Hoopa Valley Tribe

P.O. Box 1348 Highway 96 Hoopa, California 95546
(530) 625-4211

Water Quality Control Plan Hoopa Valley Indian Reservation

December 6, 2001

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Prepared By

Hoopa Valley Tribe
Hoopa Valley Tribal Environmental Protection Agency

Technical Staff
Ken Norton, BS, Water Quality Coordinator
Robert Ulibarri, BA/BS, Senior Environmental Planner
Curtis Miller, BS/MS Environmental Planner
Mike Orcutt, BS, Fisheries Director
Greg Blomstrom, BS, Forest Planner
Mark Higley, BS, Wildlife Biologist
Kim Colegrove, GIS Technician
Gary Emory, GIS Technician

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Foreword:

The Hoopa Valley Tribe applied for treatment as a state with respect to the Water Pollution Control Program under Section 106 of the Clean Water Act (CWA) on July 16, 1989. The United States Environmental Protection Agency (EPA) announced formal approval of the application on July 3, 1990. Upon receiving approval, the Hoopa Valley Tribe became the first tribe in the State of California to receive such approval and qualify for grant funds under the CWA. Subsequently, the Tribe has received funding to conduct the Water Quality Planning and Management Program on the Reservation.

Comprehensive water quality planning as set forth in the Tribe's Pollutant Discharge Prohibition Ordinance (PDPO) and the Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977, requires a water quality control plan (WQCP) for the waters of the Reservation as well as public review of the plan. The goal of this planning process is to provide a definitive program of actions designed to preserve and enhance water quality on the Reservation and to protect beneficial uses of water for the next 10 years. Further, the provision for change is integral to this planning process. In this regard, the WQCP shall be reviewed triennially by the Tribal Environmental Protection Agency to reflect changes in technologies, policies, and laws, and reflect physical changes within the Reservation's waters. Any proposed amendments to the WQCP arising from the triennial review shall comply with the Hoopa Valley Tribe's Legislative Procedures Act.

The Hoopa Valley Tribal Council adopts the WQCP, which consists of water quality criteria, standards, antidegradation policy, and implementation plans, in accordance with the PDPO, which declares that protection of the quality of surface and ground waters for the use and enjoyment by the people of the Hoopa Tribe requires control of the discharge of waste to waters of the Reservation. It is the intent of the Tribal Council, in adopting the WQCP, that the Forest Management Plan, the PDPO, Riparian Protection and Surface Mining Ordinance, and other Plans and Ordinances developed to improve the waters of the Reservation will be used as antidegradation policies. These Tribal regulatory documents are to be used as the mechanism to identify the actions needed to protect surface and ground waters of the Reservation.

Introduction

1. Introduction:

The Hoopa Valley Tribal Council pursuant to Title 37 of the Hoopa Tribal Code has assigned the primary responsibility for the protection and enhancement of water quality on the Hoopa Valley Indian Reservation to the Riparian Review Committee (RRC). The RRC along with the Hoopa Valley Tribal Environmental Protection Agency provides Reservation-wide coordination of the water quality control program by developing, reviewing and recommending for Tribal approval Reservation wide policies and plans for the implementation of Tribal and Federal law. This Water Quality Control Plan recognizes the unique characteristics of each watershed with regard to natural water quality, existing, potential, and historical beneficial uses, and water quality problems.

1.1 Function and Objectives of the Hoopa Valley Tribal Water Quality Control Plan

The goal of this plan is to provide a definitive program of actions designed to preserve and enhance water quality on the Reservation, and to protect the beneficial uses of water for the next 25 years to 30 years. The plan is concerned with all factors and activities that might affect water quality. However, the plan emphasizes actions to be taken by the Riparian Review Committee, the Hoopa Valley Tribal Fisheries, Forestry, Public Utility Departments, and Tribal Environmental Protection Agency, as they have responsibility for maintaining water quality on the Reservation.

The Water Quality Control Plan (WQCP) is comprehensive in scope. The WQCP describes the Hoopa Valley Reservation waters, the quality and quantity issues, and the existing, potential and historical beneficial uses of the Reservation's waters. The plan prescribes criteria for the protection of the Reservation waters and includes plans and policies that describe the basis for the management of water quality.

1.2 Legal Basis and Authority

The Hoopa Valley Tribe is a self-governing tribe, which possesses and exercises full control over resources within the exterior boundaries of the Reservation through the actions of various Tribal departments, including legislative and executive branches, as well as through the Tribal Court system. The Hoopa Valley Tribal Council is the governing body of the Tribe, and under Article IX of the Constitution and Bylaws, the Council is authorized to "enforce the protection of Tribal property, wildlife and natural resources" (Section 1(e)), and "safeguard and promote the safety and general welfare of the Tribe and the Reservation community" (Section 1(1)).

In protecting Tribal property, wildlife and natural resources with the adoption of this Water Quality Control Plan, the Tribe is exercising its inherent power to regulate activities that may threaten or have a direct effect on the political integrity, the economic security, and health and welfare of the Tribe.

As a sovereign power recognized by the Federal Government, as a co-manager of natural resources, and by the U.S. Environmental Protection Agency for purposes of Water Pollution Control, the Hoopa Valley Tribe maintains jurisdiction over waters that flow into and through the Reservation, regardless of the geographic origins of water sources. Furthermore, the Tribe asserts its rights to regulate non-Indians owning non-trust lands within the exterior boundaries of the Reservation. This is based in part on the legal opinion attached as Appendix A. In addition, in 1988, Congress expressly approved application of the Tribe's jurisdiction "to all lands within the confines of the Hoopa Valley Reservation boundaries." Also, congress affirmed establishment of regulations and ordinances affecting nonmembers of the Hoopa Valley Tribe pursuant to the Tribes Constitution 25 U.S.C. s 1300I-7. This Hoopa -Yurok Settlement Act confirms the Tribe's jurisdiction to safeguard the general welfare of the Tribe by regulating land "use and disposition" by all persons, including nonmembers.

1.3 Reservation Setting

The Hoopa Valley Indian Reservation is the largest reservation in California. Established by Executive Order issued by President U.S. Grant on June 23, 1876, the Reservation encompasses 90,740 acres. As currently surveyed, the Reservation is nearly square with sides 12 miles in length or approximately 144 square miles. This area encompasses roughly 50% of the Hupa aboriginal territory. The Reservation is located in the northeastern corner of Humboldt County in Northern California. It lies approximately 50 miles inland from the Pacific Ocean, and 300 miles north of San Francisco, California.

The 1990 U.S. Census indicated that there are 2,143 persons residing on the Reservation. The Tribe believes that the 1990 census under estimated the number of residents and households occupied on the reservation. As a supplement to the census information, the Tribe normally uses the 1992 Bureau of Indian Affairs (BIA) Population and Labor Force Report. This report, unlike the census, utilizes a wide variety of sources including per-capita payments, medial patient records, and the Humboldt Co. Welfare Department's caseloads.

The BIA report estimated the Reservation Native American population to be 2,936. The 1990 census reported 410 non-Indian people residing on the Reservation. These two reports together estimate the total Reservation population at 3,346. By utilizing the revised population statistics, the population on the Reservation was determined to include 1,484 Hoopa, 1,452 other Native Americans, and 410 non-Indians.

Relatively wet, cool winters and dry summers characterize the climate of the Hoopa Valley. Prevailing air masses, elevations, drainage of cold dense air from higher elevations and the distance from the Pacific Ocean influence temperatures in the basin. The mean annual temperature at the Hoopa weather station, (Agency Field, 350 feet above mean sea level), is 56.9°F. The mean annual temperature in winter is 45.1°F, and in summer is 70.9°F. Mean annual upland temperature recorded at 1,700 feet is 52.4°F. A summer high of 113°F and a winter low of 7°F have also been recorded.

Roughly three-quarters of the total annual precipitation occurs from November through March. The majority of the precipitation is associated with storms of several days duration and relatively moderate intensity. Snow occurs in moderate amounts at elevations above 2000 feet; snow remains on the ground for appreciable periods of time at elevations exceeding 4000 feet.

The mean annual precipitation at Hoopa is approximately 58.35 inches. Winter precipitation in the three-month winter period from December through February averages 30.6 inches. Mean summer precipitation is 1.32 inches. Frequency analysis of precipitation data indicates that there is only a 25% probability that the Hoopa Valley will receive less than 50 inches a year; there is a 5 percent probability of receiving less than 40 inches per year. Rainfall intensities of 2 inches per 6-hour period and 4-inches in a 24 hour period are common. Snowfall averages approximately 0.4 inches annually.

Reservation soils fall within the broad vegetation class referred to as the Douglas fir-White Oak prairie type, and have developed from the slate, shale and slate sandstone parent materials that predominate the underlying, consolidated rocks. Commercially important stands of Douglas Fir timber dominate much of the Reservation and it is this timber resource that provides the primary economic base of the community.

The Reservation topography varies from the 3/4 mile wide by six-mile long alluvial plain adjacent to the Trinity River at an elevation of 320 feet, to the steep, mountainous terrain, which is characteristic of the balance of Reservation lands. Elevations along the eastern periphery of the Reservation range to over 5,000 feet. The relatively flat land adjacent to the Trinity River accommodates the vast majority of agricultural, municipal, and industrial development within the Reservation.

The Reservation is bisected in a north-south direction by the Trinity River. The Klamath River flows in an east-west direction through a small portion of the far-northeastern part of the Reservation. A number of smaller streams flow into the Trinity and Klamath Rivers within the Reservation. The largest of these streams include: Mill Creek, Hostler Creek, Tish Tang Creek, Campbell Creek, Supply Creek, Soctish
The valley floor consists of a sequence of prominent stream terrace benches that step upward in elevation and age from the active channel of the Trinity River. The terraces or benches represent ancient to modern flood plain levels. Across the valley floor, the Trinity River has formed a series of broad meanders. The broad meanders of the Trinity River naturally divide the alluvial valley into paired sets of terraces, which the Tribe defines as "fields" of the Reservation.

1.4 Field Hydrogeology

Campbell Field
Campbell Field is roughly bounded by Campbell Creek to the south, by an unnamed creek to the north, the Trinity River to the east and the valley wall to the west. Figure 1.1 shows the Reservation fields along with known and suspected toxic sites. Galice bedded shale bedrock was encountered at an average depth of 45 feet. Bedrock drops to approximately 75 feet below the surface in some areas adjacent to the Trinity River. This increase in bedrock depth along the Trinity River may indicate a deeper incised ancient Trinity River Channel. A few of the tributary channels appear to have graded to this ancient Trinity River Channel.

Matilton Field
Captain John Gulch to the south, Ferry Gulch roughly bound Matilton Field to the north, and Trinity River to the west and the valley wall to the east. The majority of the field is bordered by the Trinity River. A relatively narrow portion of the field borders the Trinity River to the north as an eroded terrace remnant. Large boulder-gravel lag deposits approximately 10 feet thick overlie the terrace bedrock surface. The alluvial terrace deposits are overlain by colluvial deposits along the back half of the field. The thickness of the alluvial deposits is approximately 30 feet. The maximum saturated thickness of the groundwater aquifer in the primary field area is estimated at 9.4 feet from January to March. The aquifer is frequently dry during the other months of the year.

North Agency Field
For the purposes of this plan, Agency Field has been divided into North Agency and South Agency Fields. Supply Creek to the south, Brown Creek/Trinity River bound North Agency Field to the north, valley wall to the west and the Trinity River to the east. Galice schist bedrock was encountered between 21 feet and 25 feet below the ground surface. Depth to bedrock increases toward the back edge of the field indicating the presence of an ancient buried stream channel.

South Agency Field
The Trinity River, Supply Creek roughly bound South Agency Field to the south and east to the north, and the valley wall to the west. Bedded Galice slate/schist was generally encountered between 18 feet and 22 feet. Depth to bedrock increases to 48 feet along the back edge of the field, consistent with an ancient buried stream channel along the back edge of the field.

Hostler Field
Ferry Gulch, Hostler Creek roughly bound hostler Field to the south to the north, and Trinity River to the west and the valley slope to the east. Galice bedded shale bedrock was encountered at an average depth of 50 feet below the surface. The average maximum saturated thickness of the aquifer was 12 feet (1966-1974). The deposits are stratified with a westward dip of approximately 3-4% towards the Trinity River.

Chenone Field
Chenone Field is bounded by Spring Creek to the south, the valley wall and the Trinity River to the north, the Trinity River to the east, and the valley wall to the west. Galice bedded shale bedrock and South Fork Mountain Schist bedrock was encountered at an average depth of 30 feet below the ground surface. Depth to bedrock increased to 48 feet near the valley wall (back edge). The increased depth to bedrock

may represent a buried scour channel (ancient Trinity River channel). Surface scour erosion has reduced the terrace alluvium to less than 20 feet thick near the Trinity River.

Meskat Field

Mill Creek is bounded to the north, Hostler Creek bound by Meskat Field to the south, and Trinity River to the west and the valley wall to the east. Galice bedded slate was generally encountered between 20 and 67 feet below the ground surface in domestic water wells. Depth to bedrock appears to increase toward the back edge of the field, consistent with an ancient buried stream channel near the valley wall. Two large colluvial fans or landslides from the eastern valley slope overlie the back edge of the field.

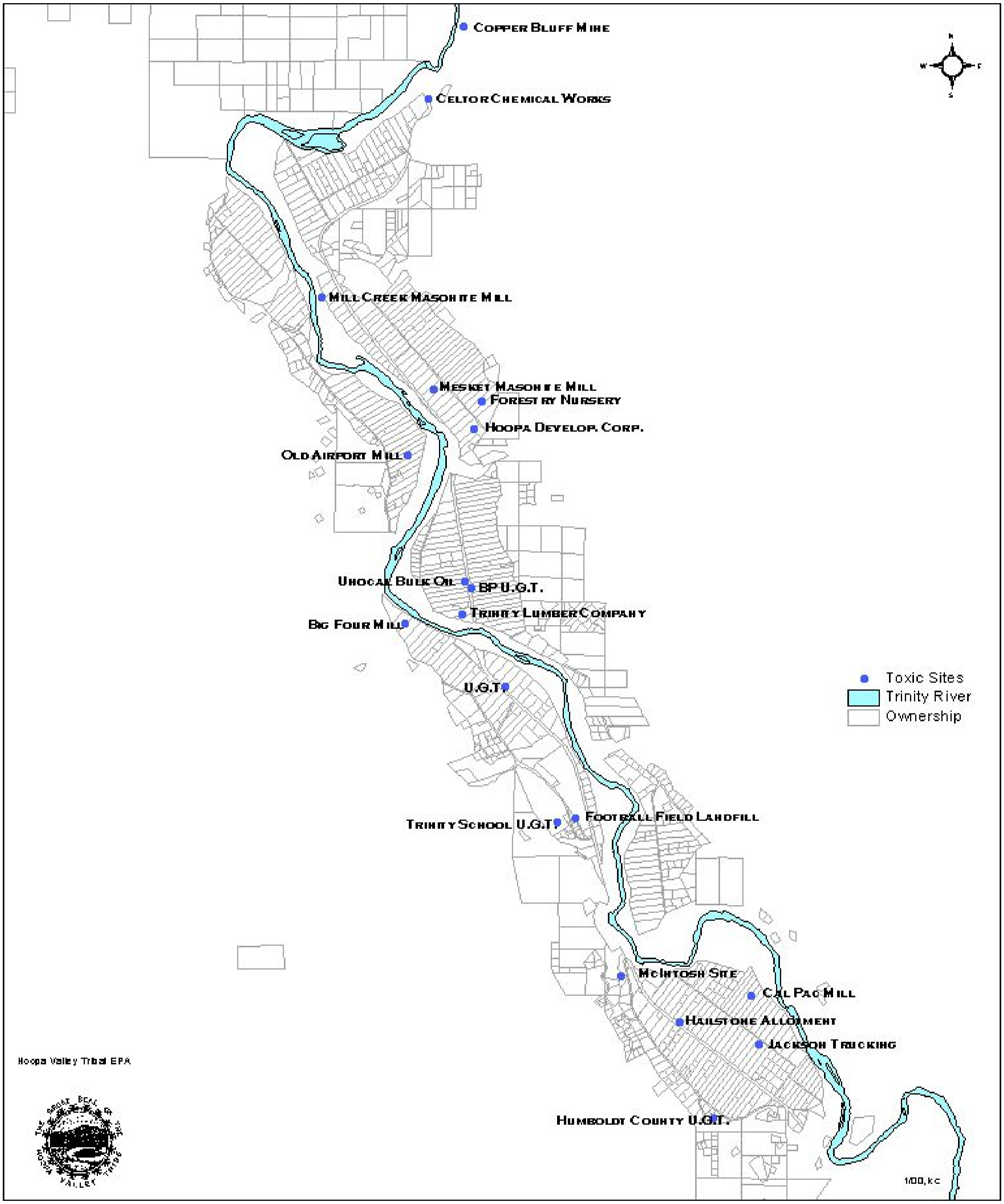
Soctish Field

Soctish Field is bounded to the south, north and east by the Trinity River, and to the west by the valley wall. Bedded Rattlesnake Creek Terrane schist bedrock was encountered between 23 feet and 60 feet below the ground surface. The field is generally bisected by the incised Soctish Creek.

Norton Field

Norton Field is bounded by Mill Creek to the north, Trinity River to the west and north, and by the valley wall to the east. Galice bedded schist bedrock was encountered between 37 feet and 50 feet across most of the field. The average maximum thickness for the saturated aquifer is 13 feet. A portion of the field includes alluvial deposits adjacent to Mill Creek.

Figure 1.1 Known Toxic Sites in Hoopa



1.5 Industrial History

Supply Creek Land Fill

The Supply Creek Landfill covered about two acres, and had been used as an unregulated dump for many years. The site received both domestic and commercial wastes. Both the BIA Complex Well and the Supply Creek Well are approximately 2 miles down gradient from the landfill. Water from Supply Creek is occasionally used for unregulated domestic drinking water. A shallow soil gas survey (Tetra Tech. 1987D) upgradient from the landfill detected low levels of trichloroethene. No testing of soil or groundwater for contamination has been done at the site, or down gradient. Three test wells were drilled to 200 feet without encountering ground water as a condition of closure for the dump in 1998. The Supply Creek Land Fill was officially encapsulated and closed in 1999.

Supply Creek Landfill before closure.

Campbell Field

Past industrial uses within Campbell Field include an abandoned sawmill site most recently occupied by Cal-Pac Lumber (Simpson Paper Company), Humboldt County Department of Public Works Maintenance Yard, Kelly Tire Store, McIntosh Site, chemical storage and disposal at the Hailstone Allotment, Jackson Trucking and Hoopa Ready Mix.

The Cal-Pac Mill site was originally operated as the Sugar Pine Lumber Company. Van Fleet Lumber Company purchased the site in 1957 and the Van Fleet Mill produced rough sawn lumber for shipment to Arcata. Both Sugar Pine Lumber and Van Fleet Lumber may have used wood preservatives and other toxic chemicals on the site. The Van Fleet Lumber Mill operated until 1968, when the mill site was transferred to California Pacific Manufacturing Company (Cal-Pac). The Cal-Pac Mill operated until 1980. The mill was dismantled in 1982. The Tribe recently purchased the property.

Lumber milled at the Cal-Pac site was treated by dipping the lumber in a pentachlorophenol (PCP) solution. In 1981 and 1982, the Cal-Pac Mill site in Campbell Field was found to contain elevated levels of chromium, barium and mercury. The California Department of Health and Human Services (DHS) sampled soils in 1981 and found 435 ppm of tetrachlorophenol (TCP) in soils below the dip tank area. Soil contaminated with more than 14 ppm of TCP and 8 ppm PCP was excavated and hauled away to the Klamath, California landfill and to Grandview, Idaho. The excavated area was subsequently covered with a concrete cap. Soils remain on site that is contaminated with 8 ppm PCP and 14 ppm TCP

(Registered Codicil, 1989). In 1991, water from a seep bordering the Cal-Pac site was found to contain relatively high levels of copper, arsenic, chromium, and mercury. Sediment from that seep contained levels of arsenic, chromium, lead, copper, mercury, nickel, and zinc in excess of the current regulations. In 1999, the Cal-Pac site was selected as a Brownfield Demonstration Project for reclamation and development.

Tee-Pee Burner at Abandoned Cal-Pac Mill

The Humboldt County Public Works Maintenance Yard is located off Shoemaker Road. Diesel and gasoline fuels were stored in underground fuel tanks until 1990. Investigations by LACO Associates (1990-1991) and Selvage, Heber and Nelson (1990) detected both gasoline and diesel contaminated soil. Groundwater contamination has not been verified. Waste oil was also apparently stored on site.

The Kelly Tire Store is located off Highway 96, adjacent to the Hailstone Allotment. Toxic chemicals and fuels may have been used or stored on-site.

The Hailstone Allotment site is located between the Kelly Tire Store and Cal-Gas on the western half of parcel 143. The Hoopa Valley Indian Housing Authority was informed in 1981 that pine treatment chemicals were stored on the Hailstone Allotment. DHS and Indian Health Service (IHS) collected surface samples in 1981; TCP was detected. DHS concluded that additional investigation and soil analysis was needed.

In 1981, the McIntosh Site was found to contain heavy metals above the current regulations, including arsenic, copper, iron, manganese and mercury. That study concluded the site was not suitable for industry or housing. Tetrachlorophenol was detected both at the McIntosh site and the Hailstone Allotment.

Matilton Field
Industrial uses on Matilton Field appear limited to operation of the Hoopa Community Airport. Fuels were once stored at the community care facility, but the underground fuel tanks have since been removed.

North Agency Field

Past industrial uses within the North Agency Field area include the abandoned Big Four Lumber Company Mill, Pacific Gas and Electric transformer substation and the Ieeque Trading Post. The Big Four Mill also known as the G.A. Way Lumber Mill, operated prior to 1964, but was destroyed by the flood. The site is currently used as pasture land. Wood preservative (e.g., PCP) and other toxic chemicals may have been used on site. No soil or groundwater assessment for toxics has been conducted on site. The Pacific Gas and Electric Company Transformer Substation is an active transformer station. The Ieeque Trading Post (now closed) reportedly sold gasoline in the past. The status of the underground fuel tanks is unknown. No soil or groundwater testing for contamination has been conducted.

South Agency Field
Past industrial uses of the South Agency Field consist of underground fuel storage at the Bureau of Indian Affairs Compound, Hoopa Valley High School, Hoopa Valley Elementary School, Humboldt-Trinity Unified School Corporation Yard, Tribal Fisheries and the BIA Fire Service. Other uses have included the old County Landfill (school football field), and fill material from the Celtor Chemical works mine tailings - used both at the Hoopa High School football field and the Neighborhood Facility Preschool playground.

All of the of the underground fuel tanks at the BIA Compound, Tribal Fisheries, and BIA Fire Service Facilities have been removed or upgraded and meet Federal requirements. An underground tank investigation at the Hoopa High School and the Elementary School/Corporation yard by LACO Associates detected diesel contamination in soil. The UST was removed however; groundwater contamination has not been verified.

The old County Landfill site was used as an open dump for several years. The dump was unregulated, and may have received lumber mill and mining-related toxic chemicals and other domestic toxic refuse. The site was closed and covered with soil after the 1964 flood. Freon, trichlorethene and trichloroethane were detected at low levels during a shallow gas survey (Tetra Tech, 1987C). No soil or groundwater has been tested for toxics.

Mine tailings from the Celtor Chemical Works might have reportedly been used as fill at The Hoopa High School football field. Soils sampled at the High School football field and Neighborhood Facility Pre-school playground contained arsenic, lead, cadmium and copper (Davis, 1983). Sampling and testing in accordance with EPA Standards has not been conducted at these two sites.

Hostler Field
Past industrial uses within Hostler Field include: Trinity River Lumber Company (abandoned), Unocal Bulk Oil and Unocal Station, BP Gas Station, Wold Logging Company, Risling Lumber Mill and the Shopping Center Sewage Treatment Plant. The Trinity River Lumber Company Mill site was abandoned after the 1964 flood. The Hoopa Valley Shopping Center complex was built over the abandoned mill site in 1975. The Public Utilities District (PUD) water well supplying the shopping center and surrounding community is located in the area previously occupied by the millpond. A soil gas survey (Tetra Tech, 1987A) detected Trichloroethene (0.004 ppb) and 1,1,1-Trichloroethane (0.002 ppb). In addition, wood preservatives (e.g., PCP) and other toxic chemicals may have been used or stored on site.

The site of the Unocal 76 Station and bulk plant is on the west side of Highway 96. The site is approximately 1/4 mile north of the Trinity River Bridge and is 1700 feet east of the Trinity River. A subsurface hydrologic investigation (Applied Geo Systems, 1990) detected as much as 2.39-ppm gasoline (TPHg) in soil, and 36 ppb TPHg and 6.1 ppb benzene in groundwater. The site was registered with the California Regional Water Quality Control Board (UGT No. 1THU109) as a leaking underground fuel storage tank site. The Hoopa Valley Tribe asserted jurisdiction however, and five 10,000-gallon tanks were removed in 1998.

The Union 76 Station located on the East Side of Highway 96 near the Unocal facility has been in operation for some years, and underground fuel tanks are currently in use at the site. This site meets all Federal UST standards and is equipped with double-walled tanks, vapor recovery systems, and containment systems. The Wold Logging Corp. yard is located on the East Side of Highway 96 and has been operating at this site for some years. Fuels and other toxic chemicals may have been used on site. Further, the abandoned Risling Lumber Mill site located on tribal trust land adjacent to Hostler Creek was destroyed in the 1964 flood. Wood preservative (e.g., PCP) and other toxic chemicals may have been used on site. Contamination status of soil and groundwater at these sites is unknown.

The shopping center community sewage treatment facility is located behind the shopping center, adjacent to the Trinity River. Treated sewage water is used for irrigation in the adjacent area. Other industrial uses of the field include a Laundromat and a hardware supply store. Toxic chemicals may be stored at these facilities.

Chenone Field
Past industrial activities within the Chenone Field appear limited to the old Airport Lumber Mill site located off Pine Creek Road. According to the Hoopa Tribal Records, the mill was abandoned prior to 1970. Wood preservative (e.g., PCP) and other toxic chemicals may have been used on site. All signs of the old Airport Mill have been removed, but it was reportedly located on the lower terrace surface between the Hoopa Rodeo Grounds and the Trinity River. The entire site lies within the 100-year flood plain of the Trinity River. The site is currently used for pastureland. No soil or groundwater assessment for toxics has been conducted.

Meskat Field
Past industrial uses of the Meskat Field have included the Masonite Mill Creek Lumber Mill, Hoopa Veneer Mill Site (Masonite Meskat Field), Tsemeta Nursery (Hoopa Tribal Forestry Nursery), Big Hill Laundromat, and Hoopa Valley Development Enterprise.

The Masonite Mill Creek Lumber Mill site located on Lots 266-273 covered approximately 21 acres when it operated. The Humboldt Fir Lumber Company originally occupied the site at some time before 1958, succeeded by the Humboldt Fir Company. The Humboldt Fir Company operated between 1958 and 1964 when the company merged with the Masonite Corporation. The Mill was partially destroyed during the 1964 flood. Two wells were installed on the Squires parcel for domestic and irrigation use.

A 1981 study of the Masonite Mill Creek Mill site found levels of Pentachlorophenol and tetrachlorophenol. The site underwent partial cleanup in 1987. The tanks were removed and all that remains at the site is a 34 by 53 foot pit (excavated 25 feet down to the hardpan) and a 1,688 cubic yard mound of diesel contaminated soil stockpile adjacent to the pit. Investigations by the U.S. EPA Field Investigation Team (FIT) in 1982, Ecology & Environment, Inc. (1982) and by Cooper Consultants (1990) have determined that the site is contaminated with PCP, Polychlorinated Dibenzodioxins (Dioxin), Polychlorinated Biphenyls (PCB), Trichlorethlene, Tetrachlorethene, 1,1,1-Trichlorethane, diesel and gasoline. A 1989 study of the sediments in the Trinity River up and downstream of the Masonite Mill Creek site found iron levels in excess of the current regulations. Samples taken from a seep in the same location found both iron and manganese levels in excess of the Minimum Concentration Level (MCL). In addition, limited testing of seeps along the Trinity River in 1992 found no trace of Pentachlorophenol or tetrachlorophenol.

Hoopa Veneer and Humboldt Fir Company also previously operated the Masonite Meskat Mill site. The site appears to have encompassed Lots 283 to 297A. The majority of the lots were transferred to the Hoopa Valley Tribe in 1978. Lumber milling operations throughout the site undoubtedly involved fungicide and wood preservative use over the past 20 years. However, various operators used different portions of the site, and the exact locations of use and the identity of all the compounds used are unknown.

A 1981 investigation of the site revealed levels of the following heavy metals above the MCL: arsenic, chromium, copper, iron, manganese and zinc. A study in 1982 also found levels of mercury and lead above the MCL. A DHS study in 1984 found high levels of barium, chromium, cobalt, lead, and vanadium and in 1986 found levels of arsenic and chromium. Investigation by Ecology and Environment

(1982) and Winzler & Kelly (1986, 1987) detected high levels of PCPs, TCPs, heavy metals and oil-grease on portions of Lots 291-295. Limited site remediation was conducted on Lots 291-295. Furthermore, sediment from a seep in Meskat Field contained levels of chromium, nickel, and zinc in excess of the current California Regulations for hazardous waste, (LACO Associates, 1991). No soil/groundwater testing has been conducted for toxics on the remaining portions of the Meskat Mill Site although a site assessment is scheduled for the summer of 2001.

The Tsemeta Nursery (Hoopa Tribal Forestry Nursery) located on Lot 265 has used and is currently using various compounds. The Hoopa Valley Development Enterprise is located on Lot 265A. The site uses include maintenance and repair of vehicles and heavy equipment. Gasoline, diesel, waste oil and other toxic chemicals may be used and stored on site. No soil/groundwater contamination testing appears to have been conducted at any of these sites.

Soctish Field

There are no known industrial sites or underground fuel tanks located within the Soctish Field.

