.01655	0.001985	0.00207	0.00202	0.000897	0.0000224	0.0101	0.0009225	0.00745	0.000118	0.000124	0.000625	0.00064	0.00089	0.000675	0.000012	0.065
				2,3,7,8-TCDD TEQ (Bird)	0.01965	0.01655	0.0009925	0.000207	0.00202	0.0000897	0.0000224	0.101	0.001845	0.0149	0.000118	0.000124	0.000625	0.00064	0.00089	0.000675	0.000012	0.160
Shiner	Humboldt Bay	TRAWL 2	DM-0039	Sample Result	0.0102	0.02175	0.0162	0.01605	0.0158	0.0796	0.406	0.0568	0.0249	0.0197	0.034	0.0148	0.029	0.0218	0.00915	0.00675	0.0783	--
				2,3,7,8-TCDD TEQ (Fish)	0.0102	0.02175	0.0081	0.0001605	0.000158	0.0000796	0.0000406	0.00284	0.001245	0.00985	0.00034	0.000148	0.0029	0.00218	0.000915	0.000675	0.00000783	0.062
				2,3,7,8-TCDD TEQ (Mammal)	0.0102	0.02175	0.00162	0.001605	0.00158	0.000796	0.0000406	0.00568	0.001245	0.00985	0.00034	0.000148	0.0029	0.00218	0.000915	0.000675	0.00000783	0.062
				2,3,7,8-TCDD TEQ (Bird)	0.0102	0.02175	0.00081	0.0001605	0.00158	0.0000796	0.0000406	0.0568	0.00249	0.0197	0.00034	0.000148	0.0029	0.00218	0.000915	0.000675	0.00000783	0.121
Shiner	Humboldt Bay	TRAWL 16	DM-0065	Sample Result	0.14	0.06	0.204	0.19	0.186	0.15	0.229	0.321	0.1115	0.063	0.062	0.0855	0.081	0.077	0.131	0.087	0.1215	--
				2,3,7,8-TCDD TEQ (Fish)	0.14	0.06	0.102	0.0019	0.00186	0.00015	0.0000229	0.01605	0.005575	0.0315	0.00062	0.000855	0.0081	0.0077	0.0131	0.0087	0.00001215	0.398
				2,3,7,8-TCDD TEQ (Mammal)	0.14	0.06	0.0204	0.019	0.0186	0.0015	0.0000229	0.0321	0.005575	0.0315	0.00062	0.000855	0.0081	0.0077	0.0131	0.0087	0.00001215	0.368
				2,3,7,8-TCDD TEQ (Bird)	0.14	0.06	0.0102	0.0019	0.0186	0.00015	0.0000229	0.321	0.01115	0.063	0.00062	0.000855	0.0081	0.0077	0.0131	0.0087	0.00001215	0.665
Shiner	Humboldt Bay	TRAWL 17	DM-0073	Sample Result	0.152	0.1605	0.1565	0.144	0.142	0.1515	0.8	0.526	0.1625	0.1255	0.03945	0.053	0.0625	0.064	0.0945	0.067	0.1565	--
				2,3,7,8-TCDD TEQ (Fish)	0.152	0.1605	0.07825	0.00144	0.00142	0.0001515	0.00008	0.0263	0.008125	0.06275	0.0003945	0.00053	0.00625	0.0064	0.00945	0.0067	0.00001565	0.521
				2,3,7,8-TCDD TEQ (Mammal)	0.152	0.1605	0.01565	0.0144	0.0142	0.001515	0.00008	0.0526	0.008125	0.06275	0.0003945	0.00053	0.00625	0.0064	0.00945	0.0067	0.00001565	0.512
				2,3,7,8-TCDD TEQ (Bird)	0.152	0.1605	0.007825	0.00144	0.0142	0.0001515	0.00008	0.526	0.01625	0.1255	0.0003945	0.00053	0.00625	0.0064	0.00945	0.0067	0.00001565	1.03
Shiner	Humboldt Bay	TRAWL 18	DM-0075	Sample Result	0.163	0.1535	0.129	0.1245	0.12	1.15	6.77	0.765	0.157	0.327	0.219	0.0775	0.0535	0.0498	0.0765	0.0575	0.559	--
				2,3,7,8-TCDD TEQ (Fish)	0.163	0.1535	0.0645	0.001245	0.0012	0.00115	0.000677	0.03825	0.00785	0.1635	0.00219	0.000775	0.00535	0.00498	0.00765	0.00575	0.0000559	0.622
				2,3,7,8-TCDD TEQ (Mammal)	0.163	0.1535	0.0129	0.01245	0.012	0.0115	0.000677	0.0765	0.00785	0.1635	0.00219	0.000775	0.00535	0.00498	0.00765	0.00575	0.0000559	0.641
				2,3,7,8-TCDD TEQ (Bird)	0.163	0.1535	0.00645	0.001245	0.012	0.00115	0.000677	0.765	0.0157	0.327	0.00219	0.000775	0.00535	0.00498	0.00765	0.00575	0.0000559	1.47
Shiner	Mill Area	TRAWL 10/11	DM-0055	Sample Result	0.1435	0.095	0.1485	0.1455	0.146	0.543	1.465	0.138	0.128	0.1045	0.099	0.099	0.0775	0.0379	0.062	0.04295	0.624	--
				2,3,7,8-TCDD TEQ (Fish)	0.1435	0.095	0.07425	0.001455	0.00146	0.000543	0.0001465	0.0069	0.0064	0.05225	0.00099	0.00099	0.00775	0.00379	0.0062	0.004295	0.0000624	0.406
				2,3,7,8-TCDD TEQ (Mammal)	0.1435	0.095	0.01485	0.01455	0.0146	0.00543	0.0001465	0.0138	0.0064	0.05225	0.00099	0.00099	0.00775	0.00379	0.0062	0.004295	0.0000624	0.385
				2,3,7,8-TCDD TEQ (Bird)	0.1435	0.095	0.007425	0.001455	0.0146	0.000543	0.0001465	0.138	0.0128	0.1045	0.00099	0.00099	0.00775	0.00379	0.0062	0.004295	0.0000624	0.542
Shrimp	Humboldt Bay	TRAWL 2	DM-0041	Sample Result	0.02125	0.0696	0.01705	0.02715	0.01685	0.074	0.622	0.138	0.01375	0.0382	0.02005	0.00935	0.0307	0.00545	0.00835	0.0062	0.1	--
				2,3,7,8-TCDD TEQ (Fish)	0.02125	0.0696	0.008525	0.0002715	0.0001685	0.000074	0.0000622	0.0069	0.0006875	0.0191	0.0002005	0.0000935	0.00307	0.000545	0.000835	0.00062	0.00001	0.132
				2,3,7,8-TCDD TEQ (Mammal)	0.02125	0.0696	0.001705	0.002715	0.001685	0.00074	0.0000622	0.0138	0.0006875	0.0191	0.0002005	0.0000935	0.00307	0.000545	0.000835	0.00062	0.00001	0.137
				2,3,7,8-TCDD TEQ (Bird)	0.02125	0.0696	0.0008525	0.0002715	0.001685	0.000074	0.0000622	0.138	0.001375	0.0382	0.0002005	0.0000935	0.00307	0.000545	0.000835	0.00062	0.00001	0.277
Shrimp	Humboldt Bay	TRAWL 4	DM-0045	Sample Result	0.0615	0.406	0.1495	0.149	0.142	0.609	2.32	1.04	0.133	0.1095	0.161	0.058	0.0398	0.0408	0.0675	0.04505	0.1605	--
				2,3,7,8-TCDD TEQ (Fish)	0.0615	0.406	0.07475	0.00149	0.00142	0.000609	0.000232	0.052	0.00665	0.05475	0.00161	0.00058	0.00398	0.00408	0.00675	0.004505	0.00001605	0.681
				2,3,7,8-TCDD TEQ (Mammal)	0.0615	0.406	0.01495	0.0149	0.0142	0.00609	0.000232	0.104	0.00665	0.05475	0.00161	0.00058	0.00398	0.00408	0.00675	0.004505	0.00001605	0.705
				2,3,7,8-TCDD TEQ (Bird)	0.0615	0.406	0.007475	0.00149	0.0142	0.000609	0.000232	1.04	0.0133	0.1095	0.00161	0.00058	0.00398	0.00408	0.00675	0.004505	0.00001605	1.68
Shrimp	Mill Area	TRAWL 5	DM-0048	Sample Result	0.0178	0.02935	0.02525	0.0764	0.02385	0.247	0.6	0.0689	0.02705	0.0221	0.0175	0.0156	0.0172	0.0072	0.01245	0.00755	0.0525	--
				2,3,7,8-TCDD TEQ (Fish)	0.0178	0.02935	0.012625	0.000764	0.0002385	0.000247	0.00006	0.003445	0.0013525	0.01105	0.000175	0.000156	0.00172	0.00072	0.001245	0.000755	0.00000525	0.082
				2,3,7,8-TCDD TEQ (Mammal)	0.0178	0.02935	0.002525	0.00764	0.002385	0.00247	0.00006	0.00689	0.0013525	0.01105	0.000175	0.000156	0.00172	0.00072	0.001245	0.000755	0.00000525	0.086
				2,3,7,8-TCDD TEQ (Bird)	0.0178	0.02935	0.0012625	0.000764	0.002385	0.000247	0.00006	0.0689	0.002705	0.0221	0.000175	0.000156	0.00172	0.00072	0.001245	0.000755	0.00000525	0.150
Shrimp	Mill Area	TRAWL 7/8	DM-0052	Sample Result	0.0217	0.0207	0.0666	0.0638	0.0228	0.342	1	0.0565	0.0745	0.066	0.0432	0.0203	0.0295	0.004255	0.0063	0.004285	0.129	--
				2,3,7,8-TCDD TEQ (Fish)	0.0217	0.0207	0.0333	0.000638	0.000228	0.000342	0.0001	0.002825	0.003725	0.033	0.000432	0.000203	0.00295	0.0004255	0.00063	0.0004285	0.0000129	0.122
				2,3,7,8-TCDD TEQ (Mammal)	0.0217	0.0207	0.00666	0.00638	0.00228	0.00342	0.0001	0.00565	0.003725	0.033	0.000432	0.000203	0.00295	0.0004255	0.00063	0.0004285	0.0000129	0.109
				2,3,7,8-TCDD TEQ (Bird)	0.0217	0.0207	0.00333	0.000638	0.00228	0.000342	0.0001	0.0565	0.00745	0.066	0.000432	0.000203	0.00295	0.0004255	0.00063	0.0004285	0.0000129	0.184
Shrimp	Mill Area	TRAWL 10/11	DM-0056	Sample Result	0.074	0.0575	0.1005	0.1035	0.1015	0.918	3.115	0.099	0.1165	0.091	0.057	0.056	0.02925	0.02765	0.0456	0.03325	0.357	--
				2,3,7,8-TCDD TEQ (Fish)	0.074	0.0575	0.05025	0.001035	0.001015	0.000918	0.0003115	0.00495	0.005825	0.0455	0.00057	0.00056	0.002925	0.002765	0.00456	0.003325	0.0000357	0.256
				2,3,7,8-TCDD TEQ (Mammal)	0.074	0.0575	0.01005	0.01035	0.01015	0.00918	0.0003115	0.0099	0.005825	0.0455	0.00057	0.00056	0.002925	0.002765	0.00456	0.003325	0.0000357	0.248
				2,3,7,8-TCDD TEQ (Bird)	0.074	0.0575	0.005025	0.001035	0.01015	0.000918	0.0003115	0.099	0.01165	0.091	0.00057	0.00056	0.002925	0.002765	0.00456	0.003325	0.0000357	0.365

CALCULATION OF DIOXIN/FURAN TOXICITY EQUIVALENTS (2,3,7,8-TCDD TEQs)[1,2]

Sierra Pacific Industries Arcata Division Sawmill

Arcata, California

Geomatrix

Concentrations are presented in nanograms per kilogram (ng/kg)

Matrix	Area Name	Station Location	Sample ID	Sample Result / Toxic Equivalents	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	2,3,4,6,7,8-HxCDF	OCDF	2,3,7,8-TCDD TEQ
				Fish Toxic Equivalency Factor (Fish TEF) [3]	1	1	0.5	0.01	0.01	0.001	0.0001	0.05	0.05	0.5	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
				Mammal Toxic Equivalency Factor (Mammal TEF) [3]	1	1	0.1	0.1	0.1	0.01	0.0001	0.1	0.05	0.5	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
				Bird Toxic Equivalency Factor (Bird TEF) [3]	1	1	0.05	0.01	0.1	0.001	0.0001	1	0.1	1	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
Sole	Humboldt Bay	TRAWL 2	DM-0038 & DM-0040	Sample Result	0.00875	0.0254	0.01265	0.0288	0.012	0.105	0.569	0.0633	0.02115	0.017	0.0225	0.01145	0.0236	0.01085	0.01595	0.01205	0.109	--
				2,3,7,8-TCDD TEQ (Fish)	0.00875	0.0254	0.006325	0.000288	0.00012	0.000105	0.0000569	0.003165	0.0010575	0.0085	0.000225	0.0001145	0.00236	0.001085	0.001595	0.001205	0.0000109	0.060
				2,3,7,8-TCDD TEQ (Mammal)	0.00875	0.0254	0.001265	0.00288	0.0012	0.00105	0.0000569	0.00633	0.0010575	0.0085	0.000225	0.0001145	0.00236	0.001085	0.001595	0.001205	0.0000109	0.063
				2,3,7,8-TCDD TEQ (Bird)	0.00875	0.0254	0.0006325	0.000288	0.0012	0.000105	0.0000569	0.0633	0.002115	0.017	0.000225	0.0001145	0.00236	0.001085	0.001595	0.001205	0.0000109	0.125
Sole	Humboldt Bay	TRAWL 4	DM-0042 & DM-0043	Sample Result	0.0126	0.0214	0.01455	0.0422	0.0143	0.111	0.417	0.0719	0.01465	0.0119	0.0847	0.0081	0.01655	0.0067	0.0099	0.0072	0.348	--
				2,3,7,8-TCDD TEQ (Fish)	0.0126	0.0214	0.007275	0.000422	0.000143	0.000111	0.0000417	0.003595	0.0007325	0.00595	0.000847	0.000081	0.001655	0.00067	0.00099	0.00072	0.0000348	0.057
				2,3,7,8-TCDD TEQ (Mammal)	0.0126	0.0214	0.001455	0.00422	0.00143	0.00111	0.0000417	0.00719	0.0007325	0.00595	0.000847	0.000081	0.001655	0.00067	0.00099	0.00072	0.0000348	0.061
				2,3,7,8-TCDD TEQ (Bird)	0.0126	0.0214	0.0007275	0.000422	0.00143	0.000111	0.0000417	0.0719	0.001465	0.0119	0.000847	0.000081	0.001655	0.00067	0.00099	0.00072	0.0000348	0.127
Sole	Humboldt Bay	TRAWL 15	DM-0062 & DM-0068	Sample Result	0.0316	0.01585	0.0178	0.0537	0.0172	0.11	0.435	0.0784	0.0141	0.0167	0.0206	0.00555	0.01475	0.0138	0.0061	0.004495	0.0898	--
				2,3,7,8-TCDD TEQ (Fish)	0.0316	0.01585	0.0089	0.000537	0.000172	0.00011	0.0000435	0.00392	0.000705	0.00835	0.000206	0.0000555	0.001475	0.00138	0.00061	0.0004495	0.00000898	0.074
				2,3,7,8-TCDD TEQ (Mammal)	0.0316	0.01585	0.00178	0.00537	0.00172	0.0011	0.0000435	0.00784	0.000705	0.00835	0.000206	0.0000555	0.001475	0.00138	0.00061	0.0004495	0.00000898	0.079
				2,3,7,8-TCDD TEQ (Bird)	0.0316	0.01585	0.00089	0.000537	0.00172	0.00011	0.0000435	0.0784	0.00141	0.0167	0.000206	0.0000555	0.001475	0.00138	0.00061	0.0004495	0.00000898	0.151
Sole	Humboldt Bay	TRAWL 15	DM-0063 & DM-0069	Sample Result	0.0705	0.075	0.087	0.0835	0.081	0.101	0.865	0.062	0.099	0.0815	0.0385	0.051	0.0235	0.02425	0.03965	0.02725	0.147	--
				2,3,7,8-TCDD TEQ (Fish)	0.0705	0.075	0.0435	0.000835	0.00081	0.000101	0.0000865	0.0031	0.00495	0.04075	0.000385	0.00051	0.00235	0.002425	0.003965	0.002725	0.0000147	0.252
				2,3,7,8-TCDD TEQ (Mammal)	0.0705	0.075	0.0087	0.00835	0.0081	0.00101	0.0000865	0.0062	0.00495	0.04075	0.000385	0.00051	0.00235	0.002425	0.003965	0.002725	0.0000147	0.236
				2,3,7,8-TCDD TEQ (Bird)	0.0705	0.075	0.00435	0.000835	0.0081	0.000101	0.0000865	0.062	0.0099	0.0815	0.000385	0.00051	0.00235	0.002425	0.003965	0.002725	0.0000147	0.325
Sole	Humboldt Bay	TRAWL 17	DM-0070 & DM-0072	Sample Result	0.0635	0.067	0.1025	0.0945	0.093	0.175	0.576	0.0955	0.1055	0.0825	0.0525	0.0735	0.0434	0.03955	0.066	0.04495	0.104	--
				2,3,7,8-TCDD TEQ (Fish)	0.0635	0.067	0.05125	0.000945	0.00093	0.000175	0.0000576	0.004775	0.005275	0.04125	0.000525	0.000735	0.00434	0.003955	0.0066	0.004495	0.0000104	0.256
				2,3,7,8-TCDD TEQ (Mammal)	0.0635	0.067	0.01025	0.00945	0.0093	0.00175	0.0000576	0.00955	0.005275	0.04125	0.000525	0.000735	0.00434	0.003955	0.0066	0.004495	0.0000104	0.238
				2,3,7,8-TCDD TEQ (Bird)	0.0635	0.067	0.005125	0.000945	0.0093	0.000175	0.0000576	0.0955	0.01055	0.0825	0.000525	0.000735	0.00434	0.003955	0.0066	0.004495	0.0000104	0.355
Sole	Humboldt Bay	TRAWL 18	DM-0076 & DM-0077	Sample Result	0.0655	0.0475	0.075	0.0765	0.072	0.093	0.438	0.0965	0.1025	0.0835	0.04145	0.054	0.02615	0.0266	0.04205	0.02885	0.2	--
				2,3,7,8-TCDD TEQ (Fish)	0.0655	0.0475	0.0375	0.000765	0.00072	0.000093	0.0000438	0.004825	0.005125	0.04175	0.0004145	0.00054	0.002615	0.00266	0.004205	0.002885	0.00002	0.217
				2,3,7,8-TCDD TEQ (Mammal)	0.0655	0.0475	0.0075	0.00765	0.0072	0.00093	0.0000438	0.00965	0.005125	0.04175	0.0004145	0.00054	0.002615	0.00266	0.004205	0.002885	0.00002	0.206
				2,3,7,8-TCDD TEQ (Bird)	0.0655	0.0475	0.00375	0.000765	0.0072	0.000093	0.0000438	0.0965	0.01025	0.0835	0.0004145	0.00054	0.002615	0.00266	0.004205	0.002885	0.00002	0.328
Sole	Mill Area	TRAWL 5	DM-0046	Sample Result	0.01725	0.0525	0.0123	0.0216	0.01225	0.166	0.478	0.0892	0.01145	0.0286	0.0699	0.0107	0.032	0.0056	0.00825	0.006	0.199	--
				2,3,7,8-TCDD TEQ (Fish)	0.01725	0.0525	0.00615	0.000216	0.0001225	0.000166	0.0000478	0.00446	0.0005725	0.0143	0.000699	0.000107	0.0032	0.00056	0.000825	0.0006	0.0000199	0.102
				2,3,7,8-TCDD TEQ (Mammal)	0.01725	0.0525	0.00123	0.00216	0.001225	0.00166	0.0000478	0.00892	0.0005725	0.0143	0.000699	0.000107	0.0032	0.00056	0.000825	0.0006	0.0000199	0.106
				2,3,7,8-TCDD TEQ (Bird)	0.01725	0.0525	0.000615	0.000216	0.001225	0.000166	0.0000478	0.0892	0.001145	0.0286	0.000699	0.000107	0.0032	0.00056	0.000825	0.0006	0.0000199	0.197
Sole	Mill Area	TRAWL 5	DM-0047	Sample Result	0.0323	0.0952	0.0192	0.17	0.01685	0.686	5.98	0.197	0.02355	0.0595	0.103	0.0196	0.02675	0.0176	0.0114	0.00745	0.226	--
				2,3,7,8-TCDD TEQ (Fish)	0.0323	0.0952	0.0096	0.0017	0.0001685	0.000686	0.000598	0.00985	0.0011775	0.02975	0.00103	0.000196	0.002675	0.00176	0.00114	0.000745	0.0000226	0.189
				2,3,7,8-TCDD TEQ (Mammal)	0.0323	0.0952	0.00192	0.017	0.001685	0.00686	0.000598	0.0197	0.0011775	0.02975	0.00103	0.000196	0.002675	0.00176	0.00114	0.000745	0.0000226	0.214
				2,3,7,8-TCDD TEQ (Bird)	0.0323	0.0952	0.00096	0.0017	0.001685	0.000686	0.000598	0.197	0.002355	0.0595	0.00103	0.000196	0.002675	0.00176	0.00114	0.000745	0.0000226	0.400
Sole	Mill Area	TRAWL 6	DM-0049	Sample Result	0.03075	0.0585	0.0255	0.0885	0.01625	0.39	0.68	0.209	0.03345	0.0923	0.183	0.0164	0.0282	0.0275	0.0137	0.0098	0.154	--
				2,3,7,8-TCDD TEQ (Fish)	0.03075	0.0585	0.01275	0.000885	0.0001625	0.00039	0.000068	0.01045	0.0016725	0.04615	0.00183	0.000164	0.00282	0.00275	0.00137	0.00098	0.0000154	0.172
				2,3,7,8-TCDD TEQ (Mammal)	0.03075	0.0585	0.00255	0.00885	0.001625	0.0039	0.000068	0.0209	0.0016725	0.04615	0.00183	0.000164	0.00282	0.00275	0.00137	0.00098	0.0000154	0.185
				2,3,7,8-TCDD TEQ (Bird)	0.03075	0.0585	0.001275	0.000885	0.001625	0.00039	0.000068	0.209	0.003345	0.0923	0.00183	0.000164	0.00282	0.00275	0.00137	0.00098	0.0000154	0.408
Sole	Mill Area	TRAWL 6	DM-0050	Sample Result	0.0397	0.0715	0.0525	0.147	0.052	0.283	0.515	0.158	0.04365	0.0365	0.0856	0.0224	0.0517	0.01785	0.0167	0.0118	0.184	--
				2,3,7,8-TCDD TEQ (Fish)	0.0397	0.0715	0.02625	0.00147	0.00052	0.000283	0.0000515	0.0079	0.0021825	0.01825	0.000856	0.000224	0.00517	0.001785	0.00167	0.00118	0.0000184	0.179
				2,3,7,8-TCDD TEQ (Mammal)	0.0397	0.0715	0.00525	0.0147	0.0052	0.00283	0.0000515	0.0158	0.0021825	0.01825	0.000856	0.000224	0.00517	0.001785	0.00167	0.00118	0.0000184	0.186
				2,3,7,8-TCDD TEQ (Bird)	0.0397	0.0715	0.002625	0.00147	0.0052	0.000283	0.0000515	0.158	0.004365	0.0365	0.000856	0.000224	0.00517	0.001785	0.00167	0.00118	0.0000184	0.331
Sole	Mill Area	TRAWL 7/8	DM-0051	Sample Result	0.02705	0.0781	0.0333	0.13	0.0326	0.338	0.69	0.127	0.0264	0.0635	0.135	0.01445	0.0456	0.01755	0.00715	0.0257	0.069	--
				2,3,7,8-TCDD TEQ (Fish)	0.02705	0.0781	0.01665	0.0013	0.000326	0.000338	0.000069	0.00635	0.00132	0.03175	0.00135	0.0001445	0.00456	0.001755	0.000715	0.00257	0.0000069	0.174
				2,3,7,8-TCDD TEQ (Mammal)	0.02705	0.0781	0.00333	0.013	0.00326	0.00338	0.000069	0.0127	0.00132	0.03175	0.00135	0.0001445	0.00456	0.001755	0.000715	0.00257	0.0000069	0.185
				2,3,7,8-TCDD TEQ (Bird)	0.02705	0.0781	0.001665	0.0013	0.00326	0.000338	0.000069	0.127	0.00264	0.0635	0.00135	0.0001445	0.00456	0.001755	0.000715	0.00257	0.0000069	0.316
Sole	Mill Area	TRAWL 10/11	DM-0053	Sample Result	0.0496	0.182	0.0695	0.294	0.072	0.911	1.98	0.321	0.0875	0.0785	0.403	0.064	0.0829	0.0815	0.04815	0.0349	0.426	--
				2,3,7,8-TCDD TEQ (Fish)	0.0496	0.182	0.03475	0.00294	0.00072	0.000911	0.000198	0.01605	0.004375	0.03925	0.00403	0.00064	0.00829	0.00815	0.004815	0.00349	0.0000426	0.360
				2,3,7,8-TCDD TEQ (Mammal)	0.0496	0.182	0.00695	0.0294	0.0072	0.00911	0.000198	0.0321	0.004375	0.03925	0.00403	0.00064	0.00829	0.00815	0.004815	0.00349	0.0000426	0.390
				2,3,7,8-TCDD TEQ (Bird)	0.0496	0.182	0.003475	0.00294	0.0072	0.000911	0.000198	0.321	0.00875	0.0785	0.00403	0.00064	0.00829	0.00815	0.004815	0.00349	0.0000426	0.684
Sole	Mill Area	TRAWL 13	DM-0057	Sample Result	0.02485	0.0471	0.108	0.449	0.131	3.04	5.4	0.153	0.0484	0.03305	0.365	0.0164	0.03855	0.0459	0.0113	0.042	0.136	--
				2,3,7,8-TCDD TEQ (Fish)	0.02485	0.0471	0.054	0.00449	0.00131	0.00304	0.00054	0.00765	0.00242	0.016525	0.00365	0.000164	0.003855	0.00459	0.00113	0.0042	0.0000136	0.180
				2,3,7,8-TCDD TEQ (Mammal)	0.02485	0.0471	0.0108	0.0449	0.0131	0.0304	0.00054	0.0153	0.00242	0.016525	0.00365	0.000164	0.003855	0.00459	0.00113	0.0042	0.0000136	0.224
				2,3,7,8-TCDD TEQ (Bird)	0.02485	0.0471	0.0054	0.00449	0.0131	0.00304	0.00054	0.153	0.00484	0.03305	0.00365	0.000164	0.003855	0.00459	0.00113	0.0042	0.0000136	0.307

Notes:

1. Table revised June 22, 2007.
2. Dixon/furan concentrations reported as non-detect are represented by one-half the detection limit.
3. Van den Berg et al., 1998. Fish, mammal, and bird toxic equivalents (TEQs) are calculated for each sample using the appropriate toxic equivalency factors (TEFs).