Norton Field and Vicinity

The primary industrial use of Norton Field was the Celtor Chemical Works. This site was used to extract copper, zinc and other precious metals from sulfide ore mined at the Copper Bluff Mine between 1957 and 1962. After abandonment in 1962, some equipment and mine tailings remained on site. The site was targeted by the Abandoned Site Project (ASP) investigation of Humboldt County in 1981. Subsequent soil investigation revealed high levels of heavy metals and very acid conditions. In 1983, the Celtor site was approved for cleanup under the Federal Superfund Program, and was remediated in 1987-88. In addition, waste soil from the Celtor site was reportedly used as fill material at several sites throughout the valley, including a playground for pre-school and elementary school children, a high school football field, a county landfill, and housing sites.

The 1993 Five Year Review of the Celtor Chemical Works site conducted by USEPA revealed that (1) the re-vegetation and post-closure maintenance was successful at insuring that the vegetation survived; (2) the vegetation cover is in good condition and there is no evidence of erosion, (3) there is no need to impose additional operation and maintenance requirements; (4) the original cleanup objectives remain protective of human health and the environment; and (5) there are no new Applicable or Relevant and Appropriate Standards, Limitations, Criteria, and Requirements (ARARs) which would make the remedial action insufficient.

However, the Tribe has concerns with the EPA Five Year Review findings. These concerns include the omission of any comment regarding the stunted growth of the vegetation adjacent to the site or the build up of salts on the lower slope of the site. Because of the salt build up, the Tribe believes additional investigation is required. In August of 1999 the salts were sampled with 4.4 ug/g of arsenic resulting. Considering the laboratory and visual evidence from settling ponds adjacent to the river indicating excessive concentrations of heavy metals and conglomeration of solids, which have been cemented together along with the salt deposits, there remains some concern for public health and safety for this reason, a sampling event is scheduled for the summer of 2001.

The Copper Bluff Mine is located approximately 0.5 miles north of the Celtor Chemical Works, adjacent to the Trinity River. Mining operations at Copper Bluff Mine (formerly Bolivar Mine) began in the 1930's. Copper, zinc, silver, and gold were extracted from the ore. Mining operations ceased in 1962 and the mine was abandoned. A 1981 study of the Copper Bluff Mine sludge found concentrations above drinking water MCL for arsenic, cadmium, copper, iron, lead, manganese, selenium, and zinc. Soil and water were sampled at the Copper Bluff Mine by Ecology and Environment (1982), and revealed high levels of heavy metals (copper, cadmium, lead, manganese) and very acidic conditions. A 1987 study of sediment from the Trinity River both up and downstream from the effluent of the Copper Bluff Mine found the following heavy metals in excess of the current regulations: arsenic, cadmium, chromium, lead, mercury, selenium, nickel, copper and zinc. The mineshaft remains open and water discharges from the shaft directly into the Trinity River. The mine water is highly acidic, and contains high levels of arsenic, cadmium, chromium, copper, lead and zinc.

A joint funding agreement with the United States Geological Survey (USGS) has provided analyses of the Copper Bluff Mine. Results from the 1995 progress report indicate pH levels for underground mine tailings range from 2.5 to 3.2 and specific conductance ranging from 560 to 2770 mS/cm. Observed pH values from surface seeps ranged from 4.0 to 4.9. Specific conductance for seepage ranged from 320 to 550 mS/cm. Upcoming work plans for the mine include chemical analysis of underground and surface-seep samples (for Al, Cd, Ca, Cr, Cu, Fe, Pb, Mg, Mn, Ni, K, Si, Na, Zn, chloride, fluoride, and sulfate), which will be analyzed by an EPA contracted laboratory.

1.6 Water Resources and Water Use

The Hoopa Valley Indian Reservation hosts a seasonal abundance of surface water for drinking water supply while in contrast, groundwater aquifers are quite limited. The Tribe is now faced with the challenge of meeting the increase demands for drinking water supply, while maintaining quality surface water in streams to protect fish, wildlife and other beneficial uses.

Klamath and Trinity Rivers

The water resources of the Klamath and Trinity Rivers, in particular, have played a key role in the indigenous life of local people. For thousands of years, the Hupa people have depended on the abundant runs of salmon and steelhead, harvesting fish first with wooden weirs, and in recent times with gill nets. Fish have historically provided the mainstay of the Native American economy in the area. Today, however, water itself has become the commodity. The Lewiston Dam on the Trinity River was developed for agriculture and electrical power generation.

Surface Water Inventory

Any catchment that included reservation land within its boundary or any catchment (except the Trinity and Klamath Rivers) that gave rise to a stream flowing through the reservation is included and delineated in the watershed inventory (Table 1.1). The delineation also includes watershed areas and estimated water yields. Beneficial uses for these watersheds are further delineated in Chapter 3.

For this assessment, streams were taken directly from blue lines on USGS topographic maps. Approximately 43 percent of the watershed area drains into the Trinity River from the east side and 25 percent drains into the Trinity River from the west. Twenty percent of the watershed area drains into the Klamath River.

Stream flow information for the Trinity River Gauging Station in Hoopa measures runoff from approximately 2,855 square miles, or 96 percent of the hydrographic area. The total drainage from tributaries within the Reservation accounts for only 7 percent of the overall drainage area that discharge into the Trinity River. The flow records from this station are summarized below in Table 1.1. These figures represent data from 1931 to 1992.

According to the Humboldt County Contingency Plan for Floods, the flood warning stage for the Trinity River in Hoopa is 44 feet and flood stage is reached at 48 feet. The 100 year flood maximum flood depth of 52 feet and peak discharge of 212,000 c.f.s were exceed during the 1964 flood, which measured 231,00 c.f.s at a height of 57 feet. The 12.5 miles of the Trinity River located within the boundaries of the Reservation has an average channel depth of 31 feet.

Watershed Name	Total Watershed Area(ac.)	Reservation Watershed Area(ac.)	Percent Total 0n-Reservation Watershed Area	Miles of Stream Class I / Class II	Estimated Water Yield (Acre-feet)[a]
	Trinity	**River**	**East Side**		
Tish Tang Creek	19,131	8,367	43	9.67 / 13.59	63,440
Hostler Creek	6,657	6,657	100	8.30 / 6.47	22,089
Mill Creek	30,806	16,824	55	14.24 / 28.91	102,175
Bull Creek	4,198	4,198	100	3.28 / 7.29	13,925
Captain John	881	881	100	0.33 / 2.01	2,934
Low Order / Direct Facing	9,601	9,458	98	0.98 / 7.74	31,847
Total	71,274	46,385	65	36.47 / 64.00	236,410
	Trinity	**River**	**West Side**		
Campbell Creek	4,355	423	10	1.18 / 0.00	14,435
Hospital Creek	1,617	1,617	100	0.00 / 6.46	5,357
Supply Creek	10,254	7,184	70	7.33 / 38.84	34,016
Soctish Creek	5,924	5,924	100	3.67 / 23.06	19,644
Big Creek	1,157	1,157	100	0.00 / 5.71	3,827
Beaver Creek	2,059	2,059	100	1.34 / 8.37	6,824
Low Order / Direct Facing	9,601	9,458	98	0.00 / 30.36	31,842
Total	34,967	27,822	79	13.52 / 112.80	115,945
	Klamath		**River**		
Hopkins Creek	5,762	3,781	66	3.69 / 8.45	19,113
Pine Creek	31,412	12,559	40	20.52 / 42.10	104,174
Direct Drainage	2,964	1,199	40	0.00 / 2.21	9,843
Total	40,138	17,482	44	24.21 / 52.76	133,130

Table 1.1. Watershed Inventory (Hoopa Valley 305(b) Water Quality Inventory, 2000)

a) Water Yield is estimated using a value of 2126 acre-feet per square mile

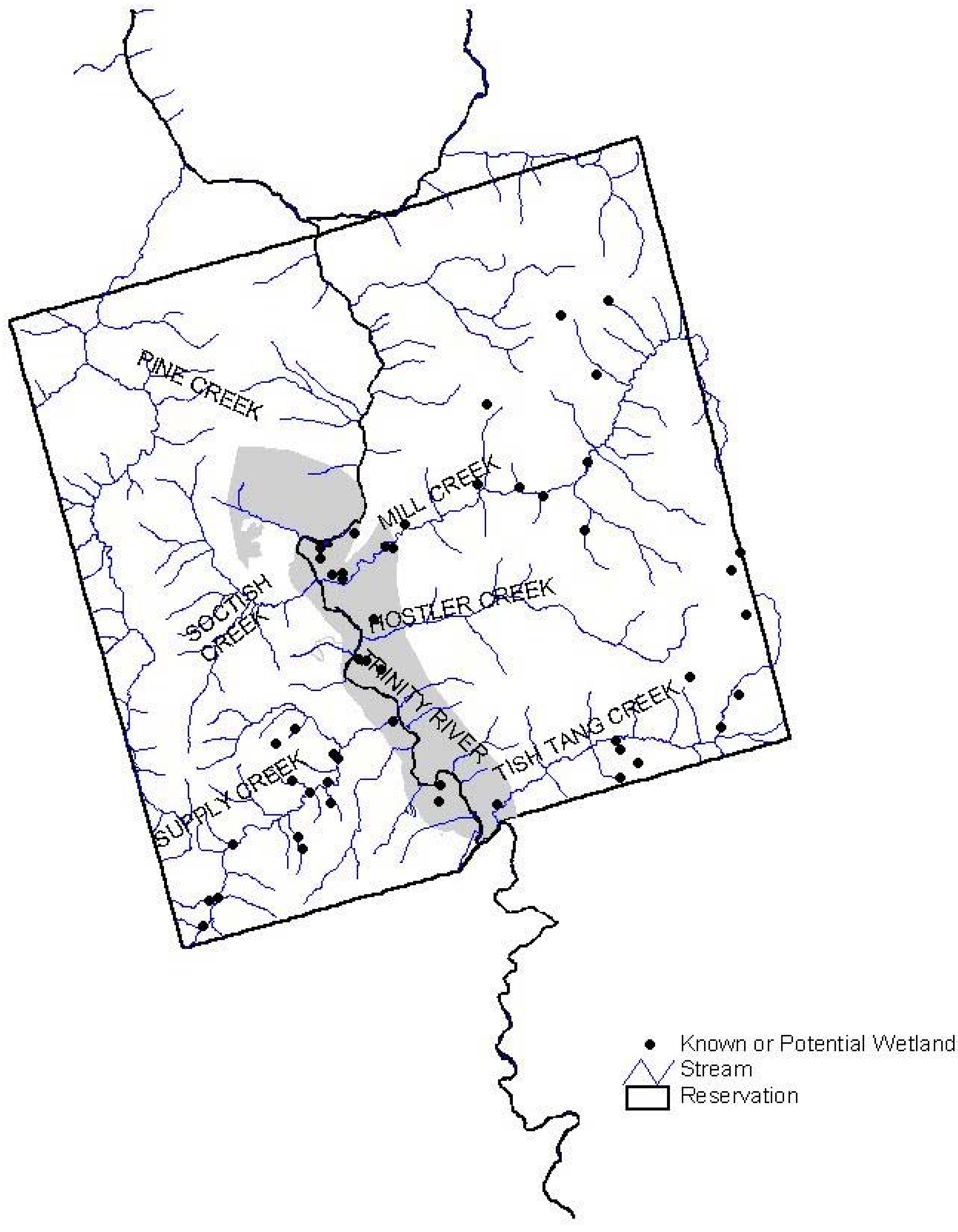
Wetlands

In 1999 the Tribal EPA and Humboldt State University cooperated on a wetland identification project using a geographic information system (GIS) and infrared aerial photo interpretation. Data layers from the GIS were queried for attributes indicative of wetland occurrences (soil, vegetation, slope and hydrography). Air photo interpretation was then used to further validate the GIS results. The study area included Mill, Supply and Tish Tang watersheds (uplands) and the Valley floor. Fifty potential wetlands were identified: 13 on the Valley floor & 37 in the uplands (fig. 1.2). Six Valley floor wetlands and 3 upland wetlands were field verified. Aerial extent of these wetlands was not determined due to the site-specific nature of wetland boundaries. Delineation of wetlands will normally be conducted when a proposed project is adjacent to it.

The Tribal EPA plans to repeat this process of remote identification and field verification for the Reservation and surrounding watersheds in cooperation with Humboldt State and adjacent stakeholders.

Figure 1.2

Known and Potential Wetland Locations
of the Hoopa Reservation



Upland Riparian and Wet Brushfield

The riparian corridors occur along most of the perennial drainages, and are characterized by dense canopy and moderately diverse hydrophytic vegetation. Approximately 200 miles of riparian corridor were delineated from photographs for tributaries to the Trinity and Klamath Rivers, in addition to 19 miles associated with the Trinity River itself. Red alder is generally dominant with varying amounts of willow, big leaf maple, Nuttal's dogwood, California bay, thimbleberry, salmonberry, spikenard, ladyfern, five-finger fern, evergreen huckleberry, streamside dogwood, and a variety of other hydrophytic trees, shrubs and herbs. Black cottonwood and western yew are occasionally present. Riparian vegetation in the southwest corner of the Reservation can also include Port-Orford cedar, western azalea, western hemlock and other species specific to either saturated ultramafic soils or the coastal Douglas fir forest.

The wet brushfields differ little compositionally from riparian, other than lacking a structural tree stratum. Brushfields are often associated with former landslide features or broad hillside seeps.

Upland Herb Meadows

The upland meadows are mostly associated with dioritic soils at higher elevation in the southeast corner of the Reservation, and are representative of the highly developed wet meadow complex that occurs farther east in the vicinity of Trinity Summit. Meadows are normally of low gradient, with diverse vegetation dominated by various sedge, rush, grass and herb species. Steeper portions of the meadows are often covered with dense brushfield.

Valley Floor Riparian

Riparian vegetation on the valley floor is similar to upland riparian, but due to past disturbance (filling, channelization) is often dominated by exotic species. Dominant native species include many associated with upland riparian, the most important trees being red alder and black cottonwood. However, the vegetation is often dominated by invasive exotic species, including Himalaya black berry, black locust and escaped cherry.

Other Wetlands on the Valley Floor

The majority of wetlands on the valley floor, excluding riparian, are located on poorly drained flat areas adjacent to drainages. The relatively stagnant "swamp" is characterized by native species such as black cottonwood, red alder, water parsley, juncus, horsetail, and other hydrophytic or aquatic species. As with riparian vegetation in the valley, these areas have been subject to intense invasion by the three exotic species noted above. Other minor wetland types present in the valley include a small amount of cattail marsh, and an aquatic forb community present in horse pasture.

Example of Valley Wetland at Mill Creek

Trends

Due to the restriction of agricultural, residential and commercial development largely to the valley floor, long-term loss of wetlands in upland areas has probably been minimal. Some upland riparian wetlands undoubtedly have been lost to road construction or streamcourse alterations. Past logging practices have contributed to downcutting of drainages and sediment deposition in some areas, altering or destroying riparian vegetation. Changes in species composition have undoubtedly occurred due to logging near to or within the riparian corridors. No attempt was made to quantify change in wetland quality or loss of wetlands as a result of these factors.

In contrast, decline in amount or quality of wetlands on the valley floor has probably been significant over the past 50-60 years. Black cottonwood/alder swamp and other stagnant wetlands were probably historically widespread in the valley, associated with the mouths of some drainages. BIA agents apparently encouraged modern techniques of farming about the turn of the century. Flat, moist, and fertile land would have been desirable, since most crops required irrigation. Additional wetlands were probably lost to mill construction and related water diversions later in the first half of the century.

Finally, significant loss or decline in quality of wetlands in the valley may have occurred as a result of the 1964 flood and subsequent stream rechannelization by the Army Corps of Engineers. Those impacts may have contributed to the high occurrence of exotic species in the valley. Subsequent construction of irrigation channels serving Campbell Field and other areas of the valley probably caused additional losses. Inspection of 1962 aerial photographs indicated no significant change in non-riparian wetlands in the valley from 1990 photos. Therefore, aside from flood-related impacts on riparian vegetation after 1964, the major historical impacts to wetlands on the valley floor appear to have occurred prior to 1962.

Groundwater Resources

The groundwater basin in the Hoopa Valley is restricted to alluvial fans at the mouth of principal tributaries and the terrace and floodplain deposits adjacent to the Trinity River. Surficial deposits range in depth from a few feet along the valley floor to a maximum of about 80 feet along the terraces bordering the river. According to the Tribe's 1993 305(b) report, the valley basin is estimated to have a usable storage capacity of approximately 6,000 acre-feet per year.

Groundwater recharge is primarily from two sources: 1) precipitation and surface runoff infiltration, and 2) percolation of water through soils adjacent to perennial stream channels. The alluvial deposits are largely sand and gravel, with moderate to high permeability, allowing water to move rapidly from recharge to discharge areas. Consequently, sustained heavy withdrawals from these aquifers during the dry summer months for domestic and agricultural uses may lower water tables and affect other groundwater users.

1.7 Identification of Water Bodies Which Do Not Meet Standards

In 1990, the Hoopa Valley Tribal Council, in conjunction with the U.S. EPA, awarded LACO Associates a contract to prepare the Water Quality Assessment EPA 305(b) report for the Hoopa Valley Indian Reservation. The purpose of the study was twofold; to complete the Water Body System 305(b) report, and to characterize water quality on the Reservation. The Hoopa Valley Tribe was granted program authorization under Section 303 of the Clean Water Act from EPA in 1996.

On August 3, 1995, the Hoopa Valley Tribal Council approved Title 37 Pollution Discharge Prohibition Ordinance. The purpose of this Ordinance was to exercise comprehensive Tribal regulatory authority over all surface and groundwater matters. The focus is to protect fundamental Tribal cultural, ceremonial, religious, fisheries, seasonal, residential, public health and safety, and water quality. This ensures adequate drinking water, protection of beneficial uses, prohibiting all point source discharges and restricting non-point source discharges of pollutants within the exterior boundaries of the Hoopa Valley Reservation. This Ordinance established numeric and descriptive water quality standards and beneficial uses of the Hoopa Reservation's waters. Full protection will be afforded to existing, potential and historical uses of the Reservation waters.

A waterbody that is not listed but that is a tributary to a listed waterbody is protected by the water quality standards that have been established for the nearest downstream waterbody. Water bodies within the Reservation, which do not have beneficial uses designated for them are assigned wildlife and/or aquatic habitat, or recreation designations. These designations in no way affect the presence or absence of other beneficial use designations in these water bodies. Further classification will be based on the size of the waterbody and its historic and environmental significance. Water bodies which are used for Domestic water, fisheries, or cultural purposes have the highest priority for protection and restoration.

There have also been many ground water, surface water, and point source studies to determine the water quality in Hoopa Valley Reservation. The bulk of these studies are useful in assessing surface waters on the Reservation with respect to Clean Water Act goals. A summary of the usable data shows a high level of soil and water runoff contamination above the accepted governmental standards in some cases. Non-point sources of contamination include gold and mercury mines, mine processing sites, timber processing mills, construction activities, urban runoff, underground storage tanks, landfills, leachfields, septic systems, roads, silviculture, agriculture, flow regulation, diversions, hydro modifications, land development, and the use of pesticides. The miles of streams impacted for each watershed is listed in the Tribe's 305 (b) report.

1.8 Identification of Non-Point Source Pollution

In 1991 through 1995 Hoopa Tribal Environmental Staff and LACO Associates sampled monitoring wells, surface waters, sediments and waters from seeps below a few point sources. The only contaminant that affected a designated use, (municipal), was the Total and Fecal Coliform found in surface waters and some wells. With proper treatment, the designated use would be supported. Even though no other impairment of designated uses was noted, there is much concern over the potential impairment by contamination in soil working its way into sediments and water sources. From the previous detection of contaminants, the following potential water quality problems were identified:

1. Potential for chlorophenols in certain streams.
2. Potential for dioxins and furans in certain streams.
3. Potential for silvicultural chemicals (organic pesticides) and their breakdown products in certain streams.
4. Potential for heavy metals and other byproducts of ore processing in certain streams.
5. Potential for unknown chemicals or combinations of chemicals entering Supply Creek from the Supply Creek landfill and dump.
6. Potential for contamination of the Trinity River by any of several industrial chemicals from a truck accident on Highways 96 or 299 which closely parallel the Trinity River for many miles.
7. Potential for further increases in sedimentation and degradation of spawning beds through mining activities, forest management practices, and road building within the Reservation, and by private concerns outside the control of the Reservation.

Beneficial uses of the Trinity River are affected by the decline in the Trinity River water levels due to increased demands for water diversion to other parts of the State. This decreases the potential use for water-oriented activities, such as, Indian subsistence fishing, cultural ceremonies, and other Indian fishing rights. A potential, but undocumented trend in Hoopa is an increase in failure of septic leachfields, contributing to an increase in coliform levels found in some of the surface and ground water sources. This would affect the designated municipal and domestic water uses if left untreated.

Soil contamination increases the potential for further contamination of water and stream sediments. This could increase with time or under certain conditions. Agriculture lands could also be affected however no studies have been conducted to see whether there is plant uptake of metals or other toxics by crops. This situation should be more closely studied.

1.9 Inter-Governmental Coordination

The Hoopa Valley Tribe's Legislative Procedures Act sets forth a comprehensive and systematic process for the Tribal Council to establish, amend, or modify policies, ordinances and acts, or to take other major governmental actions on behalf of the Hoopa Tribe. The Tribe's Title 37 Pollution Discharge Prohibition Ordinance states that:

> "It shall be the policy of the Tribe and its authorized entities and departments to vigorously enforce the provisions of this Ordinance and the Water Quality Control Plan; continue technical and legal efforts pertaining to Trinity and Klamath River water rights and flow allocations; monitor off Reservation waters which flow into the Reservation for pollutants; and to coordinate with the off-reservation jurisdiction of the North Coast Regional Water Quality Control Board, State Water Quality Control Board, or the State of California or any of its agencies, with regard to matter herein regulated by the Tribal authority."

In addition, the Tribe is mandated by the Federal Government to comply with the regulations set forth in 40 CFR Part 25 concerning public involvement.

1.10 Erosion Control and Prevention

Watershed restoration is a long-term commitment to improve fish habitat, riparian reserves, and water quality. The Hoopa Tribe is currently working to address erosion problems caused by past land management activities. From 1984 to the present, watershed rehabilitation projects have been implemented in Mill Creek, Tish Tang, Supply, and Pine Creek watersheds on the Hoopa Valley Indian Reservation.

The Tribe's goals of watershed restoration projects are:

1. To improve riparian habitat by treating chronic or potentially catastrophic areas of sediment production.

2. To minimize potential of sediment from reaching anadromous spawning habitat and to encourage the return of natural ecosystems to there predisturbance condition as closely as possible (FY94 Watershed Rehabilitation Program, HVIR, 1994).

3. Reduce turbidity during high flows on Reservation domestic water supply streams, which lead to unacceptable water quality problems during the winter on Mill Creek and Tish Tang Creek.

4. To set up long term monitoring stations to measure the effectiveness of the rehabilitation projects and overall conditions of fish bearing streams.

Erosion abatement projects are designed to reduce potential sediment delivery to Reservation streams. In 1995, 157 erosion projects were designed to reduce some 66,000 cubic yards of sediment from reaching these streams (FY95 Watershed Rehabilitation Program, HVIR, 1995). Funding of erosion treatment was a conglomeration of Option 9 monies, Tribal Timber Sale, the Trinity River Restoration Program, Environmental Protection Agency support, Integrated Resource Management Plan funds, and University of California Coop Extension funds.

1.11 Irrigation Systems, Implementation of Fish Screens

The Tribal Public Utilities Department has developed irrigation diversion systems on Hostler, Mill, Soctish, and Supply Creeks. The Tribal Fisheries Department identified that the unscreened intake pipes to these diversion systems are entraining and killing salmonid fry. In September 1997 the Tribal Fisheries installed a rotary fish screen system in Mill Creek. Interim fish screens have been installed on intake pipes located in Hostler and Soctish and Supply Creeks. Installation of fish screens resolved the problem of salmonids entering into irrigation diversion systems. Supply Creek is scheduled for installation of a rotary fish screen system in the spring of 2002.

1.12 Water Quantity and Quality Problems

In addition to further reductions in Trinity River stream flows, the Hoopa Valley Tribe faces difficult management decisions with respect to on-reservation water use conflicts and water quality problems. As the demand for water diversion from streams within the Reservation increases, it will become difficult to avoid impacts to aquatic resources including salmon and steelhead. Water quality in wells providing domestic water must be protected against groundwater pollutants deriving from septic tanks, pesticides, leaking underground fuel tanks and industrial wastes. Timber harvest activities if not adequately managed can contribute unacceptably large amounts of suspended sediment to streams, which can degrade habitat for salmon and steelhead.

Water Projects
The diversion of Trinity River is a major water development project that involves inter-basin transfers, from northern California to central valleys of California. The Project has resulted in an average annual diversion of approximately 1,000,000 acre feet of water - substantially more than the planned design diversion of approximately 900,000 acre feet, and about double the diversion originally proposed. Exported Trinity River water, which is routed through a series of hydroelectric power plants, is used for irrigation in the Sacramento and San Joaquin Valleys and also to help improve water quality in the Sacramento River and Delta. This diversion of up to 90% of the annual flow has contributed to drastic declines in the number of salmon and steelhead migrating through the Hoopa Valley Reservation. Both the subsistence and commercial fisheries of the Hoopa Valley Tribe have been impaired. Efforts to divert additional quantities of water are expected to continue despite the clear history of serious environmental consequences.

Water Systems
The existing water systems suffer from several basic inadequacies:

The east side of the reservation generally has adequate water supply in the winter and spring months, but falls short in the late summer and fall. The major surface source supplying the east side, Captain John Gulch, tends to have reduced flow rates or occasionally dry up in the summer and fall months due to its small watershed (less then two square miles). To compensate, untreated water is pumped into the system from the Mill Creek irrigation flume.

The west side of the reservation generally has year-round surface water, but high winter and springtime turbidities in Campbell Creek preclude operation of the water treatment plant during this period. Well water normally meets winter and spring demands, but there is insufficient capacity to satisfy summer demand with wells only.

In summary, maximum water demand during summer months occurs when availability of treated water is low. Overall, water storage volume and fire hydrant locations are inadequate to meet minimum fire protection standards and maintain protection of Tribal property.

Inorganic Chemicals
Most of the inorganic chemical analyses of soil and water on the Reservation have established baseline conditions of site-specific locations throughout the Reservation. The majority of this data has provided critical information in addressing serious water quality problems.

Surface water on the Reservation can be characterized as "soft", low in hardness and alkalinity. The water is slightly basic (pH 7.7-8.3) west of the Trinity River, reflecting the ultramafic nature of the underlying rocks, and more neutral (pH 7.5-8.0) east of the river, reflecting the metamorphosed sediments (Galice) and granitic geology. The groundwater is much more acidic than surface water. Campbell Field water has the lowest pH (6.2-6.6, one 7.4 measurement), while Soctish Field has groundwater that is nearly neutral.

Soctish Field groundwater is the hardest, but all the fields have groundwater ranging from low to high corrosiveness. Campbell Field water is the most corrosive; Soctish Field groundwater is the least corrosive. The basic characteristics of Reservation water that may help in understanding the degree of risk posed by inorganic constituents are listed in Tables 8.1 and 8.2 of the Tribe's 305(b) Report.

Drinking Water

The inorganic chemicals most often associated with health and environmental concerns are heavy metals. The earliest chemical analysis of water on the Reservation emphasizing metals was conducted in 1973 (Winzler & Kelly, 1974). Concentrations of silver, cadmium, mercury and selenium in the Moon Lane well were over the 1991 maximum concentration level (MCL). Presence of copper and zinc in the Gibbs Gulch sample is expected in systems deriving their water from heavily mineralized areas. Other results were well below the MCL.

In 1981, the HVPUD community well ("New Well") in Agency Field and the new Campbell Creek intake (surface water) were tested for an extensive array of compounds. Low levels of zinc were detected in water from the west side of the valley. Based on a 1982 study, mercury exceeds the MCL in the Mill Creek source (Meskat Field), Soctish-Chenone system and BIA system (Agency Field). Two of the HVPUD wells (the Old and New PUD Wells), exceed the MCL for iron, and the Old Well exceeds the MCL for manganese based on a 1987 study.

The North Agency Field system, Campbell Field system, and Soctish-Chenone system were tested for a limited suite of analytes in 1982. These systems all draw water from catchment areas west of the Trinity River. All the catchment areas include ultramafic geology. The levels of sulfates in all three fields, although appearing high, are well below the MCL. Of greater concern is the very high concentration of iron reported for the Soctish-Chenone system, well above the 1991 MCL. The relatively high level of zinc at Campbell Field is significant.

As part of the Field Investigation Team (FIT) investigation of hazardous sites in the Hoopa Valley Reservation in 1982, water was sampled from five wells; the Shopping Center (Hostler Field), Moon Lane and Jackson Trucking wells (Campbell Field), and the Squire and Deep Sleep wells (Meskat Field). This was the first widespread investigation of groundwater quality in the valley. All five wells showed detectable levels of cadmium, lead and zinc, with levels of cadmium in four wells and levels of lead in all five wells at or above the 1991 MCLs for drinking water. These levels constitute a serious potential health hazard.

The results of the FIT investigation led to further analyses of Reservation water supplies. In 1982, two wells and three water distribution systems were tested. The results of retesting the Shopping Center and Moon Lane wells again showed lead at levels somewhat greater than the MCL. Cadmium and zinc concentrations were considerably lower than the MCL. Tests of the three distribution systems showed all analytes undetectable or at levels well below the MCL. The consistent high levels of lead in Shopping Center and Moon Lane wells suggest a serious health hazard exists.

A further round of testing of community water systems was conducted between 1983 and 1985, concentrated on the smaller "East Side" systems. While not surpassing the 1991 MCL, zinc concentrations in the East Valley Community system and the new Norton Field well were among the highest recorded in the valley.

A 1986 investigation by the California Department of Water Resources (DWR) tested manganese, and arsenic which can adversely affect the central nervous system. No references to critical concentrations of boron were noted. There are no Drinking Water MCLs for boron compounds; MCLs for lead, manganese, and arsenic are 50 ppb or less. Based on the surrogate MCLs, the concentrations indicated in Table 8.12 of the Tribe's 305 report could indicate a health risk.

The "Old" and "New" HVPUD wells located near the Masonite sawmill site and next to Mill Creek were tested in 1987. The high manganese levels indicate both wells are questionable as continued sources of public drinking water. Although these levels may be "background", and people have taken water from Mill Creek for years with no apparent deleterious effects, there is potential for cumulative effects.

The Squire well and an irrigation well in the Masonite Mill Creek mill site in Meskat Field were tested in 1989 for a suite of heavy metals and other inorganics. These analyses indicate no hazard related to the inorganic target chemicals in the Squire Well existed at that time. The irrigation well is questionable as a source of drinking water, due to high barium, iron and manganese content. The high iron content may be related to the well casing.

Beneficial Uses

Beneficial Uses

Essential to this plan is a designation of beneficial uses for the Reservation waters that are to be protected. Table 2.1 identifies beneficial uses for major water bodies on the Reservation. Equal protection will be afforded to existing, potential and historical uses of the Reservation waters. The Tribe adopted the WQCP in July of 1997; the WQCP standards and criteria have been adopted as a Tribal ordinance. Further, the beneficial uses of any specifically identified water body apply to all tributaries above the beneficial use area.

Virtually all activities for both consumptive and non-consumptive uses of the Reservation waters center on satisfaction of domestic, aquatic, industrial, irrigation, recreational and cultural needs. Additional quantities of water are expected to be required for all consumptive and nonconsumptive uses over the next several years. Specifically, there has been a marked increase over the last several years in concern over some of the non-consumptive uses that water can serve, notably the growing importance given to the habitat for anadromous fish, principally chinook salmon, coho salmon and steelhead trout. More interest is also being shown in the benefit of water-orientated recreational activities. Other non-consumptive beneficial uses of growing concern include cultural uses, wildlife habitat, esthetics, wild rivers, and special Native American fisheries.

Several Federal and California laws establish beneficial uses for waterways that apply to waters of the Reservation. First, with the passage in 1972 of the "California Wild and Scenic Rivers Act" (Senate Bill 107), certain river systems, including the Klamath and Trinity, were established as wild and scenic river systems. This act prioritizes the beneficial uses of waters for scenic, fisheries, wildlife, and recreational purposes. Secondly, according to the 1975 Klamath River Basin plan: "The special Indian fishing rights amount to a unique non-consumptive beneficial use within the basin." Since many Native American families living along the major streams depend on fishing as an important means of providing food for their families, this “non-consumptive” beneficial use is extremely pertinent to the Reservation waters. Finally, on December 19, 2000 the Secretary of the Interior signed the Record of Decision adopting the Trinity River Mainstem Fishery Restoration Final Environmental Impact Statement. This decision mandates an increase of 42% flows out of the dam, in order to restore and maintain the Trinity River anadromous fishery and habitat. Also this decision re-affirms the federal trust responsibility to assure a viable fishery from which the Hoopa and Yurok Tribes can exercise their federally reserved fishing rights.

2.1 Use Designation

For the purpose of this plan, the following designated uses for the waters of the Reservation have been established. Water bodies within the Reservation, which do not have uses designated for them innately maintain beneficial uses for wildlife habitat and/or aquatic life habitat. These habitat designations in no way affect the presence or absence of other beneficial uses in these water bodies. Further classification will be based on the size of the water body and its historic and environmental significance. In addition, those water bodies, which are not assigned with a beneficial use, will be assessed in accordance with the biannual Clean Water Act 305(b) report as produced by the Water Quality Coordinator.

The codes used in Table 2.1 are as follows:

(A) Municipal and Domestic Supply (MUN) includes usual uses in community water systems and domestic uses from individual water supply systems.

(B) Agricultural Supply (AGR) includes crop, orchard and pasture irrigation, stock watering, support of vegetation for range grazing and all uses in support of farming and ranching operations.

(C) Industrial Service Supply (IND) includes uses that do not depend primarily on water quality such as mining, cooling water supply, hydraulic conveyance, gravel washing, and fire protection.

(D) Industrial Process Supply (PROC) includes process water supply and all uses related to the manufacturing of products.

(E) Groundwater Recharge (GWR) includes natural or artificial recharge for future extraction for beneficial uses.

(F) Hydropower Generation (POW) means used for hydropower generation.

(G) Cold Freshwater Habitat (COLD) includes uses of water that support cold water ecosystems including, but not limited to, preservation, or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.

(H) Water Contact Recreation (REC-1) includes all recreational uses involving actual body contact with water, such as swimming, wading, water-skiing, skin-diving, surfing, sport fishing, uses in therapeutic spas and other uses where ingestion of water is reasonably possible.

(I) Non-Contact Water Recreation (REC-2) includes recreational uses which involve the presence of water but do not require contact with water, such as picnicking, sunbathing, hiking, beach combing, camping, pleasure boating, hunting, and aesthetic enjoyment.

(J) Preservation of Areas of Special Biological Significance (BIOL) includes aquatic and wildlife refuges, ecological reserves and designated areas of special biological significance.

(K) Wildlife Habitat (WILD) provides a water supply and vegetative habitat for the maintenance of wildlife.

(L) Preservation of Threatened and Endangered Species (T&E) provides an aquatic habitat necessary, at least in part, for the survival of certain species which are Federally and/or Tribally recognized as being threatened and/or endangered species.

(M) Fish Migration (MGR) provides a migration route and temporary aquatic environment for anadromous or other fish species.

(N) Fish Spawning (SPWN) provides a high quality aquatic habitat especially suitable for fish spawning.

(O) Ceremonial and Cultural Water Use (CUL) is defined as the traditional use of a river, stream, reach, or lake for cultural purposes by members of the Hoopa Valley Tribe; such uses involves immersion, provision of adequate flows for the Boat Dance ceremony, and suitable water-temperature for ensuring the presence and consumption of anadromous salmonids for ceremonial purposes.

(P) Wild and Scenic (W&S) provides for scenic, fisheries, wildlife and recreational purposes.

Table 2.1. Designated Uses

Unit	Inter State	MUN	AGR	IND	PROC	GWR	POW	COLD	REC-1
Mill Creek	X	E	E	P	H	E	P	E	E
Tish Tang	X	P	P	P	P	E	P	E	E
Pine Creek	X	P	P	N/A	N/A	E	P	E	E
Campbell Creek	X	E	E	P	P	E	H/P	E	E
Supply Creek	X	E	E	P	P	E	H/P	E	E
Trinity River	X	P	P	E	E	E	P	E	E
Klamath River	X	P	P	P	P	E	N/A	E	E
Soctish Creek		P	E	P	P	E	P	E	E
Hostler Creek		P	E	P	P	E	H/P	E	E
Hospital Creek		P	E	N/A	N/A	E	N/A	E	E
Captain John		E	E	N/A	N/A	E	N/A	E	E
Big Creek		P	P	N/A	N/A	E	P	E	E
Gibb Gulch		E	E	N/A	N/A	E	N/A	E	E
Hopkins	X	P	N/A	N/A	N/A	N/A	N/A	E	E

Unit	Inter State	REC-2	BIOL	WILD	T&E	MGR	SPWN	CUL	W&S
Mill Creek	X	E	N/A	E	E	E	E	H	N/A
Tish Tang	X	E	N/A	E	E	E	E	H	N/A
Pine Creek	X	E	N/A	E	E	E	E	H	N/A
Campbell Creek	X	E	N/A	E	E	E	E	H	N/A
Supply Creek	X	E	N/A	E	E	E	E	H	N/A
Trinity River	X	E	N/A	E	E	E	E	E	E
Klamath River	X	E	N/A	E	E	E	E	H	E
Soctish Creek		E	N/A	E	E	E	E	H	N/A
Hostler Creek		E	N/A	E	E	E	E	H	N/A
Hospital Creek		E	N/A	E	H	H	H	H	N/A
Captain John		E	N/A	E	N/A	N/A	N/A	H	N/A
Big Creek		E	N/A	E	N/A	N/A	N/A	H	N/A
Gibb Gulch		E	N/A	E	N/A	H	H	H	N/A
Hopkins	X	E	N/A	E	H	E	E	H	N/A

The classification key for the beneficial uses is as follows:
P = Potential Use
E = Existing Use

H = Historical Use
N/A = Not Applicable
X = Waterbodies that extend beyond Reservation boundaries.

2.2 Beneficial Use Related Activities

Current activities on the Reservation including fisheries, mining, industrial, forestry, recreational and cultural activities play a key role in protecting beneficial uses of Reservation waters. These activities and their demand on Reservation waters must be balanced along with the need to supply domestic water and irrigation water throughout the Reservation.

Fisheries

The Trinity River fishery has been a cultural and subsistence mainstay of the Hupa people for thousands of years. The Tribe has and is harvesting from the returning salmonid migration a portion of those fish headed for the upper reaches of the watershed. The vast majority of fish migrating through the Reservation do not spawn within the Reservation, but spawn further up in the basin

However, the Pacific salmon populations, which once flourished in the Klamath-Trinity River systems, have experienced a disastrous decline in recent decades. Poor land use practices degrading water quality, thus altering streamflows and degrading riparian resources have resulted in decreased fisheries migration and reproduction. This has certainly been the case of the Trinity River system.

While on-Reservation impacts due to silviculture, road building and water diversion occur, the magnitude of cumulative off-site impacts of these same activities is far greater. It is therefore appropriate to consider current and past land use and the associated cumulative effects on all watersheds of the Klamath and Trinity Rivers which flow through the Hoopa Valley Indian Reservation and the subsequent threat to federally protected and reserved fishing rights of the Tribe.

Impacts have certainly occurred to Reservation waters yet they are moderate when compared to the magnitude of flow diversion such as occurs on the Trinity River, at Lewiston Dam, or the Klamath River above Irongate Dam. The devastation that has occurred on private, federal and state lands in the Klamath-Trinity River watershed as a whole due to water diversions greatly exceeds impacts incurred as a result of activities within the Hoopa Valley Indian Reservation.

Aquatic Biological Resources

The aquatic biological resources of the Hoopa Valley Indian Reservation are located in the lower portion of the Klamath and Trinity watersheds. The Klamath River system, including its major tributary, the Trinity River is one of the largest river systems in northern California. The headwaters of the Klamath originate in western Oregon and flows southwesterly through the northern extreme of California to the Pacific Coast. The Trinity River flows westerly from the Trinity Alps of Northern California until it joins the Klamath at Weitchpec, about 50 miles from the mouth of the Klamath.

Environmental factors most critical to anadromous fish relate to the basic hydrological and geological characteristics of the river systems. Snowmelt in the higher elevations sustains high spring and early summer flows. The flows open many of the small tributaries to spawning that normally are dry or intermittent during the summer and fall months. The high flows and newly established habitat provide protection for eggs and newly hatched young from predators.

All salmon spawn soon after winter rains begin to swell the rivers and tributaries. Because of their large size and aggressiveness, salmon have out-competed other species for first use of the gravel spawning riffles. The salmon spawn quickly so their eggs develop and hatch before winter and spring floods. They spawn in loose gravel in streambeds that have been washed down through the watershed by continuous erosion of the mountains. The gravel beds provide protection from predators for eggs and newly hatched young, and provide a continuous supply of fresh oxygenated water necessary for development.

Logging, mining, road building, and water diversions currently threaten the Klamath-Trinity River watershed and their rehabilitation. Redwood groves in the Lower Klamath watershed, not within National and State Park boundaries, are threatened with clear-cut logging. Extensive logging still takes place on private, public, and Indian reservation lands. Although logging practices have greatly improved, changes in tributary watersheds cannot be expected without protection, restoration, and rehabilitation. Road building, especially that associated with logging and forestry practices is still the single greatest threat to increased erosion if appropriate restoration and mitigation measures are not taken.

In recent years, State and Federal resource agencies, under Congressional authorization, have begun a concerted effort to restore and rehabilitate the Klamath-Trinity watershed. The goal of restoring the Trinity River is to improve habitat for migratory fish. Watershed rehabilitation programs have begun under auspices of the Trinity River Basin Fish and Wildlife Management Program. U.S. Forest Service, Hoopa Valley Tribe, California Department of Fish and Game, Trinity County, Yurok Tribe, Bureau of Land Management and private businesses are conducting stream rehabilitation programs.

The Lower Klamath and Trinity Rivers within the Reservation are important migration routes and spawning, rearing, and feeding areas for many anadromous fish. The anadromous fish include:

Green sturgeon	*Acipenser medirostris*
White sturgeon	*Acipenser transmontanus*
Chinook salmon	*Oncorhynchus tshawytscha*
Coho salmon	*Oncorhynchus kisutch*
Steelhead/rainbow trout	*Oncorhynchus mykissi*
Cutthroat trout	*Oncorhynchus clarki*
Brown trout	*Salmo trutta*
American shad	*Alosa sapidissma*
Pacific lamprey eel	*Petromyzon*

Irrigation Water Supply

Irrigation waters are currently supplied through small diversions of several Reservation streams that connect to the Trinity River as well as some limited application through wells. Additional water is available through the HVPUD for the valley, however, limited water supplies during drought years lead to a shortage during late summer and autumn. There is potentially a net area of 2578 acres of irrigable land in the Hoopa Valley. Using a unit rate of application of 5.0 acre-feet of water per acre, a requirement of 12,900 acre feet annually would be created (U.C. Davis, Hoopa Valley Soil Survey, 1974).

However, any type of diversion of the available creeks would be susceptible to yearly sedimentation and scouring, resulting in high maintenance costs or a short project life. The Trinity River's potential for irrigation waters is limited only by the cost of pumping the waters from the river up to the fields as well as the amount of water released from the dam. In addition, while groundwater could supplement water supplies for irrigation, the supply is inadequate to supply all the needs of the valley for irrigation purposes.

Domestic Water Supply

Two separate community water systems serve the Hoopa Valley, east and west of the Trinity River. According to the Hoopa Valley Public Utilities District, as of 1988, there were a total of 539 metered service connections, with about 280 connections on the east, and 259 on the west. Approximately 2,100 people are served by the water systems. The water systems have various surface and groundwater sources, with varying manners of treatment.

Overall, about 50 percent of the annual domestic water supply is gravity fed, and the remainder pumped. Storage tanks are located along the valley benches and are connected to the systems throughout the valley. The distribution system generally includes main water trunk lines extending the length of the valley on both sides of the river, with smaller lateral pipes and some main loops. Pressure booster pump stations and water storage tanks higher on the valley benches locally serve the upper portions of the valley. A separate small water system in the Telescope area on the west side serves 15 homes from a perennial spring.

The east side generally has adequate water supply in the winter and spring months, but falls short in the late summer and fall. The major sources, Captain John Gulch, tends to have reduced flow rates or occasionally dries up in the summer and fall months due to its small watershed (less than two square miles). To compensate, untreated water is pumped into the system from the Mill Creek irrigation flume.

The west side generally has year round surface water, but high winter and springtime turbidity levels in Campbell Creek preclude operation of the water treatment plant during this period. Well water normally meets winter and spring demands, but there is insufficient capacity to satisfy summer demand with wells only.

Sources and Treatment
The east side water system has three sources: Captain John Gulch; Shopping Center well; and Mill Creek Diversion.

Captain John Gulch is a small stream located at Matilton Field. Flow rate is highly variable, and during late summer and fall months flow rate may fall to a point where the intake and water treatment plant must be shut down. Raw water is gravity fed to filters via a combination of self-backwashing vertical sand filters, hyperchloride and fluoridation. No coagulation, presedimentation or clarification processes are used prior to filtration. The design flow rate capacity of the filters is about 120 gallons per minute (gpm); actual operation ranges from about 40 gpm in the summer-fall months (when operating) to 80 gpm. This source supplies roughly one-third of the east side yearly demand volume. Chlorine contact time is obtained in a 20,000-gallon wood stave tank at the water treatment plant (WTP) site. Treated water is gravity fed from the tank into the distribution system.

The Shopping Center well is located in downtown Hoopa, on Hostler Field near the Tribal-owned shopping center. The well is fitted with gas chlorination and fluoridation equipment, and has a pumping capacity of about 80 gpm. It is used only during peak demand periods in the summer. Considerable corrosion of the well casing and piping has occurred due to the chlorine gas cylinders being located in the same room.

The Mill Creek diversion is a pumping station that draws raw surface water from an irrigation pipeline, which is gravity fed from an intake on the bank of Mill Creek. The irrigation system is operated only in the summer; each spring the intake is excavated and cleaned and the pipeline flushed by the Hoopa Valley Public Utilities District. The pumping station is used only in the summer during irrigation operation, for domestic high demand makeup water. Pumping capacity is about 130-150 gpm. The water is not treated. Hyperchloride equipment is installed at the pumping station.

There are three water systems on the west side. The principal system, known as the "west side system" serves the vast majority of customers, and extends the length of the valley.

The principal source for the west side system is Campbell Creek for most of the year. Campbell Creek provides treated water first to Campbell Field through the valley-long main water trunkline. Water is then supplied to the rest of the valley via the trunk line, which passes over Matilton Cut-Off Pass. This pass is much higher than the system water storage tanks. When the Campbell Creek water treatment plant is shut down, the system wells must provide a majority of the water supply for the west side. This result in essentially three separate water systems within the primary west side system:

1. Campbell Field system with Moon Lane well as its sole source.

2. Matilton Cut-Off homes (about four) are served by the Telescope spring tank overflow. During the winter-spring period, the spring flow rate can increase to 60 gpm, more than the average demand of the Telescope area. The overflow is diverted through the Campbell Water Treatment Plant (WTP) and tank,

being chlorinated (and fluoridated) only. The tank feeds the valley-long water main, and the line is kept charged by closing an in-line valve at the bottom of Matilton Cut-Off at Agency Field. The main line is flushed periodically.

3. The rest of the system, which includes Agency, Chenone and Soctish Fields, is served by the Supply Creek well only. Within the primary west side system, Campbell Creek is the principle source, supplying roughly two-thirds of West Hoopa's yearly demand volume. Campbell Creek is a small stream in the southwest portion of the Reservation. It usually flows year-round. However, due to irrigation system demands and minimum allowable flow standards, water flow availability in the summer for domestic use can be inadequate. The intake is a small concrete diversion structure located approximately 1.3 miles up from the Trinity River. The watershed drainage area above the intake is small, approximately six square miles, and lies almost entirely on U.S. Forest Service land. From the intake, water flows by gravity to the water treatment plant via a water transmission line. Treatment includes an inline prescreen, two five-foot diameter pressure sand filters, gas chlorination and fluoridation. No coagulation, presedimentation or clarification processes are in place prior to filtration. Design flow rate capacity of the filters is about 120 gpm. Turbidities are normally very low during the summer months. Chlorine contact time is obtained in a 100,000-gallon wood stave water storage tank at the water treatment plant (WTP) site. From the tank, the treated water is gravity fed into the west side system via the valley-long trunk line.

The second source is Moon Lane well, located in the Campbell Field tank and distribution system. It is operated only in the winter and spring when the Campbell WTP is shut down and sufficient groundwater volume is available. Well capacity is about 100 gpm. This water is not treated.

The third source for the primary west side system is the Supply Creek well located near the south bank of Supply Creek in Agency Field. This well is used primarily for backup when Campbell WTP is shut down, and for high summer demand makeup water. The water is gas chlorinated and fluoridated. Maximum well capacity is about 130 gpm.

A second water system on the west side of the valley is located in the upper Telescope area, serving about 15 homes. The Telescope area system is gravity fed from a spring development and has two small wood stave storage tanks (25,000 and 12,000 gallon capacities). No water treatment facilities are used, although occasionally the tanks are batch-chlorinated manually by the Hoopa Valley PUD.

A third water system that formerly served only the BIA compound is now tapped into the primary west side system. The well should not be in service until electrical installation and chlorination-fluoridation treatment systems are completed. The well will be operated for a period before integrated fully into the system. Water is currently untreated; existing pump capacity is approximately 600 gpm.

In general, maximum water demand during summer months occurs when availability of treated water is low. Overall water storage volume, distribution main lateral sizes, and fire hydrant locations are inadequate to meet minimum fire protection standards.

The alternative of using the Trinity River for a drinking water source was approved by a ballot referendum by the voters of the Hoopa Valley Tribe on April 24, 2001. The official result of the referendum was 385 for and 288 against considering the use of the Trinity River as a domestic water source. Funding for this endeavor has been obtained from the U.S. EPA and the Indian Health Service.

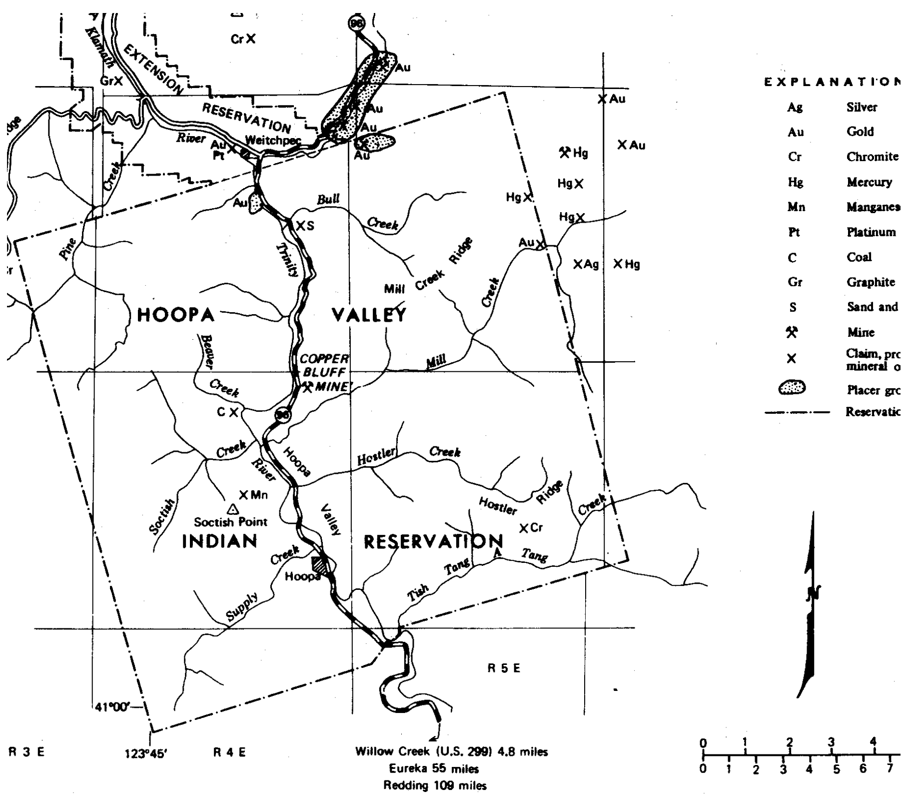
This alternative involves the construction of either an infiltration gallery or a Ranney-Type collector in the Trinity River and a treatment plant near the center of the urban zone of the Hoopa Valley community. The infiltration gallery would be constructed in a gravel bar or out in the main river channel to collect subsurface river water. The infiltration gallery would be constructed beneath the gravel and sediment of the river to provide less turbid raw water than that of a surface intake and to protect against damage to the intake during storm events. Both processes would require that a backwash system be designed to correct the likelihood of silt build-up in the intake system. Either process will allow for use of existing infrastructure such as electricity to power the pump station and treatment plant, easy access to existing water distribution mains, and easy access for operation and maintenance. For both options, a metal building approximately 40' X 30' in size will house the water treatment equipment. Either hypo- chloride or an on-site generator of hypo-chloride will be used to treat the raw water. Two storage tanks, one containing untreated water for back-washing the intake system, and one containing treated water that is released into the water line distribution system will be needed. Additionally, a diesel back-up generator with one-day fuel supply will be required in the event of power failure. No additional fuel reservoir provided by the electrical generator will be required. All backwash operations will involve the use of untreated water. As backwash operation takes place, this water is stored in a storage tank until sediments are settled, and the raw water is then re-circulated back into the intake pipe. When sediment levels reach a certain levels within the backwash tank, the material is pumped from the tank and deposited in an approved uplands site. Approximately 0.9 cfs will be withdrawn from the Trinity River for domestic consumption. Construction of this facility is scheduled in late 2001.

Mining

Gold, mercury, chromium, copper and other minerals have been mined within the Hoopa Valley Reservation or surrounding Six Rivers National Forest at one time or another since 1850 (see Figure 2.1 for number and types of mines). Now abandoned, these mines have resulted in toxic heavy metals contaminated water runoff. This mine runoff can adversely affect beneficial uses. The biological impacts are unknown and are subject for further study.

In addition, sand and gravel extraction occurs on the Reservation. Table 2.3 lists the site locations, maximum yield, and gravel renewability. The major potential problems relating to these operations are increased turbidity resulting from wash-off or discharge of tailings. This is compounded by the effect of sand and gravel extraction from the active channel, which can have significant biological impacts to spawning redds and juvenile nursery habitats.

Figure 2.1 - Mining Locations on the Hoopa Valley Indian Reservation



Source: USGS

Table 2.3 Gravel Site Location, Maximum Yield, and Renewability (Lehre, 1993).

Location	Maximum Yield (yds^3)	Renewability
Cal Pac Site, High Terraces		
North Terrace	200,000	Nonrenewable
South Terrace	420,000	Nonrenewable
Low Terrace/ Floodplain	75,000	Limited redeposit
Low river bar	1,000	Renewable
Cal Pac Island	104,000	Partially renewed
Rowland-Security Bar	58,000	Renewable
North Agency Bar	5,000	Renewable
Sentry Bar	60,000	Renewable
Rodeo 1 Bar Complex		
Rodeo 1S	67,000	Renewable
Rodeo 1N	13,000	
Rodeo 2 Bar Complex		
Rodeo 2S	74,000	Renewable
Rodeo 2N	60,000	Renewable
Trinity		

Several river bars have been used as a source of aggregate for use in concrete for road and building construction. Removal of gravel from these areas at a faster rate than it is replenished can result in physical damage to river channel morphology. This damage can range from causing increasing channel incision or degradation, (removal or under supply of streambed material through erosion), bank erosion and reduction and elimination or siltation of gravel beds essential for spawning fish and other aquatic organisms. Removal of excess material and smoothing of channel may result in channel widening, which will allow for shallower flows and reduced velocities. This decreases the ability of the stream to transport sediments and results in a finer size distribution of bed material. Such an increase in finer materials could make the deposits unsuitable for fish spawning. It also increases potential for heat gain with detrimental effects on fishery habits especially for salmonids.

Aggregate Processing on the Reservation

Rock quarries also have the potential for delivering sediments into streams. Large boulders are excavated from upland slopes for use in riprap and are crushed for roadbed reinforcement. A total of 16 potential rock quarry sites have been identified throughout the Reservation. An environmental assessment will be completed for each site before any extraction activities are implemented.

Industrial Use

Industrial use of tribal surface waters is hampered by low to no flow conditions during drought years on some of the streams. It is possible that the surface supply could be supplemented by groundwater under such conditions. Based on known analysis of the surface and groundwater, the water would have to under go at least some treatment prior to most industrial uses. The use of agricultural chemicals in the area would also make the use of surface waters or water from shallow aquifers for any food processes questionable.

Forestry

The Hoopa Valley Reservation uses Best Management Practices (BMPs) within the Tribal forestlands. Logging roads and forestry practices are designed to minimize erosion, sediment loads and impacts on stream ecology.

Intensive forest management began on the HVIR in the mid to late 1940's. Until that time poor markets for Douglas fir coupled with the Reservations remote location inhibited development. In the decade 1946-1956 about 1,456 acres were harvested with a combination of clear cutting and selection techniques. Total harvest between 1957 and 1966 was 12,221 acres, between 1967-1976 13,593 acres, between 1977-1986 7,057 acres and between 1987-1996 was 4,159 acres. By the late 1950's there were three sawmills on the Reservation and another four mills within 20 miles. Several natural disasters, including the floods of 1955 and 1964 resulted in substantial damage to the Hoopa forest and to the Tribe's road and stream systems. Cutting accelerated after the 1964 flood reaching a peak harvest of nearly 70 MMBF of timber on 2,938 acres in 1968, about 3.8% of the forested area. By 1999 about 39,500 acres of the 76,000 acres of forestland had been harvested, nearly all by clearcut logging practices.

The BIA initiated Forest management in 1945 with the first timber sale. During the period between 1950 and 1980 BIA forest management practices were similar to private timber companies in the same time period. In the late 1970's however, the Tribal Council passed several resolutions prohibiting the spraying of herbicides as a result of the spraying of nearly 15,000 acres of previously cut lands in 1976 and 1977. By 1984 the Tribal Council had instituted a Tribal Forestry Department that provided input to the BIA on contemporary forest management practices, such as reducing the size of cut blocks, lowering the tractor logging limit to approximately 40% slopes, increasing soil protection practices, etc.

In 1990 the Tribe took over all forest management from the BIA. In 1994 the Tribe adopted, and the BIA approved a forest management plan that was widely regarded as state of the art within Indian country. The FMP has standards and guidelines for management of logging, silviculture, regeneration, wildlife habitat, prescribed fire and has obtained Smart Wood Certification. In addition, the FMP allocates all land to one of 27 land use zones. These zones have detailed standards and guidelines as to the management of the lands. Example of land use zones includes zones for the viewshed, riparian areas (about 20,000 acres), roads, geologically unstable areas, inaccessible areas, wilderness areas, etc. Many of the standards and guidelines contain measures to reduce water quality impacts including those dealing with tractor logging on steep slopes, water bar standards, over-story leave standards, etc. The road standards (H specifications) in particular contain numerous standards and guidelines including limitation on operations in wet weather, road gradient, culvert sizing, surfacing, road widths, drainage features, etc. The Tribe uses BMPs that are designed to minimize erosion, sediment loads and impacts on stream ecology.

Even though the FMP has detailed road standards and BMPs, the Tribe's road system is a major water quality concern. Most of the 635 miles of road on the Reservation were built for timber management purposes during periods where concern about water quality, fish habitat and watershed processes was not high. The majority of the road system was built in the early 1950's to the late 1960', with most of the system built after the 1964 flood. By 1999 the Reservations road system was composed of roads in the following condition:

Table 2.4 Road condition and road miles for the HVIR.