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CALCULATION OF DIOXIN/FURAN TOXICITY EQUIVALENTS (2,3,7,8-TCDD TEQs)[1,2]

Sierra Pacific Industries Arcata Division Sawmill

Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Matrix	Area Name	Station Location	Sample ID	Sample Result / Toxic Equivalents	2,3,7,8-TCDD	1,2,3,7,8-PeCDD	1,2,3,4,7,8-HxCDD	1,2,3,6,7,8-HxCDD	1,2,3,7,8,9-HxCDD	1,2,3,4,6,7,8-HpCDD	OCDD	2,3,7,8-TCDF	1,2,3,7,8-PeCDF	2,3,4,7,8-PeCDF	1,2,3,4,6,7,8-HpCDF	1,2,3,4,7,8,9-HpCDF	1,2,3,4,7,8-HxCDF	1,2,3,6,7,8-HxCDF	1,2,3,7,8,9-HxCDF	2,3,4,6,7,8-HxCDF	OCDF	2,3,7,8-TCDD TEQ
				Fish Toxic Equivalency Factor (Fish TEF)[3]	1	1	0.5	0.01	0.01	0.001	0.0001	0.05	0.05	0.5	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
				Mammal Toxic Equivalency Factor (Mammal TEF)[3]	1	1	0.1	0.1	0.1	0.01	0.0001	0.1	0.05	0.5	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--
				Bird Toxic Equivalency Factor (Bird TEF)[3]	1	1	0.05	0.01	0.1	0.001	0.0001	1	0.1	1	0.01	0.01	0.1	0.1	0.1	0.1	0.0001	--

Abbreviations:

TCDD = tetrachlorodibenzo-p-dioxin
PeCDD = pentachlorodibenzo-p-dioxin
HxCDD = hexachlorodibenzo-p-dioxin
HpCDD = heptachlorodibenzo-p-dioxin
OCDD = octachlorodibenzo-p-dioxin
TCDF = tetrachlorodibenzofuran
PeCDF = pentachlorodibenzofuran
HxCDF = hexachlorodibenzofuran
HpCDF = heptachlorodibenzofuran
OCDF = octachlorodibenzofuran
2,3,7,8-TCDD TEQs = 2,3,7,8 tetrachlorodibenzo-p-dioxin toxicity equivalents
0 = not analyzed
-- = not applicable

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APPENDIX E

Calculation of Representative Concentrations

Table E-1 Calculation of Representative Zinc Wet Weight Concentrations in Upland Sediment Samples

Table E-2 Calculation of Representative Zinc Wet Weight Concentrations in Shallow Sediment Samples from Mad River Slough (less than 1 foot below surface)

Table E-3 Calculation of Representative Zinc Wet Weight Concentrations in Deeper Sediment Samples from Mad River Slough (greater than 1 foot below surface)

Table E-4 Calculation of Representative Zinc Wet Weight Concentrations in Shallow Sediment Samples from Humboldt Bay (less than 1 foot below surface)

Table E-5 Calculation of Representative Wet Weight Zinc Concentrations in Deeper Sediment Samples from Humboldt Bay (greater than 1 foot below surface)

Table E-6 Calculation of Representative Zinc Concentrations in Oyster Tissue Samples from Mad River Slough

Table E-7 Calculation of Representative Zinc Concentrations in Oyster Tissue Samples from Humboldt Bay

Table E-8 Calculation of Representative Zinc Concentrations in Mussel Tissue Samples from Mad River Slough

Table E-9 Calculation of Representative Zinc Concentrations in Crab Tissue Samples from Mad River Slough

Table E-10 Calculation of Representative Zinc Concentrations in Crab Tissue Samples from Humboldt Bay

Table E-11 Calculation of Representative Zinc Concentrations in Sculpin Tissue Samples from Humboldt Bay

Table E-12 Calculation of Representative Zinc Concentrations in Perch Tissue Samples from Humboldt Bay

Table E-13 Calculation of Representative Zinc Concentrations in Shiner Tissue Samples from Humboldt Bay

Table E-14 Calculation of Representative Zinc Concentrations in Sole Tissue Samples from Mad River Slough

Table E-15 Calculation of Representative Zinc Concentrations in Sole Tissue Samples from Humboldt Bay

Table E-16 Calculation of Representative Zinc Concentrations in Shrimp Tissue Samples from Mad River Slough

Table E-17 Calculation of Representative Zinc Concentrations in Shark Tissue Samples from Mad River Slough

Table E-18 Calculation of Representative Dioxin/Furan Concentrations in Upland Sediment Samples

Table E-19 Calculation of Representative Dioxin/Furan Concentrations in Shallow Sediment Samples from Mad River Slough (less than 1 foot below surface)

Table E-20 Calculation of Representative Dioxin/Furan Concentrations in Deeper Sediment Samples from Mad River Slough (greater than 1 foot below surface)

Table E-21 Calculation of Representative Dioxin/Furan Concentrations in Shallow Sediment Samples from Humboldt Bay (less than 1 foot below surface)

Table E-22 Calculation of Representative Dioxin/Furan Concentrations in Deeper Sediment Samples from Humboldt Bay (greater than 1 foot below surface)

Table E-23 Calculation of Representative Dioxin/Furan Concentrations in Oyster Tissue Samples from Mad River Slough
Table E-24 Calculation of Representative Dioxin/Furan Concentrations in Oyster Tissue Samples from Humboldt Bay
Table E-25 Calculation of Representative Dioxin/Furan Concentrations in Mussel Tissue Samples from Mad River Slough
Table E-26 Calculation of Representative Dioxin/Furan Concentrations in Mussel Tissue Samples from Humboldt Bay
Table E-27 Calculation of Representative Dioxin/Furan Concentrations in Crab Tissue Samples from Mad River Slough
Table E-28 Calculation of Representative Dioxin/Furan Concentrations in Crab Tissue Samples from Humboldt Bay
Table E-29 Calculation of Representative Dioxin/Furan Concentrations in Sculpin Tissue Samples from Mad River Slough
Table E-30 Calculation of Representative Dioxin/Furan Concentrations in Sculpin Tissue Samples from Humboldt Bay
Table E-31 Calculation of Representative Dioxin/Furan Concentrations in Perch Tissue Samples from Humboldt Bay
Table E-32 Calculation of Representative Dioxin/Furan Concentrations in Shiner Tissue Samples from Mad River Slough
Table E-33 Calculation of Representative Dioxin/Furan Concentrations in Shiner Tissue Samples from Humboldt Bay
Table E-34 Calculation of Representative Dioxin/Furan Concentrations in Sole Tissue Samples from Mad River Slough
Table E-35 Calculation of Representative Dioxin/Furan Concentrations in Sole Tissue Samples from Humboldt Bay
Table E-36 Calculation of Representative Dioxin/Furan Concentrations in Shrimp Tissue Samples from Mad River Slough
Table E-37 Calculation of Representative Dioxin/Furan Concentrations in Shrimp Tissue Samples from Humboldt Bay
Table E-38 Calculation of Representative Dioxin/Furan Concentrations in Shark Tissue Samples from Mad River Slough
Table E-39 Calculation of Representative Zinc Dry Weight Concentrations in Upland Sediment Samples
Table E-40 Calculation of Representative Zinc Dry Weight Concentrations in Shallow Sediment Samples from Mad River Slough (less than 1 foot below surface)
Table E-41 Calculation of Representative Zinc Dry Weight Concentrations in Deeper Sediment Samples from Mad River Slough (greater than 1 foot below surface)
Table E-42 Calculation of Representative Zinc Dry Weight Concentrations in Shallow Sediment Samples from Humboldt Bay (less than 1 foot below surface)
Table E-43 Calculation Of Representative Dry Weight Zinc Concentrations In Deeper Sediment Samples From Humboldt Bay (Greater Than 1 Foot Below Surface)

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TABLE E-1

CALCULATION OF REPRESENTATIVE ZINC WET WEIGHT CONCENTRATIONS IN UPLAND SEDIMENT SAMPLES

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	Zinc
D6-1	D6-1-0.0-0.5	Upland Mill Area	Sediment	7/22/2003	110
D6-10	D6-10-0.0-0.5	Upland Mill Area	Sediment	7/23/2003	51
D6-11	D6-11-0.0-0.5	Upland Mill Area	Sediment	7/23/2003	56
D6-12	D6-12-0.0-0.5	Upland Mill Area	Sediment	7/23/2003	240
D6-13	D6-13-0.0-0.5	Upland Mill Area	Sediment	7/23/2003	58
D6-14	D6-14-0.0-0.5	Upland Mill Area	Sediment	7/23/2003	110
D6-15	D6-15-0.0-0.5	Upland Mill Area	Sediment	7/23/2003	110
D6-16	D6-16-0.0-0.5	Upland Mill Area	Sediment	7/23/2003	78
D6-17	D6-17-0.0-0.5	Upland Mill Area	Sediment	7/23/2003	19
D6-18	D6-18-0.0-0.5	Upland Mill Area	Sediment	7/24/2003	30
D6-19	D6-19-0.0-0.5	Upland Mill Area	Sediment	7/24/2003	49
D6-2	D6-2-0.0-0.5	Upland Mill Area	Sediment	7/22/2003	190
D6-20	D6-20-0.0-0.5	Upland Mill Area	Sediment	7/24/2003	37
D6-21	D6-21-0.0-0.5	Upland Mill Area	Sediment	7/24/2003	14
D6-22	D6-22-0.0-0.5	Upland Mill Area	Sediment	7/24/2003	21
D6-23	D6-23-0.0-0.5	Upland Mill Area	Sediment	7/24/2003	17
D6-24	D6-24-0.0-0.5	Upland Mill Area	Sediment	7/24/2003	48
D6-3	D6-3-0.0-0.5	Upland Mill Area	Sediment	7/22/2003	280
D6-4	D6-4-0.0-0.5	Upland Mill Area	Sediment	7/22/2003	160
D6-5	D6-5-0.0-0.5	Upland Mill Area	Sediment	7/22/2003	76
D6-6	D6-6-0.0-0.5	Upland Mill Area	Sediment	7/22/2003	120
D6-7	D6-7-0.0-0.5	Upland Mill Area	Sediment	7/22/2003	39
D6-8	D6-8-0.0-0.5	Upland Mill Area	Sediment	7/23/2003	58
D6-9	D6-9-0.0-0.5	Upland Mill Area	Sediment	7/23/2003	46
D7-1	D7-1-0.0-0.5	Upland Mill Area	Sediment	7/9/2003	170
D7-10	D7-10-0.0-0.5	Upland Mill Area	Sediment	7/10/2003	370
D7-11	D7-11-0.0-0.5	Upland Mill Area	Sediment	7/10/2003	120
D7-12	D7-12-0.0-0.5	Upland Mill Area	Sediment	7/10/2003	75
D7-13	D7-13-0.0-0.5	Upland Mill Area	Sediment	7/10/2003	70
D7-14	D7-14-0.0-0.5	Upland Mill Area	Sediment	7/10/2003	110
D7-15	D7-15-0.0-0.5	Upland Mill Area	Sediment	7/10/2003	100
D7-16	D7-16-0.0-0.5	Upland Mill Area	Sediment	7/10/2003	210
D7-17	D7-17-0.0-0.5	Upland Mill Area	Sediment	7/10/2003	460
D7-2	D7-2-0.0-0.5	Upland Mill Area	Sediment	7/9/2003	140
D7-3	D7-3-0.0-0.5	Upland Mill Area	Sediment	7/9/2003	60
D7-4	D7-4-0.0-0.5	Upland Mill Area	Sediment	7/9/2003	150
D7-5	D7-5-0.0-0.5	Upland Mill Area	Sediment	7/9/2003	39
D7-6	D7-6-0.0-0.5	Upland Mill Area	Sediment	7/9/2003	23
D7-7	D7-7-0.0-0.5	Upland Mill Area	Sediment	7/9/2003	27
D7-8	D7-8-0.0-0.5	Upland Mill Area	Sediment	7/9/2003	34
D7-9	D7-9-0.0-0.5	Upland Mill Area	Sediment	7/10/2003	140
RP-1	RP-1-0.0-0.5	Upland Mill Area	Sediment	7/8/2003	150
RP-1	RP-1-0.5-1.0	Upland Mill Area	Sediment	7/8/2003	140

TABLE E-1

CALCULATION OF REPRESENTATIVE ZINC WET WEIGHT CONCENTRATIONS IN UPLAND SEDIMENT SAMPLES

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	Zinc
RP-1	RP-1-1.0-1.5	Upland Mill Area	Sediment	7/8/2003	140
RP-1	RP-1-1.5-2.0	Upland Mill Area	Sediment	7/8/2003	100
RP-1	RP-1-2.0-2.5	Upland Mill Area	Sediment	7/8/2003	63
RP-2	RP-2-0.0-0.5	Upland Mill Area	Sediment	7/8/2003	61
RP-2	RP-2-0.5-1.0	Upland Mill Area	Sediment	7/8/2003	55
RP-2	RP-2-1.0-1.5	Upland Mill Area	Sediment	7/8/2003	53
RP-2	RP-2-1.5-2.0	Upland Mill Area	Sediment	7/8/2003	18
RP-2	RP-2-2.0-2.5	Upland Mill Area	Sediment	7/8/2003	19
SDP-1	SDP-1-0.0-0.5	Upland Mill Area	Sediment	7/9/2003	160
SDP-1	SDP-1-2.0-2.5	Upland Mill Area	Sediment	7/9/2003	37
Ditch-1 Pipe	Ditch-1 @ Dry Shed Pipe	Upland Mill Area	Sediment	6/14/2001	270
Ditch-1 West	Ditch-1 West of Dry Shed Pipe	Upland Mill Area	Sediment	6/14/2001	330
Ditch-4	Ditch-4	Upland Mill Area	Sediment	6/14/2001	28
				Count (n)	56
				Number of Detects	56
				Number of Non-Detects	0
				Minimum Detection	14
				Maximum Detection	460
				Minimum Detection Limit	0
				Maximum Detection Limit	0
				Detection Frequency	1
				Mean (x)	106.05
				Standard Deviation (SD)	94.19
				T Value (t)	1.67
				95% UCL[1]	127.11

Note:

[1] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

Geomatrix

TABLE E-2

CALCULATION OF REPRESENTATIVE ZINC WET WEIGHT CONCENTRATIONS IN SHALLOW SEDIMENT SAMPLES FROM MAD RIVER SLOUGH (LESS THAN 1 FOOT BELOW SURFACE)

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	Zinc
C-02	C2-0.0-0.5	Mill Area	Sediment	10/22/2002	46
C-03	C3-0.0-0.5	Mill Area	Sediment	10/22/2002	44
C-04	C4-0.0-0.5	Mill Area	Sediment	10/22/2002	43
C-05	C5-0.0-0.5	Mill Area	Sediment	10/22/2002	30
C-06	C6-0-0.5	Mill Area	Sediment	10/24/2002	53
C-18	C18-0.0-0.5	Mill Area	Sediment	10/22/2002	54
C-19	C19-0.0-0.5	Mill Area	Sediment	10/23/2002	53
C-31	C31-0.0-0.5	Mill Area	Sediment	10/23/2002	37
C-32	C32-0.0-0.5	Mill Area	Sediment	10/23/2002	39
C-35	C35-0-0.5	Mill Area	Sediment	10/23/2002	52
C-39	C39-0-0.5	Mill Area	Sediment	10/24/2002	29
Outfall-1	Outfall-1	Mill Area	Sediment	6/14/2001	49
Outfall-2	Outfall-2	Mill Area	Sediment	6/14/2001	61
Outfall-3	Outfall-3	Mill Area	Sediment	6/14/2001	49
Outfall-4	Outfall-4	Mill Area	Sediment	6/14/2001	44
Outfall-2	Outfall 2	Mill Area	Sediment	6/14/2001	63
LOC 11	DM-0026	Mill Area	Sediment	10/21/2002	50
LOC 12	DM-0027	Mill Area	Sediment	10/21/2002	50
LOC 13	DM-0028	Mill Area	Sediment	10/21/2002	47
LOC 14	DM-0029	Mill Area	Sediment	10/22/2002	54
LOC 4	DM-0022	Mill Area	Sediment	10/21/2002	48
LOC 4	DM-0024	Mill Area	Sediment	10/21/2002	32
				Count (n)	22
				Number of Detects	22
				Number of Non-Detects	0
				Minimum Detection	29
				Maximum Detection	63
				Minimum Detection Limit	0
				Maximum Detection Limit	0
				Detection Frequency	100%
				Mean (x)	46.68
				Standard Deviation (SD)	9.02
				T Value (t)	1.72
				95% UCL[1]	49.99

Note:

[1] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

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TABLE E-3

CALCULATION OF REPRESENTATIVE ZINC WET WEIGHT CONCENTRATIONS IN DEEPER SEDIMENT SAMPLES FROM MAD RIVER SLOUGH (GREATER THAN 1 FOOT BELOW SURFACE)

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	Zinc
C-02	C2-1.0-1.5	Mill Area	Sediment	10/22/2002	53
C-03	C3-1.0-1.5	Mill Area	Sediment	10/22/2002	56
C-04	C4-1.0-1.8	Mill Area	Sediment	10/22/2002	50
C-05	C5-1.0-1.5	Mill Area	Sediment	10/22/2002	48
C-15	C15-1.0-1.5	Mill Area	Sediment	10/22/2002	51
C-18	C18-1.0-1.5	Mill Area	Sediment	10/22/2002	46
				Count (n)	6
				Number of Detects	6
				Number of Non-Detects	0
				Minimum Detection	46
				Maximum Detection	56
				Minimum Detection Limit	0
				Maximum Detection Limit	0
				Detection Frequency	100%
				Mean (x)	50.67
				Standard Deviation (SD)	3.56
				T Value (t)	2.02
				95% UCL[1]	53.59

Note:

[1] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

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TABLE E-4

CALCULATION OF REPRESENTATIVE ZINC WET WEIGHT CONCENTRATIONS IN SHALLOW SEDIMENT SAMPLES FROM HUMBOLDT BAY (LESS THAN 1 FOOT BELOW SURFACE)

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	Zinc
C-40-2	C40-2-0-0.5	Humboldt Bay	Sediment	10/24/2002	49
C-41	C41-0-0.5	Humboldt Bay	Sediment	10/24/2002	53
C-42	C42-0-0.5	Humboldt Bay	Sediment	10/24/2002	38
C-43	C43-0-0.5	Humboldt Bay	Sediment	10/24/2002	68
C-44	C44-0-0.5	Humboldt Bay	Sediment	10/24/2002	50
LOC 1	DM-0004	Humboldt Bay	Sediment	10/21/2002	40
LOC 10a	DM-0008	Humboldt Bay	Sediment	10/21/2002	31
LOC 10b	DM-0010	Humboldt Bay	Sediment	10/21/2002	44
LOC 15	DM-0081	Humboldt Bay	Sediment	10/24/2002	34
LOC 16	DM-0082	Humboldt Bay	Sediment	10/24/2002	28
LOC 17	DM-0083	Humboldt Bay	Sediment	10/24/2002	43
LOC 18	DM-0084	Humboldt Bay	Sediment	10/24/2002	23
LOC 19	DM-0085	Humboldt Bay	Sediment	10/24/2002	25
LOC 2	DM-0002	Humboldt Bay	Sediment	10/21/2002	35
LOC 20	DM-0086	Humboldt Bay	Sediment	10/25/2002	44
LOC 21	DM-0087	Humboldt Bay	Sediment	10/23/2002	60
LOC 22	DM-0088	Humboldt Bay	Sediment	10/23/2002	120
LOC 3	DM-0016	Humboldt Bay	Sediment	10/21/2002	41
LOC 5	DM-0018	Humboldt Bay	Sediment	10/21/2002	36
LOC 6	DM-0020	Humboldt Bay	Sediment	10/21/2002	35
LOC 7	DM-0014	Humboldt Bay	Sediment	10/21/2002	45
LOC 8	DM-0012	Humboldt Bay	Sediment	10/21/2002	42
LOC 9	DM-0006	Humboldt Bay	Sediment	10/21/2002	36
				Count (n)	23
				Number of Detects	23
				Number of Non-Detects	0
				Minimum Detection	23
				Maximum Detection	120
				Minimum Detection Limit	0
				Maximum Detection Limit	0
				Detection Frequency	1
				Mean (x)	44.35
				Standard Deviation (SD)	19.58
				T Value (t)	1.72
				95% UCL[1]	51.36

Note:

[1] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

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TABLE E-5

CALCULATION OF REPRESENTATIVE ZINC WET WEIGHT CONCENTRATIONS IN DEEPER SEDIMENT SAMPLES FROM HUMBOLDT BAY (GREATER THAN 1 FOOT BELOW SURFACE)

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	Zinc
C-40-2	C40-2-1.5-2.0	Humboldt Bay	Sediment	10/24/2002	62
C-41	C41-1.5-2.0	Humboldt Bay	Sediment	10/24/2002	60
C-42	C42-1.0-1.8	Humboldt Bay	Sediment	10/24/2002	44
C-43	C43-1.0-1.5	Humboldt Bay	Sediment	10/24/2002	41
C-44	C44-1.5-2.0	Humboldt Bay	Sediment	10/24/2002	49
				Count (n)	5
				Number of Detects	5
				Number of Non-Detects	0
				Minimum Detection	41
				Maximum Detection	62
				Minimum Detection Limit	0
				Maximum Detection Limit	0
				Detection Frequency	1
				Mean (x)	51.20
				Standard Deviation (SD)	9.42
				T Value (t)	2.13
				95% UCL[1]	60.18

Note:

[1] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

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TABLE E-6

CALCULATION OF REPRESENTATIVE ZINC WET WEIGHT CONCENTRATIONS IN OYSTER TISSUE SAMPLES FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	Zinc
LOC 4	DM-0021	Mill Area	Oyster	10/21/2002	78
LOC 4	DM-0025	Mill Area	Oyster	10/21/2002	110
				Count (n)	2
				Number of Detects	2
				Number of Non-Detects	0
				Minimum Detection	78
				Maximum Detection	110
				Minimum Detection Limit	0
				Maximum Detection Limit	0
				Detection Frequency	1
				Mean (x)	94.00
				Standard Deviation (SD)	22.63
				T Value (t)	6.31
				95% UCL[1]	195.02

Note:

[1] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

TABLE E-7

CALCULATION OF REPRESENTATIVE ZINC WET WEIGHT CONCENTRATIONS IN OYSTER TISSUE SAMPLES FROM HUMBOLDT BAY

Sierra Pacific Industries Arcata
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	Zinc
LOC 1	DM-0003	Humboldt Bay	Oyster	10/21/2002	96
LOC 10a	DM-0007	Humboldt Bay	Oyster	10/21/2002	63
LOC 10b	DM-0009	Humboldt Bay	Oyster	10/21/2002	110
LOC 2	DM-0001	Humboldt Bay	Oyster	10/21/2002	79
LOC 3	DM-0015a	Humboldt Bay	Oyster	10/21/2002	130
LOC 3	DM-0015b	Humboldt Bay	Oyster	10/21/2002	100
LOC 5	DM-0017	Humboldt Bay	Oyster	10/21/2002	110
LOC 6	DM-0019	Humboldt Bay	Oyster	10/21/2002	140
LOC 7	DM-0013	Humboldt Bay	Oyster	10/21/2002	60
LOC 8	DM-0011	Humboldt Bay	Oyster	10/21/2002	130
LOC 9	DM-0005	Humboldt Bay	Oyster	10/21/2002	58
				Count (n)	11
				Number of Detects	11
				Number of Non-Detects	0
				Minimum Detection	58
				Maximum Detection	140
				Minimum Detection Limit	0
				Maximum Detection Limit	0
				Detection Frequency	1
				Mean (x)	97.82
				Standard Deviation (SD)	29.56
				T Value (t)	1.81
				95% UCL[1]	113.97

Note:

[1] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

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TABLE E-8

CALCULATION OF REPRESENTATIVE ZINC WET WEIGHT CONCENTRATIONS IN MUSSEL TISSUE FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	Zinc
LOC 4	DM-0023	Mill Area	Mussel	10/21/2002	12
				Count (n)	1
				Number of Detects	1
				Number of Non-Detects	0
				Minimum Detection	12
				Maximum Detection	12
				Minimum Detection Limit	0
				Maximum Detection Limit	0
				Detection Frequency	1
				Mean (x)	12.00
				Standard Deviation (SD)	NA
				T Value (t)	NA
				95% UCL[1]	NA

Note:

[1] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

TABLE E-9

CALCULATION OF REPRESENTATIVE ZINC WET WEIGHT CONCENTRATIONS IN CRAB TISSUE SAMPLES FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	Zinc
STAR 2	DM-0033	Mill Area	Crab	10/24/2002	30
STAR 3	DM-0034	Mill Area	Crab	10/24/2002	25
STAR 4	DM-0035	Mill Area	Crab	10/24/2002	45
STAR 7	DM-0059	Mill Area	Crab	10/25/2002	27
STAR 8	DM-0058	Mill Area	Crab	10/25/2002	34
				Count (n)	5
				Number of Detects	5
				Number of Non-Detects	0
				Minimum Detection	25
				Maximum Detection	45
				Minimum Detection Limit	0
				Maximum Detection Limit	0
				Detection Frequency	1
				Mean (x)	32.20
				Standard Deviation (SD)	7.92
				T Value (t)	2.13
				95% UCL[1]	39.75

Note:

[1] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

TABLE E-10

CALCULATION OF REPRESENTATIVE ZINC WET WEIGHT CONCENTRATIONS IN CRAB TISSUE SAMPLES FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	Zinc
STAR 1	DM-0032	Humboldt Bay	Crab	10/24/2002	41
STAR 10	DM-0074	Humboldt Bay	Crab	10/25/2002	29
STAR 6	DM-0061	Humboldt Bay	Crab	10/25/2002	43
				Count (n)	3
				Number of Detects	3
				Number of Non-Detects	0
				Minimum Detection	29
				Maximum Detection	43
				Minimum Detection Limit	0
				Maximum Detection Limit	0
				Mean (x)	37.67
				Standard Deviation (SD)	7.57
				T Value (t)	2.92
				95% UCL[1]	50.43

Note:

[1] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

TABLE E-11

CALCULATION OF REPRESENTATIVE ZINC WET WEIGHT CONCENTRATIONS IN SCULPIN TISSUE SAMPLES FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	Zinc
STAR 5	DM-0036	Humboldt Bay	Sculpin	10/24/2002	11
				Count (n)	1
				Number of Detects	1
				Number of Non-Detects	0
				Minimum Detection	11
				Maximum Detection	11
				Minimum Detection Limit	0
				Maximum Detection Limit	0
				Detection Frequency	1
				Mean (x)	11.00
				Standard Deviation (SD)	NA
				T Value (t)	NA
				95% UCL[1]	NA

Note:

[1] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

TABLE E-12

CALCULATION OF REPRESENTATIVE ZINC WET WEIGHT CONCENTRATIONS IN PERCH TISSUE SAMPLES FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	Zinc
TRAWL 18	DM-0079	Humboldt Bay	Perch	10/25/2002	40
				Count (n)	1
				Number of Detects	1
				Number of Non-Detects	0
				Minimum Detection	40
				Maximum Detection	40
				Minimum Detection Limit	0
				Maximum Detection Limit	0
				Detection Frequency	1
				Mean (x)	40.00
				Standard Deviation (SD)	NA
				T Value (t)	NA
				95% UCL[1]	NA

Note:

[1] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

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TABLE E-13

CALCULATION OF REPRESENTATIVE ZINC WET WEIGHT CONCENTRATIONS IN SHINER TISSUE SAMPLES FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	Zinc
TRAWL 16	DM-0065	Humboldt Bay	Shiner	10/25/2002	19
TRAWL 17	DM-0073	Humboldt Bay	Shiner	10/25/2002	27
TRAWL 18	DM-0075	Humboldt Bay	Shiner	10/25/2002	17
TRAWL 2	DM-0039	Humboldt Bay	Shiner	10/24/2002	11
				Count (n)	4
				Number of Detects	4
				Number of Non-Detects	0
				Minimum Detection	11
				Maximum Detection	27
				Minimum Detection Limit	0
				Maximum Detection Limit	0
				Detection Frequency	1
				Mean (x)	18.50
				Standard Deviation (SD)	6.61
				T Value (t)	2.35
				95% UCL[1]	26.3

Note:

[1] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

TABLE E-14

CALCULATION OF REPRESENTATIVE ZINC WET WEIGHT CONCENTRATIONS IN SOLE TISSUE SAMPLES FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	Zinc
TRAWL 5	DM-0047	Mill Area	Sole	10/25/2002	13
TRAWL 6	DM-0049	Mill Area	Sole	10/25/2002	15
				Count (n)	2
				Number of Detects	2
				Number of Non-Detects	0
				Minimum Detection	13
				Maximum Detection	15
				Minimum Detection Limit	0
				Maximum Detection Limit	0
				Detection Frequency	1
				Mean (x)	14.00
				Standard Deviation (SD)	1.41
				T Value (t)	6.31
				95% UCL[1]	20.31

Note:

[1] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

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TABLE E-15

CALCULATION OF REPRESENTATIVE ZINC WET WEIGHT CONCENTRATIONS IN SOLE TISSUE SAMPLES FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	Zinc
TRAWL 15	DM-0062 & DM-0068	Humboldt Bay	Sole	10/25/2002	11
TRAWL 15	DM-0063 & DM-0069	Humboldt Bay	Sole	10/25/2002	13
TRAWL 2	DM-0038 & DM-0040	Humboldt Bay	Sole	10/24/2002	17
TRAWL 4	DM-0042 & DM-0043	Humboldt Bay	Sole	10/24/2002	11
				Count (n)	4
				Number of Detects	4
				Number of Non-Detects	0
				Minimum Detection	11
				Maximum Detection	17
				Minimum Detection Limit	0
				Maximum Detection Limit	0
				Detection Frequency	1
				Mean (x)	13.00
				Standard Deviation (SD)	2.83
				T Value (t)	2.35
				95% UCL[1]	16.33

Note:

[1] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

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TABLE E-16

CALCULATION OF REPRESENTATIVE ZINC WET WEIGHT CONCENTRATIONS IN SHRIMP TISSUE SAMPLES FROM MAD RIVER SLOUGH

Sierra Pacific Industries Arcata Division Saw Mill
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	Zinc
TRAWL 7/8	DM-0052	Mill Area	Shrimp	10/25/2002	11
				Count (n)	1
				Number of Detects	1
				Number of Non-Detects	0
				Minimum Detection	11
				Maximum Detection	11
				Minimum Detection Limit	0
				Maximum Detection Limit	0
				Detection Frequency	1
				Mean (x)	NA
				Standard Deviation (SD)	NA
				T Value (t)	NA
				95% UCL[1]	NA

Note:

[1] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

TABLE E-17

CALCULATION OF REPRESENTATIVE ZINC WET WEIGHT CONCENTRATIONS IN SHARK TISSUE SAMPLES FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	Zinc
TRAWL 13	DM-0060	Mill Area	Shark	10/25/2002	4
				Count (n)	1
				Number of Detects	1
				Number of Non-Detects	0
				Minimum Detection	4
				Maximum Detection	4
				Minimum Detection Limit	0
				Maximum Detection Limit	0
				Detection Frequency	1
				Mean (x)	NA
				Standard Deviation (SD)	NA
				T Value (t)	NA
				95% UCL[1]	NA

Note:

[1] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

TABLE E-18

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN DRY WEIGHT CONCENTRATIONS
IN UPLAND SEDIMENT SAMPLES

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
Ditch-4	Ditch-4	Upland Mill Area	Sediment	6/14/2001	13.7	24.9	15.1
				Count (n)	1	1	1
				Number of Detects	1	1	1
				Minimum Detection	13.7	24.9	15.1
				Maximum Detection	13.7	24.9	15.1
				Detection Frequency	100%	100%	100%
				Mean (x)	13.7	24.9	15.1
				Standard Deviation (SD)	--	--	--
				T Value (t)	--	--	--
				95% UCL[4]	--	--	--

Notes:

1 Fish TEFs = calculated using toxicity equivalency factors for fish (Appendix D)

2 Mammal TEFs = calculated using toxicity equivalency factors for mammals (Appendix D)

3 Bird TEFs = calculated using toxicity equivalency factors for birds (Appendix D)

4 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

Abbreviations:

2,3,7,8-TCCD TEQs = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicity equivalents

-- = not applicable

TABLE E-19

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN DRY WEIGHT CONCENTRATIONS IN SHALLOW SEDIMENT SAMPLES FROM MAD RIVER SLOUGH (LESS THAN 1 FOOT BELOW SURFACE)

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
BC	BC Comp	Mill Area	Sediment	10/23/2002	4.47	6.29	6.01
C-01	C1-0.0-0.5	Mill Area	Sediment	10/22/2002	21.3	36.0	25.9
C-01	C1-0.5-1.0	Mill Area	Sediment	10/22/2002	57.4	120	79.2
C-02	C2-0.0-0.5	Mill Area	Sediment	10/22/2002	12.6	18.8	17.9
C-03	C3-0.0-0.5	Mill Area	Sediment	10/22/2002	18.8	36.5	24.7
C-04	C-4 Comp	Mill Area	Sediment	10/22/2002	10.1	17.5	12.2
C-04	C4-0.0-0.5	Mill Area	Sediment	10/22/2002	19.3	32.0	22.9
C-05	C5-0.0-0.5	Mill Area	Sediment	10/22/2002	9.83	15.8	12.8
C-06	C-6 Comp	Mill Area	Sediment	10/22/2002	5.04	8.22	7.31
C-06	C6-0-0.5	Mill Area	Sediment	10/24/2002	5.05	6.98	6.40
C-07	C7-0.0-0.9	Mill Area	Sediment	10/23/2002	18.3	33.0	30.5
C-08	C8-0.5-1.4	Mill Area	Sediment	10/22/2002	10.2	16.1	13.2
C-08	C8-0.0-0.5	Mill Area	Sediment	10/22/2002	18.9	35.7	25.3
C-09	C9-1-0.0-0.8	Mill Area	Sediment	10/23/2002	8.08	12.1	8.77
C-09	C9-2 0.0-0.8	Mill Area	Sediment	10/24/2002	0.171	0.171	0.171
C-10	C10-0.0-0.5	Mill Area	Sediment	10/22/2002	4.92	6.80	6.46
C-11	C11-0.0-0.5	Mill Area	Sediment	10/22/2002	3.18	4.09	4.30
C-12	C12-0.-0.5	Mill Area	Sediment	10/22/2002	6.59	8.74	8.39
C-13	C13-0.0-0.5	Mill Area	Sediment	10/22/2002	6.20	9.58	8.11
C-14	C14-0.0-0.5	Mill Area	Sediment	10/22/2002	0.000610	0.000610	0.000610
C-15	C15-0.0-0.5	Mill Area	Sediment	10/22/2002	0.000490	0.000490	0.000490
C-16	C16-0-0.5	Mill Area	Sediment	10/22/2002	2.81	3.73	3.76
C-17	C17-0-0.5	Mill Area	Sediment	10/23/2002	10.4	15.5	12.4
C-18	C18-0.0-0.5	Mill Area	Sediment	10/22/2002	16.4	30.4	23.2
C-19	C19-0.5-1.2	Mill Area	Sediment	10/23/2002	1.29	1.39	2.28
C-19	C19-0.0-0.5	Mill Area	Sediment	10/23/2002	0.200	0.199	0.418
C-20	C20-0.0-0.3	Mill Area	Sediment	10/24/2002	0.0254	0.0254	0.0254
C-21	C21-0-0.5	Mill Area	Sediment	10/23/2002	0.0172	0.0172	0.0172
C-22	C22-0.0-0.5	Mill Area	Sediment	10/23/2002	0.0259	0.0259	0.0259
C-23	C23-0-0.5	Mill Area	Sediment	10/23/2002	1.89	2.15	3.29
C-24	C24-0.0-0.5	Mill Area	Sediment	10/23/2002	2.36	2.90	3.43
C-25-1	C25-1-0.0-0.5	Mill Area	Sediment	10/23/2002	0.120	0.120	0.120
C-25-2	C25-2-0.5-1.3	Mill Area	Sediment	10/23/2002	9.64	14.8	12.6
C-25-2	C25-2-0.0-0.5	Mill Area	Sediment	10/23/2002	11.3	17.7	12.5
C-26	C26-0.0-0.8	Mill Area	Sediment	10/23/2002	16.2	27.1	18.4

Geomatrix

TABLE E-19

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN DRY WEIGHT CONCENTRATIONS IN SHALLOW SEDIMENT SAMPLES FROM MAD RIVER SLOUGH (LESS THAN 1 FOOT BELOW SURFACE)

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
C-27-1	C27-1-0.0-0.5	Mill Area	Sediment	10/23/2002	3.55	4.77	4.88
C-27-2	C27-0.0-0.5	Mill Area	Sediment	10/23/2002	0.0386	0.0386	0.0386
C-28	C28-0.0-0.5	Mill Area	Sediment	10/23/2002	0.0606	0.0606	0.0606
C-29	C29-0-0.5	Mill Area	Sediment	10/23/2002	0.0539	0.0539	0.0539
C-30	C30-0-0.5	Mill Area	Sediment	10/23/2002	0.0540	0.0540	0.0540
C-31	C31-0.0-0.5	Mill Area	Sediment	10/23/2002	7.89	12.2	9.33
C-31	C31-0.5-1.0	Mill Area	Sediment	10/23/2002	12.1	19.6	16.3
C-32	C32-0.0-0.5	Mill Area	Sediment	10/23/2002	9.44	16.8	11.5
C-32	C32-0.5-1.0	Mill Area	Sediment	10/23/2002	31.7	57.7	39.6
C-33	C33-0-0.5	Mill Area	Sediment	10/23/2002	7.09	11.4	9.58
C-34	C34-0-0.5	Mill Area	Sediment	10/23/2002	0.0265	0.0265	0.0265
C-35	C35-0-0.5	Mill Area	Sediment	10/23/2002	4.23	5.72	5.87
C-36	C36-0-0.5	Mill Area	Sediment	10/23/2002	5.04	7.35	6.80
C-37	C37-0.0-0.3	Mill Area	Sediment	10/24/2002	2.76	4.18	3.62
C-38	C38-0-0.5	Mill Area	Sediment	10/24/2002	0.0192	0.0192	0.0192
C-39	C39-0-0.5	Mill Area	Sediment	10/24/2002	0.245	0.236	0.417
DSS	DSS Comp	Mill Area	Sediment	10/23/2002	5.27	9.55	7.33
Lappe_LB	S02185003240	Mill Area	Sediment	3/24/2002	2.08	3.56	2.95
Lappe_OF2	2S0118000324	Mill Area	Sediment	3/24/2002	59.5	100	63.5
Lappe_OF4	4S0173503240	Mill Area	Sediment	3/24/2002	11.1	23.7	14.2
LOC 4	DM-0022	Mill Area	Sediment	10/21/2002	3.58	4.77	5.02
LOC 4	DM-0024	Mill Area	Sediment	10/21/2002	0.288	0.357	0.543
LOC 11	DM-0026	Mill Area	Sediment	10/21/2002	0.773	0.968	1.08
LOC 12	DM-0027	Mill Area	Sediment	10/21/2002	0.797	1.04	1.09
LOC 13	DM-0028	Mill Area	Sediment	10/21/2002	1.20	1.60	1.63
LOC 14	DM-0029	Mill Area	Sediment	10/22/2002	3.29	4.04	5.00
Outfall-1	Outfall-1	Mill Area	Sediment	6/14/2001	2.28	3.02	2.68
Outfall-4	Outfall-4	Mill Area	Sediment	6/14/2001	3.62	7.90	5.25
USS	USS Comp	Mill Area	Sediment	10/22/2002	5.19	8.08	7.23
USS-2	USS-2 Comp	Mill Area	Sediment	10/23/2002	4.00	5.35	5.54
USS-3	USS-3 Comp	Mill Area	Sediment	10/23/2002	3.88	5.08	5.22

Geomatrix

TABLE E-19

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN DRY WEIGHT CONCENTRATIONS IN SHALLOW SEDIMENT SAMPLES FROM MAD RIVER SLOUGH (LESS THAN 1 FOOT BELOW SURFACE)

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
				Count (n)	66	66	66
				Number of Detects	66	66	66
				Minimum Detection	0.000490	0.000490	0.000490
				Maximum Detection	59.5	120	79.2
				Detection Frequency	100%	100%	100%
				Mean (x)	7.64	13.0	9.84
				Standard Deviation (SD)	11.2	21.0	13.9
				T Value (t)	1.67	1.67	1.67
				95% UCL[4]	9.94	17.4	12.7

Notes:

1 Fish TEFs = calculated using toxicity equivalency factors for fish (Appendix D)

2 Mammal TEFs = calculated using toxicity equivalency factors for mammals (Appendix D)

3 Bird TEFs = calculated using toxicity equivalency factors for birds (Appendix D)

4 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

Abbreviations:

2,3,7,8-TCDD TEQs = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicity equivalents

TABLE E-20

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN DRY WEIGHT CONCENTRATIONS IN DEEPER SEDIMENT SAMPLES FROM MAD RIVER SLOUGH (GREATER THAN 1 FOOT BELOW SURFACE)

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
C-02	C2-1.0-1.5	Mill Area	Sediment	10/22/2002	46.2	86.1	54.2
C-02	C2-1.5-2.3	Mill Area	Sediment	10/22/2002	21.7	32.8	24.1
C-03	C3-1.0-1.5	Mill Area	Sediment	10/22/2002	69.1	110	81.7
C-03	C3-1.5-2.0	Mill Area	Sediment	10/22/2002	38.6	62.7	41.2
C-04	C4-1.0-1.8	Mill Area	Sediment	10/22/2002	64.2	117	87.2
C-05	C5-1.0-1.5	Mill Area	Sediment	10/22/2002	23.3	40.3	31.6
C-05	C5-1.5-2.0	Mill Area	Sediment	10/22/2002	56.5	114	76.7
C-06	C6-1.0-1.5	Mill Area	Sediment	10/24/2002	15.6	28.0	21.4
C-08	C8-0.5-1.4	Mill Area	Sediment	10/22/2002	18.9	35.7	25.3
C-10	C10-1.0-1.5	Mill Area	Sediment	10/22/2002	31.8	58.4	42.2
C-15	C15-1.0-1.5	Mill Area	Sediment	10/22/2002	0.352	0.316	0.437
C-16	C16-1.0-1.5	Mill Area	Sediment	10/22/2002	8.60	13.9	11.8
C-17	C17-1.0-1.5	Mill Area	Sediment	10/23/2002	1.46	1.53	2.40
C-18	C18-1.0-1.5	Mill Area	Sediment	10/22/2002	26.2	41.6	28.8
C-18	C18-1.5-2.1	Mill Area	Sediment	10/22/2002	10.0	14.5	11.7
C-19	C19-0.5-1.2	Mill Area	Sediment	10/23/2002	0.200	0.199	0.418
C-23	C23-1.0-1.5	Mill Area	Sediment	10/23/2002	1.38	1.42	2.32
C-24	C24-1.0-1.5	Mill Area	Sediment	10/23/2002	9.01	14.1	12.8
C-25-2	C25-2-0.5-1.3	Mill Area	Sediment	10/23/2002	5.7	7.6	7.3
C-27-1	C27-1-1.0-1.5	Mill Area	Sediment	10/23/2002	11.31	17.70	12.48
C-28	C28-1.0-1.8	Mill Area	Sediment	10/23/2002	8.41	13.2	11.7
C-33	C33-1.0-1.5	Mill Area	Sediment	10/23/2002	2.52	3.73	3.22

TABLE E-20

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN DRY WEIGHT CONCENTRATIONS IN DEEPER SEDIMENT SAMPLES FROM MAD RIVER SLOUGH (GREATER THAN 1 FOOT BELOW SURFACE)

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
				Count (n)	22	22	22
				Number of Detects	22	22	22
				Minimum Detection	0.200	0.199	0.418
				Maximum Detection	69.1	117	87.2
				Detection Frequency	100%	100%	100%
				Mean (x)	21.4	37.0	26.9
				Standard Deviation (SD)	21.2	38.5	26.7
				T Value (t)	1.72	1.72	1.72
				95% UCL[4]	29.2	51.2	36.7

Notes:

[1] Fish TEFs = calculated using toxicity equivalency factors for fish (Appendix D)

[2] Mammal TEFs = calculated using toxicity equivalency factors for mammals (Appendix D)

[3] Bird TEFs = calculated using toxicity equivalency factors for birds (Appendix D)

[4] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

Abbreviations:

2,3,7,8-TCDD TEQs = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicity equivalents

TABLE E-21

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN DRY WEIGHT CONCENTRATIONS IN SHALLOW SEDIMENT SAMPLES FROM HUMBOLDT BAY (LESS THAN 1 FOOT BELOW SURFACE)

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
Arcata Bay Ref	Arcata Bay Ref	Humboldt Bay	Sediment	10/24/2002	0.850	0.975	1.23
C-40-2	C40-2-0-0.5	Humboldt Bay	Sediment	10/24/2002	1.76	1.96	2.49
C-41	C41-0-0.5	Humboldt Bay	Sediment	10/24/2002	4.28	5.31	6.30
C-42	C42-0-0.5	Humboldt Bay	Sediment	10/24/2002	0.847	1.07	1.65
C-43	C43-0-0.5	Humboldt Bay	Sediment	10/24/2002	7.30	11.0	9.96
C-44	C44-0-0.5	Humboldt Bay	Sediment	10/24/2002	1.97	2.68	3.68
Channel 1	Channel 1 Comp	Humboldt Bay	Sediment	10/23/2002	1.45	1.94	2.02
Channel 2	Channel 2 Comp	Humboldt Bay	Sediment	10/23/2002	1.23	1.55	1.71
LOC 1	DM-0004	Humboldt Bay	Sediment	10/21/2002	1.67	2.07	2.55
LOC 2	DM-0002	Humboldt Bay	Sediment	10/21/2002	1.33	1.59	2.09
LOC 3	DM-0016	Humboldt Bay	Sediment	10/21/2002	3.16	3.96	4.61
LOC 5	DM-0018	Humboldt Bay	Sediment	10/21/2002	2.30	2.94	3.31
LOC 6	DM-0020	Humboldt Bay	Sediment	10/21/2002	1.86	2.57	2.96
LOC 7	DM-0014	Humboldt Bay	Sediment	10/21/2002	2.77	3.33	3.96
LOC 8	DM-0012	Humboldt Bay	Sediment	10/21/2002	1.53	1.88	1.94
LOC 9	DM-0006	Humboldt Bay	Sediment	10/21/2002	1.09	1.43	1.90
LOC 10a	DM-0008	Humboldt Bay	Sediment	10/21/2002	0.825	1.02	1.29
LOC 10b	DM-0010	Humboldt Bay	Sediment	10/21/2002	1.83	2.24	2.72
LOC 15	DM-0081	Humboldt Bay	Sediment	10/24/2002	3.05	3.74	4.77
LOC 16	DM-0082	Humboldt Bay	Sediment	10/24/2002	2.64	3.14	3.64
LOC 17	DM-0083	Humboldt Bay	Sediment	10/24/2002	2.60	3.15	3.63
LOC 18	DM-0084	Humboldt Bay	Sediment	10/24/2002	2.93	3.56	3.80

TABLE E-21

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN DRY WEIGHT CONCENTRATIONS IN SHALLOW SEDIMENT SAMPLES FROM HUMBOLDT BAY (LESS THAN 1 FOOT BELOW SURFACE)

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
LOC 19	DM-0085	Humboldt Bay	Sediment	10/24/2002	1.39	1.64	1.89
LOC 20	DM-0086	Humboldt Bay	Sediment	10/25/2002	4.43	5.31	5.48
LOC 21	DM-0087	Humboldt Bay	Sediment	10/23/2002	2.51	3.15	3.76
LOC 22	DM-0088	Humboldt Bay	Sediment	10/23/2002	11.7	13.1	19.2
North Arcata Bay	North Arcata Bay Ref	Humboldt Bay	Sediment	10/24/2002	2.65	3.48	3.96
Old Eureka Wharf	Old Eureka Wharf Comp	Humboldt Bay	Sediment	10/24/2002	1.64	2.13	2.27
				Count (n)	28	28	28
				Number of Detects	28	28	28
				Minimum Detection	0.825	0.975	1.23
				Maximum Detection	11.7	13.1	19.2
				Detection Frequency	100%	100%	100%
				Mean (x)	2.63	3.29	3.88
				Standard Deviation (SD)	2.24	2.75	3.50
				T Value (t)	1.70	1.70	1.70
				95% UCL[4]	3.35	4.17	5.01

Notes:

[1] Fish TEFs = calculated using toxicity equivalency factors for fish (Appendix D)

[2] Mammal TEFs = calculated using toxicity equivalency factors for mammals (Appendix D)

[3] Bird TEFs = calculated using toxicity equivalency factors for birds (Appendix D)

[4] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

Abbreviations:

2,3,7,8-TCCD TEQs = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicity equivalents

Geomatrix

TABLE E-22

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN DRY WEIGHT CONCENTRATIONS IN DEEPER SEDIMENT SAMPLES FROM HUMBOLDT BAY (GREATER THAN 1 FOOT BELOW SURFACE)

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
C-40-2	C40-2-1.5-2.0	Humboldt Bay	Sediment	10/24/2002	1.27	1.29	2.41
C-41	C41-1.5-2.0	Humboldt Bay	Sediment	10/24/2002	10.6	14.3	13.1
C-42	C42-1.0-1.8	Humboldt Bay	Sediment	10/24/2002	4.96	5.52	7.32
C-43	C43-1.0-1.5	Humboldt Bay	Sediment	10/24/2002	5.45	9.33	6.86
C-44	C44-1.5-2.0	Humboldt Bay	Sediment	10/24/2002	6.18	8.89	10.7
				Count (n)	5	5	5
				Number of Detects	5	5	5
				Minimum Detection	1.27	1.29	2.41
				Maximum Detection	10.6	14.3	13.1
				Detection Frequency	100%	100%	100%
				Mean (x)	5.68	7.87	8.07
				Standard Deviation (SD)	3.32	4.84	4.07
				T Value (t)	2.13	2.13	2.13
				95% UCL[4]	8.85	12.5	12.0

Notes:

[1] Fish TEFs = calculated using toxicity equivalency factors for fish (Appendix D)

[2] Mammal TEFs = calculated using toxicity equivalency factors for mammals (Appendix D)

[3] Bird TEFs = calculated using toxicity equivalency factors for birds (Appendix D)

[4] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

Abbreviations:

2,3,7,8-TCCD TEQs = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicity equivalents

TABLE E-23

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN WET WEIGHT CONCENTRATIONS IN OYSTER TISSUE SAMPLES FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
LOC 4	020621-NBSC 02	Mill Area	Oyster	6/21/2002	2.24	2.22	2.44
LOC 4	DM-0021	Mill Area	Oyster	10/21/2002	0.239	0.215	0.389
LOC 4	DM-0025	Mill Area	Oyster	10/21/2002	0.108	0.121	0.241
				Count (n)	3	3	3
				Number of Detects	3	3	3
				Minimum Detection	0.108	0.121	0.241
				Maximum Detection	2.24	2.22	2.44
				Detection Frequency	100%	100%	100%
				Mean (x)	0.861	0.853	1.02
				Standard Deviation (SD)	--	--	--
				T Value (t)	--	--	--
				95% UCL[4]	--	--	--

Notes:

1 Fish TEFs = calculated using toxicity equivalency factors for fish (Appendix D)

2 Mammal TEFs = calculated using toxicity equivalency factors for mammals (Appendix D)

3 Bird TEFs = calculated using toxicity equivalency factors for birds (Appendix D)

4 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

Abbreviations:

2,3,7,8-TCCD TEQs = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicity equivalents
-- = not applicable

Geomatrix

TABLE E-24

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN WET WEIGHT CONCENTRATIONS IN OYSTER TISSUE SAMPLES FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
LOC 1	020621-EBAY-6-2	Humboldt Bay	Oyster	6/21/2002	0.171	0.198	0.493
LOC 1	DM-0003	Humboldt Bay	Oyster	10/21/2002	0.894	0.882	0.992
LOC 2	020621-EBAY-1-2	Humboldt Bay	Oyster	6/21/2002	0.22	0.24	0.52
LOC 2	DM-0001	Humboldt Bay	Oyster	10/21/2002	1.369	1.361	1.595
LOC 3	020621-NBSC	Humboldt Bay	Oyster	6/21/2002	0.22	0.24	0.41
LOC 3	DM-0015a	Humboldt Bay	Oyster	10/21/2002	0.174	0.200	0.428
LOC 3	DM-0015b	Humboldt Bay	Oyster	10/21/2002	4.315	4.316	4.664
LOC 5	020621-MR-7-1	Humboldt Bay	Oyster	6/21/2002	0.23	0.22	0.29
LOC 5	DM-0017	Humboldt Bay	Oyster	10/21/2002	1.524	1.529	1.703
LOC 6	020621-MR-7-2	Humboldt Bay	Oyster	6/21/2002	0.23	0.22	0.40
LOC 6	DM-0019	Humboldt Bay	Oyster	10/21/2002	1.713	1.701	1.905
LOC 7	020621-SIN	Humboldt Bay	Oyster	6/21/2002	0.19	0.20	0.44
LOC 7	DM-0013	Humboldt Bay	Oyster	10/21/2002	2.227	2.212	2.466
LOC 8	020621-SIN-1-2	Humboldt Bay	Oyster	6/21/2002	0.21	0.24	0.46
LOC 8	DM-0011	Humboldt Bay	Oyster	10/21/2002	1.272	1.249	1.412
LOC 9	020621-BIN	Humboldt Bay	Oyster	6/21/2002	0.199	0.216	0.480
LOC 9	DM-0005	Humboldt Bay	Oyster	10/21/2002	0.806	0.777	0.901
LOC 10a	DM-0007	Humboldt Bay	Oyster	10/21/2002	0.148	0.162	0.363
LOC 10b	020621-BIS	Humboldt Bay	Oyster	6/21/2002	0.20	0.23	0.48
LOC 10b	DM-0009	Humboldt Bay	Oyster	10/21/2002	1.415	1.311	1.486

TABLE E-24

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN WET WEIGHT CONCENTRATIONS IN OYSTER TISSUE SAMPLES FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
				Count (n)	20	20	20
				Number of Detects	20	20	20
				Minimum Detection	0.148	0.162	0.287
				Maximum Detection	4.31	4.32	4.66
				Detection Frequency	100%	100%	100%
				Mean (x)	0.886	0.886	1.09
				Standard Deviation (SD)	1.04	1.03	1.05
				T Value (t)	1.73	1.73	1.73
				95% UCL[4]	1.29	1.28	1.50

Notes:

[1] Fish TEFs = calculated using toxicity equivalency factors for fish (Appendix D)

[2] Mammal TEFs = calculated using toxicity equivalency factors for mammals (Appendix D)

[3] Bird TEFs = calculated using toxicity equivalency factors for birds (Appendix D)

[4] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

Abbreviations:

2,3,7,8-TCCD TEQs = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicity equivalents

TABLE E-25

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN WET WEIGHT CONCENTRATIONS IN MUSSEL TISSUE SAMPLES FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
Lappe_Mill	31M011700032402	Mill Area	Mussel	3/24/2002	0.685	0.683	0.784
LOC 4	020621-NBSCM	Mill Area	Mussel	6/21/2002	0.985	0.958	1.06
LOC 4	DM-0023	Mill Area	Mussel	10/21/2002	0.089	0.099	0.148
				Count (n)	3	3	3
				Number of Detects	3	3	3
				Minimum Detection	0.089	0.099	0.148
				Maximum Detection	0.985	0.958	1.06
				Detection Frequency	100%	100%	100%
				Mean (x)	0.586	0.580	0.663
				Standard Deviation (SD)	--	--	--
				T Value (t)	--	--	--
				95% UCL[4]	--	--	--

Notes:

1 Fish TEFs = calculated using toxicity equivalency factors for fish (Appendix D)

2 Mammal TEFs = calculated using toxicity equivalency factors for mammals (Appendix D)

3 Bird TEFs = calculated using toxicity equivalency factors for birds (Appendix D)

4 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

Abbreviations:

2,3,7,8-TCCD TEQs = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicity equivalents

-- = not applicable

TABLE E-26

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN WET WEIGHT CONCENTRATIONS IN MUSSEL TISSUE SAMPLES FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
Lappe_HS-2	12M031415034202	Humboldt Bay	Mussel	3/24/2002	0.436	0.389	0.477
				Count (n)	1	1	1
				Number of Detects	1	1	1
				Minimum Detection	0.436	0.389	0.477
				Maximum Detection	0.436	0.389	0.477
				Detection Frequency	100%	100%	100%
				Mean (x)	0.436	0.389	0.477
				Standard Deviation (SD)	--	--	--
				T Value (t)	--	--	--
				95% UCL[4]	--	--	--

Notes:

1 Fish TEFs = calculated using toxicity equivalency factors for fish (Appendix D)

2 Mammal TEFs = calculated using toxicity equivalency factors for mammals (Appendix D)

3 Bird TEFs = calculated using toxicity equivalency factors for birds (Appendix D)

4 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

Abbreviations:

2,3,7,8-TCDD TEQs = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicity equivalents

-- = not applicable

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TABLE E-27

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN WET WEIGHT CONCENTRATIONS IN CRAB TISSUE SAMPLES FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
Lappe_Mill	1R011015032402	Mill Area	Crab	3/24/2002	0.827	1.14	0.926
Lappe_Mill	3RC011230032402	Mill Area	Crab	3/24/2002	0.554	0.634	0.698
Lappe_Mill	41H0011700032402	Mill Area	Crab	3/24/2002	2.29	4.03	3.22
STAR 2	DM-0033	Mill Area	Crab	10/24/2002	0.267	0.270	0.365
STAR 3	DM-0034	Mill Area	Crab	10/24/2002	0.128	0.145	0.253
STAR 3	DM-0034 (Whole)	Mill Area	Crab	10/24/2002	0.109	0.116	0.163
STAR 4	DM-0035	Mill Area	Crab	10/24/2002	0.145	0.171	0.271
STAR 7	DM-0059	Mill Area	Crab	10/25/2002	0.231	0.275	0.344
STAR 8	DM-0058	Mill Area	Crab	10/25/2002	0.197	0.213	0.313
				Count (n)	9	9	9
				Number of Detects	9	9	9
				Minimum Detection	0.109	0.116	0.163
				Maximum Detection	2.29	4.03	3.22
				Detection Frequency	100%	100%	100%
				Mean (x)	0.527	0.777	0.728
				Standard Deviation (SD)	0.701	1.26	0.966
				T Value (t)	1.86	1.86	1.86
				95% UCL[4]	0.961	1.56	1.33

Notes:

[1] Fish TEFs = calculated using toxicity equivalency factors for fish (Appendix D)

[2] Mammal TEFs = calculated using toxicity equivalency factors for mammals (Appendix D)

[3] Bird TEFs = calculated using toxicity equivalency factors for birds (Appendix D)

[4] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

Abbreviations:

2,3,7,8-TCCD TEQs = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicity equivalents

TABLE E-28

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN WET WEIGHT CONCENTRATIONS IN CRAB TISSUE SAMPLES FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
Lappe_HS-2	14H0031415032402	Humboldt Bay	Crab	3/24/2002	1.42	1.251	1.5194
STAR 1	DM-0031	Humboldt Bay	Crab	10/24/2002	0.142	0.157	0.426
STAR 1	DM-0032	Humboldt Bay	Crab	10/24/2002	2.93	1.08	1.02
STAR 6	DM-0061	Humboldt Bay	Crab	10/25/2002	0.383	0.412	0.862
STAR 10	DM-0074	Humboldt Bay	Crab	10/25/2002	0.351	0.365	0.576
				Count (n)	5	5	5
				Number of Detects	5	5	5
				Minimum Detection	0.142	0.157	0.426
				Maximum Detection	2.93	1.25	1.52
				Detection Frequency	100%	100%	100%
				Mean (x)	1.04	0.653	0.880
				Standard Deviation (SD)	1.17	0.481	0.426
				T Value (t)	2.13	2.13	2.13
				95% UCL[4]	2.16	1.11	1.29

Notes:

1 Fish TEFs = calculated using toxicity equivalency factors for fish (Appendix D)

2 Mammal TEFs = calculated using toxicity equivalency factors for mammals (Appendix D)

3 Bird TEFs = calculated using toxicity equivalency factors for birds (Appendix D)

4 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

Abbreviations:

2,3,7,8-TCCD TEQs = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicity equivalents

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TABLE E-29

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN WET WEIGHT CONCENTRATIONS IN SCULPIN TISSUE SAMPLES FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
TRAWL 10/11	DM-0054	Mill Area	Sculpin	10/25/2002	0.150	0.151	0.276
TRAWL 13	DM-0080	Mill Area	Sculpin	10/25/2002	0.380	0.360	0.499
				Count (n)	2	2	2
				Number of Detects	2	2	2
				Minimum Detection	0.150	0.151	0.276
				Maximum Detection	0.380	0.360	0.499
				Detection Frequency	100%	100%	100%
				Mean (x)	0.265	0.255	0.388
				Standard Deviation (SD)	--	--	--
				T Value (t)	--	--	--
				95% UCL[4]	--	--	--

Notes:

1 Fish TEFs = calculated using toxicity equivalency factors for fish (Appendix D)

2 Mammal TEFs = calculated using toxicity equivalency factors for mammals (Appendix D)

3 Bird TEFs = calculated using toxicity equivalency factors for birds (Appendix D)

4 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

Abbreviations:

2,3,7,8-TCCD TEQs = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicity equivalents

-- = not applicable

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TABLE E-30

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN WET WEIGHT CONCENTRATIONS IN SCULPIN TISSUE SAMPLES FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
STAR 5	DM-0036	Humboldt Bay	Sculpin	10/24/2002	0.194	0.197	0.356
TRAWL 2	DM-0037	Humboldt Bay	Sculpin	10/24/2002	0.202	0.200	0.404
TRAWL 17	DM-0071	Humboldt Bay	Sculpin	10/25/2002	1.28	1.20	1.90
TRAWL 18	DM-0078	Humboldt Bay	Sculpin	10/25/2002	0.321	0.302	0.420
				Count (n)	4	4	4
				Number of Detects	4	4	4
				Minimum Detection	0.194	0.197	0.356
				Maximum Detection	1.28	1.20	1.90
				Detection Frequency	100%	100%	100%
				Mean (x)	0.499	0.474	0.771
				Standard Deviation (SD)	--	--	--
				T Value (t)	--	--	--
				95% UCL[4]	--	--	--

Notes:

1 Fish TEFs = calculated using toxicity equivalency factors for fish (Appendix D)

2 Mammal TEFs = calculated using toxicity equivalency factors for mammals (Appendix D)

3 Bird TEFs = calculated using toxicity equivalency factors for birds (Appendix D)

4 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

Abbreviations:

2,3,7,8-TCCD TEQs = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicity equivalents

-- = not applicable

Geomatrix

TABLE E-31

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN WET WEIGHT CONCENTRATIONS IN PERCH TISSUE SAMPLES FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
TRAWL 4	DM-0044	Humboldt Bay	Perch	10/25/2002	0.119	0.130	0.278
TRAWL 15	DM-0064 & DM-0066 & DM-0067	Humboldt Bay	Perch	10/25/2002	0.305	0.294	0.591
TRAWL 18	DM-0079	Humboldt Bay	Perch	10/25/2002	0.257	0.254	0.510
				Count (n)	3	3	3
				Number of Detects	3	3	3
				Minimum Detection	0.119	0.130	0.278
				Maximum Detection	0.305	0.294	0.591
				Detection Frequency	100%	100%	100%
				Mean (x)	0.227	0.226	0.460
				Standard Deviation (SD)	--	--	--
				T Value (t)	--	--	--
				95% UCL[4]	--	--	--

Notes:

1 Fish TEFs = calculated using toxicity equivalency factors for fish (Appendix D)

2 Mammal TEFs = calculated using toxicity equivalency factors for mammals (Appendix D)

3 Bird TEFs = calculated using toxicity equivalency factors for birds (Appendix D)

4 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

Abbreviations:

2,3,7,8-TCCD TEQs = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicity equivalents

-- = not applicable

Geomatrix

TABLE E-32

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN WET WEIGHT CONCENTRATIONS IN SHINER TISSUE SAMPLES FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
TRAWL 10/11	DM-0055	Mill Area	Shiner	10/25/2002	0.406	0.385	0.542
				Count (n)	1	1	1
				Number of Detects	1	1	1
				Minimum Detection	0.406	0.385	0.542
				Maximum Detection	0.406	0.385	0.542
				Detection Frequency	100%	100%	100%
				Mean (x)	0.406	0.385	0.542
				Standard Deviation (SD)	--	--	--
				T Value (t)	--	--	--
				95% UCL[4]	--	--	--

Notes:

[1] Fish TEFs = calculated using toxicity equivalency factors for fish (Appendix D)

[2] Mammal TEFs = calculated using toxicity equivalency factors for mammals (Appendix D)

[3] Bird TEFs = calculated using toxicity equivalency factors for birds (Appendix D)

[4] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

Abbreviations:

2,3,7,8-TCCD TEQs = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicity equivalents

-- = not applicable

TABLE E-33

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN WET WEIGHT CONCENTRATIONS IN SHINER TISSUE SAMPLES FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
TRAWL 2	DM-0039	Humboldt Bay	Shiner	10/24/2002	0.062	0.062	0.121
TRAWL 16	DM-0065	Humboldt Bay	Shiner	10/25/2002	0.398	0.368	0.665
TRAWL 17	DM-0073	Humboldt Bay	Shiner	10/25/2002	0.521	0.512	1.03
TRAWL 18	DM-0075	Humboldt Bay	Shiner	10/25/2002	0.622	0.641	1.47
				Count (n)	4	4	4
				Number of Detects	4	4	4
				Minimum Detection	0.062	0.062	0.121
				Maximum Detection	0.622	0.641	1.47
				Detection Frequency	100%	100%	100%
				Mean (x)	0.401	0.395	0.823
				Standard Deviation (SD)	--	--	--
				T Value (t)	--	--	--
				95% UCL[4]	--	--	--

Notes:

1 Fish TEFs = calculated using toxicity equivalency factors for fish (Appendix D)

2 Mammal TEFs = calculated using toxicity equivalency factors for mammals (Appendix D)

3 Bird TEFs = calculated using toxicity equivalency factors for birds (Appendix D)

4 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

Abbreviations:

2,3,7,8-TCDD TEQs = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicity equivalents
-- = not applicable

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TABLE E-34

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN WET WEIGHT CONCENTRATIONS IN SOLE TISSUE SAMPLES FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
TRAWL 5	DM-0046	Mill Area	Sole	10/25/2002	0.102	0.106	0.197
TRAWL 5	DM-0047	Mill Area	Sole	10/25/2002	0.189	0.214	0.400
TRAWL 6	DM-0049	Mill Area	Sole	10/25/2002	0.172	0.185	0.408
TRAWL 6	DM-0050	Mill Area	Sole	10/25/2002	0.179	0.186	0.331
TRAWL 7/8	DM-0051	Mill Area	Sole	10/25/2002	0.174	0.185	0.316
TRAWL 10/11	DM-0053	Mill Area	Sole	10/25/2002	0.360	0.390	0.684
TRAWL 13	DM-0057	Mill Area	Sole	10/25/2002	0.180	0.224	0.307
				Count (n)	7	7	7
				Number of Detects	7	7	7
				Minimum Detection	0.102	0.106	0.197
				Maximum Detection	0.360	0.390	0.684
				Detection Frequency	100%	100%	100%
				Mean (x)	0.194	0.213	0.377
				Standard Deviation (SD)	0.079	0.087	0.152
				T Value (t)	1.94	1.94	1.94
				95% UCL[4]	0.252	0.276	0.489

Notes:

[1] Fish TEFs = calculated using toxicity equivalency factors for fish (Appendix D)

[2] Mammal TEFs = calculated using toxicity equivalency factors for mammals (Appendix D)

[3] Bird TEFs = calculated using toxicity equivalency factors for birds (Appendix D)

[4] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

Abbreviations:

2,3,7,8-TCCD TEQs = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicity equivalents

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TABLE E-35

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN WET WEIGHT CONCENTRATIONS IN SOLE TISSUE SAMPLES FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
TRAWL 2	DM-0038 & DM-0040	Humboldt Bay	Sole	10/24/2002	0.060	0.063	0.125
TRAWL 4	DM-0042 & DM-0043	Humboldt Bay	Sole	10/24/2002	0.057	0.061	0.127
TRAWL 15	DM-0062 & DM-0068	Humboldt Bay	Sole	10/25/2002	0.074	0.079	0.151
TRAWL 15	DM-0063 & DM-0069	Humboldt Bay	Sole	10/25/2002	0.252	0.236	0.325
TRAWL 17	DM-0070 & DM-0072	Humboldt Bay	Sole	10/25/2002	0.256	0.238	0.355
TRAWL 18	DM-0076 & DM-0077	Humboldt Bay	Sole	10/25/2002	0.217	0.206	0.328
				Count (n)	6	6	6
				Number of Detects	6	6	6
				Minimum Detection	0.057	0.061	0.125
				Maximum Detection	0.256	0.238	0.355
				Detection Frequency	100%	100%	100%
				Mean (x)	0.153	0.147	0.235
				Standard Deviation (SD)	0.098	0.088	0.111
				T Value (t)	2.02	2.02	2.02
				95% UCL[4]	0.234	0.220	0.327

Notes:

1 Fish TEFs = calculated using toxicity equivalency factors for fish (Appendix D)

2 Mammal TEFs = calculated using toxicity equivalency factors for mammals (Appendix D)

3 Bird TEFs = calculated using toxicity equivalency factors for birds (Appendix D)

4 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

Abbreviations:

2,3,7,8-TCCD TEQs = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicity equivalents

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TABLE E-36

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN WET WEIGHT CONCENTRATIONS IN SHRIMP TISSUE SAMPLES FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
TRAWL 5	DM-0048	Mill Area	Shrimp	10/25/2002	0.082	0.086	0.150
TRAWL 7/8	DM-0052	Mill Area	Shrimp	10/25/2002	0.122	0.109	0.184
TRAWL 10/11	DM-0056	Mill Area	Shrimp	10/25/2002	0.256	0.248	0.365
				Count (n)	3	3	3
				Number of Detects	3	3	3
				Minimum Detection	0.082	0.086	0.150
				Maximum Detection	0.256	0.248	0.365
				Detection Frequency	100%	100%	100%
				Mean (x)	0.153	0.148	0.233
				Standard Deviation (SD)	--	--	--
				T Value (t)	--	--	--
				95% UCL[4]	--	--	--

Notes:

[1] Fish TEFs = calculated using toxicity equivalency factors for fish (Appendix D)

[2] Mammal TEFs = calculated using toxicity equivalency factors for mammals (Appendix D)

[3] Bird TEFs = calculated using toxicity equivalency factors for birds (Appendix D)

[4] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

Abbreviations:

2,3,7,8-TCCD TEQs = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicity equivalents

-- = not applicable

TABLE E-37

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN WET WEIGHT CONCENTRATIONS IN SHRIMP SAMPLES FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
TRAWL 2	DM-0041	Humboldt Bay	Shrimp	10/25/2002	0.132	0.137	0.277
TRAWL 4	DM-0045	Humboldt Bay	Shrimp	10/25/2002	0.681	0.705	1.68
				Count (n)	2	2	2
				Number of Detects	2	2	2
				Minimum Detection	0.132	0.137	0.277
				Maximum Detection	0.681	0.705	1.68
				Detection Frequency	100%	100%	100%
				Mean (x)	0.406	0.421	0.976
				Standard Deviation (SD)	--	--	--
				T Value (t)	--	--	--
				95% UCL[4]	--	--	--

Notes:

1 Fish TEFs = calculated using toxicity equivalency factors for fish (Appendix D)

2 Mammal TEFs = calculated using toxicity equivalency factors for mammals (Appendix D)

3 Bird TEFs = calculated using toxicity equivalency factors for birds (Appendix D)

4 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

Abbreviations:

2,3,7,8-TCCD TEQs = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicity equivalents

-- = not applicable

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TABLE E-38

CALCULATION OF REPRESENTATIVE DIOXIN/FURAN WET WEIGHT CONCENTRATIONS IN SHARK TISSUE SAMPLES FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	2,3,7,8-TCDD TEQ (Fish TEFs)[1]	2,3,7,8-TCDD TEQ (Mammal TEFs)[2]	2,3,7,8-TCDD TEQ (Bird TEFs)[3]
TRAWL 13	DM-0060	Mill Area	Shark	10/25/2002	0.0632	0.0648	0.160
				Count (n)	1	1	1
				Number of Detects	1	1	1
				Minimum Detection	0.0632	0.0648	0.160
				Maximum Detection	0.0632	0.0648	0.160
				Detection Frequency	100%	100%	100%
				Mean (x)	0.0632	0.0648	0.160
				Standard Deviation (SD)	--	--	--
				T Value (t)	--	--	--
				95% UCL[4]	--	--	--

Notes:

1 Fish TEFs = calculated using toxicity equivalency factors for fish (Appendix D)

2 Mammal TEFs = calculated using toxicity equivalency factors for mammals (Appendix D)

3 Bird TEFs = calculated using toxicity equivalency factors for birds (Appendix D)

4 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

Abbreviations:

2,3,7,8-TCCD TEQs = 2,3,7,8-tetrachlorodibenzo-p-dioxin toxicity equivalents

-- = not applicable

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TABLE E-39

CALCULATION OF REPRESENTATIVE ZINC DRY WEIGHT CONCENTRATIONS IN UPLAND SEDIMENT SAMPLES

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	Zinc
D6-1	D6-1-0.0-0.5	Mill Area	Sediment	7/22/2003	194.0
D6-10	D6-10-0.0-0.5	Mill Area	Sediment	7/23/2003	89.9
D6-11	D6-11-0.0-0.5	Mill Area	Sediment	7/23/2003	98.8
D6-12	D6-12-0.0-0.5	Mill Area	Sediment	7/23/2003	423.3
D6-13	D6-13-0.0-0.5	Mill Area	Sediment	7/23/2003	102.3
D6-14	D6-14-0.0-0.5	Mill Area	Sediment	7/23/2003	194.0
D6-15	D6-15-0.0-0.5	Mill Area	Sediment	7/23/2003	194.0
D6-16	D6-16-0.0-0.5	Mill Area	Sediment	7/23/2003	137.6
D6-17	D6-17-0.0-0.5	Mill Area	Sediment	7/23/2003	33.5
D6-18	D6-18-0.0-0.5	Mill Area	Sediment	7/24/2003	52.9
D6-19	D6-19-0.0-0.5	Mill Area	Sediment	7/24/2003	86.4
D6-2	D6-2-0.0-0.5	Mill Area	Sediment	7/22/2003	335.1
D6-20	D6-20-0.0-0.5	Mill Area	Sediment	7/24/2003	65.3
D6-21	D6-21-0.0-0.5	Mill Area	Sediment	7/24/2003	24.7
D6-22	D6-22-0.0-0.5	Mill Area	Sediment	7/24/2003	37.0
D6-23	D6-23-0.0-0.5	Mill Area	Sediment	7/24/2003	30.0
D6-24	D6-24-0.0-0.5	Mill Area	Sediment	7/24/2003	84.7
D6-3	D6-3-0.0-0.5	Mill Area	Sediment	7/22/2003	493.8
D6-4	D6-4-0.0-0.5	Mill Area	Sediment	7/22/2003	282.2
D6-5	D6-5-0.0-0.5	Mill Area	Sediment	7/22/2003	134.0
D6-6	D6-6-0.0-0.5	Mill Area	Sediment	7/22/2003	211.6
D6-7	D6-7-0.0-0.5	Mill Area	Sediment	7/22/2003	68.8
D6-8	D6-8-0.0-0.5	Mill Area	Sediment	7/23/2003	102.3
D6-9	D6-9-0.0-0.5	Mill Area	Sediment	7/23/2003	81.1
D7-1	D7-1-0.0-0.5	Mill Area	Sediment	7/9/2003	299.8
D7-10	D7-10-0.0-0.5	Mill Area	Sediment	7/10/2003	652.6
D7-11	D7-11-0.0-0.5	Mill Area	Sediment	7/10/2003	211.6
D7-12	D7-12-0.0-0.5	Mill Area	Sediment	7/10/2003	132.3
D7-13	D7-13-0.0-0.5	Mill Area	Sediment	7/10/2003	123.5
D7-14	D7-14-0.0-0.5	Mill Area	Sediment	7/10/2003	194.0
D7-15	D7-15-0.0-0.5	Mill Area	Sediment	7/10/2003	176.4
D7-16	D7-16-0.0-0.5	Mill Area	Sediment	7/10/2003	370.4
D7-17	D7-17-0.0-0.5	Mill Area	Sediment	7/10/2003	811.3
D7-2	D7-2-0.0-0.5	Mill Area	Sediment	7/9/2003	246.9
D7-3	D7-3-0.0-0.5	Mill Area	Sediment	7/9/2003	105.8
D7-4	D7-4-0.0-0.5	Mill Area	Sediment	7/9/2003	264.6
D7-5	D7-5-0.0-0.5	Mill Area	Sediment	7/9/2003	68.8
D7-6	D7-6-0.0-0.5	Mill Area	Sediment	7/9/2003	40.6
D7-7	D7-7-0.0-0.5	Mill Area	Sediment	7/9/2003	47.6
D7-8	D7-8-0.0-0.5	Mill Area	Sediment	7/9/2003	60.0
D7-9	D7-9-0.0-0.5	Mill Area	Sediment	7/10/2003	246.9
Ditch-1 Pipe	Ditch-1 @ Dry Shed Pipe	Mill Area	Sediment	6/14/2001	476.2

TABLE E-39

CALCULATION OF REPRESENTATIVE ZINC DRY WEIGHT CONCENTRATIONS IN UPLAND SEDIMENT SAMPLES

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	Zinc
Ditch-1 West	Ditch-1 West of Dry	Mill Area	Sediment	6/14/2001	582.0
Ditch-4	Ditch-4	Mill Area	Sediment	6/14/2001	49.4
RP-1	RP-1-0.0-0.5	Mill Area	Sediment	7/8/2003	264.6
RP-1	RP-1-0.5-1.0	Mill Area	Sediment	7/8/2003	246.9
RP-1	RP-1-1.0-1.5	Mill Area	Sediment	7/8/2003	246.9
RP-1	RP-1-1.5-2.0	Mill Area	Sediment	7/8/2003	176.4
RP-1	RP-1-2.0-2.5	Mill Area	Sediment	7/8/2003	111.1
RP-2	RP-2-0.0-0.5	Mill Area	Sediment	7/8/2003	107.6
RP-2	RP-2-0.5-1.0	Mill Area	Sediment	7/8/2003	97.0
RP-2	RP-2-1.0-1.5	Mill Area	Sediment	7/8/2003	93.5
RP-2	RP-2-1.5-2.0	Mill Area	Sediment	7/8/2003	31.7
RP-2	RP-2-2.0-2.5	Mill Area	Sediment	7/8/2003	33.5
SDP-1	SDP-1-0.0-0.5	Mill Area	Sediment	7/9/2003	282.2
SDP-1	SDP-1-2.0-2.5	Mill Area	Sediment	7/9/2003	65.3
				Count (n)	56
				Number of Detects	56
				Number of Non-Detects	0
				Minimum Detection	24.7
				Maximum Detection	811.3
				Minimum Detection Limit	0
				Maximum Detection Limit	0
				Detection Frequency	1
				Mean (x)	187.04
				Standard Deviation (SD)	166.13
				T Value (t)	1.67
				95% UCL[1]	224.18

Note:

[1] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

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TABLE E-40

CALCULATION OF REPRESENTATIVE ZINC DRY WEIGHT CONCENTRATIONS IN SHALLOW SEDIMENT SAMPLES FROM MAD RIVER SLOUGH (LESS THAN 1 FOOT BELOW SURFACE)

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	Zinc
C-02	C2-0.0-0.5	Mill Area	Sediment	10/22/2002	94.0
C-03	C3-0.0-0.5	Mill Area	Sediment	10/22/2002	88.8
C-04	C4-0.0-0.5	Mill Area	Sediment	10/22/2002	81.0
C-05	C5-0.0-0.5	Mill Area	Sediment	10/22/2002	66.6
C-06	C6-0-0.5	Mill Area	Sediment	10/24/2002	92.0
C-18	C18-0.0-0.5	Mill Area	Sediment	10/22/2002	98.9
C-19	C19-0.0-0.5	Mill Area	Sediment	10/23/2002	106.4
C-31	C31-0.0-0.5	Mill Area	Sediment	10/23/2002	80.9
C-32	C32-0.0-0.5	Mill Area	Sediment	10/23/2002	91.0
C-35	C35-0-0.5	Mill Area	Sediment	10/23/2002	96.5
C-39	C39-0-0.5	Mill Area	Sediment	10/24/2002	50.7
LOC 11	DM-0026	Mill Area	Sediment	10/21/2002	67.0
LOC 12	DM-0027	Mill Area	Sediment	10/21/2002	85.6
LOC 13	DM-0028	Mill Area	Sediment	10/21/2002	67.5
LOC 14	DM-0029	Mill Area	Sediment	10/22/2002	80.8
LOC 4	DM-0022	Mill Area	Sediment	10/21/2002	99.4
LOC 4	DM-0024	Mill Area	Sediment	10/21/2002	82.0
Outfall-1	Outfall-1	Mill Area	Sediment	6/14/2001	86.4
Outfall-2	Outfall 2	Mill Area	Sediment	6/14/2001	111.1
Outfall-2	Outfall-2	Mill Area	Sediment	6/14/2001	107.6
Outfall-3	Outfall-3	Mill Area	Sediment	6/14/2001	86.4
Outfall-4	Outfall-4	Mill Area	Sediment	6/14/2001	77.6
				Count (n)	22
				Number of Detects	22
				Number of Non-Detects	0
				Minimum Detection	50.7
				Maximum Detection	111.1
				Minimum Detection Limit	0
				Maximum Detection Limit	0
				Detection Frequency	1
				Mean (x)	86.29
				Standard Deviation (SD)	14.78
				T Value (t)	1.72
				95% UCL[1]	91.71

Note:

[1] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

TABLE E-41

CALCULATION OF REPRESENTATIVE ZINC DRY WEIGHT CONCENTRATIONS IN DEEPER SEDIMENT SAMPLES FROM MAD RIVER SLOUGH (GREATER THAN 1 FOOT BELOW SURFACE)

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	Zinc
C-02	C2-1.0-1.5	Mill Area	Sediment	10/22/2002	95.2
C-03	C3-1.0-1.5	Mill Area	Sediment	10/22/2002	106.0
C-04	C4-1.0-1.8	Mill Area	Sediment	10/22/2002	102.2
C-05	C5-1.0-1.5	Mill Area	Sediment	10/22/2002	92.7
C-15	C15-1.0-1.5	Mill Area	Sediment	10/22/2002	78.1
C-18	C18-1.0-1.5	Mill Area	Sediment	10/22/2002	89.2
				Count (n)	6
				Number of Detects	6
				Number of Non-Detects	0
				Minimum Detection	78.1
				Maximum Detection	106.0
				Minimum Detection Limit	0
				Maximum Detection Limit	0
				Detection Frequency	1
				Mean (x)	93.89
				Standard Deviation (SD)	9.90
				T Value (t)	2.02
				95% UCL[1]	102.03

Note:

[1] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

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TABLE E-41

CALCULATION OF REPRESENTATIVE ZINC DRY WEIGHT CONCENTRATIONS IN DEEPER SEDIMENT SAMPLES FROM MAD RIVER SLOUGH (GREATER THAN 1 FOOT BELOW SURFACE)

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	Zinc
C-02	C2-1.0-1.5	Mill Area	Sediment	10/22/2002	95.2
C-03	C3-1.0-1.5	Mill Area	Sediment	10/22/2002	106.0
C-04	C4-1.0-1.8	Mill Area	Sediment	10/22/2002	102.2
C-05	C5-1.0-1.5	Mill Area	Sediment	10/22/2002	92.7
C-15	C15-1.0-1.5	Mill Area	Sediment	10/22/2002	78.1
C-18	C18-1.0-1.5	Mill Area	Sediment	10/22/2002	89.2
				Count (n)	6
				Number of Detects	6
				Number of Non-Detects	0
				Minimum Detection	78.1
				Maximum Detection	106.0
				Minimum Detection Limit	0
				Maximum Detection Limit	0
				Detection Frequency	1
				Mean (x)	93.89
				Standard Deviation (SD)	9.90
				T Value (t)	2.02
				95% UCL[1]	102.03

Note:

[1] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

TABLE E-42

CALCULATION OF REPRESENTATIVE ZINC DRY WEIGHT CONCENTRATIONS IN SHALLOW SEDIMENT SAMPLES IN HUMBOLDT BAY (LESS THAN 1 FOOT BELOW SURFACE)

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	Zinc
C-40-2	C40-2-0-0.5	Humboldt Bay	Sediment	10/24/2002	70.3
C-41	C41-0-0.5	Humboldt Bay	Sediment	10/24/2002	84.2
C-42	C42-0-0.5	Humboldt Bay	Sediment	10/24/2002	53.9
C-43	C43-0-0.5	Humboldt Bay	Sediment	10/24/2002	98.5
C-44	C44-0-0.5	Humboldt Bay	Sediment	10/24/2002	77.0
LOC 1	DM-0004	Humboldt Bay	Sediment	10/21/2002	65.6
LOC 10a	DM-0008	Humboldt Bay	Sediment	10/21/2002	47.7
LOC 10b	DM-0010	Humboldt Bay	Sediment	10/21/2002	78.7
LOC 15	DM-0081	Humboldt Bay	Sediment	10/24/2002	76.2
LOC 16	DM-0082	Humboldt Bay	Sediment	10/24/2002	68.4
LOC 17	DM-0083	Humboldt Bay	Sediment	10/24/2002	97.8
LOC 18	DM-0084	Humboldt Bay	Sediment	10/24/2002	51.1
LOC 19	DM-0085	Humboldt Bay	Sediment	10/24/2002	46.0
LOC 2	DM-0002	Humboldt Bay	Sediment	10/21/2002	59.6
LOC 20	DM-0086	Humboldt Bay	Sediment	10/25/2002	90.6
LOC 21	DM-0087	Humboldt Bay	Sediment	10/23/2002	98.6
LOC 22	DM-0088	Humboldt Bay	Sediment	10/23/2002	236.9
LOC 3	DM-0016	Humboldt Bay	Sediment	10/21/2002	86.2
LOC 5	DM-0018	Humboldt Bay	Sediment	10/21/2002	84.5
LOC 6	DM-0020	Humboldt Bay	Sediment	10/21/2002	78.5
LOC 7	DM-0014	Humboldt Bay	Sediment	10/21/2002	82.9
LOC 8	DM-0012	Humboldt Bay	Sediment	10/21/2002	74.4
LOC 9	DM-0006	Humboldt Bay	Sediment	10/21/2002	59.9
				Count (n)	23
				Number of Detects	23
				Number of Non-Detects	0
				Minimum Detection	46.0
				Maximum Detection	236.9
				Minimum Detection Limit	0
				Maximum Detection Limit	0
				Detection Frequency	1
				Mean (x)	81.19
				Standard Deviation (SD)	37.43
				T Value (t)	1.72
				95% UCL[2]	94.59