HOOPA VALLEY TRIBE ROAD SYSTEM, 1999		
Type of road	Miles	Percent of total
Decommissioned log truck roads	35.2	5.55
Undriveable log truck roads	158.8	29.49
Abandoned log truck roads	8.98	1.41
Subtotal Not Driveable	212.4	33.43
Paved, valley	15.63	2.46
Paved, highway 96	14.36	2.26
Arterial, gravel main log truck haul roads	127.77	20.11
Collector, dirt/gravel connecting log truck routes	156.44	24.62
Local, dirt log truck roads 2 or 4WD	108.95	17.15
Subtotal, driveable	423.15	66.60
Subtotal all roads	635.54	100.00

About half of the undriveable and abandoned roads are closed due to brush re-growth with the remaining balance of road closures due to blown out culverts, landslides, gullies, etc. Research near the Reservation confirms that forest roads in Northwestern California deliver about 50 tons of sediment per year per mile of road to the Reservation's waters. Although watershed assessments have been completed in several of the main tributaries including Pine, Mill, Tish Tang and Supply Creeks, much of the balance of the Reservation has not been subject to a systematic analysis of which roads need to be decommissioned and those needing improvement. Of major concern is that about ½ of the Tribal road systems were built after the 1964 flood and have not been through a 100-year storm event.

The Tribal Council has considerable interest in timber harvesting activities on lands near to the Reservation. It has taken issue in several resolutions responding to USDA-Forest Service timber sales in the Trinity Summit area. This is an area that the Hoopa treat as sacred and claim as part of their aboriginal territory.

Trinity Summit Area

Recreation

Non-contact recreation has been increasing in popularity within the Hoopa Valley Reservation. Non-contact recreation includes boating, picnicking, sunbathing, hiking, camping, hunting and aesthetic enjoyment. Boating is popular on the Trinity River and non-existent or very limited on the smaller creeks. Boating activities range from powerboat racing to boat fishing to white water rafting. Hiking and camping activities are popular along several of the creeks still in a relatively pristine condition, such as Tish-Tang Creek and Captain John Gulch. In addition, camping is also common along some sections of the Trinity River and at the Tish-Tang Campground.

Contact recreation has also shown an increase in popularity. Contact recreation includes swimming, wading, water-skiing and sport fishing. Sport fishing is common in the area, but, the drought since 1985 and decreasing fish populations has placed limitations on sport fishing. Because of these dry conditions and the resulting reduced flows to the Trinity River, the Secretary of the Interior amended the Trinity River Restoration Act (1981) to provide increased flows to the Trinity River in 1991 and successive years, easing the problem slightly.

Swimming and wading are also popular along the Trinity River, and in some of the creeks, by visitors and tourists, but not among Tribal members. Tribal members, especially the children exhibit a distinct preference for using valley floor sections and mouths of major tributary streams for wading and swimming. Mill, Supply, Tish Tang, Hospital and Campbell Creeks are the high usage areas. While the high quality, water clarity and aesthetic beauty of these streams explain in part this preference; traditional cultural values are also a major factor. Tribal preference for certain creeks for swimming or wading can be traced to traditional and cultural beliefs. The Trinity River is sometimes viewed as inappropriate for swimming, or drinking, because it has traditionally been held as unclean by those same cultural beliefs.

Cultural

The waters of the Hoopa Valley have been culturally significant to the Indian population for thousands of years. Cultural significance includes ceremonial and traditional uses, and remains as a viable beneficial use to the Hoopa Valley Reservation today. The Boat Dance is an ancient religious ceremony that was timed to coincide with the natural flow regime of the Trinity River. The current flow regime produces flows different from the natural regime and thus makes the enactment of this ceremony impossible without a special request for altered flows from the USBOR. Every other year the Hoopa Tribe contacts USBOR to request an increase flows to at least 1,600 cfs for the enactment of this ceremony. On a bi-annual schedule, the Hoopa Tribe conducts ceremonies integral to the Hoopa's religion and culture. These ceremonies require sufficient flow in the mainstem of the Trinity River to facilitate the “Boat Dance” ceremony. This requirement is protected under the American Indian Religious Freedom Act (P.L. 95 – 341).

Water Quality Criteria

3.1. **INTRODUCTION**

In 1988, the U.S. Congress ratified and confirmed Section 8 of Public Law 100-580, which established the Hoopa Valley Tribal Council as the governing body of the Tribe. Article IX of this section authorizes the Hoopa Valley Tribal Council to protect Tribal property, wildlife, and natural resources; Section 1 addresses the protocols to safeguard and promote the safety and general welfare of the Tribe and Reservation community. Pursuant to this directive, Title 37 (Pollutant Discharge Prohibition Ordinance of the Hoopa Valley Indian Reservation) establishes pollution control criteria to apply to all individuals within the Hoopa Valley Indian Reservation boundaries. As part of the Pollution Control Ordinance, the Hoopa Valley Tribal Council establishes the completion of water quality standards covering all surface waters on the Hoopa Indian Reservation. These standards shall provide a mechanism for managing and safeguarding the quality and use of all water bodies within the Hoopa Reservation boundaries by establishing water quality criteria, and providing a legal basis for regulatory controls.

The standards provided herein are established to restore, maintain and protect the chemical, physical, biological, and cultural integrity of the surface waters of the Hoopa Valley Reservation; to promote the health, social welfare, and economic well-being of the Hoopa Valley Tribe, its people, and all the residents of the Hoopa Valley Reservation; to achieve a level of water quality that provides for all potential uses; and to provide for full protection of threatened and endangered species.

These standards will provide designation of the existing and potential uses for the surface waters of the Hoopa Valley Tribe and water quality standards (narrative and numeric) to sustain the designated uses and protect existing water quality.

The water use and quality provisions set forth herein are established in conformance with present and potential water uses of the surface waters of the Hoopa Valley Indian Reservation and in consideration of the natural water quality potential and limitations of the same.

The Hoopa Valley Tribe recognizes that the Water Quality Control Plan does not contain all water quality pollutants; therefore, the Tribe shall use EPA Region IX Preliminary Remediation Goals (PRGs) guidelines (Appendix E) to evaluate risk contamination to soil and water bodies of the Reservation.

In addition, the Hoopa Valley Tribe has reviewed the California Toxics Rule (CTR) as promulgated by the U.S. Environmental Protection Agency (40 CFR Part §131.38) and has determined that for the purposes of consistency, the water quality criteria for priority pollutants in the CTR apply to waters of the Hoopa Valley Indian Reservation as outlined in Appendix F.

3.2 **DEFINITIONS**

Definitions pertaining to this chapter can be found in Appendix B.

3.3 **GENERAL CONDITIONS**

The water quality standards applicable to tribal waters are a combination of standards outlined in: the Clean Water Act as amended; North Coast Region Water Quality Control Plan; Oregon Administrative Rules Chapter 340, U. S. EPA Integrated Risk Information System (IRIS) and California Code of Regulations Title 22, U.S. EPA preliminary Remediation Goals and criteria objectives established in the California Toxics Rule.

The following conditions will apply to all water quality criteria and classifications set forth herein.

3.3.1 Any controllable factors are not allowed to degrade water quality of the Hoopa Valley Indian Reservation. In no cases may controllable water quality factors effect present and anticipated beneficial uses of water nor result in water quality less than that prescribed by the criteria contained in this document. When uncontrollable factors result in the degradation of water quality exceeding the limits set forth in this document, then controllable factors shall not contribute additional burden on the water quality. Controllable factors are those relating to the presence of human activity that may impact the quality of waters.

3.3.2. In circumstances where the natural conditions of surface waters are of lower quality than the criteria assigned, the Riparian Review Committee may determine that the natural conditions shall constitute the water quality criteria. If natural condition varies with time, the natural condition will be determined as the highest quality prevailing natural condition measured during an annual, seasonal, or shorter time period prior to influence of human-caused pollution. The Riparian Review Committee may, at its discretion, determine a natural condition for one or more seasonal or shorter time period to reflect variable ambient conditions. The Riparian Review Committee reviews and recommends changes to the WQCP.

3.3.3 The Federal Clean Water Act requires the governing entity to submit for approval to the Administrator of the U. S. Environmental Protection Agency (EPA) all new or revised water quality standards that are established for surface waters. These regulations also require the review of water quality standards at least every three years. These "Triennial Reviews" provide the opportunity to both evaluate the effectiveness of the current water quality criteria and to amend or revise water quality criteria. The Hoopa Valley Tribal Council may revise criteria on a Reservation-wide or waterbody-specific basis as needed to protect the beneficial uses and to increase the technical accuracy of the criteria being applied. The Riparian Review Committee shall formally adopt any revised criteria following public review and comment.

3.3.4. In no case shall discharge to surface waters result in a violation of standards for downstream water bodies. The water quality standards of this plan apply throughout a water body column. In situations where water bodies with differing standards mix at a confluence, no acute toxicity shall occur within mixing zones. The Riparian Review Committee shall determine where, at the confluence of water bodies, the differing standards apply. The Hoopa Valley Tribal Council may review this determination.

3.3.5. As part of the Reservation's continuing planning process, data will be collected and numerical water quality objectives will be developed for those constituents where sufficient information is presently not available for the establishment of such objectives.

3.3.6 As part of the Hoopa Valley Indian Tribes' continuing planning process, specific use designations of the water bodies within and flowing through the Hoopa Valley Indian Reservation (HVIR) are listed in section 2.1 of chapter 2. Specific use criteria for the designated uses are listed in section 3.5.1 of this chapter. The specific use designation and the specific use criteria contained within the Water Quality Control Plan has been implemented by the Hoopa Valley Tribe sense 1997. The monitoring of the waterways listed below will be implemented during the next 10 years. The first waterway to be monitored will be the Trinity River. Any and all named tributaries that originate within the exterior boundaries of the HVIR or flow through the HVIR into the primary waterway, which is the Trinity River, are ranked for monitoring purposes as follows:

1. Tish Tang Creek
2. Supply Creek
3. Pine Creek
4. Mill Creek
5. Soctish Creek
6. Big Creek
7. Captain John Creek
8. Gibb Gulch
9. Campbell Creek
10. Hospital Creek
11. Klamath River
12. Hopkins Creek

Specific use criteria will be applied to the above listed tributaries as outlined in section 3.5.1 of this chapter. Appropriate water quality standards will be applied to the tributaries. As data concerning each tributary is analyzed by Hoopa Valley Tribal Environmental Protection Agency, the water quality standards may be revised with the recommendation of the Riparian Review Committee and Tribal Council consent. As the water quality data base development and monitoring allows for scientific analysis of the listed and prioritized waterways, the Specific Use Criteria may be modified in accordance with the Clean Water Act, section 303.

3.4. **NUMERIC CRITERIA**

3.4.1 TOXIC SUBSTANCES

(A) Toxic substances shall not be introduced into waters within the boundaries of the Hoopa Valley Indian Reservation. Numeric criteria concentrations, which have the potential to either singularly or cumulatively adversely, affect beneficial water uses, cause acute or chronic toxicity to the most sensitive biota, or adversely affect public health. Additional criteria for toxins that cause adverse effects from bioaccumulation are listed in Appendix F.

(B) The Hoopa Valley Tribal Environmental Protection Agency (TEPA) shall employ or require chemical testing, acute and chronic toxicity testing, and biological assessments, as appropriate, to evaluate compliance with this section. Where necessary TEPA shall establish controls to ensure that aquatic communities and the existing and characteristic beneficial uses of waters are being fully protected.

(C) Risk-based criteria for carcinogenic substances shall be applied such that the upper-bound excess cancer risk is less than or equal to one in 10^6, which means the probability of one excess cancer per million people exposed.

(D) Numeric and narrative criteria shall be applied to all surface waters of the Hoopa Valley Indian Reservation for the protection of aquatic life and human health. Selecting values for regulatory purposes will depend on the most sensitive beneficial use to be protected, and what level of protection is necessary for aquatic life and human health.

(E) Dioxins are known to be some of the most toxic manmade compounds known. Recent research has indicated that these compounds may be several orders of magnitude more toxic than was originally indicated (EPA 1985). Criteria established for such compounds are likely to be below the levels one could reasonably expect to be able to detect. No dioxin compounds will be discharged to any water within the Reservation boundaries.

(F) The pH of surface waters within the Reservation shall be maintained between 5 – 9 for (MUN) use designations and will be maintained between 6.5 – 9 for all other beneficial uses.

(G) Ammonia: Because ammonia toxicity to fish is influenced by pH, waters designated for the purpose of protection of threatened and endangered fish species in cold freshwater habitat shall meet the following conditions for ammonia based on the pH in the waterbody:

i) The one-hour average concentration of total ammonia nitrogen (in mg N/L) does not exceed, more than once every three years on the average, the CMC (acute criterion) calculated using the following equation. Where salmonid fish are present:

$$CMC = \frac{0.275}{1 + 10^{7.204 - pH}} + \frac{39.0}{1 + 10^{pH - 7.204}}$$

Based on this equation, ammonia toxicity values for a given pH value are provided in the following table.

Ammonia Toxicity Table for salmonids in fresh water at various expected pH levels.

pH	NH3 mg N/l
4	38.98
5	38.76
6	36.72
7	24.10
8	5.62
9	0.88
10	0.34
11	0.28

ii) The thirty-day average concentration of total ammonia nitrogen (in mg N/L) does not exceed, more than once every three years on the average, the CCC (Chronic criterion) calculated using the following equation. When fish early life stages are present:

$$CCC = \left\{ \frac{0.0577}{1 + 10^{7.688 - pH}} + \frac{2.487}{1 + 10^{pH - 7.688}} \right\} \times MIN(2.85,\ 1.45 \times 10^{0.028 \times (25 - T)}$$

(H) Radioactivity: Radionuclides shall not be present in concentrations which are deleterious to human, plant, animal or aquatic life nor which result in the accumulation of radionuclides in the food chain to an extent which presents a hazard to human, plant, animal or indigenous aquatic life.

(I) Waters designated for use as domestic or municipal supply shall not contain concentrations of radionuclides in excess of the following:

Maximum Contaminant Level (drinking water standards based on drinking 2 liters of water/day).

Constituent	Level, pCi/l
Combined Radium-226 and Radium-228	5
(including Radium-226 but excluding Radon and Uranium)	
Gross Alpha particle activity	15
Tritium	20,000
Strontium-90	8
Gross Beta particle activity	50

3.5 SPECIFIC USES

3.5.1 Specific Use Criteria: Except for temperature and turbidity the following water quality criteria were designated based on data and information provided in U.S. EPA Quality Criteria for Water 1986 (Gold Book).

(A) Waters listed with the designated uses of Municipal and Domestic Supply (**MUN**), Cultural (**CUL**), Preservation of Threatened and Endangered Species (**T&E**), Preservation of Areas of Special Biological significance (**BIOL**), Cold Freshwater Habitat (**COLD**), Fish Spawning (**SPWN**), Wildlife habitat (**WILD**) and/or Contact Recreation (**REC-1**) shall meet the following criteria over the entire length of the stream including connecting tributaries within the jurisdiction of the HVT:

i. Bacteriological Criteria – Bacterial criteria for freshwater use a single value maximum, which shall not exceed the following:

	Geometric mean
Fecal enterococci	33 CFU/100 ml
Escherichia coli	126 CFUs/100 ml

- CFUs – Coliform Forming Units

ii. Dissolved Oxygen - The minimum level of dissolved oxygen shall not drop below 11.0 mg/l in the water column. If water quality monitoring indicates that dissolved oxygen levels are below 11.0 mg/l then an investigation of impact will be conducted.

iii. Intergravel Dissolved Oxygen - The intergravel dissolved oxygen shall not be decreased below 8.0 mg/l by any human related activity.

iv. Temperature - Tribal temperature objectives consist of two parts: 1) objectives that directly relate to the flows in the Trinity River, and 2) numeric temperature standards that deal with point and non-point source temperature management in the Trinity River. These objectives and standards agree with and support the Trinity River Flow Evaluation (TRFE) particularly with regard to the TRFE's flow regime and resultant temperatures. The aim of the objectives/standards is to provide protection for the survival, growth, and reproduction of anadromous fish and other aquatic life, such that ceremonial and cultural values of the Tribe and other beneficial uses are maintained.

Trinity River Temperature Objectives

The Hoopa Valley Tribe's Trinity River temperature criteria (Table 3.1) are based on temperature-flow relationships that maintain TRFE flow regimes and protect adult salmonid holding and spawning. The approach of adopting the TRFE flow regime as an integral component of the temperature criteria recognizes the importance of temperature variation through the year to the life history stages and development of anadromous fish species. The Tribe's Trinity River temperature objectives were established by Tribal Environmental Protection Agency in cooperation with Tribal Fisheries, U.S. Fish & Wildlife Service, North Coast Regional Water Quality Control Board (NCRWQCB) and U.S. Environmental Protection Agency. In June of 1999, the Hoopa Valley Tribe and U.S. Fish and Wildlife Service published the TRFE. The TRFE represents the most thorough state-of-the-art scientific report on regulated flow releases and related actions designed to restore and maintain the riverine ecology of the upper mainstem Trinity River. Temperatures will be monitored based on water-year type as established in the TRFE by inflow into the Trinity River Reservoir each spring. The U.S. Bureau of Reclamation (USBOR) determines water-year type. The Hoopa Valley Tribe's temperature objectives agree precisely with those outlined in the TRFE preferred alternative and are consistent with temperature standards as specified in the NCRWQCB temperature standards for the Trinity River below Lewiston Dam and downstream to Douglas City and the confluence of the North Fork Trinity. The Tribe's temperature standards do not require additional flows over and above those required by TRFE. Temperatures recorded at Weitchpec will be utilized to determine compliance with the Trinity River standards. Therefore, continued evaluation of temperature information is needed to refine and revise temperature standards for the reservation over time. The Tribe recognizes that the development and implementation of control technologies and best management practices to reduce human caused warming are ongoing and the achievement of the optimal temperature standard will be an evolutionary process. The Hoopa Tribe will initiate Clean Water Act triennial review amendments, which are consistent with the Adaptive Environmental Assessment and Management (AEAM) principles, outlined in the TRFE as appropriate.

Table 3.1 Trinity River Temperature Criteria for the Hoopa Valley Indian Reservation.

Running 7-Day Average	Temperature	Not to Exceed			
Water-Year Type	May 23 to June 4	June 5 to July 9	July 10 to September14	September 15 to October 31	November 1 to May 22
Extremely Wet, Wet and Normal	≤ 59°F or 15.0°C	≤62.6°F or 17.0°C	≤ 72.0°F or 22.1°C	≤ 66.0°F or 19.0°C	≤ 55.4°F or 13.0°C
	May 23 to June 4	June 5 to June 15	June 16 to September 14	September 15 to October 31	November 1 to May 22
Dry and Critically Dry	≤ 62.6°F or 17.0°C	≤ 68°F or 20.0°C	≤ 74.0°F or 23.5 °C *	≤ 66.0°F or 19.0°C	≤ 59.0°F or 15.0°C

* For the seasonal period of June 16th through September 14th temperatures on the mainstem Trinity River at the Weitchpec gauging station were used to determine running seven-day averages.

Tribal Trinity River temperature standards have been established for the portion of the Trinity River that flows through the Hoopa Valley Indian Reservation and are adjusted according to the hydrologic conditions of the year. Temperature standards will be monitored at the Weitchpec temperature monitoring station operated and maintained by the U.S. Bureau of Reclamation.

Temperature standard violation(s) will be determined if > 10 % of seven-day running averages exceed the standard. The 10 % exceedance will be determined on the number of days exceeded for that seasonal period. For example, for the seasonal period of June 16th through September 14th (91 days), 10 % exceedance will equate to nine days. If temperature standards cannot be met due to unusually excessive ambient air temperatures coupled with TRFE level flows, enforcement action will not be pursued against USBR. Excessive air temperature will be determined if the measured 7-day average air temperature during the previous seven-day period of the year exceeds the 90th percentile of the seven-day average daily maximum air temperature calculated in a June 16th through September 14th series over the historic record available within the basin.

Point and Non-Point Temperature Objectives

Hoopa's temperature standards establish numeric criteria designed to protect beneficial uses and to provide a basis from which to initiate actions to control human-caused sources that adversely increase stream temperatures. Human-caused activities that affect surface water temperatures include, but are not limited to, discharge of heated water, widening streams, or reduction of stream shading, flows and depth. Natural surface water temperatures at times exceed the numeric criteria due to naturally high ambient air temperatures, naturally low stream flows, streamside shade, solar radiation, or other natural conditions. These exceedances are not considered water quality standard violations when the natural conditions themselves cause water temperatures to exceed the numeric criteria. In surface waters where both natural and human-caused factors are responsible for exceedances of the numeric criteria, each human-caused source will be responsible for controlling that portion of the increase caused by the human activity. This will be determined through the use of baseline data, when it exists, in conjunction with temperature monitoring upstream and down-stream of the human-caused source. The Tribal Forestry Department and Tribal Environmental Protection Agency will establish, implement, and improve forest management practices in order to reduce, achieve and maintain the surface water temperature criteria. Federal forest management agencies are required by the federal Clean Water Act to meet or exceed the substantive requirements of Tribe's non-point source program. The requirement for a surface water temperature management plan and the content of the plan will be appropriate to the contribution the permitted source makes to the temperature problem, the technologies and practices available to reduce thermal loads, and the potential for trading or mitigating thermal loads. These measures will apply to the portion of the Trinity River that flows through the Reservation to assure attainment of running 7-day average temperatures of 21°C during the July 10 – September 14 period. It is the goal of TEPA to achieve 21°C for this period within five years of adoption of these standards. If monitoring shows that temperatures continue to increase, HVT will employ adaptive management strategies until such time that the trend is toward lower temperatures. This management approach gives the Tribe a framework for improving temperature conditions in the lower Trinity while allowing the implementation of the TMDL process for the South Fork of Trinity to improve watershed conditions.

Reservation Tributary Temperatures

There are seven major tributaries to the Trinity and Klamath Rivers that run through the Hoopa Valley Indian Reservation and provide significant habitat for resident and anadromous species. The headwaters of these streams originate off the Reservation with the exception of Hostler and Soctish Creeks. These tributaries support different uses by anadromous fish than the mainstem Trinity thus requiring a different set of temperature standards. Since the tributaries support the incubation and rearing of fishes, temperatures must be adequate to support the most sensitive life stages of salmonids. Therefore, the following standards (Table 3.2) apply to the entire length of all tributaries existing within the exterior boundaries of the Reservation. Temperature exceedences will be documented as running seven-day average for each time period. A watershed will be considered to have exceeded the temperature standard when 2 or more exceedences occur during the rearing period and/or 3 or more during adult migration and maintenance period. If a watershed documents exceedence of the temperature standard for 3 or more years within the 10-year assessment period it will be considered as a violation of the standard. Stream temperatures shall not exceed 20°C due to human activities for the period of June 16th to October 14th. In addition, when natural conditions exceed 20°C, no temperature increase will be allowed which will rise the receiving water temperature by greater than 0.3°C. In the case when natural surface water temperatures exceed the numeric criteria due to naturally high ambient air temperatures and/or with abnormally low stream flows due to drought conditions, temperatures that surpass the criteria will not be documented as "exceedences under normal conditions".

Table 3.2 Stream Temperature Criteria for the Hoopa Valley Indian Resevation.

Designated Use	Running Seven-day Average Temperature Not to Exceed	Period
SPWN, COLD, MGR, T&E, WILD, GWR, *CUL and/or BIOL	62.6°F or 17°C	October 15 to June 15
MUN,REC-1, REC-2, COLD, AGR, PROC, IND, and POW	68°F or 20°C	June 16 to October 14

* The Hoopa Valley Tribe defines "Ceremonial Water Use (CUL)" as the use of a river, stream, reach, or lake for cultural purposes by members of the Hoopa Valley Tribe; such use involves immersion, provision of adequate instream flows for the Boat Dance ceremony, and suitable water-temperature for ensuring the presence and consumption of anadromous salmonids for ceremonial purposes.

v.pH shall be within the range of 5.0 to 9.0 with a human-caused variation of no more than 0.2 units.

vi. Turbidity: A watershed will be considered to have exceeded the turbidity standard when average turbidity exceeds 50 % or more of 50 NTU's during the winter period from (October 15th – April 15th). Average turbidity will be assessed during rain events that produce turbidities of 10 NTU's or more. Below this value, turbidity readings will not be used to calculate the average. The compilation of these average values over the winter period will represent the critical value for that year. If a watershed documents exceedences for three or more years within the 10-year assessment period it will be considered in violation of the standard. These critical values will be compiled and averaged over a 10-year period before evaluating a watershed's condition and potential listing as an "impaired watershed". If however, land management activities are modified in such a way as to influence a reduction in turbidity within the 10 year assessment period, then the watershed will be placed into recovery status and will be evaluated for an additional 3 years before making a final determination of impairment. During dry conditions from April 16th – October 14th the turbidity standard will be applied at 50 NTU.

(B) Waters designated Fish Migration (**MGR**), Water Contact Recreation (**REC**-1) meet the following criteria:

i. Bacteriological Criteria – Bacterial criteria for freshwater use will be based on 5 samples over a 30-day period shall not exceed the following steady state geometric mean:

Enterococci	33 CFU/100 ml
Escherichia coli	126 CFU/100 ml

ii. Dissolved Oxygen – - The minimum level of dissolved oxygen shall not drop below 8.0 mg/l in the water column. If water quality monitoring indicates that dissolved oxygen levels are below 8.0 mg/l then an investigation of cause will be evaluated.

iii. Intergravel Dissolved Oxygen - The intergravel dissolved oxygen shall not be decreased below 5.0 mg/l by any human related activity.

iv. pH shall be within the range of 6.5 to 9.0 with a human-caused variation of less than 0.2 units.

v. Turbidity - A watershed will be considered to have exceeded the turbidity standard when average turbidity exceeds 50 % or more of 50 NTU's during the winter period from (October 15th – April 15th). Average turbidity will be assessed during rain events that produce turbidities of 10 NTU's or more. Below this value, turbidity readings will not be used to calculate the average. The compilation of these average values over the winter period will represent the critical value for that year. If a watershed documents exceedences for three or more years within the 10-year assessment period it will be considered in violation of the standard. These critical values will be compiled and averaged over a 10-year period before evaluating a watershed's condition and potential listing as an "impaired watershed". If however, land management activities are modified in such a way as to influence a reduction in turbidity within the 10 year assessment period, then the watershed will be placed into recovery status and will be evaluated for an additional 3 years before making a final determination of impairment. During dry conditions from April 16th – October 14th the turbidity standard will be applied at 50 NTU

(C) Waters with beneficial uses including but not limited to Agricultural Supply (**AGR**), Industrial Process Supply (**PROC**) and Non-Contact Recreation (**REC-2**) shall have the following criteria:

i Bacteriological Criteria – Bacterial criteria for freshwater use will be based on 5 samples over a 30- day period shall not exceed the following steady state geometric mean:

Eenterococci	108 CFU/100 ml
Escherichia coli	406 CFU/100 ml

ii. Dissolved Oxygen - The minimum level of dissolved oxygen shall not drop below 7.0 mg/l in the water column. If water quality monitoring indicates that dissolved oxygen levels are below 7.0 mg/l then an investigation of impact will be evaluated.

iii. Intergravel Dissolved Oxygen - The intergravel dissolved oxygen shall not be decreased below 4.0 mg/l by any human related activity.

iv. pH shall be within the range of 6.5 to 9.0 with a human-caused variation of less than 0.2 units.

Turbidity: - A watershed will be considered to have exceeded the turbidity standard when average turbidity exceeds 50 % or more of 50 NTU's during the winter period from (October 15th – April 15th). Average turbidity will be assessed during rain events that produce turbidities of 10 NTU's or more. Below this value, turbidity readings will not be used to calculate the average. The compilation of these average values over the winter period will represent the critical value for that year. If a watershed documents exceedences for three or more years within the 10-year assessment period it will be considered in violation of the standard. These critical values will be compiled and averaged over a 10-year period before evaluating a watershed's condition and potential listing as an "impaired watershed". If however, land management activities are modified in such a way as to influence a reduction in turbidity within the 10 year assessment period, then the watershed will be placed into recovery status and will be evaluated for an additional 3 years before making a final determination of impairment. During dry conditions from April 16th – October 14th the turbidity standard will be applied at 50 NTU

v. Temperature – the following standards apply to tributaries that are specific to these beneficial uses only.

REC-2, AGR, PROC,	68°F or 20°C	June 16 to October 14

(D) Waters with beneficial uses including but not limited to Groundwater Recharge (**GWR**), Industrial Service Supply (**IND**) and Hydropower Generation (**POW**) shall have the following criteria:

i. Bacteriological Criteria - Bacterial criteria for freshwater use will be based on 5 samples over a 30-day period shall not exceed the following steady state geometric mean:

Enterococci	151 CFU/100 ml
Escherichia coli	576 CFU/100 ml

ii. Dissolved Oxygen - The minimum level of dissolved oxygen shall not drop below 7.0 mg/l in the water column. If water quality monitoring indicates that dissolved oxygen levels are below 7.0 mg/l then an investigation of impact will be evaluated.

iii. Intergravel Dissolved Oxygen - The intergravel dissolved oxygen shall not be decreased below 4.0 mg/l by any human related activity.

iv. pH shall be within the range of 6.5 to 9.0 with a human-caused variation of less than 0.2 units.

v. Turbidity: A watershed will be considered to have exceeded the turbidity standard when average turbidity exceeds 50 % or more of 50 NTU's during the winter period from (October 15th – April 15th). Average turbidity will be assessed during rain events that produce turbidities of 10 NTU's or more. Below this value, turbidity readings will not be used to calculate the average. The compilation of these average values over the winter period will represent the critical value for that year. If a watershed documents exceedences for three or more years within the 10-year assessment period it will be considered in violation of the standard. These critical values will be compiled and averaged over a 10-year period before evaluating a watershed's condition and potential listing as an "impaired watershed". If however, land management activities are modified in such a way as to influence a reduction in turbidity within the 10 year assessment period, then the watershed will be placed into recovery status and will be evaluated for an additional 3 years before making a final determination of impairment. During dry conditions from April 16th – October 14th the turbidity standard will be applied at 50 NTU

vi. Temperature – the following standards apply to tributaries that are specific to these beneficial uses only.

GWR, IND and POW	68°F or 20°C	June 16 – October 14

3.6. NARRATIVE CRITERIA

3.6.1 Surface Waters: All surface waters of the reservation, including mixing zones, shall be free from substances attributable to human activity in accordance with the following:

3.6.1.1 Benthic Macroinvertebrate Populations: Site specific species composition shall not be degraded in both abundance and structure to a level that would threaten fish habitat conditions, water quality, and general watershed health. Bioassessment procedures for identifying macroinvertebrates in the laboratory and information analysis are set forth and standardized in the California Stream Bioassessment Procedure (CSBP) document. Biological monitoring maybe implemented to determine impacts on aquatic organisms from both point and non-point source pollution.

3.6.1.2 Biostimulatory Substances: Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.

3.6.1.3 Bottom Substrate: Suitable substrate particle size distributions shall be maintained to insure successful fish spawning as well as attachment of macroinvertebrates and algal components.

3.6.1.4 Color: Waters shall be free of unnatural coloration, which causes nuisance or impairs the designated beneficial uses.

3.6.1.5 Dioxins: Dioxins are known to be some of the most toxic manmade compounds known. Recent research has indicated that these compounds may be several orders of magnitude more toxic than was originally indicated (EPA 1985). Criteria established for such compounds are likely to be below the levels one could reasonably expect to be able to detect. No dioxin compounds will be discharged to any water within the reservation boundaries.

3.6.1.6 Floating Material: Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses.

3.6.1.7 Nitrate: Levels of Nitrates in waters with municipal or domestic supply use shall not exceed 10 mg/l. In other bodies of water the levels of nitrate shall not be increased by human related activity above the levels consistent with preservation of the specified beneficial uses.

3.6.1.8 Nitrite: Levels of nitrites shall not be increased, in any body of water, by human related activity above the levels consistent with preservation of the specified beneficial use corresponding to that water body.

3.6.1.9 Oil and Grease: Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses.

3.6.1.10 Pentachlorophenol: No discharge of pentachlophenol will be allowed to any water body within the boundaries of the reservation. Any existing point or non-point source causing increased levels of PCP shall be addressed as a noncompliance condition under the antidegredation plan.

3.6.1.11 Petroleum Hydrocarbons: No increase above background levels of petroleum hydrocarbons will be allowed due to human related activity in any water body within the reservation boundaries.

3.6.1.12 Pesticides: No individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses. There shall be no bioaccumulation in pesticide concentrations found in bottom sediments or aquatic life.

Waters designated for use, as domestic or municipal supply shall not contain concentrations of pesticides in excess of the limiting conditions set forth in Appendix F. Any existing point or non-point source causing increased levels of pesticides shall be addressed as a noncompliance condition under the antidegredation plan.

3.6.1.13 Phosphates: In order to preserve the existing quality of water within the reservation boundaries from existing and to avoid potential eutrophication of phosphorous in any water body shall not be increased by human related activity above levels consistent with preservation of the specified beneficial uses.

3.6.1.14 Radioactivity: Radionuclides shall not be present in concentrations which are deleterious to human, plant, animal or aquatic life nor which result in the accumulation of radionuclides in the food web to an extent which presents a hazard to human, plant, animal or indigenous aquatic life.

3.6.1.15 Sediment: The suspended sediment load and suspended sediment discharge rate of waters shall not be altered in such a manner as to cause impairment or adversely affect beneficial uses.

3.6.1.16 Settable Material: Waters shall not contain substances in concentrations that result in deposition of material that causes nuisance or adversely affect beneficial uses.

3.6.1.17 Suspended Material: Waters shall not contain suspended material in concentrations that cause impairment or adversely affect beneficial uses.

3.6.1.18 Tastes and Odors: Waters shall not contain taste or odor producing substances in concentrations that impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin, or that cause nuisance or adversely affect beneficial uses.

3.6.1.19 Tetrachlorophenol: No discharge of tetrachlorophenol will be allowed to any water body within the boundaries of the reservation. Any existing point or non-point source causing increased levels of TCP shall be addressed as a non-compliant condition under the antidegredation plan.

3.6.1.20 Total Dissolved Solids: The total dissolved solids shall not exceed 100.0 mg/l unless specifically authorized by the Riparian Review Committee upon such conditions as it may deem necessary to carry out the general intent of this plan and to protect the beneficial uses specified in this document.

3.6.1.21 Toxicity: All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life. This objective applies regardless of whether the toxicity is caused by a single substance or the interactive effect of multiple substances. Compliance with this objective will be determined by analysis of indicator organisms, species diversity, population density, growth anomalies, biotoxicity tests of appropriate duration, or other methods as specified by the Riparian Review Committee.

i. The survival of aquatic life in surface waters subjected to a waste discharge, or other controllable pollution factors, shall not be less than that for the same water body in areas unaffected by the waste discharge. For other control water bodies the requirements for "experimental water" are described in Methods for Measuring Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, latest edition, and Short-Term Methods For Estimating The Chronic Toxicity of Effluents And Receiving Water To Freshwater Organisms, latest edition.

ii. Effluent limits based upon acute bioassay of effluent will be prescribed where appropriate. Additional numerical receiving water standards for specific toxicants will be established as sufficient data become available. Source control of toxic substances will be encouraged.

iii Waters designated for use as domestic or municipal supply shall not contain concentrations of toxic compounds in excess of the limiting concentrations set forth in Appendix F.

3.6.1.22 Other Chemical Constituents: Surface water used for domestic or municipal supply shall not contain concentrations of chemical constituents in excess of the limiting concentrations set forth in Appendix F.

Waters designated for use as agricultural supply shall not contain concentrations of chemical constituents in amounts that adversely affect such beneficial use.

3.6.2 Ground Waters

In general groundwater standards and criteria will be the same as those for surface waters. The designated uses specified for those waters derived from groundwater sources will dictate the specific standards that apply.

Groundwater shall not contain chemical constituents, toxicants, radionuclides, pesticides or substances which produce tastes or odors in concentrations that produce detrimental physiological responses in human, plant, animal or aquatic life associated with the beneficial uses.

Groundwater used for domestic or municipal supply shall not contain concentrations of contaminants in excess of the maximum contaminant limits set forth in EPA's Safe Drinking Water Act.

Additional groundwater protection is provided under Section 5., Wellhead Protection, of Ordinance No. 3-95 of the Hoopa Valley Tribe.

3.6.3 Wetlands

Determination of wetland jurisdiction and wetland delineation will be made in accordance with the protocols outlined in the *Federal Manual for Identifying and Delineating Jurisdictional Wetlands* (Interagency Cooperative Publication, January 1989). The Riparian Review Committee or their respective department representatives will be responsible for wetland determination.

There shall be no net loss of wetlands on the Hoopa Valley Indian Reservation. This means that no activity shall convert a wetland to non-wetland status when a feasible alternative exists. If no feasible alternative exists, then a wetland of equal or greater size must be constructed or rehabilitated in another area (preferably within the same watershed) as mitigation.

When water is present at the surface or extracted from the subsurface in a wetland, the above criteria for surface and groundwater applies.

Vegetation removal within wetlands shall be avoided where a feasible alternative exists. If no feasible alternative exists, the wetland is to be replanted or expanded to mitigate for the area where vegetation has been removed.

Dumping waste of any kind is prohibited in wetlands. Dumping in wetlands will be considered a Class II Moderate violation.

3.3.7. **ANTDEGRADATION POLICY**

The Tribe has developed an antidegradation policy that is implemented through the Tribe's Forest Management Plan's Riparian Protection Guidelines and Pollutant Discharge Prohibition Ordinance. The Tribal Riparian Protection Guidelines and the Tribal minimum management requirements for domestic and non-domestic waters are hereby adopted as Best Management Practices to protect water quality. It is the intent of the Tribal Council, in adopting the WQCP, that the Forest Management Plan, the PDPO, Riparian Protection and Surface Mining Ordinance, and other Plans and Ordinances developed to improve the waters of the Reservation will be used as antidegradation policies. To the extent there is a conflict between a provision of the WQCP and a provision of another Tribal plan, ordinance, or policy, the more stringent provision shall apply. In the case of any conflict between either (1) the mixing zone provisions of this plan, or (2) the provisions of this plan, which states that, as a general rule, downstream standards apply to upstream tributaries when those standards are more protective.

3.7.1 The Tribe shall maintain and protect existing instream water uses and water quality so as not to degrade the subsequent instream uses for other purposes. In such cases where the designated uses of a given water body are impaired by water quality, there shall be no additional lowering of water quality with respect to the specific pollutant or pollutants which are causing or contributing to the impairment.

3.7.2 Where the quality of the waters exceeds levels necessary to support propagation of fish and wildlife and for recreation, that quality shall be maintained and protected. If however, the Tribe finds it necessary to allow a lower water quality in a specific water body to accommodate important economic or social development in the area in which the waters are located, the Tribe shall do so only after the Tribe's intra-governmental coordination provisions have been met. In allowing such degradation or lower water quality, the Tribe shall assure that water quality will protect existing uses. Further, the Tribe shall assure that the statutory and regulatory requirements for all new and existing point sources will be met shall be achieved the highest statutory and regulatory requirements for all new and existing point sources will be met. In addition, it's the objective of the Tribe that reasonable best management practices for non-point source control will be implemented.

3.7.3 The Tribal Council or designated agency may allow lower water quality on a temporary basis in order to respond to emergencies or to otherwise protect public health and welfare, but shall not allow degradation below the standards for any designated use as outlined in the WQCP.

3.7.4 In such cases where water uses justify outstanding resource designations, the designated water quality and uses shall be maintained and protected. Pollutants that will reduce the existing water quality shall not be allowed to enter such waters. To accomplish this the department may require water controls, maintenance of natural flow regimes, protection of in-stream habitats, and pursuit of land use practices protective of the watershed.

Outstanding resource waters are those, which meet one or more of the following criteria:

a) Outstanding national or Tribal resource; Waters in designated Tribal preserves and portions of the Trinity River which are recognized as Wild and Scenic;
b) Documented critical habitat for populations of threatened or endangered species and areas of cold-water refugia that provide exceptionally low summer temperatures relative to the needs of salmonid species.
c) Waters of exceptional recreational, ceremonial, cultural, or ecological significance;
d) Waters supporting priority species as determined by the Tribe.

3.7.5 In those cases where potential water quality impairments associated with thermal discharge are involved; the Antidegradation Policy and implementing methods shall be consistent with Section 316 of the Clean Water Act.

Implementation Plans and Policies

Implementation Plans

4.1 General Conditions

The requirements of the water quality standards set forth in this plan shall be met for all waters of the Reservation. No activity shall be permitted if that activity violates or causes the violation of these standards. All discharges from point sources, all instream activities, and all activities, which generate nonpoint source pollution, shall be conducted so as to comply with this plan and all other Federal and Tribal regulations. The Riparian Review Committee as established in Title 37, the Pollutant Discharge Prohibition Ordinance (PDPO), shall determine compliance.

All permits issued or reissued, and all activities undertaken by the Tribe, United States Environmental Protection Agency, Bureau of Indian Affairs, Indian Health Services, Army Corps of Engineers, Bureau of Reclamation, California Department of Forestry, United States Forest Service or any other government agencies or commissions shall be conditioned in such a manner as to authorize only activities that will not cause violations of this plan. Permits may be subject to review by the Riparian Review Committee after Tribal approval whenever it appears to the Riparian Review Committee that the activity has the potential to significantly impact water quality on the Reservation.

Best Management Practices shall be applied so that individual Best Management Practices are utilized, and that combinations of Best Management Practices do not result in cumulative impacts, which violate water quality criteria. If a person is applying all Best Management Practices and a violation of water quality occurs, the person shall modify those existing practices or apply further water quality pollution control measures, as selected or approved by the Riparian Review Committee, to achieve compliance with water quality criteria. Best Management Practices established in permits, orders, rules or directives shall, be subject to Tribal Council approval, be reviewed and modified by the Riparian Review Committee, as appropriate, to achieve compliance with water quality standards.

4.2 Triennial Water Quality Assessment Plan

To fulfill the requirements of this plan, the Hoopa Valley Tribal Environmental Protection Agency (TEPA) is primarily responsible for overseeing the Tribe's water quality monitoring, enforcement, and compliance programs, and the Tribe's point and nonpoint source permit review system. Most importantly, TEPA shall be responsible for conducting triennial assessments of the Tribe's Water Quality Control Plan for review by the Tribal Council and develop regulations to further the purposes of the PDPO.

TEPA triennial water quality assessment (WQA) of the Tribe’s WQCP identifies the water quality condition as good, fair, poor, impaired, or unknown. The data used to categorize water bodies in the WQA are obtained from the various monitoring programs described in the 1992 QA Manual (LACO Associates, 1992). The WQA serves many purposes. Most noticeably, the 305(b) report, also know as the National Water Quality Inventory Report, is a summary of all Reservation's water quality reports compiled for the USEPA. The report is updated biannually pursuant to Section 305(b)(1) of the CWA.

Tribal EPA prepares the Reservation report using information taken from the WQA. The Reservation 305(b) Report includes: a) a description of the water quality of major waters in the Reservation during the preceding years; b) an analysis of the extent to which significant waters support designated beneficial uses; c) an analysis of the extent to which elimination of the discharge of pollutants has been achieved; d) an estimate of the environmental impact, the economic and social costs necessary to achieve the “no pollutant discharge” objective of the CWA, the economic and social benefits of such achievement, and the date of such achievement; and e) a description of the nature and extent of nonpoint sources of pollutants and recommendations as to the programs which must be taken to control them, with estimates of cost.

For the purpose of sampling water bodies for the assessment, TEPA has developed a water quality-monitoring program that incorporates the recent scientific findings and priorities of the Tribe.
In this program, sampling objectives remain, as stated in the 1992 QA Manual and the 1993 Supplement, "to provide information that can be used to determine the current quality of water within the Reservation and the extent to which it meets designated beneficial uses."

The information gathered under this program is for field analysis, to aid the determination of the water bodies' ability to support the specific beneficial uses. All analyses will take place in the field, in the TEPA Laboratory, or at a designated contract laboratory. All applicable sampling procedures as outlined in the 1992 QA Manual will be followed. Where previous data exists, the information will aid in any determination of trends for that water body

4.3 Monitoring Plan

A program has been developed for the purpose of monitoring the Reservation waters. The Tribe's water quality monitoring program is based upon the beneficial uses assigned to each stream and the potential point and nonpoint source pollution, which can be attributed to the activities, which take place in each watershed. The purposes of the Tribe's water quality monitoring efforts are for the collection of data. The data collected has and will continue to be used in the development and implementation of the future water quality standards and other management programs. TEPA intends to expand the monitoring program to all of the previously listed waterways as funding and personnel become available.

The monitoring program has been separated into the priority stream, groundwater, and point source systems. The priority stream water quality-monitoring program is comprehensive in scope and is concerned with all factors and activities, which might affect water quality in streams. The priority streams on the reservation are Mill Creek, Tish Tang Creek, Pine Creek, Campbell Creek, Hostler Creek, Soctish Creek, and Supply Creek. These streams have been determined to be of top priority for water quality monitoring and restoration as a result of the beneficial uses assigned to them (see, Table 1.4, pg 21, of the Non-Point Source Pollution Assessment).

4.4 Non-Point Source Management Program

4.4.1 Identification of Best Management Practices

Best Management Practices BMP's are those practices determined to be practical, acceptable to the public, and effective in preventing water pollution or reducing the amount of pollution generated by non-point sources. Best management practices include information and education programs, technical and financial assistance, technology transfer, demonstration projects, monitoring/evaluation systems, and regulation and enforcement. The Tribal Environmental Protection Agency and other departments within the Tribe will develop and present BMP's to the Tribal Council for approval in accordance with the Tribe's Legislative Procedures Act.

Reservation wide program objectives include current as well as proposed programs and identify activities, products, responsible agencies, and funding. Existing non-point source problem and current conditions were assessed in the Hoopa Valley Indian Reservation Water Quality Assessment. The Tribal Council for forest management activities, such as, surface mining, firewood cutting, fishing, grazing, herbicide use, wellhead protection, and road building, has approved BMP's. The following non-exhaustive list of BMP's have been approved by the Tribal Council:

- Land Assignment and Lease Ordinance:
- Conservation /Trespass Act:
- Riparian Protection and Surface Mining Ordinance:
- Pollution Discharge Prohibition Ordinance:
- Fishing Ordinance:
- Land Use, Development Standards and Zoning Plan

Closed Range Ordinance:
Tribal Resolutions 81-80, 81-90, 81-91, 81-93, and 94-19 on the use of Pesticides
Forest Management Plan:
    Riparian Management Practices:
    Cumulative Effects Assessment Guidelines:
    Guidelines for Geologically unstable (E-MEHR) /Inaccessible Lands
    Firewood Policy and Permit:
    Road Construction/Reconstruction H Specs:

4.4.2 Identification of Needed Implementation Programs

The following Tribal Ordinances, plans, and regulations shall be drafted and presented to The Tribal Council for adoption as Best Management Practices, and shall impose administrative responsibility and fiscal liability for monitoring, investigation, cleanup, and enforcement costs, together with damages for all resulting injuries to tribal natural resources:

- Water Quality Control Plan
- Wellhead Protection Plan
- Pesticide Control Ordinance
- Solid Waste Ordinance
- Solid Waste Management Plan
- Hazardous Waste Ordinance
- Emergency Operations Plan
- Underground Storage Tank Regulations
- Water Diversion Plan

The prioritization of the Tribe's non-point management program is as follows:

1. Inter-departmental cooperation shall support maintenance and improvement of water quality within the reservation.
2. Implement Best Management Practices for construction, mining, silviculture, grazing, agriculture, and other potential non-point source pollution areas.
   A. Monitoring Forest Management BMPs
      1. Contracts for Compliance
      2. Harvest techniques
      3. Stream above and below restoration projects
   B. Monitoring gravel mining BMPs
      1. Permit applications
      2. Extraction techniques
      3. Recontour extraction site
   C. Monitoring road construction BMPs
      1. Contracts for compliance
      2. Erosion prevention techniques
      3. Cumulative impacts
      4. Bioassessment monitoring of bentic macroinvertbra
3. Train Tribal Environmental staff on hazardous materials handling, monitoring, and safety.
4. Upgrade the Tribal Environmental Laboratory to monitor non-point source pollution on the Reservation.
5. Implement a management plan to safeguard public water supply wells.
6. Implement a management plan to safeguard watersheds supplying public drinking water supplies.
7. Conduct a detailed survey of the abandoned mines, which flow into and through the Reservation.
8. Conduct a remedial site investigation of the Copper Bluff Mine.
9. Conduct a remedial site investigation of known and suspected contaminated soils and groundwater.

10. Finalize the remediation of the soil contaminated with petroleum hydrocarbons at Masonite Mill Creek.
11. Monitor the clean closure of the Supply Creek Landfill.
12. Locate and characterize septic tanks and leachfields throughout the valley.
13. Improve irrigation and domestic water diversion systems.
14. Initiation of restoration projects for the rehabilitation of the following non-point source problem areas
    - Wellhead protection from groundwater contamination
    - Watershed rehabilitation for surface erosion abatement
    - Stream restoration projects
    - Water Diversion Projects
    - Road rehabilitation projects
    - Mine restoration projects
    - Agricultural runoff projects
    - Construction runoff projects
    - Urban runoff projects

4.4.3 Consistency Of Federal Programs With State Non-point Source Requirements

The Tribe's Non-Point Source Management Program is consistent with the Tribe's goals and objectives. These goals and objectives have been ratified in the following Tribal Ordinance, Resolutions, Management Plans, Guidelines, and Best Management Practices:

Land Assignment and Lease Ordinance:
Conservation /Trespass Act:
Riparian Protection and Surface Mining Ordinance:
Pollution Discharge Prohibition Ordinance:
Fishing Ordinance:
Closed Range Ordinance:
Tribal Resolutions: 81-80, 81-90, 81-91, 81-93, and 94-19.
Forest Management Plan:
Riparian Management Practices:
Cumulative Effects Assessment Guidelines:
Guidelines for Geologically unstable (E-MEHR) /Inaccessible Lands
Firewood Policy and Permit:
Road Construction/Reconstruction H Specs:
Guidelines for Reservation Wide Fuel Management and Prescribed Fire

4.4.4 Public Notice And Opportunity For Public Comment

The Hoopa Valley Tribe's Legislative Procedures Act (Title 6) sets forth a comprehensive and systematic process for the Tribal Council to establish, amend, or modify policies, ordinances and acts, or to take other major governmental actions on behalf of the Hoopa Tribe. The Tribe's Title 37 Pollution Discharge Prohibition Ordinance provides for coordination "with the off-reservation jurisdiction of the North Coast Regional Water Quality Control Board, State Water Quality Control Board, or the State of California or any of its agencies, with regard to matter herein regulated by the Tribal authority."

The public participation requirements are intended to foster public awareness and the open processes of governmental decision-making. The Hoopa Valley Tribal Environmental Protection Agency seeks to implement public participation requirements by requesting the public's input, assimilating its viewpoints and preferences, and demonstrating that those viewpoints have been considered. In general, as specified in Tribal law, all legislation must comply with the Hoopa Valley Tribal Legislative Procedures Act.

Periodically, the Hoopa Valley Tribal Environmental Protection Agency shall hold public hearings for the purpose of reviewing the water quality standards and, as appropriate, modifying standards for Tribal Council approval. The Hoopa Valley Tribal Environmental Protection Agency will issue public notice of proposed changes and provide opportunity for public comment.

In the quality control planning process, a notice of the proposed action is published in area newspapers and distributed to a list of interested persons or organizations. All WQCP amendments must observe, as a minimum, the publication procedures notification in a newspaper of general circulation once, and three consecutive times when a prohibition of waste discharge is being considered.

Input from interested persons may be either through written correspondence, through public workshop sessions, or at the hearing. At the hearing all interested persons are given the opportunity to speak and respond to the material being considered, within reasonable limitations as determined by the Hoopa Valley Tribal Environmental Protection Agency.

4.5 Pollution Prevention Plans

The Clean Water Act provides that storm water discharges associated with industrial activity from a point source (including discharges through a municipal separate storm sewer system) to waters of the United States are unlawful unless authorized by a Section 402 National Pollutant Discharge Elimination System (NPDES) permit. The terms "storm water discharge associated with industrial activity", "point source" and "waters of the United States" are critical to determining whether a facility is subject to this requirement. Section 402 requires permits for all discharges of storm water associated with industrial activity from construction sites that will result in the disturbance of five or more acres total land area.

Pollution Prevention Plans for construction projects over five acres must include the following:

1. Site description, including:
- The type of construction activity
- Intended sequence of major construction activities
- The total area of the site
- The area of the site that is expected to undergo disturbance
- The runoff coefficient of the site before and after construction is complete
- Existing soil and storm water data
- A site map with:
    - Drainage patterns
    - Approximate slopes after major grading
    - Area of soil disturbance
    - Outline of areas which will not be disturbed
    - Location of major structural and non structural controls
    - Areas where stabilization practices are expected to occur
    - Surface waters
    - Storm water discharge locations
    - The name of the receiving water

2. A description of controls:

2.1 Erosion and sediment controls including:
- Stabilization practices for all areas disturbed by construction
- Structural practices for all drainage/discharge locations

2.2 Storm water management controls including:
- Measures used to control pollutants occurring in storm water discharges after construction activities are complete
- Velocity dissipation devices to provide non-erosive flow conditions from the discharge point along the length of any outflow channel

2.3 Other controls including:

- Waste disposal practices which prevent discharge of solid materials to waters of the Reservation
- Measures to minimize off-site tracking of sediments by construction vehicles
- Measures to ensure compliance with Federal and Tribal waste disposal, sanitary sewer, or septic system regulations

2.4 Description of the timing during the construction when measures will be implemented

- State or Local requirements incorporated into the plans
- Inspection and maintenance procedures for control measures identified in the plan
- Identification of allowable non-storm water discharges and pollution prevention measures
- Location and description of where all off-site excavation and disposal of spoils will occur
- Contractors certification
- Plan certification

All contractors and subcontractors identified in a storm water pollution prevention plan shall sign a copy of the following certification statement before conducting any professional service identified in the storm water pollution prevention plan:

I certify under penalty of law that I understand the terms and conditions of the general National Pollutant Discharge Elimination System (NPDES) permit that authorizes the storm water discharges associated with industrial activity from the construction site identified as part of this certification.

The certification must include the name and title of the person providing the signature; the name address and telephone number of the contracting firm; the address (or other identifying description) of the site; and the date the certification is made.

4.5.1 Categorical Exclusions

The Tribal Council in accordance with the Tribal Legislative Procedure Act (LPA) process, including an RRC review and public hearing may exclude categories of uses, activities or projects from requirements for one or more of the following reasons with USEPA approval:

(a) Naturally occurring pollution;

(b) Natural low-flow conditions;

(c) Irretrievable human-caused conditions;

(d) Substantial and widespread economic and social impacts.

<u>Variances:</u>

Variances to established water quality objectives will be reviewed in accordance with the LPA process and a public hearing by the RRC and forwarded, if amended or approved by the RRC, to the Tribal Council, only when the applicant satisfactorily demonstrates that:

(a) Water quality will not be permanently impaired,

(b) Public health will not be threatened,

(c) No significant adverse environmental effects will occur due to the limited size or scale of a proposed activity,

(d) A mitigation plan approved by RRC demonstrates that all discharges will be below established water quality standard as set forth in the Water Quality Control Plan before the expiration of the variance;

(e) The variance does not exceed one year from the date of issuance; and

(f) A 30-day public review period has passed with at least one public meeting.

4.6 Department of Public Safety and Emergency Services

The Department of Public Safety and Emergency Services shall enforce the provisions of this plan. Any Tribal Law Enforcement Officer, or any person officially appointed by the Hoopa Valley Tribal Council in consultation with the Director of the Department of Public Safety may issue the following for violations:

(A) Cease Orders or Citations: Upon determination that any person is discharging or causing to be discharged or is about to discharge into any Reservation waters, directly or indirectly, any pollutant which constitutes a violation of this plan, a Cease Order or Citations will be served.

(B) It shall be a civil offense, for which a fine of not less than $100.00 shall be assessed, to obstruct or otherwise interfere with investigative or other activities of any agent or officer of the Tribe carrying out this plan.

4.7 Tribal Court

The Hoopa Valley Tribal Court shall have jurisdiction of all cases and controversies arising under this plan, as provided for in Title 37, Section 3.4.

(A) Upon failure of any person to comply with provision of this plan, the Riparian Review Committee, by and through an attorney, may petition the Tribal Court for an injunction or other order requiring the person to comply herewith. In any such suit, the court shall have jurisdiction to grant a prohibitory or mandatory injunction, either preliminary or permanent, and to levy such fines as the facts may warrant and at a minimum to cover all clean-up and administrative costs;

(B) Any person who in violation of this plan discharges any pollutant into the waters of the Reservation shall be liable for all costs associated with or necessary to clean up, abate, or remove said pollutants from the waters of the Reservation and restore the quality of the waters of the Reservation to their condition as they existed immediately prior to the discharge.

Civil Penalty Schedule Matrix

In addition to any liability, duty, or other penalty provided by law, the Land Management Department Director, in accordance with Title 37 section 3.3, or the Tribal Court may assess a civil penalty for any violation of the tribal water quality standards.

<u>Violation Matrix (Penalty Per Day).</u>

Class of

Violation	Major	Moderate	Minor
Class I	$6,000	$3,000	$1,000
Class II	$2,000	$1,000	$500
Class III	$500	$250	$100

No civil penalty issued by the Director shall be less than $50.00 or more than $10,000 for each day of violation.

Class I Major violations:

1. Violation of a written Cease and Desist order from the Tribal Court or the Land Management Department Director.
2. Any discharge of a toxic waste that enters Tribal waters.
3. Any discharge of a waste that enters Tribal waters and results in a kill of fish or other aquatic animals.
4. Violation of a permit compliance requirement that causes major harm or poses a major risk to public health or to the environment.
5. Any violation related to water quality that causes major harm or poses a major risk to public health or to the environment.

Class I Moderate violations:

1. Any discharge of a waste that enters Tribal waters either without a waste discharge permit or from a point not authorized by a waste discharge permit.
2. Failure to comply with any statute, rule, or permit requirement regarding notification of a spill or upset which results in a non-permitted discharge to Tribal waters.
3. Violation of a permit compliance requirement that causes harm or poses a risk to public health or to the environment.

Class I Minor violations:

1. Operation of heavy equipment in the active channel.

Class II Major violations:

1. Operation of a properly operating waste disposal system without first obtaining a permit.
2. Placing wastes such that the wastes are likely to enter Tribal waters by any means.

Class II Moderate violations:

1. Failure to submit a report or plan as required by any permit.
2. Failure to submit a pre-season monitoring report requiring cross-sections or other surveyed data on time.
3. Operating heavy equipment in an equipment exclusion zone.

Class II Minor violations

1. Any violation of water quality not otherwise classified.

Class III Major violations:

1. Failure to submit a post-season monitoring report requiring cross-sections or other surveyed data on time.
2. Failures to submit a discharge monitoring report on time.

3. Exceeding waste discharge requirements of more than 20 percent by concentrations or of more than 10 percent by mass loading.
4. Violation of pH requirement by more than 0.5.

Class III Moderate violations:

1. Failures to submit a post-season monitoring report on time.
2. Exceeding waste discharge requirements of 20 percent or less by concentrations or of 10 percent or less by mass loading
3. Violation of pH requirement by less than 0.5 and more than 0.2

Class III Minor violations:

1. Failures to submit a complete discharge monitoring report on time.

4.8 Wellhead Protection Plan

For the purpose of this plan, wellhead protection zones were as established in the Pollutant Discharge Prohibition Ordinance (PDPO) consist of aquifers and/or groundwater recharge zones as with minimum zoning radii of 100 feet for groundwater extraction of 1,000 gallons per day (gpd); 200 feet for 5,000 gpd; 300 feet for 20,000 gpd; 400 feet for wells pumping 100,000 gpd or more. These wellhead protection areas are delineated on a map at a scale of 1 inch to 1,000 feet and are entitled "Wellhead Protection Overlays. This map is on file at the TEPA. In addition, the PDPO provides specifications regulating permitted activities within these wellhead protection areas.