Note:

[1] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

TABLE E-43

CALCULATION OF REPRESENTATIVE ZINC DRY WEIGHT CONCENTRATIONS IN DEEPER SEDIMENT SAMPLES IN HUMBOLDT BAY (GREATER THAN 1 FOOT BELOW SURFACE)

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Station Identifier	Sample Identifier	General Location	Matrix	Sample Date	Zinc
C-40-2	C40-2-1.5-2.0	Humboldt Bay	Sediment	10/24/2002	84.0
C-41	C41-1.5-2.0	Humboldt Bay	Sediment	10/24/2002	96.1
C-42	C42-1.0-1.8	Humboldt Bay	Sediment	10/24/2002	65.1
C-43	C43-1.0-1.5	Humboldt Bay	Sediment	10/24/2002	51.3
C-44	C44-1.5-2.0	Humboldt Bay	Sediment	10/24/2002	73.3
				Count (n)	5
				Number of Detects	5
				Number of Non-Detects	0
				Minimum Detection	51.3
				Maximum Detection	96.1
				Minimum Detection Limit	0
				Maximum Detection Limit	0
				Detection Frequency	1
				Mean (x)	73.96
				Standard Deviation (SD)	17.20
				T Value (t)	2.13
				95% UCL[1]	90.36

Note:

[1] 95% UCL = 95 percent upper confidence limit of the arithmetic mean = $x + t*SD/n^{0.5}$

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APPENDIX F

ProUCL Calculations of Upperbound Representative Concentrations

Table F-1 Computation of Representative Zinc (Wet Weight) Concentrations Using ProUCL in Upland Sediment Samples

Table F-2 Computation of Representative Zinc (Wet Weight) Concentrations Using ProUCL in Sediment Samples (<1 ft. bgs) Collected from Mad River Slough

Table F-3 Computation of Representative Zinc (Wet Weight) Concentrations Using ProUCL in Sediment Samples (>1 ft. bgs) Collected from Mad River Slough

Table F-4 Computation of Representative Zinc (Wet Weight) Concentrations Using ProUCL in Sediment Samples (<1 ft. bgs) Collected from Humboldt Bay

Table F-5 Computation of Representative Zinc (Wet Weight) Concentrations Using ProUCL in Sediment Samples (>1 ft. bgs) Collected from Humboldt Bay

Table F-6 Computation of Representative Zinc Concentrations Using ProUCL in Oyster Tissue Samples Collected from Humboldt Bay

Table F-7 Computation of Representative Zinc Concentrations Using ProUCL in Crab Tissue Samples Collected from Mad River Slough

Table F-8 Computation of Representative Dioxin/Furan Concentrations (Fish TEQs) Using ProUCL in Sediment Samples (<1 ft. bgs) Collected from Mad River Slough

Table F-9 Computation of Representative Dioxin/Furan Concentrations (Mammal TEQs) Using ProUCL in Sediment Samples (<1 ft. bgs) Collected from Mad River Slough

Table F-10 Computation of Representative Dioxin/Furan Concentrations (Bird TEQs) Using ProUCL in Sediment Samples (<1 ft. bgs) Collected from Mad River Slough

Table F-11 Computation of Representative Dioxin/Furan Concentrations (Fish TEQs) Using ProUCL in Sediment Samples (<1 ft. bgs) Collected from Humboldt Bay

Table F-12 Computation of Representative Dioxin/Furan Concentrations (Mammal TEQs) Using ProUCL in Sediment Samples (<1 ft. bgs) Collected from Humboldt Bay

Table F-13 Computation of Representative Dioxin/Furan Concentrations (Bird TEQs) Using ProUCL in Sediment Samples (<1 ft. bgs) Collected from Humboldt Bay

Table F-14 Computation of Representative Dioxin/Furan Concentrations (Fish TEQs) Using ProUCL in Sediment Samples (>1 ft. bgs) Collected from Mad River Slough

Table F-15 Computation of Representative Dioxin/Furan Concentrations (Mammal TEQs) Using ProUCL in Sediment Samples (>1 ft. bgs) Collected from Mad River Slough

Table F-16 Computation of Representative Dioxin/Furan Concentrations (Bird TEQs) Using ProUCL in Sediment Samples (>1 ft. bgs) Collected from Mad River Slough

Table F-17 Computation of Representative Dioxin/Furan Concentrations (Fish TEQs) Using ProUCL in Sediment Samples (>1 ft. bgs) Collected from Humboldt Bay

Table F-18 Computation of Representative Dioxin/Furan Concentrations (Mammal TEQs) Using ProUCL in Sediment Samples (>1 ft. bgs) Collected from Humboldt Bay

Table F-19 Computation of Representative Dioxin/Furan Concentrations (Bird TEQs) Using ProUCL in Sediment Samples (>1 ft. bgs) Collected from Humboldt Bay

Table F-20 Computation of Representative Dioxin/Furan Concentrations (Fish TEQs) Using ProUCL in Oyster Tissue Samples Collected from Humboldt Bay

Table F-21 Computation of Representative Dioxin/Furan Concentrations (Mammal TEQs) Using ProUCL in Oyster Tissue Samples Collected from Humboldt Bay

Table F-22 Computation of Representative Dioxin/Furan Concentrations (Bird TEQs) Using ProUCL in Oyster Tissue Samples Collected from Humboldt Bay

Table F-23 Computation of Representative Dioxin/Furan Concentrations (Fish TEQs) Using ProUCL in Crab Tissue Samples Collected from Mad River Slough
Table F-24 Computation of Representative Dioxin/Furan Concentrations (Mammal TEQs) Using ProUCL in Crab Tissue Samples Collected from Mad River Slough
Table F-25 Computation of Representative Dioxin/Furan Concentrations (Bird TEQs) Using ProUCL in Crab Tissue Samples Collected from Mad River Slough
Table F-26 Computation of Representative Dioxin/Furan Concentrations (Fish TEQs) Using ProUCL in Crab Tissue Samples Collected from Humboldt Bay
Table F-27 Computation of Representative Dioxin/Furan Concentrations (Mammal TEQs) Using ProUCL in Crab Tissue Samples Collected from Humboldt Bay
Table F-28 Computation of Representative Dioxin/Furan Concentrations (Bird TEQs) Using ProUCL in Crab Tissue Samples Collected from Humboldt Bay
Table F-29 Computation of Representative Dioxin/Furan Concentrations (Fish TEQs) Using ProUCL in Sole Tissue Samples Collected from Mad River Slough
Table F-30 Computation of Representative Dioxin/Furan Concentrations (Mammal TEQs) Using ProUCL in Sole Tissue Samples Collected from Mad River Slough
Table F-31 Computation of Representative Dioxin/Furan Concentrations (Bird TEQs) Using ProUCL in Sole Tissue Samples Collected from Mad River Slough
Table F-32 Computation of Representative Dioxin/Furan Concentrations (Fish TEQs) Using ProUCL in Sole Tissue Samples Collected from Humboldt Bay
Table F-33 Computation of Representative Dioxin/Furan Concentrations (Mammal TEQs) Using ProUCL in Sole Tissue Samples Collected from Humboldt Bay
Table F-34 Computation of Representative Dioxin/Furan Concentrations (Bird TEQs) Using ProUCL in Sole Tissue Samples Collected from Humboldt Bay
Table F-35 Computation of Representative Zinc (Dry Weight) Concentrations Using ProUCL in Upland Sediment Samples
Table F-36 Computation of Representative Zinc (Dry Weight) Concentrations Using ProUCL in Sediment Samples (<1 ft. bgs) Collected from Mad River Slough
Table F-37 Computation of Representative Zinc (Dry Weight) Concentrations Using ProUCL in Sediment Samples (<1 ft. bgs) Collected from Humboldt Bay
Table F-38 Computation of Representative Zinc (Dry Weight) Concentrations Using ProUCL in Sediment Samples (>1 ft. bgs) Collected from Mad River Slough
Table F-39 Computation of Representative Zinc (Dry Weight) Concentrations Using ProUCL in Sediment Samples (>1 ft. bgs) Collected from Humboldt Bay

TABLE F-1

COMPUTATION OF REPRESENTATIVE ZINC (WET WEIGHT) CONCENTRATIONS USING PROUCL IN UPLAND SEDIMENT SAMPLES

Sierra Pacific Industries

Arcata Division Sawmill

Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Summary Statistics for	Zinc	Summary Statistics for	ln(Zinc)
Number of Samples	56	Minimum	2.6
Minimum	14	Maximum	6.1
Maximum	460	Mean	4.3
Mean	106.1	Standard Deviation	0.9
Median	72.5	Variance	0.7
Standard Deviation	94.2		
Variance	8872.6	Lilliefors Test Statisitic	0.1
Coefficient of Variation	0.9	Lilliefors 5% Critical Value	0.1
Skewness	1.8	Data are Lognormal at 5% Significance Level	
95 % UCL (Assuming Normal Data)		Estimates Assuming Lognormal Distribution	
Student's-t	127.1	MLE Mean	108.3
		MLE Standard Deviation	113.4
95 % UCL (Adjusted for Skewness)		MLE Coefficient of Variation	1.0
Adjusted-CLT	130.0	MLE Skewness	4.3
Modified-t	127.6	MLE Median	74.8
		MLE 80% Quantile	154.7
95 % Non-parametric UCL		MLE 90% Quantile	225.9
CLT	126.8	MLE 95% Quantile	307.9
Jackknife	127.1	MLE 99% Quantile	553.2
Standard Bootstrap	126.7		
Bootstrap-t	130.8	MVU Estimate of Median	74.3
Chebyshev (Mean, Std)	160.9	MVU Estimate of Mean	107.3
		MVU Estimate of Std. Dev.	108.6
		MVU Estimate of SE of Mean	14.1
		UCL Assuming Lognormal Distribution	
		95% H-UCL	139.0
		95% Chebyshev (MVUE) UCL	168.6
		99% Chebyshev (MVUE) UCL	247.2
		Recommended UCL to use:	
		H-UCL	

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TABLE F-2

COMPUTATION OF REPRESENTATIVE ZINC (WET WEIGHT) CONCENTRATIONS USING PROUCL IN SEDIMENT SAMPLES (<1 FT. BGS) COLLECTED FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Summary Statistics for	Zinc	Summary Statistics for	ln(Zinc)
Number of Samples	22	Minimum	3.4
Minimum	29	Maximum	4.1
Maximum	63	Mean	3.8
Mean	46.7	Standard Deviation	0.2
Median	48.5	Variance	0.0
Standard Deviation	9.0		
Variance	81.4	Shapiro-Wilk Test Statisitic	0.9
Coefficient of Variation	0.2	Shapiro-Wilk 5% Critical Value	0.9
Skewness	-0.4	Data are Lognormal at 5% Significance Level	
95 % UCL (Assuming Normal Data)		Estimates Assuming Lognormal Distribution	
Student's-t	50.0	MLE Mean	46.8
		MLE Standard Deviation	9.9
95 % UCL (Adjusted for Skewness)		MLE Coefficient of Variation	0.2
Adjusted-CLT	49.7	MLE Skewness	0.6
Modified-t	50.0	MLE Median	45.8
		MLE 80% Quantile	54.6
95 % Non-parametric UCL		MLE 90% Quantile	59.9
CLT	49.8	MLE 95% Quantile	64.6
Jackknife	50.0	MLE 99% Quantile	74.5
Standard Bootstrap	49.8		
Bootstrap-t	49.9	MVU Estimate of Median	45.7
Chebyshev (Mean, Std)	55.1	MVU Estimate of Mean	46.7
		MVU Estimate of Std. Dev.	9.8
		MVU Estimate of SE of Mean	2.1
		UCL Assuming Lognormal Distribution	
		95% H-UCL	50.7
		95% Chebyshev (MVUE) UCL	55.9
		99% Chebyshev (MVUE) UCL	67.6
		Recommended UCL to use:	
		Student's-t or H-UCL	

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TABLE F-3

COMPUTATION OF REPRESENTATIVE ZINC (WET WEIGHT) CONCENTRATIONS USING PROUCL IN SEDIMENT SAMPLES (>1 FT. BGS) COLLECTED FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Summary Statistics for	Zinc	Summary Statistics for	ln(Zinc)
Number of Samples	6	Minimum	3.8
Minimum	46	Maximum	4.0
Maximum	56	Mean	3.9
Mean	50.7	Standard Deviation	0.1
Median	50.5	Variance	0.0
Standard Deviation	3.6		
Variance	12.7	Shapiro-Wilk Test Statisitic	1.0
Coefficient of Variation	0.1	Shapiro-Wilk 5% Critical Value	0.8
Skewness	0.3	Data are Lognormal at 5% Significance Level	
95 % UCL (Assuming Normal Data)		Estimates Assuming Lognormal Distribution	
Student's-t	53.6	MLE Mean	50.7
		MLE Standard Deviation	3.6
95 % UCL (Adjusted for Skewness)		MLE Coefficient of Variation	0.1
Adjusted-CLT	53.2	MLE Skewness	0.2
Modified-t	53.6	MLE Median	50.6
		MLE 80% Quantile	53.6
95 % Non-parametric UCL		MLE 90% Quantile	55.3
CLT	53.1	MLE 95% Quantile	56.7
Jackknife	53.6	MLE 99% Quantile	59.5
Standard Bootstrap	52.8		
Bootstrap-t	53.8	MVU Estimate of Median	50.5
Chebyshev (Mean, Std)	57.0	MVU Estimate of Mean	50.7
		MVU Estimate of Std. Dev.	3.5
		MVU Estimate of SE of Mean	1.4
		UCL Assuming Lognormal Distribution	
		Standard Deviation too small for H-Statistic	
		95% Chebyshev (MVUE) UCL	57.0
		99% Chebyshev (MVUE) UCL	65.1
		Recommended UCL to use:	
		Student's-t	

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TABLE F-4

COMPUTATION OF REPRESENTATIVE ZINC (WET WEIGHT) CONCENTRATIONS USING PROUCL IN SEDIMENT SAMPLES (<1 FT. BGS) COLLECTED FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Summary Statistics for	Zinc	Summary Statistics for	ln(Zinc)
Number of Samples	23	Minimum	3.1
Minimum	23	Maximum	4.8
Maximum	120	Mean	3.7
Mean	44.3	Standard Deviation	0.3
Median	41	Variance	0.1
Standard Deviation	19.6		
Variance	383.2	Shapiro-Wilk Test Statisitic	0.9
Coefficient of Variation	0.4	Shapiro-Wilk 5% Critical Value	0.9
Skewness	2.8	Data are Lognormal at 5% Significance Level	
95 % UCL (Assuming Normal Data)		Estimates Assuming Lognormal Distribution	
Student's-t	51.4	MLE Mean	44.1
		MLE Standard Deviation	15.7
95 % UCL (Adjusted for Skewness)		MLE Coefficient of Variation	0.4
Adjusted-CLT	53.6	MLE Skewness	1.1
Modified-t	51.8	MLE Median	41.5
		MLE 80% Quantile	55.7
95 % Non-parametric UCL		MLE 90% Quantile	64.8
CLT	51.1	MLE 95% Quantile	73.4
Jackknife	51.4	MLE 99% Quantile	92.9
Standard Bootstrap	51.0		
Bootstrap-t	56.1	MVU Estimate of Median	41.4
Chebyshev (Mean, Std)	62.1	MVU Estimate of Mean	44.0
		MVU Estimate of Std. Dev.	15.5
		MVU Estimate of SE of Mean	3.2
		UCL Assuming Lognormal Distribution	
		95% H-UCL	50.6
		95% Chebyshev (MVUE) UCL	58.1
		99% Chebyshev (MVUE) UCL	76.2
		Recommended UCL to use:	
		Student's-t or H-UCL	

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TABLE F-5

COMPUTATION OF REPRESENTATIVE ZINC (WET WEIGHT) CONCENTRATIONS USING PROUCL IN SEDIMENT SAMPLES (>1 FT. BGS) COLLECTED FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Summary Statistics for	Zinc	Summary Statistics for	ln(Zinc)
Number of Samples	5	Minimum	3.7
Minimum	41	Maximum	4.1
Maximum	62	Mean	3.9
Mean	51.2	Standard Deviation	0.2
Median	49	Variance	0.0
Standard Deviation	9.4		
Variance	88.7	Shapiro-Wilk Test Statisitic	0.9
Coefficient of Variation	0.2	Shapiro-Wilk 5% Critical Value	0.8
Skewness	0.2	Data are Lognormal at 5% Significance Level	
95 % UCL (Assuming Normal Data)		Estimates Assuming Lognormal Distribution	
Student's-t	60.2	MLE Mean	51.4
		MLE Standard Deviation	9.5
95 % UCL (Adjusted for Skewness)		MLE Coefficient of Variation	0.2
Adjusted-CLT	58.6	MLE Skewness	0.6
Modified-t	60.3	MLE Median	50.5
		MLE 80% Quantile	59.0
95 % Non-parametric UCL		MLE 90% Quantile	64.0
CLT	58.1	MLE 95% Quantile	68.3
Jackknife	60.2	MLE 99% Quantile	77.5
Standard Bootstrap	57.3		
Bootstrap-t	66.2	MVU Estimate of Median	50.3
Chebyshev (Mean, Std)	69.6	MVU Estimate of Mean	51.2
		MVU Estimate of Std. Dev.	9.4
		MVU Estimate of SE of Mean	4.2
		UCL Assuming Lognormal Distribution	
		95% H-UCL	62.7
		95% Chebyshev (MVUE) UCL	69.5
		99% Chebyshev (MVUE) UCL	93.0
		Recommended UCL to use:	
		Student's-t or H-UCL	

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TABLE F-6

COMPUTATION OF REPRESENTATIVE ZINC CONCENTRATIONS USING PROUCL IN OYSTER TISSUE SAMPLES COLLECTED FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Summary Statistics for	Zinc	Summary Statistics for	ln(Zinc)
Number of Samples	11	Minimum	4.1
Minimum	58	Maximum	4.9
Maximum	140	Mean	4.5
Mean	97.8	Standard Deviation	0.3
Median	100	Variance	0.1
Standard Deviation	29.6		
Variance	873.8	Shapiro-Wilk Test Statisitic	0.9
Coefficient of Variation	0.3	Shapiro-Wilk 5% Critical Value	0.9
Skewness	-0.1	Data are Lognormal at 5% Significance Level	
95 % UCL (Assuming Normal Data)		Estimates Assuming Lognormal Distribution	
Student's-t	114.0	MLE Mean	98.5
		MLE Standard Deviation	32.7
95 % UCL (Adjusted for Skewness)		MLE Coefficient of Variation	0.3
Adjusted-CLT	112.2	MLE Skewness	1.0
Modified-t	113.9	MLE Median	93.5
		MLE 80% Quantile	122.9
95 % Non-parametric UCL		MLE 90% Quantile	141.7
CLT	112.5	MLE 95% Quantile	159.2
Jackknife	114.0	MLE 99% Quantile	198.4
Standard Bootstrap	112.0		
Bootstrap-t	113.5	MVU Estimate of Median	93.0
Chebyshev (Mean, Std)	136.7	MVU Estimate of Mean	98.0
		MVU Estimate of Std. Dev.	32.0
		MVU Estimate of SE of Mean	9.7
		UCL Assuming Lognormal Distribution	
		95% H-UCL	120.6
		95% Chebyshev (MVUE) UCL	140.1
		99% Chebyshev (MVUE) UCL	194.1
		Recommended UCL to use:	
		Student's-t or H-UCL	

TABLE F-7

COMPUTATION OF REPRESENTATIVE ZINC CONCENTRATIONS USING PROUCL IN CRAB TISSUE SAMPLES COLLECTED FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Summary Statistics for	Zinc	Summary Statistics for	ln(Zinc)
Number of Samples	5	Minimum	3.2
Minimum	25	Maximum	3.8
Maximum	45	Mean	3.4
Mean	32.2	Standard Deviation	0.2
Median	30	Variance	0.1
Standard Deviation	7.9		
Variance	62.7	Shapiro-Wilk Test Statisitic	0.9
Coefficient of Variation	0.2	Shapiro-Wilk 5% Critical Value	0.8
Skewness	1.3	Data are Lognormal at 5% Significance Level	
95 % UCL (Assuming Normal Data)		Estimates Assuming Lognormal Distribution	
Student's-t	39.7	MLE Mean	32.3
		MLE Standard Deviation	7.6
95 % UCL (Adjusted for Skewness)		MLE Coefficient of Variation	0.2
Adjusted-CLT	40.3	MLE Skewness	0.7
Modified-t	40.1	MLE Median	31.5
		MLE 80% Quantile	38.3
95 % Non-parametric UCL		MLE 90% Quantile	42.4
CLT	38.0	MLE 95% Quantile	46.0
Jackknife	39.7	MLE 99% Quantile	53.8
Standard Bootstrap	37.2		
Bootstrap-t	48.3	MVU Estimate of Median	31.3
Chebyshev (Mean, Std)	47.6	MVU Estimate of Mean	32.2
		MVU Estimate of Std. Dev.	7.4
		MVU Estimate of SE of Mean	3.3
		UCL Assuming Lognormal Distribution	
		95% H-UCL	41.9
		95% Chebyshev (MVUE) UCL	46.6
		99% Chebyshev (MVUE) UCL	65.1
		Recommended UCL to use:	
		Student's-t or H-UCL	

TABLE F-8

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (FISH TEQS) USING PROUCL IN SEDIMENT SAMPLES (<1 FT. BGS) COLLECTED FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Data File		Variable: 2,3,7,8-TCDD TEQ (Fish)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	66	Lilliefors Test Statisitic	0.2471511
Number of Unique Samples	60	Lilliefors 5% Critical Value	0.1090591
Minimum	0.00049	Data not normal at 5% significance level	
Maximum	59.48		
Mean	7.6409091	95% UCL (Assuming Normal Distribution)	
Median	4.115	Student's-t UCL	9.9370979
Standard Deviation	11.179389		
Variance	124.97873		
Coefficient of Variation	1.4630967		
Skewness	3.1444271		
Gamma Statistics Not Available			
Lognormal Statistics Not Available			
		95% Non-parametric UCLs	
		CLT UCL	9.9043718
		Adj-CLT UCL (Adjusted for skewness)	10.473482
		Mod-t UCL (Adjusted for skewness)	10.025868
		Jackknife UCL	9.9370979
		Standard Bootstrap UCL	9.8783358
		Bootstrap-t UCL	11.029753
RECOMMENDATION		Hall's Bootstrap UCL	11.923929
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	10.047576
		BCA Bootstrap UCL	11.582727
Use 95% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	13.639136
		97.5% Chebyshev (Mean, Sd) UCL	16.234574
		99% Chebyshev (Mean, Sd) UCL	21.332808

TABLE F-9

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (MAMMAL TEQS) USING PROUCL IN SEDIMENT SAMPLES (<1 FT. BGS) COLLECTED FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Data File		Variable: 2,3,7,8-TCDD TEQ (Mammals)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	66	Lilliefors Test Statisitic	0.2677615
Number of Unique Samples	61	Lilliefors 5% Critical Value	0.1090591
Minimum	0.00049	Data not normal at 5% significance level	
Maximum	120.3		
Mean	13.03274394	95% UCL (Assuming Normal Distribution)	
Median	6.005	Student's-t UCL	17.352902
Standard Deviation	21.03342982		
Variance	442.4051698	Gamma Distribution Test	
Coefficient of Variation	1.613891128	A-D Test Statistic	0.7131149
Skewness	3.395422545	A-D 5% Critical Value	0.8412758
		K-S Test Statistic	0.1040024
Gamma Statistics		K-S 5% Critical Value	0.1176784
k hat	0.397117988	Data follow gamma distribution	
k star (bias corrected)	0.389168181	at 5% significance level	
Theta hat	32.8183168		
Theta star	33.48871925	95% UCLs (Assuming Gamma Distribution)	
nu hat	52.41957443	Approximate Gamma UCL	18.645336
nu star	51.37019984	Adjusted Gamma UCL	18.796405
Approx.Chi Square Value (.05)	35.9068159		
Adjusted Level of Significance	0.046363636	Lognormal Distribution Test	
Adjusted Chi Square Value	35.6182284	Lilliefors Test Statisitic	0.2044903
		Lilliefors 5% Critical Value	0.1090591
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-7.621105167		
Maximum of log data	4.789988623	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	0.908499751	95% H-UCL	483.01611
Standard Deviation of log data	2.747240048	95% Chebyshev (MVUE) UCL	294.98372
Variance of log data	7.547327879	97.5% Chebyshev (MVUE) UCL	385.80602
		99% Chebyshev (MVUE) UCL	564.20884
		95% Non-parametric UCLs	
		CLT UCL	17.29133
		Adj-CLT UCL (Adjusted for skewness)	18.447549
		Mod-t UCL (Adjusted for skewness)	17.533249
		Jackknife UCL	17.352902
		Standard Bootstrap UCL	17.090558
		Bootstrap-t UCL	19.452074
RECOMMENDATION		Hall's Bootstrap UCL	22.223554
Data follow gamma distribution (0.05)		Percentile Bootstrap UCL	17.364858
		BCA Bootstrap UCL	20.035024
Use Adjusted Gamma UCL		95% Chebyshev (Mean, Sd) UCL	24.318091
		97.5% Chebyshev (Mean, Sd) UCL	29.20127
		99% Chebyshev (Mean, Sd) UCL	38.793329

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TABLE F-10

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (BIRD TEQS) USING PROUCL IN SEDIMENT SAMPLES (<1 FT. BGS) COLLECTED FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Data File		Variable: 2,3,7,8-TCDD TEQ (Bird)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	66	Lilliefors Test Statisitic	0.2400542
Number of Unique Samples	61	Lilliefors 5% Critical Value	0.1090591
Minimum	0.00049	Data not normal at 5% significance level	
Maximum	79.2		
Mean	9.83835	95% UCL (Assuming Normal Distribution)	
Median	5.705	Student's-t UCL	12.699936
Standard Deviation	13.93212		
Variance	194.10396	Gamma Distribution Test	
Coefficient of Variation	1.4161033	A-D Test Statistic	1.1691248
Skewness	3.057464	A-D 5% Critical Value	0.8299044
		K-S Test Statistic	0.1308641
Gamma Statistics		K-S 5% Critical Value	0.1169522
k hat	0.4442162	Data do not follow gamma distribution	
k star (bias corrected)	0.4341256	at 5% significance level	
Theta hat	22.147662		
Theta star	22.662453	95% UCLs (Assuming Gamma Distribution)	
nu hat	58.636537	Approximate Gamma UCL	13.784261
nu star	57.304573	Adjusted Gamma UCL	13.889269
Approx.Chi Square Value (.05)	40.900449		
Adjusted Level of Significance	0.0463636	Lognormal Distribution Test	
Adjusted Chi Square Value	40.591226	Lilliefors Test Statisitic	0.2213036
		Lilliefors 5% Critical Value	0.1090591
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-7.621105		
Maximum of log data	4.3719763	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	0.8295872	95% H-UCL	291.67404
Standard Deviation of log data	2.6298333	95% Chebyshev (MVUE) UCL	197.63032
Variance of log data	6.9160231	97.5% Chebyshev (MVUE) UCL	257.5152
		99% Chebyshev (MVUE) UCL	375.14744
		95% Non-parametric UCLs	
		CLT UCL	12.659151
		Adj-CLT UCL (Adjusted for skewness)	13.348779
		Mod-t UCL (Adjusted for skewness)	12.807504
		Jackknife UCL	12.699936
		Standard Bootstrap UCL	12.656723
		Bootstrap-t UCL	13.806727
RECOMMENDATION		Hall's Bootstrap UCL	14.72667
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	12.804545
		BCA Bootstrap UCL	14.570176
Use 99% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	17.313536
		97.5% Chebyshev (Mean, Sd) UCL	20.548056
		99% Chebyshev (Mean, Sd) UCL	26.901642

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TABLE F-11

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (FISH TEQS) USING PROUCL IN SEDIMENT SAMPLES (<1 FT. BGS) COLLECTED FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Data File		Variable: 2,3,7,8-TCDD TEQ (Fish)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	28	Shapiro-Wilk Test Statisitic	0.6697706
Number of Unique Samples	27	Shapiro-Wilk 5% Critical Value	0.924
Minimum	0.83	Data not normal at 5% significance level	
Maximum	11.71		
Mean	2.6289286	95% UCL (Assuming Normal Distribution)	
Median	1.915	Student's-t UCL	3.3486322
Standard Deviation	2.2358598		
Variance	4.9990692	Gamma Distribution Test	
Coefficient of Variation	0.8504833	A-D Test Statistic	0.9194229
Skewness	2.9514412	A-D 5% Critical Value	0.7558593
		K-S Test Statistic	0.162441
Gamma Statistics		K-S 5% Critical Value	0.167079
k hat	2.4908613	Data follow approximate gamma distibution	
k star (bias corrected)	2.2477928	at 5% significance level	
Theta hat	1.0554295		
Theta star	1.16956	95% UCLs (Assuming Gamma Distribution)	
nu hat	139.48823	Approximate Gamma UCL	3.277782
nu star	125.8764	Adjusted Gamma UCL	3.3231717
Approx.Chi Square Value (.05)	100.95853		
Adjusted Level of Significance	0.0404	Lognormal Distribution Test	
Adjusted Chi Square Value	99.579585	Shapiro-Wilk Test Statisitic	0.9488503
		Shapiro-Wilk 5% Critical Value	0.924
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	-0.18633		
Maximum of log data	2.4604432	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	0.7526133	95% H-UCL	3.2730342
Standard Deviation of log data	0.6166066	95% Chebyshev (MVUE) UCL	3.9220062
Variance of log data	0.3802037	97.5% Chebyshev (MVUE) UCL	4.5171171
		99% Chebyshev (MVUE) UCL	5.6860971
		95% Non-parametric UCLs	
		CLT UCL	3.3239414
		Adj-CLT UCL (Adjusted for skewness)	3.5757677
		Mod-t UCL (Adjusted for skewness)	3.387912
		Jackknife UCL	3.3486322
		Standard Bootstrap UCL	3.3140695
		Bootstrap-t UCL	4.053295
RECOMMENDATION		Hall's Bootstrap UCL	6.7721324
Assuming gamma distribution (0.05)		Percentile Bootstrap UCL	3.3735714
		BCA Bootstrap UCL	3.8396429
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	4.4707281
		97.5% Chebyshev (Mean, Sd) UCL	5.2676762
		99% Chebyshev (Mean, Sd) UCL	6.8331265

TABLE F-12

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (MAMMAL TEQS) USING PROUCL IN SEDIMENT SAMPLES (<1 FT. BGS) COLLECTED FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Data File		Variable: 2,3,7,8-TCDD TEQ (Mammals)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	28	Shapiro-Wilk Test Statisitic	0.6771099
Number of Unique Samples	26	Shapiro-Wilk 5% Critical Value	0.924
Minimum	0.98	Data not normal at 5% significance level	
Maximum	13.12		
Mean	3.285	95% UCL (Assuming Normal Distribution)	
Median	2.625	Student's-t UCL	4.1691897
Standard Deviation	2.746858812		
Variance	7.545233333	Gamma Distribution Test	
Coefficient of Variation	0.836182287	A-D Test Statistic	0.994148
Skewness	2.629659115	A-D 5% Critical Value	0.7559521
		K-S Test Statistic	0.1609025
Gamma Statistics		K-S 5% Critical Value	0.1671001
k hat	2.4692802	Data follow approximate gamma distibution	
k star (bias corrected)	2.228523988	at 5% significance level	
Theta hat	1.3303472		
Theta star	1.47406984	95% UCLs (Assuming Gamma Distribution)	
nu hat	138.2796912	Approximate Gamma UCL	4.0999285
nu star	124.7973434	Adjusted Gamma UCL	4.1569691
Approx.Chi Square Value (.05)	99.99180986		
Adjusted Level of Significance	0.0404	Lognormal Distribution Test	
Adjusted Chi Square Value	98.61975371	Shapiro-Wilk Test Statisitic	0.9446594
		Shapiro-Wilk 5% Critical Value	0.924
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	-0.020202707		
Maximum of log data	2.574137784	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	0.973420362	95% H-UCL	4.1114348
Standard Deviation of log data	0.623045196	95% Chebyshev (MVUE) UCL	4.9296365
Variance of log data	0.388185317	97.5% Chebyshev (MVUE) UCL	5.6832461
		99% Chebyshev (MVUE) UCL	7.1635661
		95% Non-parametric UCLs	
		CLT UCL	4.1388559
		Adj-CLT UCL (Adjusted for skewness)	4.414506
		Mod-t UCL (Adjusted for skewness)	4.2121855
		Jackknife UCL	4.1691897
		Standard Bootstrap UCL	4.1150384
		Bootstrap-t UCL	5.1025545
RECOMMENDATION		Hall's Bootstrap UCL	8.7995699
Assuming gamma distribution (0.05)		Percentile Bootstrap UCL	4.1696429
		BCA Bootstrap UCL	4.7132143
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	5.5477372
		97.5% Chebyshev (Mean, Sd) UCL	6.5268254
		99% Chebyshev (Mean, Sd) UCL	8.4500546

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TABLE F-13

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (BIRD TEQS) USING PROUCL IN SEDIMENT SAMPLES (<1 FT. BGS) COLLECTED FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Data File		Variable: 2,3,7,8-TCDD TEQ (Bird)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	28	Shapiro-Wilk Test Statisitic	0.6119297
Number of Unique Samples	27	Shapiro-Wilk 5% Critical Value	0.924
Minimum	1.23	Data not normal at 5% significance level	
Maximum	19.15		
Mean	3.8828571	95% UCL (Assuming Normal Distribution)	
Median	3.135	Student's-t UCL	5.0092283
Standard Deviation	3.4992294		
Variance	12.244606	Gamma Distribution Test	
Coefficient of Variation	0.9011996	A-D Test Statistic	1.121311
Skewness	3.4421509	A-D 5% Critical Value	0.75583
		K-S Test Statistic	0.189559
Gamma Statistics		K-S 5% Critical Value	0.1670723
k hat	2.4976844	Data do not follow gamma distribution	
k star (bias corrected)	2.2538849	at 5% significance level	
Theta hat	1.5545828		
Theta star	1.7227398	95% UCLs (Assuming Gamma Distribution)	
nu hat	139.87032	Approximate Gamma UCL	4.8396607
nu star	126.21755	Adjusted Gamma UCL	4.9065805
Approx.Chi Square Value (.05)	101.26427		
Adjusted Level of Significance	0.0404	Lognormal Distribution Test	
Adjusted Chi Square Value	99.883152	Shapiro-Wilk Test Statisitic	0.9356602
		Shapiro-Wilk 5% Critical Value	0.924
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	0.2070142		
Maximum of log data	2.9523027	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	1.1432277	95% H-UCL	4.7534521
Standard Deviation of log data	0.6008664	95% Chebyshev (MVUE) UCL	5.6868328
Variance of log data	0.3610404	97.5% Chebyshev (MVUE) UCL	6.5337769
		99% Chebyshev (MVUE) UCL	8.1974348
		95% Non-parametric UCLs	
		CLT UCL	4.970586
		Adj-CLT UCL (Adjusted for skewness)	5.4302333
		Mod-t UCL (Adjusted for skewness)	5.080924
		Jackknife UCL	5.0092283
		Standard Bootstrap UCL	4.935696
		Bootstrap-t UCL	6.3363393
RECOMMENDATION		Hall's Bootstrap UCL	10.099951
Data are lognormal (0.05)		Percentile Bootstrap UCL	5.0525
		BCA Bootstrap UCL	5.8853571
Use H-UCL		95% Chebyshev (Mean, Sd) UCL	6.765363
		97.5% Chebyshev (Mean, Sd) UCL	8.0126256
		99% Chebyshev (Mean, Sd) UCL	10.462631

TABLE F-14

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (FISH TEQS) USING PROUCL IN SEDIMENT SAMPLES (>1 FT. BGS) COLLECTED FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Data File		Variable: 2,3,7,8-TCDD TEQ (Fish)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	22	Shapiro-Wilk Test Statisitic	0.8605022
Number of Unique Samples	22	Shapiro-Wilk 5% Critical Value	0.911
Minimum	0.200000	Data not normal at 5% significance level	
Maximum	69.13		
Mean	21.4127273	95% UCL (Assuming Normal Distribution)	
Median	13.43	Student's-t UCL	29.191733
Standard Deviation	21.2040846		
Variance	449.613202	Gamma Distribution Test	
Coefficient of Variation	0.99025614	A-D Test Statistic	0.2175629
Skewness	1.08379858	A-D 5% Critical Value	0.7817963
		K-S Test Statistic	0.1055825
Gamma Statistics		K-S 5% Critical Value	0.1924939
k hat	0.77410976	Data follow gamma distribution	
k star (bias corrected)	0.69885237	at 5% significance level	
Theta hat	27.6610997		
Theta star	30.6398436	95% UCLs (Assuming Gamma Distribution)	
nu hat	34.0608295	Approximate Gamma UCL	34.507191
nu star	30.7495043	Adjusted Gamma UCL	35.794084
Approx.Chi Square Value (.05)	19.080972		
Adjusted Level of Significance	0.0386	Lognormal Distribution Test	
Adjusted Chi Square Value	18.3949599	Shapiro-Wilk Test Statisitic	0.9030711
		Shapiro-Wilk 5% Critical Value	0.911
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-1.60943791		
Maximum of log data	4.23598879	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	2.29395392	95% H-UCL	125.3855
Standard Deviation of log data	1.61847138	95% Chebyshev (MVUE) UCL	92.769525
Variance of log data	2.6194496	97.5% Chebyshev (MVUE) UCL	118.8105
		99% Chebyshev (MVUE) UCL	169.96296
		95% Non-parametric UCLs	
		CLT UCL	28.84866
		Adj-CLT UCL (Adjusted for skewness)	29.964818
		Mod-t UCL (Adjusted for skewness)	29.365831
		Jackknife UCL	29.191733
		Standard Bootstrap UCL	28.687711
		Bootstrap-t UCL	31.05256
RECOMMENDATION		Hall's Bootstrap UCL	29.620057
Data follow gamma distribution (0.05)		Percentile Bootstrap UCL	28.989091
		BCA Bootstrap UCL	32.261818
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	41.118115
		97.5% Chebyshev (Mean, Sd) UCL	49.644652
		99% Chebyshev (Mean, Sd) UCL	66.393383

TABLE F-15

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (MAMMAL TEQS) USING PROUCL IN SEDIMENT SAMPLES (>1 FT. BGS) COLLECTED FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Data File		Variable: 2,3,7,8-TCDD TEQ (Mammals)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	22	Shapiro-Wilk Test Statisitic	0.8344801
Number of Unique Samples	22	Shapiro-Wilk 5% Critical Value	0.911
Minimum	0.2	Data not normal at 5% significance level	
Maximum	117.19		
Mean	37.04863636	95% UCL (Assuming Normal Distribution)	
Median	22.855	Student's-t UCL	51.15832
Standard Deviation	38.46030214		
Variance	1479.194841	Gamma Distribution Test	
Coefficient of Variation	1.038103043	A-D Test Statistic	0.286049
Skewness	1.100798949	A-D 5% Critical Value	0.7898746
		K-S Test Statistic	0.1133657
Gamma Statistics		K-S 5% Critical Value	0.193715
k hat	0.668884463	Data follow gamma distribution	
k star (bias corrected)	0.607975976	at 5% significance level	
Theta hat	55.38869325		
Theta star	60.93766502	95% UCLs (Assuming Gamma Distribution)	
nu hat	29.43091639	Approximate Gamma UCL	62.109826
nu star	26.75094294	Adjusted Gamma UCL	64.628932
Approx.Chi Square Value (.05)	15.95699131		
Adjusted Level of Significance	0.0386	Lognormal Distribution Test	
Adjusted Chi Square Value	15.33502001	Shapiro-Wilk Test Statisitic	0.8881455
		Shapiro-Wilk 5% Critical Value	0.911
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-1.609437912		
Maximum of log data	4.763796549	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	2.702918012	95% H-UCL	356.49338
Standard Deviation of log data	1.821671044	95% Chebyshev (MVUE) UCL	206.1786
Variance of log data	3.318485394	97.5% Chebyshev (MVUE) UCL	266.74387
		99% Chebyshev (MVUE) UCL	385.71262
		95% Non-parametric UCLs	
		CLT UCL	50.536048
		Adj-CLT UCL (Adjusted for skewness)	52.59231
		Mod-t UCL (Adjusted for skewness)	51.479055
		Jackknife UCL	51.15832
		Standard Bootstrap UCL	50.191128
		Bootstrap-t UCL	54.584649
RECOMMENDATION		Hall's Bootstrap UCL	51.872457
Data follow gamma distribution (0.05)		Percentile Bootstrap UCL	50.517273
		BCA Bootstrap UCL	56.873182
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	72.790579
		97.5% Chebyshev (Mean, Sd) UCL	88.256146
		99% Chebyshev (Mean, Sd) UCL	118.63526

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TABLE F-16

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (BIRD TEQS) USING PROUCL IN SEDIMENT SAMPLES (>1 FT. BGS) COLLECTED FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Data File		Variable: 2,3,7,8-TCDD TEQ (Bird)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	22	Shapiro-Wilk Test Statisitic	0.8437235
Number of Unique Samples	22	Shapiro-Wilk 5% Critical Value	0.911
Minimum	0.42	Data not normal at 5% significance level	
Maximum	87.19		
Mean	26.86	95% UCL (Assuming Normal Distribution)	
Median	17.105	Student's-t UCL	36.669382
Standard Deviation	26.73850176		
Variance	714.9474762	Gamma Distribution Test	
Coefficient of Variation	0.99547661	A-D Test Statistic	0.2589412
Skewness	1.183601535	A-D 5% Critical Value	0.7793858
		K-S Test Statistic	0.1187905
Gamma Statistics		K-S 5% Critical Value	0.1921116
k hat	0.823627716	Data follow gamma distribution	
k star (bias corrected)	0.741617876	at 5% significance level	
Theta hat	32.61182143		
Theta star	36.21811295	95% UCLs (Assuming Gamma Distribution)	
nu hat	36.23961951	Approximate Gamma UCL	42.607047
nu star	32.63118654	Adjusted Gamma UCL	44.140692
Approx.Chi Square Value (.05)	20.57109627		
Adjusted Level of Significance	0.0386	Lognormal Distribution Test	
Adjusted Chi Square Value	19.8563647	Shapiro-Wilk Test Statisitic	0.9026571
		Shapiro-Wilk 5% Critical Value	0.911
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-0.86750057		
Maximum of log data	4.468089645	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	2.57279385	95% H-UCL	126.48517
Standard Deviation of log data	1.524043824	95% Chebyshev (MVUE) UCL	102.99536
Variance of log data	2.322709576	97.5% Chebyshev (MVUE) UCL	131.1875
		99% Chebyshev (MVUE) UCL	186.56551
		95% Non-parametric UCLs	
		CLT UCL	36.236764
		Adj-CLT UCL (Adjusted for skewness)	37.773858
		Mod-t UCL (Adjusted for skewness)	36.909137
		Jackknife UCL	36.669382
		Standard Bootstrap UCL	36.055403
		Bootstrap-t UCL	39.218018
RECOMMENDATION		Hall's Bootstrap UCL	37.271756
Data follow gamma distribution (0.05)		Percentile Bootstrap UCL	36.529091
		BCA Bootstrap UCL	40.600909
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	51.708635
		97.5% Chebyshev (Mean, Sd) UCL	62.460659
		99% Chebyshev (Mean, Sd) UCL	83.580928

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TABLE F-17

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (FISH TEQS) USING PROUCL IN SEDIMENT SAMPLES (>1 FT. BGS) COLLECTED FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Data File		Variable: 2,3,7,8-TCDD TEQ (Fish)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	5	Shapiro-Wilk Test Statisitic	0.9489933
Number of Unique Samples	5	Shapiro-Wilk 5% Critical Value	0.762
Minimum	1.27	Data are normal at 5% significance level	
Maximum	10.57		
Mean	5.686	95% UCL (Assuming Normal Distribution)	
Median	5.45	Student's-t UCL	8.8545471
Standard Deviation	3.32345152		
Variance	11.04533	Gamma Distribution Test	
Coefficient of Variation	0.58449728	A-D Test Statistic	0.3876332
Skewness	0.34174954	A-D 5% Critical Value	0.6831393
		K-S Test Statistic	0.2941831
Gamma Statistics		K-S 5% Critical Value	0.3597138
k hat	2.72015724	Data follow gamma distribution	
k star (bias corrected)	1.22139623	at 5% significance level	
Theta hat	2.09032034		
Theta star	4.65532796	95% UCLs (Assuming Gamma Distribution)	
nu hat	27.2015724	Approximate Gamma UCL	12.939282
nu star	12.2139623	Adjusted Gamma UCL	19.469949
Approx.Chi Square Value (.05)	5.36726749		
Adjusted Level of Significance	0.0086	Lognormal Distribution Test	
Adjusted Chi Square Value	3.56696314	Shapiro-Wilk Test Statisitic	0.8650203
		Shapiro-Wilk 5% Critical Value	0.762
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	0.2390169		
Maximum of log data	2.3580198	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	1.54307526	95% H-UCL	30.694037
Standard Deviation of log data	0.78561966	95% Chebyshev (MVUE) UCL	14.799715
Variance of log data	0.61719825	97.5% Chebyshev (MVUE) UCL	18.636279
		99% Chebyshev (MVUE) UCL	26.172465
		95% Non-parametric UCLs	
		CLT UCL	8.1307339
		Adj-CLT UCL (Adjusted for skewness)	8.3734551
		Mod-t UCL (Adjusted for skewness)	8.8924067
		Jackknife UCL	8.8545471
		Standard Bootstrap UCL	7.8545639
		Bootstrap-t UCL	8.9843432
RECOMMENDATION		Hall's Bootstrap UCL	9.7722535
Data are normal (0.05)		Percentile Bootstrap UCL	7.79
		BCA Bootstrap UCL	8.668
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	12.1646
		97.5% Chebyshev (Mean, Sd) UCL	14.967895
		99% Chebyshev (Mean, Sd) UCL	20.474426

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TABLE F-18

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (MAMMAL TEQS) USING PROUCL IN SEDIMENT SAMPLES (>1 FT. BGS) COLLECTED FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Data File		Variable: 2,3,7,8-TCDD TEQ (Mammals)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	5	Shapiro-Wilk Test Statisitic	0.9804169
Number of Unique Samples	5	Shapiro-Wilk 5% Critical Value	0.762
Minimum	1.29	Data are normal at 5% significance level	
Maximum	14.34		
Mean	7.874	95% UCL (Assuming Normal Distribution)	
Median	8.89	Student's-t UCL	12.492085
Standard Deviation	4.84385487		
Variance	23.46293	Gamma Distribution Test	
Coefficient of Variation	0.615170799	A-D Test Statistic	0.358839
Skewness	-0.08791914	A-D 5% Critical Value	0.6842416
		K-S Test Statistic	0.2587711
Gamma Statistics		K-S 5% Critical Value	0.3603498
k hat	2.114510548	Data follow gamma distribution	
k star (bias corrected)	0.979137553	at 5% significance level	
Theta hat	3.723793199		
Theta star	8.041771025	95% UCLs (Assuming Gamma Distribution)	
nu hat	21.14510548	Approximate Gamma UCL	20.230378
nu star	9.791375527	Adjusted Gamma UCL	32.546001
Approx.Chi Square Value (.05)	3.810966315		
Adjusted Level of Significance	0.0086	Lognormal Distribution Test	
Adjusted Chi Square Value	2.368871412	Shapiro-Wilk Test Statisitic	0.8580996
		Shapiro-Wilk 5% Critical Value	0.762
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	0.254642218		
Maximum of log data	2.663052835	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	1.808846996	95% H-UCL	81.018316
Standard Deviation of log data	0.93231641	95% Chebyshev (MVUE) UCL	23.363328
Variance of log data	0.869213888	97.5% Chebyshev (MVUE) UCL	29.800687
		99% Chebyshev (MVUE) UCL	42.445632
		95% Non-parametric UCLs	
		CLT UCL	11.437144
		Adj-CLT UCL (Adjusted for skewness)	11.346135
		Mod-t UCL (Adjusted for skewness)	12.47789
		Jackknife UCL	12.492085
		Standard Bootstrap UCL	11.045592
		Bootstrap-t UCL	12.410218
RECOMMENDATION		Hall's Bootstrap UCL	11.331941
Data are normal (0.05)		Percentile Bootstrap UCL	11.158
		BCA Bootstrap UCL	12.16
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	17.316411
		97.5% Chebyshev (Mean, Sd) UCL	21.40215
		99% Chebyshev (Mean, Sd) UCL	29.427793

TABLE F-19

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (BIRD TEQS) USING PROUCL IN SEDIMENT SAMPLES (>1 FT. BGS) COLLECTED FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Data File		Variable: 2,3,7,8-TCDD TEQ (Bird)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	5	Shapiro-Wilk Test Statisitic	0.9741279
Number of Unique Samples	5	Shapiro-Wilk 5% Critical Value	0.762
Minimum	2.41	Data are normal at 5% significance level	
Maximum	13.12		
Mean	8.074	95% UCL (Assuming Normal Distribution)	
Median	7.32	Student's-t UCL	11.954683
Standard Deviation	4.07040293		
Variance	16.56818	Gamma Distribution Test	
Coefficient of Variation	0.5041371	A-D Test Statistic	0.3174581
Skewness	-0.2356976	A-D 5% Critical Value	0.6816624
		K-S Test Statistic	0.2489086
Gamma Statistics		K-S 5% Critical Value	0.3587447
k hat	3.69614179	Data follow gamma distribution	
k star (bias corrected)	1.61179005	at 5% significance level	
Theta hat	2.18444001		
Theta star	5.00933729	95% UCLs (Assuming Gamma Distribution)	
nu hat	36.9614179	Approximate Gamma UCL	16.177704
nu star	16.1179005	Adjusted Gamma UCL	22.729989
Approx.Chi Square Value (.05)	8.04415293		
Adjusted Level of Significance	0.0086	Lognormal Distribution Test	
Adjusted Chi Square Value	5.72529656	Shapiro-Wilk Test Statisitic	0.887909
		Shapiro-Wilk 5% Critical Value	0.762
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	0.87962675		
Maximum of log data	2.57413778	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	1.94731614	95% H-UCL	27.135933
Standard Deviation of log data	0.65401092	95% Chebyshev (MVUE) UCL	18.664664
Variance of log data	0.42773028	97.5% Chebyshev (MVUE) UCL	23.158306
		99% Chebyshev (MVUE) UCL	31.985195
		95% Non-parametric UCLs	
		CLT UCL	11.068192
		Adj-CLT UCL (Adjusted for skewness)	10.863169
		Mod-t UCL (Adjusted for skewness)	11.922704
		Jackknife UCL	11.954683
		Standard Bootstrap UCL	10.775458
		Bootstrap-t UCL	12.187815
RECOMMENDATION		Hall's Bootstrap UCL	13.000692
Data are normal (0.05)		Percentile Bootstrap UCL	10.8
		BCA Bootstrap UCL	10.216
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	16.008676
		97.5% Chebyshev (Mean, Sd) UCL	19.442017
		99% Chebyshev (Mean, Sd) UCL	26.18615

TABLE F-20

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (FISH TEQS) USING PROUCL IN OYSTER TISSUE SAMPLES COLLECTED FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Data File		Variable: 2,3,7,8-TCDD TEQ (Fish)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	20	Shapiro-Wilk Test Statisitic	0.7215061
Number of Unique Samples	16	Shapiro-Wilk 5% Critical Value	0.905
Minimum	0.15	Data not normal at 5% significance level	
Maximum	4.31		
Mean	0.8855	95% UCL (Assuming Normal Distribution)	
Median	0.23	Student's-t UCL	1.2868291
Standard Deviation	1.037976143		
Variance	1.077394474	Gamma Distribution Test	
Coefficient of Variation	1.172192144	A-D Test Statistic	1.5577042
Skewness	2.09947336	A-D 5% Critical Value	0.76824
		K-S Test Statistic	0.3198209
Gamma Statistics		K-S 5% Critical Value	0.1994021
k hat	0.993516692	Data do not follow gamma distribution	
k star (bias corrected)	0.877822522	at 5% significance level	
Theta hat	0.891278432		
Theta star	1.008746048	95% UCLs (Assuming Gamma Distribution)	
nu hat	39.74066769	Approximate Gamma UCL	1.3786111
nu star	35.11290087	Adjusted Gamma UCL	1.4289921
Approx.Chi Square Value (.05)	22.55347734		
Adjusted Level of Significance	0.038	Lognormal Distribution Test	
Adjusted Chi Square Value	21.75832422	Shapiro-Wilk Test Statisitic	0.8338096
		Shapiro-Wilk 5% Critical Value	0.905
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-1.89711999		
Maximum of log data	1.460937904	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-0.70302951	95% H-UCL	1.7955976
Standard Deviation of log data	1.096548873	95% Chebyshev (MVUE) UCL	1.912047
Variance of log data	1.202419432	97.5% Chebyshev (MVUE) UCL	2.3656441
		99% Chebyshev (MVUE) UCL	3.256648
		95% Non-parametric UCLs	
		CLT UCL	1.2672681
		Adj-CLT UCL (Adjusted for skewness)	1.3836936
		Mod-t UCL (Adjusted for skewness)	1.3049891
		Jackknife UCL	1.2868291
		Standard Bootstrap UCL	1.2568242
		Bootstrap-t UCL	1.501411
RECOMMENDATION		Hall's Bootstrap UCL	1.8753237
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	1.287
		BCA Bootstrap UCL	1.5125
Use 99% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	1.897194
		97.5% Chebyshev (Mean, Sd) UCL	2.3349548
		99% Chebyshev (Mean, Sd) UCL	3.1948511

TABLE F-21

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (MAMMAL TEQS) USING PROUCL IN OYSTER TISSUE SAMPLES COLLECTED FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Data File		Variable: 2,3,7,8-TCDD TEQ (Mammals)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	20	Shapiro-Wilk Test Statisitic	0.7129831
Number of Unique Samples	14	Shapiro-Wilk 5% Critical Value	0.905
Minimum	0.16	Data not normal at 5% significance level	
Maximum	4.32		
Mean	0.8855	95% UCL (Assuming Normal Distribution)	
Median	0.24	Student's-t UCL	1.2834051
Standard Deviation	1.029120601		
Variance	1.059089211	Gamma Distribution Test	
Coefficient of Variation	1.162191531	A-D Test Statistic	1.5947559
Skewness	2.175891101	A-D 5% Critical Value	0.7668414
		K-S Test Statistic	0.3240968
Gamma Statistics		K-S 5% Critical Value	0.1991435
k hat	1.054065544	Data do not follow gamma distribution	
k star (bias corrected)	0.929289046	at 5% significance level	
Theta hat	0.840080586		
Theta star	0.952878982	95% UCLs (Assuming Gamma Distribution)	
nu hat	42.16262175	Approximate Gamma UCL	1.359505
nu star	37.17156182	Adjusted Gamma UCL	1.4075451
Approx.Chi Square Value (.05)	24.21132479		
Adjusted Level of Significance	0.038	Lognormal Distribution Test	
Adjusted Chi Square Value	23.38498225	Shapiro-Wilk Test Statisitic	0.8309928
		Shapiro-Wilk 5% Critical Value	0.905
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-1.83258146		
Maximum of log data	1.463255402	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-0.66588994	95% H-UCL	1.6932174
Standard Deviation of log data	1.049722224	95% Chebyshev (MVUE) UCL	1.8447779
Variance of log data	1.101916748	97.5% Chebyshev (MVUE) UCL	2.2723659
		99% Chebyshev (MVUE) UCL	3.1122799
		95% Non-parametric UCLs	
		CLT UCL	1.264011
		Adj-CLT UCL (Adjusted for skewness)	1.3836448
		Mod-t UCL (Adjusted for skewness)	1.3020656
		Jackknife UCL	1.2834051
		Standard Bootstrap UCL	1.2545157
		Bootstrap-t UCL	1.5042409
RECOMMENDATION		Hall's Bootstrap UCL	1.9556265
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	1.2885
		BCA Bootstrap UCL	1.5135
Use 99% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	1.8885627
		97.5% Chebyshev (Mean, Sd) UCL	2.3225887
		99% Chebyshev (Mean, Sd) UCL	3.1751488