Furthermore, as specified in the PDPO, if the location of the wellhead protection zone in relation to a suspected prohibited use is in doubt, resolution of boundary disputes shall be through the Hoopa Valley Land Management Department.

Disputants shall be afforded notice and an opportunity to be heard after prima facie showing by the Tribe as to the prohibited activities occurring in the wellhead protection zone, the burden of proof shall be upon the owner(s) of the land in question to show where the boundary should properly be located. At the request of the owner(s), the Hoopa Valley Tribe may engage a professional engineer (civil or sanitary), hydrologist, geologist, or surveyor to determine more accurately the boundaries of the wellhead protection zone with respect to individual parcels of land, and may charge the owner(s) for all or part of the cost of the investigation.

4.9 Policy on the Control of Water Quality with Respect to On-Site Waste Treatment and Disposal Practices

The following policy shall be implemented with respect to discharges from individual waste treatment and disposal systems. This policy sets forth uniform Reservation wide criteria and guidelines to protect water quality and to preclude health hazards and nuisance conditions arising from the subsurface discharges of waste from on-site waste treatment and disposal systems.

Site Evaluation Criteria and Methods
A. Criteria: The following site criteria are considered necessary for the protection of water quality and the prevention of health hazards and nuisance conditions arising from the on-site discharge of wastes. Waiver of individual criterion may be made in accordance with the "provisions of a waiver" contained in this policy.

1) Subsurface Disposal: On-site waste treatment and disposal systems shall be located, designed, constructed and operated in a manner to ensure that effluent does not surface at any time, and that percolation of effluent shall not adversely affect beneficial uses of waters of the Reservation.

2) Ground Slope and Stability: Natural ground slope in all areas to be used for effluent disposal shall not be greater than thirty (30) percent. Where less than five (5) feet of soil exists below the trench bottom ground slope shall not exceed twenty (20) percent.

Natural ground slope criteria for mounds shall be as follows: for percolation rates of 3 to 60 minutes per inch the maximum allowable slope is twelve (12) percent and for percolation rates of 60 to 120 minutes per inch the maximum allowable slope is six (6) percent. In addition, steeper ground slopes may be allowed for experimental systems approved by the Riparian Review Committee and the Tribal Council.

All soils to be utilized for effluent disposal shall be stable.

3) Soil Depth: Soil depth is measured vertically to the point where bedrock, hardpan, impermeable soils or saturated soils are encountered. Where ground slope is twenty (20) percent to thirty (30) percent minimum soil depth immediately below the bottom of the leaching trench shall be five (5) feet. Where ground slope is less than twenty (20) percent, a minimum soil depth of three feet immediately below the leaching trench shall be permitted. Lesser soil depths may be granted only as a waiver or for alternative systems.

4) Depth to Groundwater: Minimum depth to anticipated highest level of groundwater below the bottom of the leaching trench shall be determined according to soil texture and percolation rates as shown in Table 4.1.

5) Percolation Rates: Percolation test results in the effluent disposal area shall not be less than one inch per 60 minutes (60 MPI) for conventional leaching trenches and one inch per 30 minutes (30 MPI) for seepage pits. Percolation rates of less than one inch per 60 minutes (60 MPI) may be granted as a waiver or for Alternative Systems.

Table 4.1. Minimum Depth to Groundwater Below Leaching Trench

Soil Texture[1] Percent Silt & Clay	Depth to Groundwater Below Leaching Trench (feet)
5 OR LESS	**40**
6 TO 10	**20**
11 TO 15	**10**
Greater than 15[2]	**5**
Greater than 15	**2[3]**

1. Must exist for a minimum of three continuous feet below the bottom of the leaching trench and groundwater.
2. Or a percolation rate slower than 5 MPI
3. Granted only as a waiver or for Alternative Systems.

Setback Distances**:** Minimum setback distances for various features of individual waste treatment and disposal systems shall be as shown in Table 4.3.

Table 4.2. Minimum Setback Distances

Facility	Well	Perennially Flowing Stream[1]	Ephemeral Stream[2]	Cut Banks, Natural Bluffs and Sharp Changes in Slope	Unstable Land Forms
Septic Tank	100	100	50	25	50
Leaching Field	100	100	50	25[3]	50
Septage Pit	150	100	50	25[3]	50

1. As measured from the line, which defines the limit of ten (10) year frequency flood.
2. As measured from the edge of the watercourse.

3. Where soil depth or depth of groundwater below the leaching trench is less than five feet, a minimum set back distance of fifty (50) feet shall be required.

Replacement Area: An adequate replacement area equivalent to and separate from the initial effluent disposal area shall be identified at the time of site approval. Incompatible uses of the replacement area shall be prohibited.

B. Methods of Site Evaluation

Site evaluation are required in all instances to allow proper system design and to determine compliance with proceeding site suitability criteria prior to approving the use of on-site waste treatment and disposal systems. The Riparian Review Committee will be notified prior to conduct of site evaluations since verification by the Riparian Review Committee may be required. Site evaluation methods shall be in accordance with the following guidelines.

1) General Site Features: Site features to be determined by inspection shall include:

a. Land area available for primary disposal system and replacement area.

b. Ground slope soil type and soil depth in the effluent disposal and replacement area.

c. Location of cut banks, natural bluffs, sharp changes in slope and unstable land forms within fifty feet of the disposal and replacement area.

d. Location of wells, intercept drains, streams, and other bodies of water on the property in question and within 100 feet on adjacent properties.

2) Soil Profiles: Soil characteristics shall be evaluated by soil profile analysis. One backhoe excavation in the primary disposal field and one in the replacement area shall be required for this purpose. A third profile shall be required if the initial two profiles show dissimilar conditions. Augered test holes shall be an acceptable alternative, upon determination of the Riparian Review Committee: (a) where use of a backhoe is impractical because of access, (b) when necessary only to verify conditions expected on the basis of prior soil investigations, or (c) when done in connection with geologic investigations. Where this method is employed, three test holes in the primary disposal field and three in the replacement area shall be required.

In evaluation of new subdivisions, an adequate number of soil profile excavations shall be made to identify a suitable disposal and replacement area on each proposed parcel.

The following factors shall be observed and reported from ground surface to a depth of at least five feet below the proposed leachfield system:

a. Thickness and coloring of soil layers and apparent United States Department of Agriculture classification.

b. Depth to and type of bedrock, hardpan, or impermeable soil layer.

c. Depth to observed groundwater.

d. Depth to soil mottling.

e. Other prominent soil features such as structure, gravel content, roots and porocity, water holding capacity, etc.

3) Depth to Groundwater Determinations: The anticipated highest level of groundwater shall be estimated:

a. As the highest extent of soil mottling observed in the examination of soil profiles; or

b. By direct observation of groundwater levels during wet weather conditions.

Where a conflict, in the above methods of examination exists, the direct observation shall govern.

In those areas, which, because of parent materials, the soils lack the necessary iron compounds to exhibit mottling, direct observation during wet weather conditions shall be required. Guidance in defining such areas shall be provided by the Riparian Review Committee.

4) Soil Percolation Suitability: Determination of a site's suitability for percolation of effluent shall be either of the following methods:

a. Percolation Testing

Percolation testing shall be in accordance with methods specified by the Hoopa Valley Tribal Environmental Protection Agency and Hoopa Valley Public Utilities District, reviewed by the Riparian Review Committee and approved by the Tribal Council. Percolation testing of soils within Zone 3 and 4 shall be conducted during wet weather.

Percolation testing of soils falling within Zone 1 and Zone 2 may be conducted in non-wet weather conditions provided presoaking of the test hole is accomplished with (a) a continuous 12 hour presoaking, or (b) a minimum of four complete refillings beginning during the day prior to the day the test is conducted.

b. Soil Analysis

Soil from the limiting soil layer observed within the excavated soil profile shall be obtained and analyzed for texture and bulk density according to methods prescribed by the Hoopa Valley Tribal Environmental Protection Agency, reviewed by the Riparian Review Committee and approved by the Tribal Council. The results shall be plotted on a soil texture triangle.

(1) Soils within Zone 1 shall be considered to have minimum filtration capabilities, requiring increased depths to groundwater.

(2) Soils within Zone 2 shall be considered suitable for effluent disposal without further testing.

(3) Soils within Zone 3 and 4 shall require percolation testing as per (a) above to verify suitability for effluent disposal.

(4) Wet Weather Criteria: Hoopa Valley Tribal Environmental Protection Agency (TEPA) shall determine Wet weather testing periods on a geographic base. The following criteria shall be followed:

a. Between January 1 and April 30; and

b. Following 10 inches of rain in a 30-day period or after one-half of the seasonal normal precipitation has fallen.

Extension of wet weather testing beyond the limits of above criteria may be made in accordance with a program of groundwater level monitoring approved by the Tribal Council and conducted by TEPA.

C. Provision for Waiver

Except for mounds, waiver of site suitability criteria and evaluation methods specified herein may be granted by the Riparian Review Committee, following Tribal approval, when it can be satisfactory demonstrated that water quality will not be impaired and public health will not be threatened as a result of such waivers.

Waivers may be granted for:

(1) Individual cases, or
(2) Defined geographical areas.

The TEPA shall notify the Tribal Council of the basis for each waiver and seek Tribal approval for each waiver. Prior to granting geographical area waivers, TEPA shall submit technical justification to the Riparian Review Committee for review and concurrence.

D. Waiver Prohibitions

Where surveys conducted by TEPA indicate that discharges from on-site waste treatment and disposal systems in specific geographical areas are resulting in or threatening to result in health hazards or water quality impairment, the Riparian Review Committee may prohibit the issuance of waivers in said areas. Exemptions to such prohibitions shall be granted by the Riparian Review Committee, after seeking Tribal approval, only where an authorized public agency can provide satisfactory assurance that individual systems will be appropriately designed, located, sized, shaped, constructed and maintained to provide adequate protection of beneficial uses of water and prevention of nuisance, pollution, and contamination.

4.10 Policy on the Regulation of Waste Discharges from Underground Petroleum Tank Systems

It shall be the policy of the Hoopa Valley Tribe to implement a program to investigate and cleanup groundwater pollution caused by the unauthorized releases of petroleum from underground tanks that protects water quality while at the same time minimizes the cost to responsible parties and the public in general. The following principles shall constitute the policy:

With respect to all underground petroleum tank cases in the Reservation, the highest priority will be to eliminate pollutant sources through tank removal, product removal, and removal of contaminated soil to the extent practicable. If required, the need for further remedial action will be based on impacts on the beneficial uses of affected waters as determined by reasonable monitoring or other investigation.

TEPA shall assign the highest priority to the resolution of underground petroleum tank cases where drinking water sources are being adversely impacted.

Where practical, TEPA will schedule the investigation and cleanup of petroleum pollution by responsible parties to coincide with the availability of funds.

Where practical, TEPA will recognize the use of alternative cleanup techniques such as in-situ bioremediation and passive remediation.

4.11 Underground Storage Tank Closure Procedures

General Information and Requirements

1. A complete application must be submitted to the Hoopa Valley Tribal Council, or the Tribal Environmental Protection Agency (TEPA) with appropriate fees at least ten (10) working days prior to closure activities. Incomplete applications will be returned.

NOTE: All terms of the permit must be met prior to final approval. Permits are issued only to the owner or a duly authorized representative of the owner. Permits are non-transferable and non-refundable. The approved permit, with the exception of temporary closure, will expire within ninety- (90) days of approval, if the work authorized has not begun. The permit can be extended an additional ninety days, if requested in writing prior to expiration. The applicant must make the written request and a tentative closure date must be specified at that time. In the case where permits are allowed to expire without notification to the TEPA, the entire application process must be repeated (including payment of fees) before an authorized closure may begin.

2. Submit appropriate permit application fees.

3. Submit a site-specific safety plan for each tank closure application.

4. Notify the respective fire agency of the tank closure and follow any special requirements and/or restrictions that they impose.

5. Leak detection monitoring shall continue until actual tank closure. Each tank must have a valid operating permit or closure permit, issued by the TEPA.

6. TEPA staff shall inspect all closure activities. Notify TEPA a minimum of 48 hours prior to commencing work. Closure activities must not begin prior to permit approval unless authorized by TEPA, with the exception of emergency measures necessary to protect health, safety, and the environment. An approved permit must be obtained prior to scheduling an inspection.

7. All parts of the tank system(s) must be properly closed, but do not have to be closed in the same manner. The application/plan must indicate how all portions of the tank system(s), including piping, will be closed pursuant to applicable requirements.

8. The tank owner is responsible for proper closure and investigation of the underground storage tank(s). The owner or contractor shall ensure that proper procedures are followed and all necessary information is obtained and/or made available for inspection. A copy of the approved permit/plan shall be kept on site. Any changes made to the permit/plan must be approved by TEPA and shall be made known to the owner and to all persons performing the work.

9. The closure application and the laboratory chain-of-custody form must authorize the laboratory conducting the analysis to submit copies of the results directly to TEPA.

10. If field observation indicates and/or laboratory analysis confirms soil or groundwater contamination during the closure activities, an unauthorized release (leak) shall be reported to the US Environmental Protection Agency, Office of Underground Storage Tanks. Within 24 hours of discovery, the owner or operator shall report the release to TEPA, followed by a written report (unauthorized release report form) within five (5) working days.

11. Excavating small amounts of contaminated soil during the tank removal is permitted where determined appropriate by TEPA inspectors. Generally, ten (10) to twenty (20) cubic yards of soil per tank may be stockpiled on site in such a way as to prevent contamination of surface water, groundwater, and soil. Alternatively, soil may be removed for treatment and disposal at an approved off-site facility with prior approval from TEPA.

12. Receipts of manifest documents for the disposal of product, rinsate, tanks, and piping must be submitted to the TEPA within thirty days of closure activities. The State Contractors' License Law requires contractors installing or closing underground storage tanks to hold the Hazardous Waste Certification issued by the State Contractors' License Board and have either a General Engineering - A classification or General Engineering - B license classification.

A copy of the contractors' license, Hazardous Waste Certification, Workers' Compensation Certificate, and evidence of appropriate health and safety training must be on file with TEPA.

13. Persons authorized to sign the permit application include:

a) A contractor who meets the requirements specified in 12 above.
b) An owner who possesses a current Certificate of Workers' Compensation Insurance.
c) An owner who is exempt from the Licensing Law and certifies, in the performance of the permitted work, no person shall be employed in any manner so as to become subject to the Workers' Compensation Law.

UST Closure Requirements - Planning and Preclosure

1. Specify the type of tank closure (i.e., removal, in-place closure, or temporary closure) and reason for closure of each tank.

2. Provide the facility name, site address, phone number, the owner of the facility, the operator of the facility, and the contractor responsible for the proposed permit application activity.

3. Provide a description of each tank (i.e., capacity in gallons, age, contents, date last operated, and whether any product remains inside). Describe any site history and any investigation activities that may have been conducted in the past (e.g., monitoring wells and their results).

4. Submit a site plot plan, drawn to scale on 8½" X 11" paper, including the following:

   a) Draw plan to scale (e.g., 1"=10', 1"=20', 1"=40', etc.).
   b) North arrow.
   c) Street address and property boundaries.
   d) Location of tank(s), all associated piping, and dispensers, Remaining tank(s), underground and overhead utilities, wells, drainage courses, and other obstacles.
   e) Overburden-excavated soil cover area, placed on and covered by 10 mil minimum or equivalent high-density polyethylene.
   f) Sample locations with numbers and sample analysis table for anticipated sampling.

5. Provide a one-time EPA Generator's number along with the facility name. The owner may obtain a one-time hazardous waste generator number. The owner must contact the Department of Toxic Substances Control at (916) 324-1781. The contractor or consultant may obtain the number for the owner by sending a fax to the Manifest Unit, at (916) 327-4495. Include name, license, firm, address, phone, and fax of the representative, and the name and site for which the number is being requested.

6. All liquid must be removed from the tank system. If the liquid is classified as a waste, then the California Highway Patrol must license the hauler, and a Uniform Hazardous Waste Manifest must be completed. A copy of the manifest shall be submitted to TEPA within thirty - (30) days.

The tank and the associated piping are considered hazardous waste unless rendered clean. If these items are cleaned, then the resulting rinsate is considered hazardous, unless proven otherwise by sampling.

If the remaining liquid is to be removed as usable product, then all California Department of Transportation regulations must be met. Documentation of proper rinsate disposal, tank and piping disposal, or reuse, is required to be submitted to TEPA within thirty (30) days of tank excavation. Disposal or reuse information for the tank and piping shall include the name and address of the recipient and the final disposal/reuse location of the tank and piping.

7. Soil/water sampling must be performed for permanent tank closure. The applicant must authorize the laboratory or consultant to release any and all analytical results to TEPA within thirty days. For approval of the closure work, the following documentation shall be submitted to TEPA within thirty (30) days of tank removal:

   a) Laboratory analysis results and chain of custody record directly from the lab.
   b) Copies of hazardous waste manifests.

c) Disposal documentation for cleaned tank(s) and piping.

UST Closure Option I - Tank Removal

1. Indicate how each tank and its associated piping will be handled and finally disposed.

   NOTE: Tanks and associated piping previously containing gasoline or diesel fuel must be free of product. Any loose scale, residue, and sludge must be inserted into the tank before removal from the ground or transportation off-site. All underground storage tank system components shall be transported and disposed of as hazardous waste. No portion of any underground storage tank system may be reused for other than compatible hazardous materials storage unless certified as being rendered non-hazardous by a California Department of Toxic Substances Control permitted Hazardous Waste Treatment Facility.

3. The excavation site shall be adequately secured to prevent entry by unauthorized persons. This may be by total enclosure with a secured, locked six-foot high chain-link fence or its equivalent.

4. Soil excavated from the tank and piping shall be placed on an impervious surface (20 mil polyethylene, or equivalent). The contractor shall attempt to segregate obviously contaminated soil and keep asphalt and concrete paving separate. Contaminated wet soils shall not be removed from the excavation or be handled in a manner that will cause surface contamination.

5. All associated piping (remote fill pipes, product, vapor recovery, and vent piping) shall be removed and disposed of unless removal will damage structures, or other pipes in use and are in a common trench. All piping to be removed must be exposed and inspected for deterioration and signs of contamination. Piping closed in-place must meet the requirements of In-Place Tank Closure of this policy. Product and vent lines shall be drained into the tank and disconnected from the tank in a manner allowing tank openings to be sealed. Care must be taken to prevent product spillage.

6. Tanks previously containing flammable liquids shall be made inert by using a minimum of 20 pounds of dry ice per 1,000 gallons of tank volume for a sufficient time prior to removal. The tank removal shall not proceed until the tank atmosphere show 6% or less oxygen by volume, or 10% or less of the lower explosive limit (LEL). The contractor/applicant shall provide portable instrumentation to verify that these conditions are obtained. Tanks must be transported under these conditions and in most cases must be transported on the same day.

3. The exterior of the tank(s) must be free of soil and debris, and inspected for signs of leakage/failure before loading onto the truck for transport.

4. Sampling is required for closure of a tank system or any portion of the entire tank system. Soil and water samples must be obtained and submitted for laboratory analysis. All soil and water samples shall be taken using appropriate sampling equipment and protocol. Samples shall have a chain of custody form and shall be immediately stored under refrigeration at 34° F. or below (an ice chest may be used if samples are to be transported to the laboratory immediately).

5. The tank excavation may be purged of water and allowed to refill before sampling. If the excavation is pumped dry and water does not return within twenty-four (24) hours, then the source may be considered not to be groundwater. The purged water must be stored, sampled, and disposed of properly.

6. If excavation reveals a previously unknown tank or any portions of a tank system, including piping, then operations may be stopped until the permit is modified and adequate information is obtained to ensure safe and proper removal.

UST Closure Option II - In-Place Closure

Underground storage tanks and/or associated piping may be closed in-place. An investigation to determine the presence of an unauthorized release from the system is required. Closure in-place should only be considered for tanks/piping that, if removed, would damage a structure such as a building foundation or when other piping is in use in a common trench. Closure by this method requires a more extensive soil and groundwater investigation.

1. The application must include a workplan prepared by a California registered geologist or engineer experienced in soil and groundwater investigations. The workplan must propose an investigation of the tank site for the presence of an unauthorized release.

   The workplan will be reviewed and a decision will be rendered on how to proceed with the closure. If closure by removal is determined appropriate based on the findings, then the permit application can be amended and a closure by removal can proceed. If closure in-place is appropriate, then the closure can proceed.

2. All residual products shall be removed and the tank/piping cleaned. Provide information to TEPA on the company cleaning the tank and hauling the rinsate including their Department of Health Services Hazardous Waste Hauler's License number.

3. These requirements do not apply to those underground storage tanks in which hazardous substances remain even though the hazardous substances are not in use. In these cases, the applicable containment and monitoring requirements of the operating permit shall continue to apply.

4. Underground storage tank systems that have emitted an unauthorized release do not qualify for temporary closure until the tank owner demonstrates to TEPA that appropriate authorized repairs have been made which would make the tank capable of storing hazardous substances in accordance with the conditions of an operating permit issued by TEPA.

5. All residual liquid, solids, or sludge shall be removed and hauled by an environmentally accredited hazardous waste hauler. Indicate the name and license number, if applicable, of the company removing and hauling the tank contents.

6. If the underground storage tank contained a hazardous substance that could produce flammable vapors as standard temperature and pressure, then the tank shall be made inert, as often as necessary to levels that will preclude an explosion or to such lower vapor levels as required by the local fire agency. Tanks may be triple-rinsed to lower vapor levels. Indicate the name and hazardous waste hauler number of the company hauling the rinsate.

7. All fill, access locations, and piping (except required vent piping) shall be sealed with locking caps or concrete. Electric service to the pumps serving the tank shall be disconnected, unless the pump serves another tank in use and/or an impressed current cathodic protection system.

8. Monitoring requirements for the temporarily closed tank may be modified or eliminated by TEPA during the period of closure. Generally, monthly or quarterly tank gauging will be required at a minimum.

9. The temporarily closed tank(s) shall be inspected at least once every three months to ensure that temporary closure measures are still in place and to monitor the tank(s). Records of inspections shall be kept and submitted at the end of the temporary closure period. An inspection plan shall be submitted with the application that includes the following:

   a) Name and phone number of the company/person performing the inspections.
   b) Schedule for site inspections.
   c) Description of the inspection procedure or observations to be made.

10. If inspection reveals the intrusion of water or any other sign of an unauthorized release, then TEPA shall be notified within twenty-four (24) hours. Permanent closure by removal may then be required.

The owner may terminate the temporary closure and reuse the underground storage tank system(s) only if they will be upgraded to the latest standards.

4.12 Groundwater Resource Protection

The groundwater resources of the Hoopa Valley are located in a series of isolated fields. Groundwater resources in the individual field are very vulnerable and highly susceptible to contamination. Open pit mining on or adjacent to any field places the quality of the groundwater resources of that field at risk and is therefore prohibited.

Triennial Review and Amendment Process

Triennial Review and Amendment Process

The Pollutant Discharge Prohibition Ordinance and the Clean Water Act (Section 303(c)(1)) require periodic review of the Water Quality Control Plan (WQCP) to keep pace with changes in regulations, new technologies, policies, and physical changes within the Reservation. The Riparian Review Committee will be responsible for this review, which is to be conducted triennially, and is required to 1) identify those portions of the WQCP which are in need of modification or new additions; 2) adopt new standards as appropriate; and 3) recognize the portions of the WQCP which are appropriate as written. The review includes a public hearing process to allow the public to raise issues for the Riparian Review Committee to consider for incorporation into the WQCP.

After the triennial review has concluded, the Riparian Review Committee shall present the Tribal Council 1) a summary of those sections of the WQCP which the Riparian Review Committee has determined to be appropriate and up to date, and 2) sets forth a prioritized list of issues (priority list), to be adopted by the Tribal Council, which the Riparian Review Committee has determined are necessary for further evaluation and potential development into a WQCP revision.

The triennial review priority list directs the planning efforts concerning water quality for the Hoopa Valley Tribal Environmental Protection Agency until the next triennial review. As budget and staffing allows, and starting from the top of the list, the Hoopa Valley Tribal Environmental Protection Agency considers each of the issues identified on the priority list for potential WQCP revisions. The Hoopa Valley Tribal Environmental Protection Agency may also initiate the WQCP revisions apart from the triennial review process in response to urgent needs, which arise after completion of the triennial review.

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Appendix A
Tribal Legal Capacity

OFFICE OF TRIBAL ATTORNEY
HOOPA VALLEY TRIBE

Post Office Box 188 • Highway 96
Hoopa, California • 95546
(916) 625-4211 • FAX (916) 625-4847

SENIOR TRIBAL ATTORNEY
BRUCE J. FRIEDMAN

LEGAL ASSISTANT /
OFFICE MANAGER
WARREN L. TAMERIUS, JR.

LEGAL SECRETARY
TAMERA L. HOSTLER

July 27, 1995

Felicia Marcus
Regional Administrator - Region IX
Environmental Protection Agency
75 Hawthorne Street
San Francisco, California 94105

Subject: Tribal Jurisdiction - Water Quality
Non-Indians - Non-Trust Lands

Dear Ms. Marcus,

The intent of this letter is to clarify and to affirm the jurisdiction of the Hoopa Valley Tribe, a federally recognized Indian Tribe, 25 USC § 1300i-7, to set and to enforce water quality standards respecting non-Indians owning non-trust lands on the Hoopa Valley Indian Reservation. At the outset, your attention is drawn to an accompanying July 11, 1989 letter from the Office of the Tribal Attorney to a past Regional Administrator - Region IX. The letter is accurate still and is soundly reasoned. I'll focus on subsequently acquired information, changes in Tribal law and later federal cases.

1. Land Ownership On Reservation - the federal courts have lately analyzed land ownership quantitatively as a component of tribal jurisdiction. In Brendale v. Confederated Tribes and Bands of [the] Yakima Indian Nation, 492 U.S. 408 (1989), a crucial concurring opinion by Justice Stevens, joined by Justice O'Connor, traced tribal jurisdiction to regulate non-Indians and non-trust lands to "[tribal] power to define the essential character of the territory." In turn the presence of that tribal power is subject to a quantitative analysis of land ownership on reservation. In Brendale the fact that the "closed" sector on the Yakima reservation is held in trust by the Tribe and by Indian allottees, except for "a very small proportion" privately owned by "[a] few individuals," was found sufficient to affirm tribal jurisdiction respecting non-Indians on non-trust lands:

> Congress ... could not have intended that tribes would lose control over the character of their reservations upon the sale of a few, relatively small parcels of land. Id. p. 441
>
> the tribe has authority to prevent the few individuals who own portions of the closed area in fee from undermining its general plan to preserve the character of this unique resource by developing their isolated parcels without regard to an otherwise common scheme. Id. p. 441
>
> the fact that a very small proportion of the closed area is owned in fee does not deprive the tribe of the right to ensure that this area maintains its unadulterated character. Id. p. 444

The Court in Brendale came to a different result respecting a non-Indian privately owning land on the "open" sector on the Yakima reservation. At least half the land in the "open" sector is privately owned.

Applying the United States Supreme Court land ownership quantitative analysis to the Hoopa Valley Indian Reservation, the accompanying graphic plainly shows that just 1922.6 acres - 2.8% - of the 87948.5 acre- reservation, overlooking for the moment boundary disputes not bearing on non-Indians on privately owned lands, is held in trust by the Hoopa Valley Tribe and by Indian allottees. Scrutinizing the 1922.6 acres, I am informed that roughly 2/3 are held by the Tribe or by Tribal members.

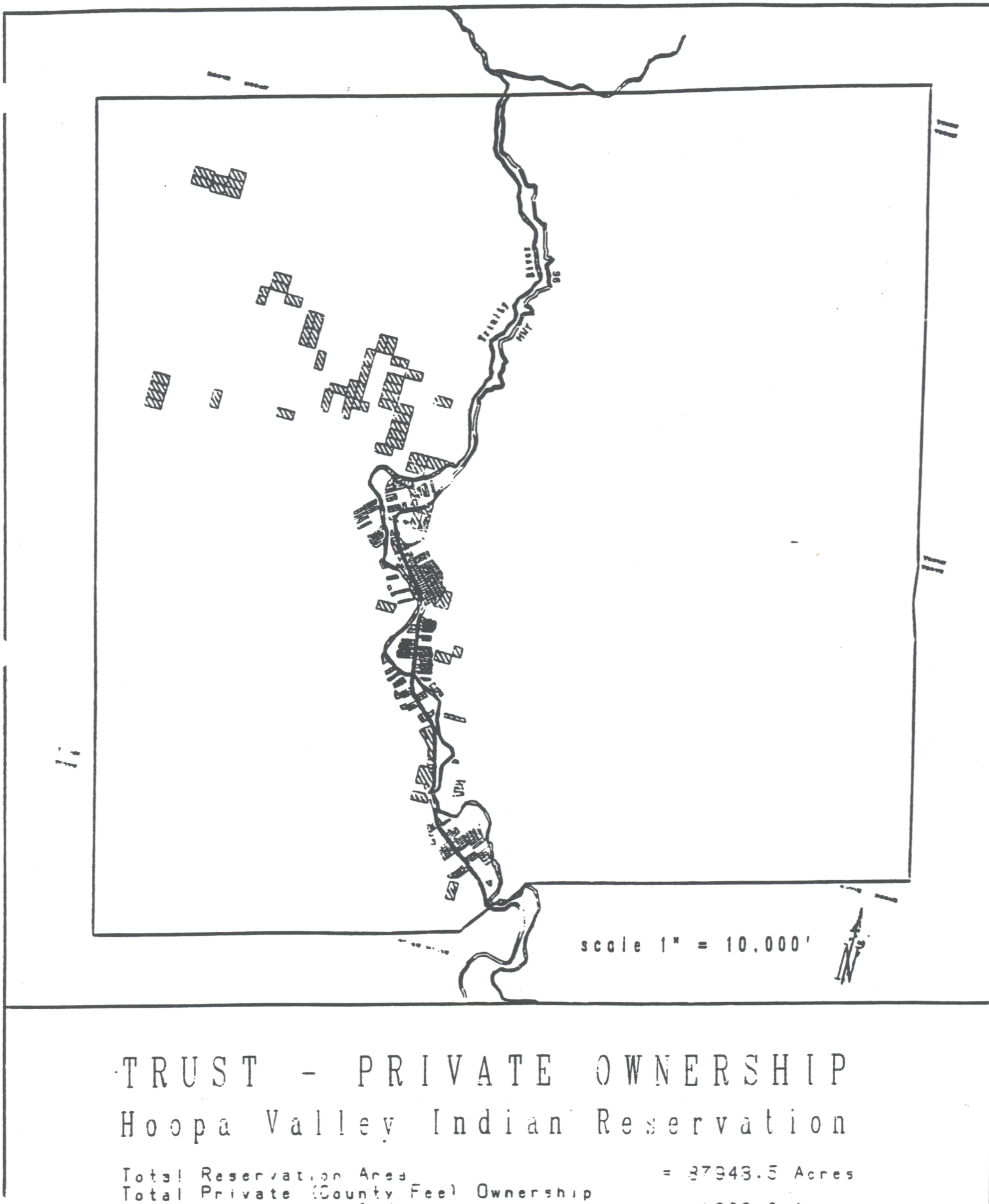
So somewhat less than 1% of the Hoopa Valley Indian reservation is privately owned by non-Indians, at least comparable to the "closed" sector Yakima facts in Brendale; far different than the facts on the Salish and Kootenai Reservation. The Hoopa Valley Tribe, as it happens, and as anticipated in Brendale, is endeavoring to assure that their reservation - their home since time immemorial - "maintains its unadulterated character."

2. Tribal Riparian Ordinance - on August 3, 1992, the Hoopa Valley Tribe passed a Riparian Protection Ordinance, no. 92-3, that is intended, inter alia, to set and to enforce water quality standards respecting surface mining throughout the Reservation "including such activities conducted by non-members of the Tribe or on privately owned lands." 35 Hoopa Tribal Code § 35.1.1

The Hoopa Valley Tribal Council, on July 7, 1995, issued a Gravel Permit, no. 95-2, to a non-Indian operating on privately owned lands. The Hoopa Valley Tribe has not "accommodated itself to the State's 'near exclusive' regulation" of water quality. Cf. Montana v. United States, 450 U.S. 544, 566 (1981). Gravel Permit no. 95-2 was issued subject to conditions pertaining to water quality.

3. Congressionally Delegated Tribal Jurisdiction - it bears repeating that the United States Supreme Court has stated clearly that Indian tribes can set and enforce water quality standards respecting non-Indians on privately owned land if Tribal jurisdiction is congressionally delegated. The Court in Brendale, by way of example, cited 33 USC §§ 1377 (e) and (h) (1), id. p. 428, tribal treatment as a state.

4. Recent Federal Cases - the Federal courts carry on a long line of authority to the effect that Indian tribes have jurisdiction to legislate and to adjudicate that non-Indians operating on non-trust lands refrain from interfering with the profound interests of tribal members on their reservations. Salish and Kootenai Tribes v. Montana, 750 F.Supp. 446 (D.Mont. 1990); FMC v. Shoshone Bannock Tribes, 905 F.2d 1311 (9th Cir. 1990); United States ex rel. Morongo Band v. Rose, 34 F.3d 813 (9th Cir. 1994); Stock West Corp. v. Taylor, 964 F.2d 912 (9th Cir. 1992).



TRUST - PRIVATE OWNERSHIP

Hoopa Valley Indian Reservation

Total Reservation Area = 87943.5 Acres
Total Private (County Fee) Ownership
Indian and Non-Indian owners = 1922.6 Acres
Percent of Reservation Privately Owned = 2.3 %

source: HVTC, Forestry Div. GIS Database (ovr95). 7/26/95. je.

Legal Department
Hoopa Valley Business Council
P.O. Box 1348 • Hoopa, California 95546 • (916) 625-4211

Stephen H. Suagee
Staff Attorney

MEMORANDUM

TO: Daniel McGovern, Regional Administrator
EPA - Region 9

FROM: Stephen H. Suagee
Attorney for Hoopa Valley Tribe

DATE: July 11, 1989

SUBJECT: Legal Basis of Hoopa Valley Tribe's Regulatory Authority Over Water Resources of the Hoopa Valley Reservation

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This memorandum explains the legal basis for the Hoopa Valley Tribe's regulatory authority over the water resources within the Hoopa Valley Reservation in northern California. It is presented in support of the Tribe's Petition for Treatment as a State for Section 106 funding and for authority to establish water quality standards, as required by Section 518(e)(2) of the Clean Water Act, 33 U.S.C. § 1377(e)(2), and by EPA's Interim Final Rule, Indian Tribes: Water Quality Planning and Management, published in 54 Fed. Reg. 14354-60 (April 11, 1989). Although the Hoopa Valley Tribe lacks a formally designated Attorney General, I am an analogous official and am authorized by the Hoopa Valley Business Council to submit this statement.

The Hoopa Valley Tribe is a federally recognized Tribe. The Interior Department approved the Tribe's current Constitution and Bylaws in 1972. Article III of this Constitution provides that "[t]he jurisdiction of the Hoopa Valley Tribe shall extend to all lands within the confines of the Hoopa Valley Reservation boundaries as established by Executive Order of June 23, 1876." Article V, Section (1) provides that the Hoopa Valley Business Council is the governing body of the Tribe.

Section II.A. of the Tribe's Petition for Treatment as a State acknowledges that due to protracted federal court litigation regarding the nature of Indian and tribal rights in the Hoopa Valley Reservation, some doubt once existed whether the Hoopa Valley Tribe possessed exclusive jurisdiction over Reservation territory as defined in Article III of the Tribal Constitution. <u>See Jessie Short, et al. v. United States</u>, Cl.Ct.

No. 102-63, and Lillian Blake Puzz, et al. v. Dept. of Interior, No. C 80-1908 TEH. Any and all doubts were conclusively laid to rest by the recent implementation of the Hoopa-Yurok Settlement Act, Pub. L. 100-580, 25 U.S.C. §§ 1300i-1300i-11. Section 2 of the Settlement Act provides that upon publication of the appropriate Federal Register Notice, the Hoopa Valley Reservation[1/] "shall thereafter be held in trust by the United States for the benefit of the Hoopa Valley Tribe." 25 U.S.C. § 1300i-1(h). The appropriate notice was published by the Interior Department on December 7, 1988, 53 Fed. Reg. 49361-62 (copy attached), and as of that date the Hoopa Valley Tribe has been the exclusive beneficial owner of the unallotted trust lands and assets that comprise over 95% of the Reservation.

More significantly for purposes of tribal jurisdiction, Section 8 of the Settlement Act provides that "the existing governing documents of the Hoopa Valley Tribe and the governing body established and elected thereunder, as heretofore recognized by the Secretary, are hereby ratified and confirmed." 25 U.S.C.§ 1300i-7. The existing governing documents of the Tribe are its 1972 Constitution and Bylaws, which provides that the Hoopa Valley Tribe has jurisdiction over Reservation territory. See footnote [1/]. Thus there can be no question that, regardless of any doubt that may have been raised by the Short and Puzz lawsuits, the Hoopa Valley Tribe is now vested by Congress and tribal law with exclusive sovereign authority to govern the territory of the Hoopa Valley Reservation.[2/]

Several provisions of the Tribal Constitution, Article IX, expressly authorize the Business Council to exercise powers that entail regulation of not only water quality for all surface and groundwater within the Reservation, but also use of all waters originating within the Reservation as well: Section 1(p) authorizes protection of tribal property and natural resources, which includes regulation of federal reserved fishing and water rights; Section 1(g) authorizes the Council to represent the Tribe in negotiations with other governments; Section 1(h) authorizes the Council to represent tribal positions in

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[1/] The Settlement Act and the Tribal Constitution both define the Hoopa Valley Reservation in the same way - as established by the 1876 Executive Order.

[2/] See attached Order in the Puzz case dismissing all claims as moot in light of the Settlement Act.

litigation; Section 1(j) authorizes the Council to exclude non-members of the Tribe from tribal lands, and otherwise regulate their activities thereon; Section 1(l) authorizes protection of the general welfare, health, and safety; and Section 1(h) authorizes establishment of the Tribal Court, which has been in existence since March 27, 1986.

These specific Constitutional provisions are interpreted broadly to achieve the protection of tribal rights and interests, and to accommodate constant developments in federal law that expand or refine the general scope of tribal jurisdiction. In addition, the Tribe is authorized to exercise any inherent sovereign power not expressly extinguished by Congress.

The Council has enacted a number of Ordinances pursuant to the above cited authority, including: the Fishing Ordinance, which comprehensively regulates fishing on the Reservation; the Law and Order Code which establishes the Tribal Court for adjudication of disputes arising on the Reservation or offenses arising under tribal law; the Exclusion Ordinance, which protects against natural resources trespass; the Use/Permit Ordinance, which regulates use of Reservation natural resources by Indians and non-Indians.

In addition, the Council is drafting Ordinances: to set forth required environmental review procedures;[3/] to provide for comprehensive zoning consistent with the Tribe's overall land use plan; to protect the special ceremonial, fisheries, recreational, environmental, and commercial values of the Trinity River riparian zone; to establish best forestry management practices for protection of watersheds. These will be implemented after a public review process.

The Tribe has been awarded grant funds for the coming year from the Administration for Native Americans to establish a Water Resources Department with in-house hydrological and legal capability. One objective of the grant funded phase of the

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[3/] The Tribe already exercises primary responsibility for NEPA compliance on the Reservation. The Bureau of Indian Affairs, in its internal Manual setting forth NEPA procedures for Indian Country, recognizes that "tribal governments have substantial authority for environmental protection within their reservations as an aspect of their <u>retained</u> tribal sovereignty." 30 BIAM, Supp. 1 § 2.6 (emphasis added).

program is development of the technical information necessary to enactment of tribal Water Use and Water Quality Codes. The activities of the Water Quality Planning and Management proposal submitted herewith to EPA will be coordinated with those of the Water Resources Department, and should yield information essential to development of such Codes.

The Tribe's main purposes in regulating the use of Reservation resources generally, and water use and quality particularly, include protection of the Tribe's federal reserved fishing and water rights from environmental degradation and unauthorized interference by outside persons and governments. Tribal authority to regulate these reserved rights necessarily entails the authority to serve the purposes for which the rights exist, which include: subsistence, ceremonial, and commercial use of the Reservation fishery; and protection of traditional cultural and ceremonial values associated with the salmon runs, the Trinity River riparian zone, and all Reservation water resources. In addition, tribal regulation of this type fulfills the Council's constitutional obligations to protect the basic health, safety, and welfare of the Tribe and the Reservation community. Ultimately, such regulation promotes the political integrity of the Hoopa Valley Tribe.

Given the fundamental tribal interests implicated by water use and quality regulation, the Tribe is approaching surface water regulation on a watershed basis: The Hoopa Valley Reservation is bisected by the Trinity River. The Hoopa Valley floor consists of 3500-4000 acres of alluvial flat land along the River, and is the principal residential and agricultural area. The remaining 85,000 acres of the Reservation consist of mountainous forest lands, drained by a number of small creeks tributary to the Trinity River. All these creeks are sources of domestic and agricultural water, and many have their headwaters within the Reservation. Some creeks are used for salmon rearing, and both the Tribe and the United States have invested heavily in restoration of salmonid habitat in these creeks. In addition, certain streams have potential for micro-hydro development, to provide power and enhance domestic and agricultural water uses. Upland forest development activities must therefore conform to the water use and quality requirements at the lower end of each drainage.

The groundwater table adjacent to the Trinity River is also a source of domestic and agricultural water. Although it underlies a variety of tribal lands, residences, and businesses on the Valley floor, as well as the tribally-owned riparian zone, the groundwater table is a unitary resource that provides runoff into the Trinity River and the lower portions of Reservation creeks. In order to protect tribal values and interests in the creeks and River, and to prevent buildup of pollutants underground, the groundwater table must be regulated as a unitary system.

Due to the extremely high percentage of tribal lands within the Reservation (95-97%), and to the fundamental tribal interests implicated by the need to comprehensively regulate all Reservation water use and quality, the Tribe must have, and does have, jurisdiction to regulate water use and quality throughout the Reservation. This Reservation-wide jurisdiction over water resources is consistent with the broad language of CWA Section 518(e)(2) and (h), which recognizes tribal primacy over "the management and protection of water resources . . . within the borders of an Indian reservation," 33 U.S.C. § 1377(e)(2), and further defines "Indian reservation" as "all land within the limits of any Indian reservation . . . notwithstanding the issuance of any patent," 33 U.S.C. § 1377(h).

This clear statutory language found in the 1987 CWA amendments confirms doctrine developed in prior federal cases, that absent express Congressional action vesting States with civil regulatory jurisdiction over Reservation resources and land use, it is tribal governments which exercise this jurisdiction. In the case of CWA Section 518, express Congressional language confirms that regulatory jurisdiction over Reservation waters inheres in Tribes.

EPA is of course no stranger to the pre-1987 federal court decisions affirming this aspect of tribal jurisdiction, inasmuch as it has successfully asserted this position against various challenges by state agencies and private interests. See Washington Dept. of Ecology v. EPA, 752 F.2d 1465 (9th Cir. 1985) (sustaining EPA's administrative policy that the Resources Conservation and Recovery Act did not authorize state jurisdiction over hazardous wastes on Indian reservations in the State of Washington); Phillips Petroleum Corp. v. EPA, 803 F.2d 545 (10th Cir. 1986); Nance v. EPA, 645 F.2d 701 (9th Cir. 1981). Accordingly, it is not necessary to engage in extended analysis of the federal cases.

It is worth nothing, however, that under Pub. L. 83-280, which transferred criminal jurisdiction and limited civil adjudicatory (not regulatory) jurisdiction over Reservations to certain States, including California, Indian tribes retain full authority to regulate rights reserved to them by treaty or federal statute. 25 U.S.C. § 1322(b). The reserved fishing and water rights of the Hoopa Valley Tribe are secured by an 1864 Act of Congress which authorized the 1876 Executive Order establishing the Reservation. See United States v. Eberhardt, 789 F.2d 1354, 1359 and -61 (9th Cir. 1986) (confirming that fishing rights on the Hoopa Valley Reservation are protected by the 1864 federal statute, which bars state regulation). Accord People v. McCovey, 205 Cal. Rptr. 643, 653, cert. denied 469 U.S. 1062 (1984). See also California v. Cabazon Band of Mission Indians, 107 S.Ct. 1083 (1987) (Public Law 83-280 did not vest California with civil regulatory jurisdiction over Indian reservations); and footnote 3/ above regarding BIA recognition of retained tribal authority over environmental regulation.

EPA's implementation of CWA Section 518 seems to recognize inherent tribal authority as described above:" . . . a Tribe will ordinarily have authority to administer Clean Water Act programs within reservation boundaries." 54 Fed. Reg. 14355 (emphasis added). Supplementary information to the most recent Proposed Rule amending 40 C.F.R. Part 131, Water Quality Standards, acknowledges that both Tribes and States have inherent authority, predating CWA Section 510, to set quality standards for waters within their respective territories. Section 510, 33 U.S.C. § 1310, functions as a "savings clause," in EPA's words, to confirm that while Congress intended to require compliance with minimum federal standards, it did not intend to restrict preexisting inherent authority of Tribes and States to establish standards stricter than federal standards. See attached letter of March 2, 1988 from Hoopa Valley Tribe to David Sabock, Chief, EPA Branch of Standards, commenting on earlier draft of amended regulations.

Finally, the Federal Register Notice under which the Tribe submits its petition for primacy requests a statement regarding the Tribe's ability to exercise emergency powers comparable to those granted the EPA Administrator in CWA Section 504. 54 Fed. Reg. 14358 (Interim Revision of 40 C.F.R. § 35.260(b). First, the Hoopa Valley Business Council is authorized to initiate legal actions in the name of the Tribe, and has standing in federal district court to seek injunctive relief from water pollution emergencies that threaten tribal resources, reserved rights, or the public health and safety. 28 U.S.C.§ 1362. Under this federal jurisdictional statute, a Tribe stands in the shoes of its trustee, the United States, and therefore may assert any claim the United States would be entitled to assert. Moe v. Confederated Salish and Kootenai Tribes., 425 U.S. 463 (1976). Second, the Council may bring actions in Tribal Court under its current exclusion and natural resources trespass laws. Council enactment in the near future of expanded environmental procedures laws and comprehensive riparian zone regulation, as well as ultimate establishment of water quality standards, will expand the Tribe's ability to use its own court system to respond to water pollution emergencies.

In sum, the Hoopa Valley Tribe clearly possesses the legal authority to comprehensively regulate water quality and use within the Hoopa Valley Reservation. The Tribe also possesses emergency response authority comparable to that of the EPA Administrator under CWA Section 504. Accordingly, EPA is respectfully urged to qualify the Tribe for treatment as a state under CWA Section 518(e)(2) for purposes of its Section 106 proposal and to authorize promulgation of tribal water quality standards. If any questions should be raised about the Tribe's authority as described herein, we hereby request an opportunity to respond before EPA makes any determination regarding our eligibility for treatment as a State. Thank you for your consideration.

Stephen H. Suagee
Legal Department
Hoopa Valley Tribe
Attorney for Hoopa Valley Tribe

SHS/ib
Enclosures
071189/certif/epa

Appendix B
Definitions

Definitions

For the purposes of this plan, the following words and phrases shall have the following meanings:

"Acute Conditions" are conditions in the physical, chemical, or biological environment which are expected or demonstrated to result in injury or death to an organism as a result of short-term exposure to a substance or detrimental environmental condition.

"Acute Toxicity" refers to a relatively short-term lethal or other adverse effect to an organism caused by pollutants, and usually defined as occurring within 4 days for fish and large invertebrates and shorter times for smaller organisms.

"Appropriate reference site or region" means a site on the same water body or within the same basin or eco-region that has similar habitat conditions, which is expected to represent the water quality and biological community attainable within the area(s) of concern.

"Aquatic species" means any plant or animal which lives at least part of their life cycle in water.

"Aquifer" means any geologic formation capable of yielding a significant amount of potentially recoverable water.

"Background conditions" means the biological, chemical, and physical conditions of a water body, outside and up-gradient of the area of influence of the point source discharge, nonpoint source, or in stream activity under consideration. For example, in rivers and streams background sampling locations would be upstream from the source or activity, but not upstream from other inflows. If several sources to any water body exist, background sampling would be undertaken immediately upstream from each source.

"Beneficial uses" means all lawful uses of water identified in the Water Quality Control Plan. Uses may include but are not limited to domestic, commercial, industrial, agricultural, traditional, cultural, recreational uses, and use by fish and wildlife for habitat or propagation.

"Best Management Practices" means physical, structural, and/or managerial practices that, when used singularly or in combination, prevent or reduce pollution.

"Benthic Macroinvertebrates" are organisms that, for at least a portion of their life cycle inhabit the bottom substrates of freshwater habitats. They are retained by a mesh size of >200 micrometers.

"Chronic toxicity" means a fairly long-term adverse effect to an organism (when compared to the life span of the organism) caused by or related to changes in feeding, growth, metabolism, reproduction, a pollutant, genetic mutation, etc. Short-term test methods for detecting chronic toxicity may be used.

"Council" means the Hoopa Valley Tribal Council.

"Critical conditions" means the physical, chemical, and biological characteristics of the receiving water that interact with the point source discharge, nonpoint source or in-stream activity to produce the greatest potential adverse impact on aquatic biota and existing or characteristic water uses.

"Cultural water use" means water which are used to support and maintain the way of life of the Hupa People including, but not limited to: use from in stream flow, habitat for fisheries and wildlife, and preservation of habitat for berries, roots, medicines and other vegetation significant to the values of the Hupa People.

"Damage to the ecosystem" means any demonstrated or predicted stress to aquatic or terrestrial organisms or communities of organisms which the department concludes may interfere with the health or survival success or natural structure and functioning of such populations. This stress may be due to alteration in habitat or changes in water temperature, chemistry, or turbidity or other causes. In making a determination regarding ecosystem damage, the department shall consider the cumulative effects of pollutants or incremental changes in habitat which may create stress over the long term.

"Designated use" means a use that is specified in water quality standards as a goal for a waterbody segment, whether or not it is currently being attained.

"Embeddedness" is an evaluation of the bottom substrate suitability, expressed as percent composition of rock size and/or type (fines, cobbles, boulders), needed to maintain the quality and integrity for survival of aquatic populations.

"EPA" means the United States Environmental Protection Agency.

"Escherichia coli (E. coli)" is a specific bacterial coliform used as an indicator for fecal contamination.

"Existing uses" means all uses actually attained in the waterbody on or after November 28, 1975, whether or not they are explicitly stated as designated uses in the water quality standards or presently existing uses.

"Fish Consumption" is expressed as the amount of fish in Kg consumed by residents of the Hoopa Valley Indian Reservation on a daily basis.

“Permit” means a document issued pursuant to tribal code or federal laws (such as NPDES, CWA, Section 401; CWA, Section 404) specifying the waste treatment and control requirements and waste discharge conditions.

“Persistent pollutant” means a pollutant which is slow to or does not decay, degrade, transform, volatilize, hydrolyze, or photolyze.

“Person” means any individual, corporation, partnership, association, agency, municipality, commission, or department, including the Hoopa Valley Tribe or other federally recognized tribal government.

“Pesticide” mans any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest. Also, any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant.

“Point source” means any discernible, confined and discrete conveyance, including but not limited to any pipe, ditch, channel, tunnel, conduit, culvert, well, discrete fissures, containers, rolling stock,, concentration animal feeding operation, vessel or other floating craft.

“Pollutant” means any substance that will alter the quality of the waters of the Reservation.

“Potential uses” means all uses attainable in the watebody, whether or not they are explicitly stated as designated uses in the water quality standards or presently potential uses.

“Quality of the water or waters” means any chemical, physical, biological, bacteriological, radiological, and other properties and characteristics of water which affect its use.

“Reservation” means all land, air and water located within the exterior boundaries of the Hoopa Valley Indian Reservation.

“Recharge Area” means any areas that collect precipitation or surface water which contributes to the aquifer. Recharge areas may include areas designated as wellhead protection areas.

“Resident aquatic community” means aquatic life expected to exist in a particular habitat when water quality standards for a specific eco-region, basin, or water body are met. This shall be established by accepted biomonitoring techniques.

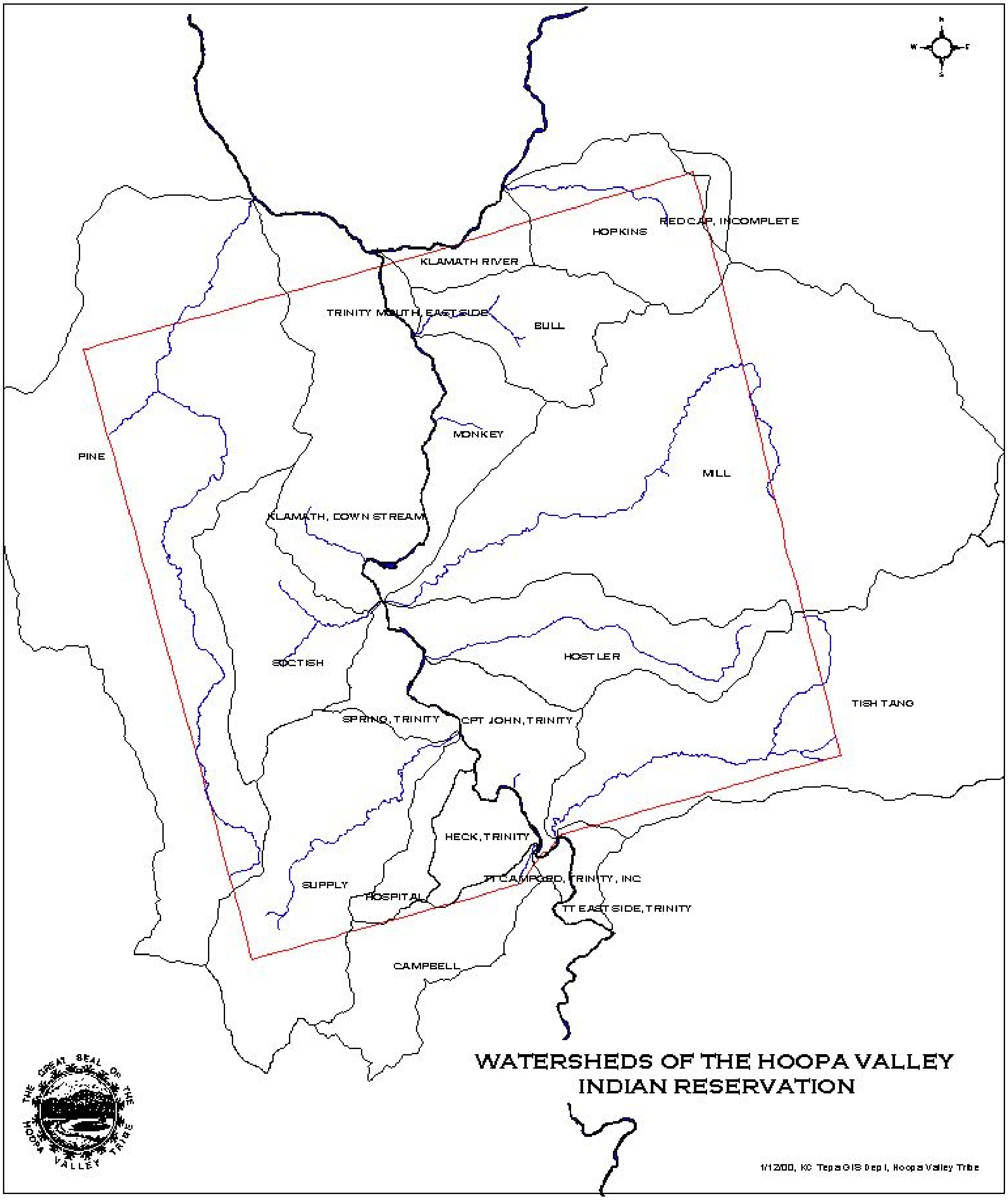
“Violations of water quality” means that when pollutants are discharged into waterways either directly or indirectly which result from human activities that were not planned, approved and/or permitted from a consortium of staff from Tribal EPA, Fisheries, Forestry and the Tribal cultural committee.

“Wellhead protection area” means the surface and subsurface area surrounding a water well or well field, supplying a domestic water system, through which contaminants are reasonably likely to move toward and reach such water well or well field.

“Wetland” means any area that is inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.

“Wildlife habitat” means the waters of the tribe used by, or that directly or indirectly provide food support to fish, other aquatic life, and wildlife for any life history stage or activity.

Appendix C
Tribal Watersheds


REDCAP, INCOMPLETE
HOPKINS
KLAMATH RIVER
TRINITY MOUTH, EAST SIDE
BULL
MONKEY
PINE
MILL
KLAMATH, DOWN STREAM
SOCTISH
HOSTLER
TISH TANG
SPRING, TRINITY
CPT JOHN, TRINITY
HECK, TRINITY
SUPPLY
HOSPITAL
TT CAMPGRD, TRINITY, INC
TT EAST SIDE, TRINITY
CAMPBELL
WATERSHEDS OF THE HOOPA VALLEY
INDIAN RESERVATION
THE GREAT SEAL OF THE HOOPA VALLEY TRIBE
1/12/00, KC Tepa GIS Dept, Hoopa Valley Tribe

Appendix D
Trinity River Temperature
Support Analysis

1997 - 2001
Water Quality Standards Triennial Review
Supporting Analysis

The Hoopa Valley Tribe's Environmental Protection Agency (TEPA) is responsible for protecting water quality within the Hoopa Reservation. To fulfill that responsibility, TEPA sets in-stream water quality standards for the Trinity River and connecting tributaries that originate and/or flow into the reservation. The standards are set with the goal of providing full protection to beneficial uses. Depending on the watershed, beneficial uses may include: drinking water, anadramous spawning and rearing, swimming, irrigation, hydropower, and other uses. Standards include narrative and numeric criteria and identification of the associated beneficial uses that they are intended to protect. The purpose of this document is to comply with the requirements of part 131.21 of the Clean Water Act as amended and provide the supporting analysis that determined the site-specific criteria development for certain constituents and temperature.

Review Process

Under Section 303 of the federal Clean Water Act, tribes must review their water quality standards every two or three years in order to incorporate the most recent scientific findings and to reflect evolving priorities within the tribe. The Hoopa Tribe, in establishing water quality standards, recognizes that new information is constantly being developed on water criteria and how water criteria affect different beneficial uses. Therefore, continued reevaluation of criteria information is needed to refine and revise water quality standards for the reservation over time. The Hoopa Tribe has adopted a triennial review process which begun in 1997 and is scheduled for completion by May 27th, 2000. The standards under review include: temperature, and three priority metal constituents. In addition, guidance for implementation of the Water Quality Control Plan's (WQCP) anti-degradation policy is also being updated, and protocols for wetland protection have been developed.

TEPA is the technical advisory body established for standards under review. TEPA's technical staff evaluates and revises the standards based on recent scientific advances. The process of revising standards follow the required Tribal Legislative Procedures Act and Clean Water Act, section 303(c) (1) by notifying the general public, holding public hearings, and responding to comments on the standards. Public legal notices have been published in newspapers circulated from Humboldt to Fresno County. Following completion of the public process, the revised standards will be submitted to EPA Region IX for Section 7 consultation with cognizant federal agencies. Under 33 U.S.C. § 1313 (a) EPA must notify the Tribe within 90 days of submission of standards whether its revised standards satisfy the Clean Water Act.

The summaries below provide a brief overview of the reasons for revising each standard, and the proposed revision. Details on the scientific and policy rational for the standard changes is provided in this document.

Introduction
Tribal temperature objectives consist of two parts: 1) objectives that directly relate to the flows in the Trinity River, and 2) numeric temperature standards that deal with point and non-point source temperature management in the Trinity River. These objectives and standards agree with and support the Trinity River Flow Evaluation (TRFE) particularly with regard to the TRFE's flow regime and resultant temperatures. The aim of the objectives/standards is to provide protection for the survival, growth, and reproduction of anadromous fish and other aquatic life, such that ceremonial and cultural values of the Tribe and other beneficial uses are maintained. In odd years the Hoopa Tribe conducts ceremonies integral to the Hoopa's religion and culture. These ceremonies require sufficient flow in the mainstem of the Trinity River to facilitate the "Boat Dance" ceremony. This requirement is protected under the American Indian Religious Freedom Act (P.L. 95 – 341).