TABLE F-22

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (BIRD TEQS) USING PROUCL IN OYSTER TISSUE SAMPLES COLLECTED FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Data File		Variable: 2,3,7,8-TCDD TEQ (Bird)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	20	Shapiro-Wilk Test Statisitic	0.7188049
Number of Unique Samples	19	Shapiro-Wilk 5% Critical Value	0.905
Minimum	0.29	Data not normal at 5% significance level	
Maximum	4.66		
Mean	1.0945	95% UCL (Assuming Normal Distribution)	
Median	0.505	Student's-t UCL	1.5015426
Standard Deviation	1.0527532		
Variance	1.1082892	Gamma Distribution Test	
Coefficient of Variation	0.9618576	A-D Test Statistic	1.1883425
Skewness	2.2871309	A-D 5% Critical Value	0.7556072
		K-S Test Statistic	0.2737082
Gamma Statistics		K-S 5% Critical Value	0.1969018
k hat	1.7023131	Data do not follow gamma distribution	
k star (bias corrected)	1.4802995	at 5% significance level	
Theta hat	0.6429487		
Theta star	0.7393774	95% UCLs (Assuming Gamma Distribution)	
nu hat	68.092525	Approximate Gamma UCL	1.5243082
nu star	59.211979	Adjusted Gamma UCL	1.5654709
Approx.Chi Square Value (.05)	42.516015		
Adjusted Level of Significance	0.038	Lognormal Distribution Test	
Adjusted Chi Square Value	41.398093	Shapiro-Wilk Test Statisitic	0.8913178
		Shapiro-Wilk 5% Critical Value	0.905
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-1.2378744		
Maximum of log data	1.5390154	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-0.2313092	95% H-UCL	1.6230493
Standard Deviation of log data	0.7793192	95% Chebyshev (MVUE) UCL	1.9204057
Variance of log data	0.6073385	97.5% Chebyshev (MVUE) UCL	2.2949588
		99% Chebyshev (MVUE) UCL	3.0306959
		95% Non-parametric UCLs	
		CLT UCL	1.4817031
		Adj-CLT UCL (Adjusted for skewness)	1.6103407
		Mod-t UCL (Adjusted for skewness)	1.5216074
		Jackknife UCL	1.5015426
		Standard Bootstrap UCL	1.4716755
		Bootstrap-t UCL	1.767397
RECOMMENDATION		Hall's Bootstrap UCL	3.0863076
Data are Non-parametric (0.05)		Percentile Bootstrap UCL	1.4965
		BCA Bootstrap UCL	1.732
Use 95% Chebyshev (Mean, Sd) UCL		95% Chebyshev (Mean, Sd) UCL	2.1205969
		97.5% Chebyshev (Mean, Sd) UCL	2.5645898
		99% Chebyshev (Mean, Sd) UCL	3.4367279

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TABLE F-23

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (FISH TEQs) USING PROUCL IN CRAB TISSUE SAMPLES COLLECTED FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Data File		Variable: 2,3,7,8-TCDD TEQ (Fish)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	9	Shapiro-Wilk Test Statisitic	0.6478875
Number of Unique Samples	9	Shapiro-Wilk 5% Critical Value	0.829
Minimum	0.11	Data not normal at 5% significance level	
Maximum	2.29		
Mean	0.527777778	95% UCL (Assuming Normal Distribution)	
Median	0.23	Student's-t UCL	0.9629409
Standard Deviation	0.702046611		
Variance	0.492869444	Gamma Distribution Test	
Coefficient of Variation	1.330193579	A-D Test Statistic	0.7134552
Skewness	2.427848831	A-D 5% Critical Value	0.7421527
		K-S Test Statistic	0.279036
Gamma Statistics		K-S 5% Critical Value	0.2864778
k hat	1.072298504	Data follow gamma distribution	
k star (bias corrected)	0.788939744	at 5% significance level	
Theta hat	0.492192963		
Theta star	0.66897096	95% UCLs (Assuming Gamma Distribution)	
nu hat	19.30137307	Approximate Gamma UCL	1.1173149
nu star	14.20091538	Adjusted Gamma UCL	1.3245701
Approx.Chi Square Value (.05)	6.7079814		
Adjusted Level of Significance	0.02308	Lognormal Distribution Test	
Adjusted Chi Square Value	5.658384861	Shapiro-Wilk Test Statisitic	0.8964095
		Shapiro-Wilk 5% Critical Value	0.829
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	-2.207274913		
Maximum of log data	0.828551818	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-1.173074507	95% H-UCL	1.6570116
Standard Deviation of log data	1.003646268	95% Chebyshev (MVUE) UCL	1.1935245
Variance of log data	1.007305831	97.5% Chebyshev (MVUE) UCL	1.5042683
		99% Chebyshev (MVUE) UCL	2.1146641
		95% Non-parametric UCLs	
		CLT UCL	0.9126991
		Adj-CLT UCL (Adjusted for skewness)	1.1150595
		Mod-t UCL (Adjusted for skewness)	0.994505
		Jackknife UCL	0.9629409
		Standard Bootstrap UCL	0.8959772
		Bootstrap-t UCL	2.1057529
RECOMMENDATION		Hall's Bootstrap UCL	2.2474642
Data follow gamma distribution (0.05)		Percentile Bootstrap UCL	0.9388889
		BCA Bootstrap UCL	1.26
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	1.5478279
		97.5% Chebyshev (Mean, Sd) UCL	1.9892043
		99% Chebyshev (Mean, Sd) UCL	2.856203

TABLE F-24

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (MAMMAL TEQS) USING PROUCL IN CRAB TISSUE SAMPLES COLLECTED FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Data File		Variable: 2,3,7,8-TCDD TEQ (Mammals)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	9	Shapiro-Wilk Test Statisitic	0.5804568
Number of Unique Samples	9	Shapiro-Wilk 5% Critical Value	0.829
Minimum	0.12	Data not normal at 5% significance level	
Maximum	4.03		
Mean	0.7777778	95% UCL (Assuming Normal Distribution)	
Median	0.27	Student's-t UCL	1.5604267
Standard Deviation	1.2626438		
Variance	1.5942694	Gamma Distribution Test	
Coefficient of Variation	1.6233992	A-D Test Statistic	0.9238184
Skewness	2.6545527	A-D 5% Critical Value	0.7496259
		K-S Test Statistic	0.3184041
Gamma Statistics		K-S 5% Critical Value	0.2887337
k hat	0.8073883	Data do not follow gamma distribution	
k star (bias corrected)	0.612333	at 5% significance level	
Theta hat	0.9633255		
Theta star	1.2701877	95% UCLs (Assuming Gamma Distribution)	
nu hat	14.53299	Approximate Gamma UCL	1.8679964
nu star	11.021993	Adjusted Gamma UCL	2.2838746
Approx.Chi Square Value (.05)	4.5892279		
Adjusted Level of Significance	0.02308	Lognormal Distribution Test	
Adjusted Chi Square Value	3.7535603	Shapiro-Wilk Test Statisitic	0.8698409
		Shapiro-Wilk 5% Critical Value	0.829
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	-2.120264		
Maximum of log data	1.3937664	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-0.985503	95% H-UCL	3.1126296
Standard Deviation of log data	1.142208	95% Chebyshev (MVUE) UCL	1.7617192
Variance of log data	1.304639	97.5% Chebyshev (MVUE) UCL	2.2440978
		99% Chebyshev (MVUE) UCL	3.1916371
		95% Non-parametric UCLs	
		CLT UCL	1.4700659
		Adj-CLT UCL (Adjusted for skewness)	1.867999
		Mod-t UCL (Adjusted for skewness)	1.6224963
		Jackknife UCL	1.5604267
		Standard Bootstrap UCL	1.4379173
		Bootstrap-t UCL	5.1139967
RECOMMENDATION		Hall's Bootstrap UCL	4.6068341
Data are lognormal (0.05)		Percentile Bootstrap UCL	1.5266667
		BCA Bootstrap UCL	2.0877778
Use 95% Chebyshev (MVUE) UCL		95% Chebyshev (Mean, Sd) UCL	2.6123567
		97.5% Chebyshev (Mean, Sd) UCL	3.4061805
		99% Chebyshev (Mean, Sd) UCL	4.9654936

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TABLE F-25

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (BIRD TEQS) USING PROUCL IN CRAB TISSUE SAMPLES COLLECTED FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Data File		Variable: 2,3,7,8-TCDD TEQ (Bird)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	9	Shapiro-Wilk Test Statisitic	0.5980001
Number of Unique Samples	9	Shapiro-Wilk 5% Critical Value	0.829
Minimum	0.16	Data not normal at 5% significance level	
Maximum	3.22		
Mean	0.7277778	95% UCL (Assuming Normal Distribution)	
Median	0.34	Student's-t UCL	1.3265806
Standard Deviation	0.9660458		
Variance	0.9332444	Gamma Distribution Test	
Coefficient of Variation	1.3273911	A-D Test Statistic	0.8825843
Skewness	2.660186	A-D 5% Critical Value	0.7394952
		K-S Test Statistic	0.3045763
Gamma Statistics		K-S 5% Critical Value	0.285626
k hat	1.2181533	Data do not follow gamma distribution	
k star (bias corrected)	0.8861763	at 5% significance level	
Theta hat	0.5974435		
Theta star	0.8212562	95% UCLs (Assuming Gamma Distribution)	
nu hat	21.92676	Approximate Gamma UCL	1.4645721
nu star	15.951173	Adjusted Gamma UCL	1.7151426
Approx.Chi Square Value (.05)	7.9264855		
Adjusted Level of Significance	0.02308	Lognormal Distribution Test	
Adjusted Chi Square Value	6.7684804	Shapiro-Wilk Test Statisitic	0.8820044
		Shapiro-Wilk 5% Critical Value	0.829
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	-1.832581		
Maximum of log data	1.1693814	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-0.781369	95% H-UCL	1.8406993
Standard Deviation of log data	0.9030269	95% Chebyshev (MVUE) UCL	1.5303612
Variance of log data	0.8154576	97.5% Chebyshev (MVUE) UCL	1.911388
		99% Chebyshev (MVUE) UCL	2.6598413
		95% Non-parametric UCLs	
		CLT UCL	1.2574457
		Adj-CLT UCL (Adjusted for skewness)	1.5625495
		Mod-t UCL (Adjusted for skewness)	1.3741706
		Jackknife UCL	1.3265806
		Standard Bootstrap UCL	1.2192797
		Bootstrap-t UCL	3.2218543
RECOMMENDATION		Hall's Bootstrap UCL	3.1062165
Data are lognormal (0.05)		Percentile Bootstrap UCL	1.3088889
		BCA Bootstrap UCL	1.7033333
Use H-UCL		95% Chebyshev (Mean, Sd) UCL	2.1314098
		97.5% Chebyshev (Mean, Sd) UCL	2.7387624
		99% Chebyshev (Mean, Sd) UCL	3.9317892

TABLE F-26

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (FISH TEQs) USING PROUCL IN CRAB TISSUE SAMPLES COLLECTED FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Data File		Variable: 2,3,7,8-TCDD TEQ (Fish)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	5	Shapiro-Wilk Test Statisitic	0.8205666
Number of Unique Samples	5	Shapiro-Wilk 5% Critical Value	0.762
Minimum	0.14	Data are normal at 5% significance level	
Maximum	2.93		
Mean	1.044	95% UCL (Assuming Normal Distribution)	
Median	0.38	Student's-t UCL	2.1556427
Standard Deviation	1.1659889		
Variance	1.35953	Gamma Distribution Test	
Coefficient of Variation	1.1168476	A-D Test Statistic	0.3510426
Skewness	1.4182987	A-D 5% Critical Value	0.6909796
		K-S Test Statistic	0.3024957
Gamma Statistics		K-S 5% Critical Value	0.3642105
k hat	1.0364068	Data follow gamma distribution	
k star (bias corrected)	0.547896	at 5% significance level	
Theta hat	1.0073265		
Theta star	1.905471	95% UCLs (Assuming Gamma Distribution)	
nu hat	10.364068	Approximate Gamma UCL	4.1473309
nu star	5.4789604	Adjusted Gamma UCL	8.518815
Approx.Chi Square Value (.05)	1.3792086		
Adjusted Level of Significance	0.0086	Lognormal Distribution Test	
Adjusted Chi Square Value	0.671459	Shapiro-Wilk Test Statisitic	0.9474229
		Shapiro-Wilk 5% Critical Value	0.762
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	-1.9661129		
Maximum of log data	1.0750024	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-0.5115719	95% H-UCL	42.764854
Standard Deviation of log data	1.2118175	95% Chebyshev (MVUE) UCL	3.3025483
Variance of log data	1.4685016	97.5% Chebyshev (MVUE) UCL	4.2868122
		99% Chebyshev (MVUE) UCL	6.2202082
		95% Non-parametric UCLs	
		CLT UCL	1.9017025
		Adj-CLT UCL (Adjusted for skewness)	2.2551073
		Mod-t UCL (Adjusted for skewness)	2.2107667
		Jackknife UCL	2.1556427
		Standard Bootstrap UCL	1.8111112
		Bootstrap-t UCL	8.7171394
RECOMMENDATION		Hall's Bootstrap UCL	10.542395
Data are normal (0.05)		Percentile Bootstrap UCL	1.862
		BCA Bootstrap UCL	2.326
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	3.3169307
		97.5% Chebyshev (Mean, Sd) UCL	4.3004296
		99% Chebyshev (Mean, Sd) UCL	6.2323229

TABLE F-27

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (MAMMAL TEQS) USING PROUCL IN CRAB TISSUE SAMPLES COLLECTED FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Data File		Variable: 2,3,7,8-TCDD TEQ (Mammals)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	5	Shapiro-Wilk Test Statisitic	0.8704984
Number of Unique Samples	5	Shapiro-Wilk 5% Critical Value	0.762
Minimum	0.16	Data are normal at 5% significance level	
Maximum	1.25		
Mean	0.652	95% UCL (Assuming Normal Distribution)	
Median	0.41	Student's-t UCL	1.110887
Standard Deviation	0.481321099		
Variance	0.23167	Gamma Distribution Test	
Coefficient of Variation	0.738222544	A-D Test Statistic	0.3568737
Skewness	0.501030158	A-D 5% Critical Value	0.6843341
		K-S Test Statistic	0.2469058
Gamma Statistics		K-S 5% Critical Value	0.3604031
k hat	2.063689077	Data follow gamma distribution	
k star (bias corrected)	0.958808964	at 5% significance level	
Theta hat	0.315939066		
Theta star	0.68001033	95% UCLs (Assuming Gamma Distribution)	
nu hat	20.63689077	Approximate Gamma UCL	1.6963731
nu star	9.58808964	Adjusted Gamma UCL	2.7482531
Approx.Chi Square Value (.05)	3.685176548		
Adjusted Level of Significance	0.0086	Lognormal Distribution Test	
Adjusted Chi Square Value	2.274693845	Shapiro-Wilk Test Statisitic	0.924624
		Shapiro-Wilk 5% Critical Value	0.762
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	-1.832581464		
Maximum of log data	0.223143551	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-0.689145248	95% H-UCL	4.3830616
Standard Deviation of log data	0.848260497	95% Chebyshev (MVUE) UCL	1.7227551
Variance of log data	0.719545871	97.5% Chebyshev (MVUE) UCL	2.1821611
		99% Chebyshev (MVUE) UCL	3.0845752
		95% Non-parametric UCLs	
		CLT UCL	1.0060602
		Adj-CLT UCL (Adjusted for skewness)	1.0575961
		Mod-t UCL (Adjusted for skewness)	1.1189255
		Jackknife UCL	1.110887
		Standard Bootstrap UCL	0.9627428
		Bootstrap-t UCL	2.0989698
RECOMMENDATION		Hall's Bootstrap UCL	6.7177804
Data are normal (0.05)		Percentile Bootstrap UCL	0.998
		BCA Bootstrap UCL	1.114
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	1.5902676
		97.5% Chebyshev (Mean, Sd) UCL	1.9962567
		99% Chebyshev (Mean, Sd) UCL	2.7937437

TABLE F-28

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (BIRD TEQS) USING PROUCL IN CRAB TISSUE SAMPLES COLLECTED FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Data File		Variable: 2,3,7,8-TCDD TEQ (Bird)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	5	Shapiro-Wilk Test Statisitic	0.9553971
Number of Unique Samples	5	Shapiro-Wilk 5% Critical Value	0.762
Minimum	0.43	Data are normal at 5% significance level	
Maximum	1.52		
Mean	0.882	95% UCL (Assuming Normal Distribution)	
Median	0.86	Student's-t UCL	1.2870732
Standard Deviation	0.424876453		
Variance	0.18052	Gamma Distribution Test	
Coefficient of Variation	0.481719334	A-D Test Statistic	0.1901517
Skewness	0.773711968	A-D 5% Critical Value	0.6805473
		K-S Test Statistic	0.1782626
Gamma Statistics		K-S 5% Critical Value	0.358246
k hat	5.444473212	Data follow gamma distribution	
k star (bias corrected)	2.311122618	at 5% significance level	
Theta hat	0.161999144		
Theta star	0.381632715	95% UCLs (Assuming Gamma Distribution)	
nu hat	54.44473212	Approximate Gamma UCL	1.5473996
nu star	23.11122618	Adjusted Gamma UCL	2.0280118
Approx.Chi Square Value (.05)	13.1731332		
Adjusted Level of Significance	0.0086	Lognormal Distribution Test	
Adjusted Chi Square Value	10.05127379	Shapiro-Wilk Test Statisitic	0.9858805
		Shapiro-Wilk 5% Critical Value	0.762
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	-0.84397007		
Maximum of log data	0.418710335	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-0.22020143	95% H-UCL	1.8539214
Standard Deviation of log data	0.491179155	95% Chebyshev (MVUE) UCL	1.7197725
Variance of log data	0.241256962	97.5% Chebyshev (MVUE) UCL	2.0821398
		99% Chebyshev (MVUE) UCL	2.7939401
		95% Non-parametric UCLs	
		CLT UCL	1.1945395
		Adj-CLT UCL (Adjusted for skewness)	1.2647905
		Mod-t UCL (Adjusted for skewness)	1.2980309
		Jackknife UCL	1.2870732
		Standard Bootstrap UCL	1.1592317
		Bootstrap-t UCL	1.3717962
RECOMMENDATION		Hall's Bootstrap UCL	1.4517677
Data are normal (0.05)		Percentile Bootstrap UCL	1.17
		BCA Bootstrap UCL	1.288
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	1.7102367
		97.5% Chebyshev (Mean, Sd) UCL	2.0686154
		99% Chebyshev (Mean, Sd) UCL	2.7725809

TABLE F-29

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (FISH TEQS) USING PROUCL IN SOLE TISSUE SAMPLES COLLECTED FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Data File		Variable: 2,3,7,8-TCDD TEQ (Fish)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	7	Shapiro-Wilk Test Statisitic	0.7573855
Number of Unique Samples	5	Shapiro-Wilk 5% Critical Value	0.803
Minimum	0.1	Data not normal at 5% significance level	
Maximum	0.36		
Mean	0.1928571	95% UCL (Assuming Normal Distribution)	
Median	0.18	Student's-t UCL	0.2512626
Standard Deviation	0.0795224		
Variance	0.0063238	Gamma Distribution Test	
Coefficient of Variation	0.4123383	A-D Test Statistic	0.7837927
Skewness	1.7820057	A-D 5% Critical Value	0.7089887
		K-S Test Statistic	0.3273868
Gamma Statistics		K-S 5% Critical Value	0.3123281
k hat	8.156893	Data do not follow gamma distribution	
k star (bias corrected)	4.7563198	at 5% significance level	
Theta hat	0.0236435		
Theta star	0.0405476	95% UCLs (Assuming Gamma Distribution)	
nu hat	114.1965	Approximate Gamma UCL	0.2631237
nu star	66.588478	Adjusted Gamma UCL	0.2902516
Approx.Chi Square Value (.05)	48.806185		
Adjusted Level of Significance	0.01584	Lognormal Distribution Test	
Adjusted Chi Square Value	44.244589	Shapiro-Wilk Test Statisitic	0.8451701
		Shapiro-Wilk 5% Critical Value	0.803
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	-2.302585		
Maximum of log data	-1.021651	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-1.708354	95% H-UCL	0.2730792
Standard Deviation of log data	0.3730757	95% Chebyshev (MVUE) UCL	0.3107304
Variance of log data	0.1391855	97.5% Chebyshev (MVUE) UCL	0.3620122
		99% Chebyshev (MVUE) UCL	0.4627452
		95% Non-parametric UCLs	
		CLT UCL	0.2422959
		Adj-CLT UCL (Adjusted for skewness)	0.2639271
		Mod-t UCL (Adjusted for skewness)	0.2546366
		Jackknife UCL	0.2512626
		Standard Bootstrap UCL	0.2382579
		Bootstrap-t UCL	0.3574841
RECOMMENDATION		Hall's Bootstrap UCL	0.5079304
Data are lognormal (0.05)		Percentile Bootstrap UCL	0.2442857
		BCA Bootstrap UCL	0.2614286
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	0.323871
Use Modified-t UCL		97.5% Chebyshev (Mean, Sd) UCL	0.3805608
Use H-UCL		99% Chebyshev (Mean, Sd) UCL	0.4919169

TABLE F-30

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (MAMMAL TEQS) USING PROUCL IN SOLE TISSUE SAMPLES COLLECTED FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Data File		Variable: 2,3,7,8-TCDD TEQ (Mammals)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	7	Shapiro-Wilk Test Statisitic	0.8130716
Number of Unique Samples	6	Shapiro-Wilk 5% Critical Value	0.803
Minimum	0.11	Data are normal at 5% significance level	
Maximum	0.39		
Mean	0.2128571	95% UCL (Assuming Normal Distribution)	
Median	0.19	Student's-t UCL	0.2758539
Standard Deviation	0.0857738		
Variance	0.0073571	Gamma Distribution Test	
Coefficient of Variation	0.4029641	A-D Test Statistic	0.5652562
Skewness	1.6311589	A-D 5% Critical Value	0.7089484
		K-S Test Statistic	0.2734639
Gamma Statistics		K-S 5% Critical Value	0.3122965
k hat	8.30304	Data follow gamma distribution	
k star (bias corrected)	4.8398324	at 5% significance level	
Theta hat	0.025636		
Theta star	0.0439803	95% UCLs (Assuming Gamma Distribution)	
nu hat	116.24256	Approximate Gamma UCL	0.289561
nu star	67.757653	Adjusted Gamma UCL	0.3191096
Approx.Chi Square Value (.05)	49.808851		
Adjusted Level of Significance	0.01584	Lognormal Distribution Test	
Adjusted Chi Square Value	45.196693	Shapiro-Wilk Test Statisitic	0.8975139
		Shapiro-Wilk 5% Critical Value	0.803
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	-2.207275		
Maximum of log data	-0.941609	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-1.60856	95% H-UCL	0.3013354
Standard Deviation of log data	0.3722067	95% Chebyshev (MVUE) UCL	0.3429391
Variance of log data	0.1385379	97.5% Chebyshev (MVUE) UCL	0.3994544
		99% Chebyshev (MVUE) UCL	0.5104678
		95% Non-parametric UCLs	
		CLT UCL	0.2661824
		Adj-CLT UCL (Adjusted for skewness)	0.287539
		Mod-t UCL (Adjusted for skewness)	0.2791852
		Jackknife UCL	0.2758539
		Standard Bootstrap UCL	0.2621604
		Bootstrap-t UCL	0.3182203
RECOMMENDATION		Hall's Bootstrap UCL	0.5546156
Data are normal (0.05)		Percentile Bootstrap UCL	0.2671429
		BCA Bootstrap UCL	0.2957143
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	0.3541702
		97.5% Chebyshev (Mean, Sd) UCL	0.4153165
		99% Chebyshev (Mean, Sd) UCL	0.5354265

TABLE F-31

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (BIRD TEQS) USING PROUCL IN SOLE TISSUE SAMPLES COLLECTED FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Data File		Variable: 2,3,7,8-TCDD TEQ (Bird)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	7	Shapiro-Wilk Test Statisitic	0.8618424
Number of Unique Samples	7	Shapiro-Wilk 5% Critical Value	0.803
Minimum	0.2	Data are normal at 5% significance level	
Maximum	0.68		
Mean	0.3785714	95% UCL (Assuming Normal Distribution)	
Median	0.33	Student's-t UCL	0.488611
Standard Deviation	0.1498253		
Variance	0.0224476	Gamma Distribution Test	
Coefficient of Variation	0.3957649	A-D Test Statistic	0.390823
Skewness	1.4636139	A-D 5% Critical Value	0.7089103
		K-S Test Statistic	0.2206479
Gamma Statistics		K-S 5% Critical Value	0.3122667
k hat	8.441057	Data follow gamma distribution	
k star (bias corrected)	4.9186992	at 5% significance level	
Theta hat	0.0448488		
Theta star	0.0769658	95% UCLs (Assuming Gamma Distribution)	
nu hat	118.1748	Approximate Gamma UCL	0.5136055
nu star	68.861789	Adjusted Gamma UCL	0.5655204
Approx.Chi Square Value (.05)	50.757062		
Adjusted Level of Significance	0.01584	Lognormal Distribution Test	
Adjusted Chi Square Value	46.09755	Shapiro-Wilk Test Statisitic	0.9405443
		Shapiro-Wilk 5% Critical Value	0.803
Log-transformed Statistics		Data are lognormal at 5% significance level	
Minimum of log data	-1.609438		
Maximum of log data	-0.385662	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-1.031753	95% H-UCL	0.5346153
Standard Deviation of log data	0.3699277	95% Chebyshev (MVUE) UCL	0.6086839
Variance of log data	0.1368465	97.5% Chebyshev (MVUE) UCL	0.7086099
		99% Chebyshev (MVUE) UCL	0.9048953
		95% Non-parametric UCLs	
		CLT UCL	0.4717173
		Adj-CLT UCL (Adjusted for skewness)	0.5051902
		Mod-t UCL (Adjusted for skewness)	0.4938321
		Jackknife UCL	0.488611
		Standard Bootstrap UCL	0.4642157
		Bootstrap-t UCL	0.550253
RECOMMENDATION		Hall's Bootstrap UCL	0.9875263
Data are normal (0.05)		Percentile Bootstrap UCL	0.4714286
		BCA Bootstrap UCL	0.52
Use Student's-t UCL		95% Chebyshev (Mean, Sd) UCL	0.6254099
		97.5% Chebyshev (Mean, Sd) UCL	0.7322172
		99% Chebyshev (Mean, Sd) UCL	0.9420193

TABLE F-32

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (FISH TEQS) USING PROUCL IN SOLE TISSUE SAMPLES COLLECTED FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg)

Data File		Variable: 2,3,7,8-TCDD TEQ (Fish)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	6	Shapiro-Wilk Test Statisitic	0.7681295
Number of Unique Samples	5	Shapiro-Wilk 5% Critical Value	0.788
Minimum	0.06	Data not normal at 5% significance level	
Maximum	0.26		
Mean	0.1533333	95% UCL (Assuming Normal Distribution)	
Median	0.145	Student's-t UCL	0.2352125
Standard Deviation	0.0995322		
Variance	0.0099067	Gamma Distribution Test	
Coefficient of Variation	0.6491233	A-D Test Statistic	0.8062975
Skewness	0.0634191	A-D 5% Critical Value	0.7027908
		K-S Test Statistic	0.3082972
Gamma Statistics		K-S 5% Critical Value	0.3351992
k hat	2.4927801	Data follow approximate gamma distibution	
k star (bias corrected)	1.3575012	at 5% significance level	
Theta hat	0.061511		
Theta star	0.1129526	95% UCLs (Assuming Gamma Distribution)	
nu hat	29.913361	Approximate Gamma UCL	0.3058823
nu star	16.290014	Adjusted Gamma UCL	0.4026051
Approx.Chi Square Value (.05)	8.1658932		
Adjusted Level of Significance	0.01222	Lognormal Distribution Test	
Adjusted Chi Square Value	6.2040993	Shapiro-Wilk Test Statisitic	0.7580101
		Shapiro-Wilk 5% Critical Value	0.788
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-2.813411		
Maximum of log data	-1.347074	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-2.08893	95% H-UCL	0.50596
Standard Deviation of log data	0.7415479	95% Chebyshev (MVUE) UCL	0.357441
Variance of log data	0.5498933	97.5% Chebyshev (MVUE) UCL	0.4452052
		99% Chebyshev (MVUE) UCL	0.6176011
		95% Non-parametric UCLs	
		CLT UCL	0.2201701
		Adj-CLT UCL (Adjusted for skewness)	0.2212942
		Mod-t UCL (Adjusted for skewness)	0.2353879
		Jackknife UCL	0.2352125
		Standard Bootstrap UCL	0.2146182
		Bootstrap-t UCL	0.2310374
RECOMMENDATION		Hall's Bootstrap UCL	0.1879171
Assuming gamma distribution (0.05)		Percentile Bootstrap UCL	0.215
		BCA Bootstrap UCL	0.2266667
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	0.3304523
		97.5% Chebyshev (Mean, Sd) UCL	0.4070917
		99% Chebyshev (Mean, Sd) UCL	0.5576352

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TABLE F-33

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (MAMMAL TEQS) USING PROUCL IN SOLE TISSUE SAMPLES COLLECTED FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg

Data File		Variable: 2,3,7,8-TCDD TEQ (Mammals)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	6	Shapiro-Wilk Test Statisitic	0.7718628
Number of Unique Samples	4	Shapiro-Wilk 5% Critical Value	0.788
Minimum	0.06	Data not normal at 5% significance level	
Maximum	0.24		
Mean	0.1483333	95% UCL (Assuming Normal Distribution)	
Median	0.145	Student's-t UCL	0.2227205
Standard Deviation	0.0904249		
Variance	0.0081767	Gamma Distribution Test	
Coefficient of Variation	0.6096062	A-D Test Statistic	0.7430406
Skewness	0.031423	A-D 5% Critical Value	0.7017913
		K-S Test Statistic	0.2925114
Gamma Statistics		K-S 5% Critical Value	0.334755
k hat	2.839833	Data follow approximate gamma distibution	
k star (bias corrected)	1.5310276	at 5% significance level	
Theta hat	0.0522331		
Theta star	0.0968848	95% UCLs (Assuming Gamma Distribution)	
nu hat	34.077996	Approximate Gamma UCL	0.2821415
nu star	18.372331	Adjusted Gamma UCL	0.363882
Approx.Chi Square Value (.05)	9.6590854		
Adjusted Level of Significance	0.01222	Lognormal Distribution Test	
Adjusted Chi Square Value	7.489322	Shapiro-Wilk Test Statisitic	0.7777867
		Shapiro-Wilk 5% Critical Value	0.788
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-2.8134107		
Maximum of log data	-1.4271164	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-2.0945718	95% H-UCL	0.4289232
Standard Deviation of log data	0.6921594	95% Chebyshev (MVUE) UCL	0.3328421
Variance of log data	0.4790847	97.5% Chebyshev (MVUE) UCL	0.4121661
		99% Chebyshev (MVUE) UCL	0.5679828
		95% Non-parametric UCLs	
		CLT UCL	0.2090545
		Adj-CLT UCL (Adjusted for skewness)	0.2095605
		Mod-t UCL (Adjusted for skewness)	0.2227994
		Jackknife UCL	0.2227205
		Standard Bootstrap UCL	N/R
		Bootstrap-t UCL	N/R
RECOMMENDATION		Hall's Bootstrap UCL	N/R
Assuming gamma distribution (0.05)		Percentile Bootstrap UCL	N/R
		BCA Bootstrap UCL	N/R
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	0.3092457
		97.5% Chebyshev (Mean, Sd) UCL	0.3788726
		99% Chebyshev (Mean, Sd) UCL	0.5156411
Recommended UCL exceeds the maximum observatior			

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TABLE F-34

COMPUTATION OF REPRESENTATIVE DIOXIN/FURAN CONCENTRATIONS (BIRD TEQS) USING PROUCL IN SOLE TISSUE SAMPLES COLLECTED FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in nanograms per kilogram (ng/kg

Data File		Variable: 2,3,7,8-TCDD TEQ (Bird)	
Raw Statistics		Normal Distribution Test	
Number of Valid Samples	6	Shapiro-Wilk Test Statisitic	0.7838721
Number of Unique Samples	5	Shapiro-Wilk 5% Critical Value	0.788
Minimum	0.13	Data not normal at 5% significance level	
Maximum	0.36		
Mean	0.2366667	95% UCL (Assuming Normal Distribution)	
Median	0.235	Student's-t UCL	0.3276295
Standard Deviation	0.1105743		
Variance	0.0122267	Gamma Distribution Test	
Coefficient of Variation	0.4672152	A-D Test Statistic	0.762711
Skewness	0.0420626	A-D 5% Critical Value	0.6980587
		K-S Test Statistic	0.3064213
Gamma Statistics		K-S 5% Critical Value	0.3327804
k hat	5.1550902	Data follow approximate gamma distibution	
k star (bias corrected)	2.6886562	at 5% significance level	
Theta hat	0.0459093		
Theta star	0.0880241	95% UCLs (Assuming Gamma Distribution)	
nu hat	61.861082	Approximate Gamma UCL	0.3765309
nu star	32.263875	Adjusted Gamma UCL	0.4507884
Approx.Chi Square Value (.05)	20.279301		
Adjusted Level of Significance	0.01222	Lognormal Distribution Test	
Adjusted Chi Square Value	16.938732	Shapiro-Wilk Test Statisitic	0.7768666
		Shapiro-Wilk 5% Critical Value	0.788
Log-transformed Statistics		Data not lognormal at 5% significance level	
Minimum of log data	-2.0402208		
Maximum of log data	-1.0216512	95% UCLs (Assuming Lognormal Distribution)	
Mean of log data	-1.5412183	95% H-UCL	0.4429636
Standard Deviation of log data	0.4986297	95% Chebyshev (MVUE) UCL	0.4472746
Variance of log data	0.2486316	97.5% Chebyshev (MVUE) UCL	0.5382005
		99% Chebyshev (MVUE) UCL	0.7168069
		95% Non-parametric UCLs	
		CLT UCL	0.3109182
		Adj-CLT UCL (Adjusted for skewness)	0.3117465
		Mod-t UCL (Adjusted for skewness)	0.3277587
		Jackknife UCL	0.3276295
		Standard Bootstrap UCL	0.3050976
		Bootstrap-t UCL	0.3346858
RECOMMENDATION		Hall's Bootstrap UCL	0.2746934
Assuming gamma distribution (0.05)		Percentile Bootstrap UCL	0.305
		BCA Bootstrap UCL	0.315
Use Approximate Gamma UCL		95% Chebyshev (Mean, Sd) UCL	0.433435
		97.5% Chebyshev (Mean, Sd) UCL	0.5185768
		99% Chebyshev (Mean, Sd) UCL	0.6858214
Recommended UCL exceeds the maximum observatior			

TABLE F-35

COMPUTATION OF REPRESENTATIVE ZINC (DRY WEIGHT) CONCENTRATIONS USING PROUCL IN UPLAND SEDIMENT SAMPLES

Sierra Pacific Industries
Arcata Division Saw Mill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Summary Statistics for	Zinc	Summary Statistics for	ln(Zinc)
Number of Samples	56	Minimum	3.2
Minimum	24.7	Maximum	6.7
Maximum	811.3	Mean	4.9
Mean	187.0	Standard Deviation	0.9
Median	127.9	Variance	0.7
Standard Deviation	166.1		
Variance	27599.0	Lilliefors Test Statisitic	0.1
Coefficient of Variation	0.9	Lilliefors 5% Critical Value	0.1
Skewness	1.8	Data are Lognormal at 5% Significance Level	
95 % UCL (Assuming Normal Data)		Estimates Assuming Lognormal Distribution	
Student's-t	224.2	MLE Mean	190.9
		MLE Standard Deviation	200.0
95 % UCL (Adjusted for Skewness)		MLE Coefficient of Variation	1.0
Adjusted-CLT	229.2	MLE Skewness	4.3
Modified-t	225.1	MLE Median	131.9
		MLE 80% Quantile	272.8
95 % Non-parametric UCL		MLE 90% Quantile	398.4
CLT	223.6	MLE 95% Quantile	543.1
Jackknife	224.2	MLE 99% Quantile	975.8
Standard Bootstrap	223.4		
Bootstrap-t	237.1	MVU Estimate of Median	131.0
Chebyshev (Mean, Std)	283.8	MVU Estimate of Mean	189.2
		MVU Estimate of Std. Dev.	191.6
		MVU Estimate of SE of Mean	24.8
		UCL Assuming Lognormal Distribution	
		95% H-UCL	245.2
		95% Chebyshev (MVUE) UCL	297.4
		99% Chebyshev (MVUE) UCL	436.0
		Recommended UCL to use:	
		H-UCL	

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TABLE F-36

COMPUTATION OF REPRESENTATIVE ZINC (DRY WEIGHT) CONCENTRATIONS USING PROUCL IN SEDIMENT SAMPLES (<1 FT. BGS) COLLECTED FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Summary Statistics for	Zinc	Summary Statistics for	ln(Zinc)
Number of Samples	22	Minimum	3.9
Minimum	50.7	Maximum	4.7
Maximum	111.1	Mean	4.4
Mean	86.3	Standard Deviation	0.2
Median	86.4	Variance	0.0
Standard Deviation	14.8		
Variance	218.6	Shapiro-Wilk Test Statisitic	0.9
Coefficient of Variation	0.2	Shapiro-Wilk 5% Critical Value	0.9
Skewness	-0.5	Data are Lognormal at 5% Significance Level	
95 % UCL (Assuming Normal Data)		Estimates Assuming Lognormal Distribution	
Student's-t	91.7	MLE Mean	86.4
		MLE Standard Deviation	16.1
95 % UCL (Adjusted for Skewness)		MLE Coefficient of Variation	0.2
Adjusted-CLT	91.1	MLE Skewness	0.6
Modified-t	91.7	MLE Median	85.0
		MLE 80% Quantile	99.3
95 % Non-parametric UCL		MLE 90% Quantile	107.7
CLT	91.5	MLE 95% Quantile	115.2
Jackknife	91.7	MLE 99% Quantile	130.6
Standard Bootstrap	91.5		
Bootstrap-t	91.5	MVU Estimate of Median	84.9
Chebyshev (Mean, Std)	100.0	MVU Estimate of Mean	86.4
		MVU Estimate of Std. Dev.	16.1
		MVU Estimate of SE of Mean	3.4
		UCL Assuming Lognormal Distribution	
		95% H-UCL	92.8
		95% Chebyshev (MVUE) UCL	101.3
		99% Chebyshev (MVUE) UCL	120.4
		Recommended UCL to use:	
		Student's-t or H-UCL	

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TABLE F-37

COMPUTATION OF REPRESENTATIVE ZINC (DRY WEIGHT) CONCENTRATIONS USING PROUCL IN SEDIMENT SAMPLES (<1 FT. BGS) COLLECTED FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Summary Statistics for	Zinc	Summary Statistics for	ln(Zinc)
Number of Samples	23	Minimum	3.8
Minimum	46	Maximum	5.5
Maximum	236.9	Mean	4.3
Mean	81.2	Standard Deviation	0.3
Median	77	Variance	0.1
Standard Deviation	37.4		
Variance	1400.8	Shapiro-Wilk Test Statisitic	0.9
Coefficient of Variation	0.5	Shapiro-Wilk 5% Critical Value	0.9
Skewness	3.5	Data not Lognormal at 5% Significance Level	
		Data not Normal: Try Non-parametric UCL	
95 % UCL (Assuming Normal Data)			
Student's-t	94.6	Estimates Assuming Lognormal Distribution	
		MLE Mean	80.6
95 % UCL (Adjusted for Skewness)		MLE Standard Deviation	27.8
Adjusted-CLT	100.0	MLE Coefficient of Variation	0.3
Modified-t	95.5	MLE Skewness	1.1
		MLE Median	76.2
95 % Non-parametric UCL		MLE 80% Quantile	101.1
CLT	94.0	MLE 90% Quantile	117.1
Jackknife	94.6	MLE 95% Quantile	132.1
Standard Bootstrap	93.6	MLE 99% Quantile	166.0120202
Bootstrap-t	106.7		
Chebyshev (Mean, Std)	115.2	MVU Estimate of Median	76.0
		MVU Estimate of Mean	80.3
		MVU Estimate of Std. Dev.	27.4
		MVU Estimate of SE of Mean	5.716188828
		UCL Assuming Lognormal Distribution	
		95% H-UCL	91.9
		95% Chebyshev (MVUE) UCL	105.3
		99% Chebyshev (MVUE) UCL	137.2225112

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TABLE F-38

COMPUTATION OF REPRESENTATIVE ZINC (DRY WEIGHT) CONCENTRATIONS USING PROUCL IN SEDIMENT SAMPLES (>1 FT. BGS) COLLECTED FROM MAD RIVER SLOUGH

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Summary Statistics for	Zinc	Summary Statistics for	ln(Zinc)
Number of Samples	6	Minimum	4.4
Minimum	78.1	Maximum	4.7
Maximum	106	Mean	4.5
Mean	93.9	Standard Deviation	0.1
Median	93.95	Variance	0.0
Standard Deviation	9.9		
Variance	98.0	Shapiro-Wilk Test Statisitic	1.0
Coefficient of Variation	0.1	Shapiro-Wilk 5% Critical Value	0.8
Skewness	-0.5	Data are Lognormal at 5% Significance Level	
95 % UCL (Assuming Normal Data)		Estimates Assuming Lognormal Distribution	
Student's-t	102.0	MLE Mean	94.0
		MLE Standard Deviation	10.2
95 % UCL (Adjusted for Skewness)		MLE Coefficient of Variation	0.1
Adjusted-CLT	99.6	MLE Skewness	0.3
Modified-t	101.9	MLE Median	93.5
		MLE 80% Quantile	102.4
95 % Non-parametric UCL		MLE 90% Quantile	107.4
CLT	100.5	MLE 95% Quantile	111.7
Jackknife	102.0	MLE 99% Quantile	120.2
Standard Bootstrap	100.2		
Bootstrap-t	101.9	MVU Estimate of Median	93.4
Chebyshev (Mean, Std)	111.5	MVU Estimate of Mean	93.9
		MVU Estimate of Std. Dev.	10.2
		MVU Estimate of SE of Mean	4.2
		UCL Assuming Lognormal Distribution	
		95% H-UCL	103.4
		95% Chebyshev (MVUE) UCL	112.0
		99% Chebyshev (MVUE) UCL	135.2
		Recommended UCL to use:	
		Student's-t or H-UCL	

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TABLE F-39

COMPUTATION OF REPRESENTATIVE ZINC (DRY WEIGHT) CONCENTRATIONS USING PROUCL IN SEDIMENT SAMPLES (>1 FT. BGS) COLLECTED FROM HUMBOLDT BAY

Sierra Pacific Industries
Arcata Division Sawmill
Arcata, California

Concentrations are presented in milligrams per kilogram (mg/kg)

Summary Statistics for	Zinc	Summary Statistics for	ln(Zinc)
Number of Samples	5	Minimum	3.9
Minimum	51.3	Maximum	4.6
Maximum	96.1	Mean	4.3
Mean	74.0	Standard Deviation	0.2
Median	73.3	Variance	0.1
Standard Deviation	17.2		
Variance	295.8	Shapiro-Wilk Test Statisitic	1.0
Coefficient of Variation	0.2	Shapiro-Wilk 5% Critical Value	0.8
Skewness	0.0	Data are Lognormal at 5% Significance Level	
95 % UCL (Assuming Normal Data)		Estimates Assuming Lognormal Distribution	
Student's-t	90.4	MLE Mean	74.4
		MLE Standard Deviation	18.2
95 % UCL (Adjusted for Skewness)		MLE Coefficient of Variation	0.2
Adjusted-CLT	86.5	MLE Skewness	0.7
Modified-t	90.3	MLE Median	72.3
		MLE 80% Quantile	88.6
95 % Non-parametric UCL		MLE 90% Quantile	98.6
CLT	86.6	MLE 95% Quantile	107.5
Jackknife	90.4	MLE 99% Quantile	126.7
Standard Bootstrap	85.3		
Bootstrap-t	91.2	MVU Estimate of Median	71.9
Chebyshev (Mean, Std)	107.5	MVU Estimate of Mean	74.0
		MVU Estimate of Std. Dev.	17.8
		MVU Estimate of SE of Mean	8.0
		UCL Assuming Lognormal Distribution	
		95% H-UCL	97.9
		95% Chebyshev (MVUE) UCL	108.7
		99% Chebyshev (MVUE) UCL	153.2
		Recommended UCL to use:	
		Student's-t or H-UCL	

APPENDIX G

Ecological Risk Assessment Dose Calculation Tool

APPENDIX H

Human Health Risk Assessment Calculations

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FIN FISH INGESTION: RESIDENT

Chemical	Concentration in Fish Tissue (Cf) (mg/kg)	Oral Absorption Factor (ABSo) (--)	Annual Average Daily Dose (AADD) (mg/kg-d)	Oral Chronic Reference Dose (RfDo) (mg/kg-d)	Hazard Quotient (--)	Lifetime Average Daily Dose (LADD) (mg/kg-d)	Oral Slope Factor (SFo) $(mg/kg\text{-}d)^{-1}$	Excess Cancer Risk (--)
2,3,7,8-TCDD TEQs	2.60E-07	1	9.0E-11	1.00E-08	9.0E-03	3.2E-11	1.30E+05	4.2E-06
Zinc	1.40E+01	1	4.8E-03	0.3	1.6E-02	1.7E-03	NA	NA
					2.5E-02			4E-06

$$AADD = \frac{(Cs \times IRs \times ABSos \times EFig \times ED \times CFmg\text{-}kg)}{(BW \times ATnc)}$$

$$\text{Hazard Quotient} = \frac{AADD}{RfDo}$$

$$LADD = \frac{(Cs \times IRs \times ABSos \times EFig \times ED \times CFmg\text{-}kg)}{(BW \times ATca)}$$

$$\text{Excess Cancer Risk} = LADD \times SFo$$

Parameter	Symbol	Value	Units
Exposure Frequency	EFig	350	d/yr
Exposure Duration	ED	30	yr
Body Weight	BW	70	kg
Averaging Time-Non-cancer	ATnc	9,125	days
Averaging Time-Cancer	ATca	25,550	days
Ingestion Rate	IRff	21	g/day
Conversion Factor from mg to kg	$CF_{g\text{-}kg}$	1E-03	kg/g

APPENDIX H
HUMAN HEALTH RISK ASSESSMENT CALCULATIONS
Sierra Pacific Industries Arcata Division Sawmill
Arcata, California
Project #9329
FINAL

FIN FISH INGESTION: ADULT ANGLER

Chemical	Concentration in Fish Tissue (Cf) (mg/kg)	Oral Absorption Factor (ABSo) (--)	Annual Average Daily Dose (AADD) (mg/kg-d)	Oral Chronic Reference Dose (RfDo) (mg/kg-d)	Hazard Quotient (--)	Lifetime Average Daily Dose (LADD) (mg/kg-d)	Oral Slope Factor (SFo) $(mg/kg\text{-}d)^{-1}$	Excess Cancer Risk (--)
2,3,7,8-TCDD TEQs	3.80E-07	1	1.0E-09	1.00E-08	1.0E-01	3.6E-10	1.30E+05	4.7E-05
Zinc	1.50E+01	1	4.0E-02	0.3	1.3E-01	1.4E-02	NA	NA
					2.3E-01			5E-05

AADD = (Cs x IRs x ABSos x EFig x ED x CFmg-kg) / (BW x ATnc)

Hazard Quotient = AADD / RfDo

LADD = (Cs x IRs x ABSos x EFig x ED x CFmg-kg) / (BW x ATca)

Excess Cancer Risk = LADD x SFo

Parameter	Symbol	Value	Units
Exposure Frequency	EFig	350	d/yr
Exposure Duration	ED	30	yr
Body Weight	BW	70	kg
Averaging Time-Non-cancer	ATnc	9,125	days
Averaging Time-Cancer	ATca	25,550	days
Ingestion Rate	IRff	161	g/day
Conversion Factor from mg to kg	$CF_{g\text{-}kg}$	1E-03	kg/g

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OYSTER INGESTION: RESIDENT

Chemical	Concentration in Fish Tissue (Cf) (mg/kg)	Oral Absorption Factor (ABSo) (--)	Annual Average Daily Dose (AADD) (mg/kg-d)	Oral Chronic Reference Dose (RfDo) (mg/kg-d)	Hazard Quotient (--)	Lifetime Average Daily Dose (LADD) (mg/kg-d)	Oral Slope Factor (SFo) $(mg/kg\text{-}d)^{-1}$	Excess Cancer Risk (--)
2,3,7,8-TCDD TEQs	8.50E-07	1	2.4E-12	1.00E-08	2.4E-04	8.5E-13	1.30E+05	1.1E-07
Zinc	9.40E+01	1	2.6E-04	3.00E-01	8.8E-04	9.4E-05	NA	NA
					1.1E-03			1E-07

$$AADD = \frac{(Cs \times IRs \times ABSos \times EFig \times ED \times CFmg\text{-}kg)}{(BW \times ATnc)} \qquad \text{Hazard Quotient} = \frac{AADD}{RfDo}$$

$$LADD = \frac{(Cs \times IRs \times ABSos \times EFig \times ED \times CFmg\text{-}kg)}{(BW \times ATca)} \qquad \text{Excess Cancer Risk} = LADD \times SFo$$

Parameter	Symbol	Value	Units
Exposure Frequency	EFig	350	d/yr
Exposure Duration	ED	30	yr
Body Weight	BW	70	kg
Averaging Time-Non-cancer	ATnc	9,125	days
Averaging Time-Cancer	ATca	25,550	days
Ingestion Rate	IRo	0.17	g/day
Conversion Factor from mg to kg	$CF_{g\text{-}kg}$	1E-03	kg/g

OYSTER INGESTION: ADULT ANGLER

Chemical	Concentration in Fish Tissue (Cf) (mg/kg)	Oral Absorption Factor (ABSo) (--)	Annual Average Daily Dose (AADD) (mg/kg-d)	Oral Chronic Reference Dose (RfDo) (mg/kg-d)	Hazard Quotient (--)	Lifetime Average Daily Dose (LADD) (mg/kg-d)	Oral Slope Factor (SFo) $(mg/kg\text{-}d)^{-1}$	Excess Cancer Risk (--)
2,3,7,8-TCDD TEQs	2.22E-06	1	5.0E-11	1.00E-08	5.0E-03	1.8E-11	1.30E+05	2.3E-06
Zinc	1.10E+02	1	2.5E-03	3.00E-01	8.2E-03	8.8E-04	NA	NA
					1.3E-02			2E-06

AADD = (Cs x IRs x ABSos x EFig x ED x CFmg-kg) / (BW x ATnc)

Hazard Quotient = AADD / RfDo

LADD = (Cs x IRs x ABSos x EFig x ED x CFmg-kg) / (BW x ATca)

Excess Cancer Risk = LADD x SFo

Parameter	Symbol	Value	Units
Exposure Frequency	EFig	350	d/yr
Exposure Duration	ED	30	yr
Body Weight	BW	70	kg
Averaging Time-Non-cancer	ATnc	9,125	days
Averaging Time-Cancer	ATca	25,550	days
Ingestion Rate	IRo	1.36	g/day
Conversion Factor from mg to kg	$CF_{g\text{-}kg}$	1E-03	kg/g

SHRIMP INGESTION: RESIDENT

Chemical	Concentration in Fish Tissue (Cf) (mg/kg)	Oral Absorption Factor (ABSo) (--)	Annual Average Daily Dose (AADD) (mg/kg-d)	Oral Chronic Reference Dose (RfDo) (mg/kg-d)	Hazard Quotient (--)	Lifetime Average Daily Dose (LADD) (mg/kg-d)	Oral Slope Factor (SFo) $(mg/kg\text{-}d)^{-1}$	Excess Cancer Risk (--)
2,3,7,8-TCDD TEQs	1.50E-07	1	6.4E-12	1.00E-08	6.4E-04	2.3E-12	1.30E+05	3.0E-07
Zinc	1.10E+01	1	4.7E-04	3.00E-01	1.6E-03	1.7E-04	NA	NA
					2.2E-03			3E-07

AADD = (Cs x IRs x ABSos x EFig x ED x CFmg-kg) / (BW x ATnc)

Hazard Quotient = AADD / RfDo

LADD = (Cs x IRs x ABSos x EFig x ED x CFmg-kg) / (BW x ATca)

Excess Cancer Risk = LADD x SFo

Parameter	Symbol	Value	Units
Exposure Frequency	EFig	350	d/yr
Exposure Duration	ED	30	yr
Body Weight	BW	70	kg
Averaging Time-Non-cancer	ATnc	9,125	days
Averaging Time-Cancer	ATca	25,550	days
Ingestion Rate	IRs	2.6	g/day
Conversion Factor from mg to kg	$CF_{g\text{-}kg}$	1E-03	kg/g

APPENDIX H
HUMAN HEALTH RISK ASSESSMENT CALCULATIONS
Sierra Pacific Industries Arcata Division Sawmill
Arcata, California
Project #9329
FINAL

SHRIMP INGESTION: ADULT ANGLER

Chemical	Concentration in Fish Tissue (Cf) (mg/kg)	Oral Absorption Factor (ABSo) (--)	Annual Average Daily Dose (AADD) (mg/kg-d)	Oral Chronic Reference Dose (RfDo) (mg/kg-d)	Hazard Quotient (--)	Lifetime Average Daily Dose (LADD) (mg/kg-d)	Oral Slope Factor (SFo) $(mg/kg\text{-}d)^{-1}$	Excess Cancer Risk (--)
2,3,7,8-TCDD TEQs	2.50E-07	1	8.5E-11	1.00E-08	8.5E-03	3.1E-11	1.30E+05	4.0E-06
Zinc	1.10E+01	1	3.8E-03	3.00E-01	1.3E-02	1.3E-03	NA	NA
					2.1E-02			4E-06

AADD = $\frac{(Cs \times IRs \times ABSos \times EFig \times ED \times CFmg\text{-}kg)}{(BW \times ATnc)}$

Hazard Quotient = $\frac{AADD}{RfDo}$

LADD = $\frac{(Cs \times IRs \times ABSos \times EFig \times ED \times CFmg\text{-}kg)}{(BW \times ATca)}$

Excess Cancer Risk = LADD x SFo

Parameter	Symbol	Value	Units
Exposure Frequency	EFig	350	d/yr
Exposure Duration	ED	30	yr
Body Weight	BW	70	kg
Averaging Time-Non-cancer	ATnc	9,125	days
Averaging Time-Cancer	ATca	25,550	days
Ingestion Rate	IRs	20.8	g/day
Conversion Factor from mg to kg	$CF_{g\text{-}kg}$	1E-03	kg/g

CRAB INGESTION: RESIDENT

Chemical	Concentration in Fish Tissue (Cf) (mg/kg)	Oral Absorption Factor (ABSo) (--)	Annual Average Daily Dose (AADD) (mg/kg-d)	Oral Chronic Reference Dose (RfDo) (mg/kg-d)	Hazard Quotient (--)	Lifetime Average Daily Dose (LADD) (mg/kg-d)	Oral Slope Factor (SFo) $(mg/kg\text{-}d)^{-1}$	Excess Cancer Risk (--)
2,3,7,8-TCDD TEQs	7.80E-07	1	3.8E-12	1.00E-08	3.8E-04	1.4E-12	1.30E+05	1.8E-07
Zinc	3.22E+01	1	1.6E-04	3.00E-01	5.3E-04	5.7E-05	NA	NA
					9.1E-04			2E-07

AADD = (Cs x IRs x ABSos x EFig x ED x CFmg-kg) / (BW x ATnc)

Hazard Quotient = AADD / RfDo

LADD = (Cs x IRs x ABSos x EFig x ED x CFmg-kg) / (BW x ATca)

Excess Cancer Risk = LADD x SFo

Parameter	Symbol	Value	Units
Exposure Frequency	EFig	350	d/yr
Exposure Duration	ED	30	yr
Body Weight	BW	70	kg
Averaging Time-Non-cancer	ATnc	9,125	days
Averaging Time-Cancer	ATca	25,550	days
Ingestion Rate	IRc	0.3	g/day
Conversion Factor from mg to kg	$CF_{g\text{-}kg}$	1E-03	kg/g

APPENDIX H
HUMAN HEALTH RISK ASSESSMENT CALCULATIONS
Sierra Pacific Industries Arcata Division Sawmill
Arcata, California
Project #9329
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CRAB INGESTION: ADULT ANGLER

Chemical	Concentration in Fish Tissue (Cf) (mg/kg)	Oral Absorption Factor (ABSo) (--)	Annual Average Daily Dose (AADD) (mg/kg-d)	Oral Chronic Reference Dose (RfDo) (mg/kg-d)	Hazard Quotient (--)	Lifetime Average Daily Dose (LADD) (mg/kg-d)	Oral Slope Factor (SFo) $(mg/kg\text{-}d)^{-1}$	Excess Cancer Risk (--)
2,3,7,8-TCDD TEQs	1.76E-06	1	6.9E-11	1.00E-08	6.9E-03	2.5E-11	1.30E+05	3.2E-06
Zinc	4.19E+01	1	1.7E-03	0.3	5.5E-03	5.9E-04	NA	NA
					1.2E-02			3E-06

AADD = (Cs x IRs x ABSos x EFig x ED x CFmg-kg) / (BW x ATnc)

Hazard Quotient = AADD / RfDo

LADD = (Cs x IRs x ABSos x EFig x ED x CFmg-kg) / (BW x ATca)

Excess Cancer Risk = LADD x SFo

Parameter	Symbol	Value	Units
Exposure Frequency	EFig	350	d/yr
Exposure Duration	ED	30	yr
Body Weight	BW	70	kg
Averaging Time-Non-cancer	ATnc	9,125	days
Averaging Time-Cancer	ATca	25,550	days
Ingestion Rate	IRc	2.4	g/day
Conversion Factor from mg to kg	$CF_{g\text{-}kg}$	1E-03	kg/g