Trinity River Temperature Objectives
The Hoopa Valley Tribe's Trinity River temperature criteria (Table 1) are based on temperature-flow relationship that maintains TRFE flow regimes and protects adult salmonids holding and spawning. The approach of adopting the TRFE flow regime as temperature objectives recognizes the importance of temperature variation through the year to the life history stages and development of anadromous fish species. The Tribe's Trinity River temperature objectives were established by Tribal Environmental Protection Agency in cooperation with Tribal Fisheries, U.S. Fish & Wildlife Service, North Coast Regional Water Quality Control Board (NCRWQCB) and U.S. Environmental Protection Agency. In June of 1999, the Hoopa Valley Tribe, U.S. Bureau of Reclamation (USBR), and U.S. Fish and Wildlife Service (USFWS), published the TRFE. The TRFE represents the most thorough state-of-the-art science report on regulated flow releases and related actions designed to restore and maintain the riverine ecology of the upper mainstem Trinity River. The TRFE establishes temperature objectives consistent with the NCRWQCB's temperature criteria above Douglas City. Temperatures will be monitored based on water-year type as established in the TRFE by inflow into the Trinity River Reservoir each spring. The USBR determines water-year type. The Hoopa Valley Tribe's temperature objectives agree precisely with those outlined in the TRFE preferred alternative and are consistent with temperature objectives as specified in the NCRWQCB temperature standards for the Trinity River below Lewiston Dam and downstream to Douglas City and the confluence of the North Fork Trinity. The Tribe's temperature objectives do not require additional flows over and above those required by TRFE. Temperatures recorded at Weitchpec will be utilized to determine compliance with the Trinity River standards. Therefore, continued reevaluation of temperature information is needed to refine and revise temperature standards for the reservation over time. The Tribe also recognizes that the development and implementation of control technologies and best management practices to reduce human caused warming are ongoing and the achievement of the optimal temperature standard will be an evolutionary process. The Hoopa Tribe will initiate Clean Water Act triennial review amendments, which are consistent with the Adaptive Environmental Assessment and Management (AEAM) principles, outlined in the TRFE as appropriate.

(Table 1) Temperature criteria are specified by seasonal time frames and water-year type.

Running 7-Day Average	Temperature	Not to Exceed			
Water-Year Type	May 23 to June 4	June 5 to July 9	July 10 to September14	September 15 to October 31	November 1 to May 22
Extremely Wet, Wet and Normal	≤ 59°F or 15.0°C	≤62.6°F or 17.0°C	≤ 72.0°F or 22.1°C	≤ 66.0°F or 19.0°C	≤ 55.4°F or 13.0°C
	May 23 to June 4	June 5 to June 15	June 16 to September 14	September 15 to October 31	November 1 to May 22
Dry and Critically Dry	≤ 62.6°F or 17.0°C	≤ 68°F or 20.0°C	≤ 74.0°F or 23.5 °C *	≤ 66.0°F or 19.0°C	≤ 59.0°F or 15.0°C

*For the seasonal period of June 16th through September 14th temperatures on the mainstem Trinity River at the Weitchpec gauging station were used to determine running seven-day averages.

Tribal Trinity River temperature standards have been established for the portion of the Trinity River that flows through the Hoopa Valley Indian Reservation and are adjusted according to the hydrologic conditions of the year. Temperature standards will be monitored at the Weitchpec temperature monitoring station operated and maintained by the U.S. Bureau of Reclamation.

Development Process

The development of Tribal temperature standards to address TRFE flow regimes provided a significant challenge to TEPA staff. The over riding goal of the Tribal temperature standards is to achieve compliance with flow regimes and resulting water temperatures specified in preferred alternative of the TRFE.

The TRFE and NCRWQCB recommend temperature objectives for the Trinity River at Weitchpec throughout year with the exception of the period from June 16th through October 31st. For this period, Tribal temperature criteria are derived directly from ambient temperature data recorded at the U.S. Bureau of Reclamation's Weitchpec gauging station since 1991. The recommended base flow of 450 cfs has occurred during this period since 1991. The recorded temperatures for June 16th to October 31st were used to construct an 8-year historical temperature sequence (Table 2)[1]. These temperature values were calculated using a 7-day running average for each temperature period from June 16th through October 31st. Calculating the 7-day running average involves taking the average daily temperatures and averaging it with the prior six days sequentially throughout the sample period. These results were then queried for an upper temperature value that was not exceeded more than 90% within the given time period, (i.e., 10% or less of the 7-day running averages exceeded the upper temperature value). The temperatures shown in (Table 2) represent the upper 7-day running averages that

[1] Water temperatures at Weitchpec were not recorded in 1995 and not included in the USBR's temperature record from 1991 to 1999.

occurred in each sample period. Individual years were then grouped into two categories that consisted of "Dry and Critically Dry" and "Wet, Extremely Wet, and Normal" hydrologic conditions. Within each category an upper temperature mean was established. The temperature mean for each category is the standard for that time period. For the period of June 16th to September 14th during Critically Dry and Dry years, 23.7 °C was determined to be the upper temperature standard not to be exceeded. During Normal, Wet, and Extremely Wet years from July 10th through September 14th, 22.3°C was determined to be the upper temperature standard not to be exceeded. The same analytical process was used to establish temperature criteria for September 15th through October 31st in "Dry and Critically Dry" and "Wet, Extremely Wet, and Normal" hydrologic conditions. Since the seasonal time frames were refined late in the process through further consultation, the 7-day running average was re-evaluated and the final standard for the period of September 15 through October 31st in Extremely Wet, Wet, and Normal water years was adjusted from 16º C to 19º C.

(Table 2). 7-day running average temperatures for times frames from June 16th through October 31st.

Dry & Critically water years	June16-Sept14	Sept 15-Oct 31
91	23.6	20.2
92	23.9	19
94	23.6	ND
Average	23.7	19.6
Extremely Wet, Wet, &Normal	July10-Sept14	Sept 15-Oct 31
93	21.4	18.5
95	ND	ND
96	23.4	ND
97	23	18.5
98	22.2	19.7
99	21.4	
Average	22.28	18.9

ND = No data, the record sequence was incomplete for analysis.

Achieving the natural temperature regime for the lower Trinity River is the focus of the Tribal standard. Trinity River Basin anadromous species have developed on an evolutionary time scale, the ability to utilize the variety of temperature regimes found in different reaches and segments within the river at different seasonal periods. Historically, the Trinity River had a natural tendency to warm as flows move in a downstream direction even under natural conditions. Recorded summer temperatures for the Trinity River at Weitchpec from 1991-1999 exceed those that are optimal for cold-water species, as recommended in published literature, for a several week period each summer. Bell (1984) found the upper lethal limit for chinook salmon to be 77ºF (25ºC). According to EPA and NMFS (1971), temperatures of 70ºF (21º) were directly lethal to more than 50 percent of the adult salmon and steelhead exposed to that temperature. Typically, maximum Trinity River temperatures recorded at Weitchpec are the warmest from July through August when incoming solar radiation levels are high, air temperature are high, days are long and flows are low. The salmonid life history stages that occur during these months include upstream migration of adults, holding, and spawning. The seasonal period which adult salmonids are present within the boundaries of the Reservation have been assessed in the Tribal net-harvest fishery. The adult salmonid species harvested in the Tribal gill-net fishery include, chinook salmon, coho salmon, and steelhead trout. The adult species harvested in the gill-net fishery within each temperature period from 1991 through 1999, are shown in (Table 3). Examinations of harvest data for adult coho reveals that coho are harvested in the late fall when temperatures are cooler 66º F and below. Trinity River basin anadromous species have developed on an evolutionary time scale, both juveniles and adults exhibit a unique ability to utilize a variety of temperature regimes found in different reaches and segments within the river at different times. The long-term trend for temperature must be monitored and improvements must be demonstrated. If monitoring show that temperatures continue to increase, HVT will employ adaptive management strategies until such time that the trend is toward lower temperatures. This management approach gives the Tribe a framework for improving temperature conditions in the lower Trinity while allowing the continuation of TRFE flow requirements. First, this approach will lead to the generation of data needed for study of riverine ecology. Second, land use activities that influence river temperature will be subject to regulatory requirements that are already understood by watershed managers. Finally, point and non-point source impacts can be assessed in the context of the overall temperature impacts and available control practice and technology.

Specific research will be used to identify temperature suitability criteria for adult chinook salmon that migrate, and hold in the lower Trinity River during this summer period. In the fall of 2000, the Tribe conducted contour and thermal mapping of eight miles of the Trinity River that lies with the Reservation. This study delineated cold-water refugia (i.e. pool stratification and cold water areas) and the influence of diurnal fluctuations on adult survival. As new scientific information becomes available the temperature standards will be evaluated through the triennial review process required by the Clean Water Act.

Temperature standard violation(s) will be determined if > 10 % of seven-day running averages exceed the standard. The 10 % exceedance will be determined on the number of days exceeded for that seasonal period. For example, for the seasonal period of June 16th through September 14th (91 days), 10 % exceedance will equate to nine days. If temperature standards cannot be met due to unusually excessive ambient air temperatures coupled with TRFE level flows, enforcement action will not be pursued against USBR. Excessive air temperature will be determined if the measured 7-day average air temperature during the previous seven-day period of the year exceeds the 90th percentile of the seven-day average daily maximum air temperature calculated in a June 16th through September 14th series over the historic record available within the basin.

Point and Non-Point Temperature Objectives

Hoopa's temperature standards establish numeric criteria designed to protect designated beneficial uses and to provide a basis from which to initiate actions to control human-caused sources that adversely increase stream temperatures. Human-caused activities that affect surface water temperatures include discharge of heated water, widening streams, or reduction of stream shading, flows and depth. These human-caused modifications, as well as others, increase water temperatures. Natural surface water temperatures at times exceed the numeric criteria due to naturally high ambient air temperatures, naturally low stream flows, streamside shade, solar radiation, and or other natural conditions. These exceedances are not water quality standard violations when the natural conditions themselves cause water temperatures to exceed the numeric criteria. In surface waters where both natural and human-caused factors cause exceedances of the numeric criteria, each human-caused source will be responsible for controlling that portion of the increase caused by the human activity. This will be determined through the use of baseline data, when it exist, in conjunction with temperature monitoring upstream and down-stream of the human-caused source. The Tribal Forestry Department and Tribal Environmental Protection Agency will establish, implement, and improve practices in order to reduce thermal loads to achieve and maintain the surface water temperature criteria. Federal forest management agencies are required by the federal Clean Water Act to meet or exceed the substantive requirements of Tribe's non-point source program. The requirement for a surface water temperature management plan and the content of the plan will be appropriate to the contribution the permitted source makes to the temperature problem, the technologies and practices available to reduce thermal loads, and the potential for trading or mitigating thermal loads. These measures will be implemented sufficiently to assure attainment of running 7-day average temperatures of 21°C during the July 10 – September 14 period of each year (June 16 – September 14 in dry and critically dry years) within five years of adoption of these standards.

Reservation Tributary Temperatures

There are seven major tributaries to the Trinity and Klamath Rivers that run through the Hoopa Valley Indian Reservation and provide significant habitat for resident and anadromous species. The headwaters of these streams originate off the Reservation with the exception of Hostler and Soctish Creeks. These tributaries support different uses by anadromous fish than the mainstem Trinity thus requiring a different set of temperature standards. Since the tributaries support the incubation and rearing of fishes, temperatures must be adequate to support the most sensitive life stages of salmonids. Therefore, the following standards (Table 4) apply to the entire length of all tributaries existing within the exterior boundaries of the Reservation. Temperature exceedences will be documented as running seven-day average for each time period. A watershed will be considered to have exceeded the temperature standard when 2 or more exceedences occur during the rearing period and/or 3 or more during adult migration and maintenance period. If a watershed documents exceedence of the temperature standard for 3 or more years within the 10-year assessment period it will be considered as a violation of the standard. If however, land management activities are modified in such a way as to influence a reduction in stream temperatures within the 10 year assessment period then the watershed will be placed into recovery status and will be evaluated for an additional 3 years before making a final determination of Watershed Impairment. Stream temperatures shall not exceed 20°C due to human activities for the period of June 16th to October 14th. In addition, when natural conditions exceed 20°C, no temperature increase will be allowed which will raise the receiving water temperature by greater than 0.3°C. In the case when natural surface water temperatures exceed the numeric criteria due to naturally high ambient air temperatures and/or with abnormally low stream flows due to drought conditions, temperatures that surpass the criteria will not be documented as “exceedences under normal conditions”.

Table 4 Stream Temperature Criteria for the Hoopa Valley Indian Resevation.

Designated Use	Running Seven-day Average Temperature Not to Exceed	Period
SPWN, COLD, MGR, T&E, WILD, GWR, *CUL and/or BIOL	62.6°F or 17°C	October 15 to June 15
MUN,REC-1, REC-2, COLD, AGR, PROC, IND, and POW	68°F or 20°C	June 16 to October 14

- The Hoopa Valley Tribe defines “Ceremonial and Religious Water Use (CUL)” as the use of a river, stream, reach, or lake for religious purposes by members of the Hoopa Valley Tribe; such use involves immersion, provision of adequate instream flows for the Boat Dance ceremony, and suitable water-temperature for ensuring the presence and consumption of anadromous salmonids for ceremonial purposes.

Year	Water Year Class	Seven-Day Running Average Temperatures recorded 90% or more for (June 16 - Oct. 1) and (July 10 – Oct 1)
91	Critically Dry	23.1° C
92	Dry	23.8° C
93	Wet	20.9° C
94	Critically Dry	23.5° C
96	Wet	23.2° C
97	Wet	22.9° C
98	Extremely Wet	22.2° C
99	Wet	21.4° C

Appendix E
Preliminary Remediation Goals

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

October 1, 1999

Subject: Region 9 Preliminary Remediation Goals (PRGs) 1999

From: Stanford J. Smucker, Ph.D.
Regional Toxicologist (SFD-8-B)
Technical Support Team

To: PRG Table Mailing List

Please find the annual update to the Region 9 PRG (Preliminary Remediation Goals) table. Risk-based PRGs presented in the "lookup" table are useful tools for evaluating and cleaning up contaminated sites. They are being used to streamline and standardize all stages of the risk decision-making process. If you are not currently on the PRG table mailing list but would like to be, please call Lynn Trujillo (415.744.2419) or email her (Trujillo.Dianna@epamail.epa.gov) and leave your name, address, and phone number.

EPA Region 9 has established a homepage for the PRGs on the World Wide Web which you can find at **http://www.epa.gov/region09/waste/sfund/prg/** . The PRG homepage presents additional information not available in the printed tables that are sent out to folks; including pathway-specific screening concentrations, non-cancer PRGs for carcinogenic substances, and physical-chemical information for volatile organic compounds (VOCs). This information may be viewed or downloaded at our website.

Region 9 risk-based PRGs are "evergreen" and have evolved as new methodologies and parameters have been developed. Changes to individual PRGs that have occurred from the 1998 table reflect either updates in toxicity information or a reclassification of a chemical's status as a VOC. These chemical-specific changes are identified by boldface type in the table. In addition, a more global change in the PRG numeric values reflects new exposure guidelines presented in "Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim Guidance" (USEPA 1999a, see Section 4.3).

Chemicals for which toxicity values have been revised or added include: **acetonitrile, aluminum, antimony trioxide, chlordane, chlorobenzene, chloroethane, chloroform, chloromethane, chromium VI, dichlorobenzene isomers, ethyl chloride, manganese, nitroglycerin, 4-nitrophenol, PCBs, 1,1,2,2-tetrachloroethane, and tetrahydrofuran.** Updates to EPA toxicity values were obtained from IRIS and the National Center for Environmental Assessment (NCEA) through August 1999.

Chemicals for which the VOC status has changed in an effort to reconcile differences among the regions include: **chloronitrobenzene isomers, cyanogen and its salts, methylcyclohexane,**

methylene bromide, and the nitrotoluene isomers. The criteria for VOC status are taken from RAGS Part B. However, three “borderline chemicals” (**dibromochloromethane, 1,2-dibromochloropropane, and pyrene**) that do not strictly meet the RAGS criteria of volatility have also been included based upon discussions with other state and federal agencies and after a consideration of vapor pressure characteristics etc.

Before relying on any number in the table, it is recommended that the user verify the numbers with an agency toxicologist or risk assessor because the toxicity / exposure information in the table may contain errors or default assumptions that need to be refined based on further evaluation. If you find an error please send me a note via email at smucker.stan@epamail.epa.gov or fax at 415.744.1916.

DISCLAIMER

Preliminary remediation goals (PRGs) focus on common exposure pathways and may not consider all exposure pathways encountered at CERCLA / RCRA sites (Exhibit 1-1). PRGs do not consider impact to groundwater or address ecological concerns. PRGs are specifically not intended as a (1) stand-alone decision-making tool, (2) as a substitute for EPA guidance for preparing baseline risk assessments, or (3) a rule to determine if a waste is hazardous under RCRA.

The guidance set out in this document is not final Agency action. It is not intended, nor can it be relied upon to create any rights enforceable by any party in litigation with the United States. EPA officials may decide to follow the guidance provided herein, or act at variance with the guidance, based on an analysis of specific circumstances. The Agency also reserves the right to change this guidance at any time without public notice.

1.0 INTRODUCTION

Region 9 Preliminary Remediation Goals (PRGs) are risk-based tools for evaluating and cleaning up contaminated sites. They are being used to streamline and standardize all stages of the risk decision-making process.

The Region 9 PRG table combines current EPA toxicity values with "standard" exposure factors to estimate contaminant concentrations in environmental media (soil, air, and water) that are considered protective of humans, including sensitive groups, over a lifetime. Chemical concentrations above these levels would not automatically designate a site as "dirty" or trigger a response action. However, exceeding a PRG suggests that further evaluation of the potential risks that may be posed by site contaminants is appropriate. Further evaluation may include additional sampling, consideration of ambient levels in the environment, or a reassessment of the assumptions contained in these screening-level estimates (e.g. appropriateness of route-to-route extrapolations, appropriateness of using chronic toxicity values to evaluate childhood exposures, appropriateness of generic exposure factors for a specific site etc.).

The PRG concentrations presented in the table can be used to screen pollutants in environmental media, trigger further investigation, and provide an initial cleanup goal if applicable. When considering PRGs as preliminary goals, residential concentrations should be used for maximum beneficial uses of a property. Industrial concentrations are included in the table as an alternative cleanup goal for soils. In general, it is not recommended that industrial PRGs be used for screening sites unless they are used in conjunction with residential values.

Before applying PRGs as screening tools or initial goals, the user of the table should consider whether the exposure pathways and exposure scenarios at the site are fully accounted for in the PRG calculation. Region 9 PRG concentrations are based on exposure pathways for which generally accepted methods, models, and assumptions have been developed (i.e. ingestion, dermal contact, and inhalation) for specific land-use conditions and do not consider impact to groundwater or ecological receptors (see Developing a Conceptual Site Model below).

EXHIBIT 1-1
TYPICAL EXPOSURE PATHWAYS BY MEDIUM
FOR RESIDENTIAL AND INDUSTRIAL LAND USES[a]

EXPOSURE PATHWAYS, ASSUMING:		
MEDIUM	RESIDENTIAL LAND USE	INDUSTRIAL LAND USE
Ground Water	***Ingestion from drinking***	Ingestion from drinking
	Inhalation of volatiles	Inhalation of volatiles
	Dermal absorption from bathing	Dermal absorption
Surface Water	***Ingestion from drinking***	Ingestion from drinking
	Inhalation of volatiles	Inhalation of volatiles
	Dermal absorption from bathing	Dermal absorption
	Ingestion during swimming	
	Ingestion of contaminated fish	
Soil	***Ingestion***	***Ingestion***
	Inhalation of particulates	***Inhalation of particulates***
	Inhalation of volatiles	***Inhalation of volatiles***
	Exposure to indoor air from soil gas	Exposure to indoor air from soil gas
	Exposure to ground water contaminated by soil leachate	Exposure to ground water contaminated by soil leachate
	Ingestion via plant, meat, or dairy products	Inhalation of particulates from trucks and heavy equipment
	Dermal absorption	***Dermal absorption***

Footnote:
[a]Exposure pathways considered in the PRG calculations are indicated in boldface italics.

2.0 READING THE PRG TABLE

2.1 General Considerations

With the exceptions described below, PRGs are chemical concentrations that correspond to fixed levels of risk (i.e. either a one-in-one million [10^{-6}] cancer risk or a noncarcinogenic hazard quotient of 1) in soil, air, and water. In most cases, where a substance causes both cancer and noncancer (systemic) effects, the 10^{-6} cancer risk will result in a more stringent criteria and consequently this value is presented in the hard copy of the table. PRG concentrations that equate to a 10^{-6} cancer risk are indicated by "ca". PRG concentrations that equate to a hazard quotient of 1 for noncarcinogenic concerns are indicated by "nc".

If the risk-based concentrations are to be used for site screening, it is recommended that both cancer and noncancer-based PRGs be used. Both carcinogenic and noncarcinogenic values may be obtained at the Region 9 PRG homepage at:

http://www.epa.gov/region09/waste/sfund/prg/

It has come to my attention that some users have been multiplying the cancer PRG concentrations by 10 or 100 to set "action levels" for triggering remediation or to set less stringent cleanup levels for a specific site after considering non-risk-based factors such as ambient levels, detection limits, or technological feasibility. This risk management practice recognizes that there may be a range of values that may be "acceptable" for carcinogenic risk (EPA's risk management range is one-in-a-million [10^{-6}] to one-in-ten thousand [10^{-4}]). However, this practice could lead one to overlook serious noncancer health threats and it is strongly recommended that the user consult with a toxicologist or regional risk assessor before doing this. For carcinogens, I have indicated by asterisk ("ca*") in the PRG table where the noncancer PRGs would be exceeded if the cancer value that is displayed is multiplied by 100. Two stars ("ca**") indicate that the noncancer values would be exceeded if the cancer PRG were multiplied by 10. There is no range of "acceptable" noncarcinogenic "risk" so that under no circumstances should noncancer PRGs be multiplied by 10 or 100, when setting final cleanup criteria.

In general, PRG concentrations in the table are risk-based but for soil there are two important exceptions: (1) for several volatile chemicals, PRGs are based on the soil saturation equation ("sat") and (2) for relatively less toxic inorganic and semivolatile contaminants, a non-risk based "ceiling limit" concentration is given as 10^{+5} mg/kg ("max").

Also included in the PRG table are California EPA PRGs ("CAL-Modified PRGs") for specific chemicals where CAL-EPA screening values may be “significantly” more restrictive than the federal values; and, soil screening levels (SSLs) for protection of groundwater (see Section 2.3 below).

2.2 Toxicity Values

<u>Heirarchy of Toxicity Values</u>

EPA toxicity values, known as noncarcinogenic reference doses (RfD) and carcinogenic slope factors (SF) were obtained from IRIS, NCEA (formerly ECAO) through August 1999, and HEAST. The priority among sources of toxicological constants has changed since the last iteration of the table because the HEAST tables are no longer being updated. Therefore, the revised order of preference is as follows: (1) IRIS (indicated by "i"), (2) NCEA ("n"), (3) HEAST ("h"), (4) withdrawn from IRIS or HEAST and under review ("x") or obtained from other EPA documents ("o").

Inhalation Conversion Factors

As of January 1991, IRIS and NCEA databases no longer present RfDs or SFs for the inhalation route. These criteria have been replaced with reference concentrations (RfC) for noncarcinogenic effects and unit risk factors (URF) for carcinogenic effects. However, for purposes of estimating risk and calculating risk-based concentrations, inhalation reference doses (RfDi) and inhalation slope factors (SFi) are preferred. This is not a problem for most chemicals because the inhalation toxicity criteria are easily converted. To calculate an RfDi from an RfC, the following equation and assumptions may be used for most chemicals:

Likewise, to calculate an SFi from an inhalation URF, the following equation and assumptions may be used:

Substances with New Toxicity Values

To help users rapidly identify substances with new toxicity values, these chemicals are printed in boldface type. This issue of the PRG table contains new or revised toxicity values for **acetonitrile, aluminum, antimony trioxide, chlordane, chlorobenzene, chloroethane, chloroform, chloromethane, chromium VI, dichlorobenzene isomers, ethyl chloride, manganese, nitroglycerin, 4-nitrophenol, PCBs, 1,1,2,2-tetrachloroethane, and tetrahydrofuran**.

Route-to-Route Methods

Route-to-route extrapolations ("r") were frequently used when there were no toxicity values available for a given route of exposure. Oral cancer slope factors ("SFo") and reference doses ("RfDo") were used for both oral and inhaled exposures for organic compounds lacking inhalation values. Inhalation slope factors ("SFi") and inhalation reference doses ("RfDi") were used for both inhaled and oral exposures for organic compounds lacking oral values. Route extrapolations were not performed for inorganics due to portal of entry effects and known differences in absorption efficiency for the two routes of exposure.

An additional route extrapolation is the use of oral toxicity values for evaluating dermal exposures. For many chemicals, a scientifically defensible data base does not exist for making an adjustment of an oral slope factor/RfD to estimate a dermal toxicity value. Based on the current guidance (USEPA 1999a), the only chemical for which an adjustment is recommended is cadmium. An oral absorption efficiency of 5% is assumed for cadmium which leads to an estimated dermal reference dose (RfDd) of 2.5E-05. Please note that the 1999 PRG calculations for cadmium are based on this adjustment.

Although route-to-route methods are a useful screening procedure, the appropriateness of these default assumptions for specific contaminants should be verified by a toxicologist or regional risk assessor. Please note that whenever route-extrapolated values are used to calculate risk-based PRGs, additional uncertainties are introduced in the calculation.

2.3 Soil Screening Levels

Generic, soil screening levels (SSLs) for the protection of groundwater have been included in the PRG table for 100 of the most common contaminants at Superfund sites. Generic SSLs are derived using default values in standardized equations presented in *Soil Screening Guidance* (available from NTIS as document numbers PB96-963502 and PB96-963505 or EPA/540/R-95/128 and EPA/540/R-96/018).

The SSLs were developed using a default dilution-attenuation factor (DAF) of 20 to account for natural processes that reduce contaminant concentrations in the subsurface. Also included are generic SSLs that assume no dilution or attenuation between the source and the receptor well (i.e., a DAF of 1). These values can be used at sites where little or no dilution or attenuation of soil leachate concentrations is expected at a site (e.g., sites with shallow water tables, fractured media, karst topography, or source size greater than 30 acres).

In general, if an SSL is not exceeded for the migration to groundwater pathway, the user may eliminate this pathway from further investigation.

2.4 Miscellaneous

Volatile organic compounds (VOCs) are indicated by "1" in the VOC column of the table and in general, are defined as those chemicals having a Henry's Law constant greater than 10^{-5} (atm-m^3/mol) and a molecular weight less than 200 g/mole). Three borderline chemicals (dibromochloromethane, 1,2-dibromochloropropane, and pyrene) which do not strictly meet these criteria of volatility have also been included based upon discussions with other state and federal agencies and after a consideration of vapor pressure characteristics etc. Volatile organic chemicals are evaluated for potential volatilization from soil/water to air using volatilization factors (see Section 4.1).

Chemical-specific dermal absorption values for contaminants in soil and dust are presented for arsenic, cadmium, chlordane, 2,4-D, DDT, lindane, TCDD, PAHs, PCBs, and pentachlorophenols as recommended in the "Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim Guidance" (USEPA 1999a). Otherwise, default skin absorption fractions are assumed to be 0.10 for nonvolatile organics. Please note that previous defaults of 0.01 and 0.10 for inorganics and VOCs respectively, have been withdrawn per new guidance.

3.0 USING THE PRG TABLE

The decision to use PRGs at a site will be driven by the potential benefits of having generic risk-based concentrations in the absence of site-specific risk assessments. The original intended use of PRGs was to provide initial cleanup goals for individual chemicals given specific medium and land-use combinations (see RAGS Part B, 1991), however risk-based concentrations have several applications. They can also be used for:

- Setting health-based detection limits for chemicals of potential concern
- Screening sites to determine whether further evaluation is appropriate
- Calculating cumulative risks associated with multiple contaminants

A few basic procedures are recommended for using PRGs properly. These are briefly described below. Potential problems with the use of PRGs are also identified.

3.1 Developing a Conceptual Site Model

The primary condition for use of PRGs is that exposure pathways of concern and conditions at the site match those taken into account by the PRG framework. Thus, it is always necessary to develop a conceptual site model (CSM) to identify likely contaminant source areas, exposure pathways, and potential receptors. This information can be used to determine the applicability of PRGs at the site and the need for additional information. For those pathways not covered by PRGs, a risk assessment specific to these additional pathways may be necessary. Nonetheless, the PRG lookup values will still be useful in such situations for focusing further investigative efforts on the exposure pathways not addressed.

To develop a site-specific CSM, perform an extensive records search and compile existing data (e.g. available site sampling data, historical records, aerial photographs, and hydrogeologic information). Once this information is obtained, CSM worksheets such as those provided in ASTM's *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites* (1995) can be used to tailor the generic worksheet model to a site-specific CSM. The final CSM diagram represents linkages among contaminant sources, release mechanisms, exposure pathways and routes and receptors. It summarizes our understanding of the contamination problem.

As a final check, the CSM should answer the following questions:

- Are there potential ecological concerns?
- Is there potential for land use other than those covered by the PRGs (that is, residential and industrial)?
- Are there other likely human exposure pathways that were not considered in development of the PRGs (e.g. impact to groundwater, local fish consumption, raising beef, dairy, or

other livestock)?

- Are there unusual site conditions (e.g. large areas of contamination, high fugitive dust levels, potential for indoor air contamination)?

If any of these four conditions exist, the PRG may need to be adjusted to reflect this new information. Suggested references for evaluating pathways not currently evaluated by Region 9 PRG's are presented in Exhibit 3-1.

EXHIBIT 3-1
SUGGESTED READINGS FOR EVALUATING EXPOSURE PATHWAYS NOT CURRENTLY ADDRESSED BY REGION 9 PRGs

EXPOSURE PATHWAY	REFERENCE
Migration of contaminants to an underlying potable aquifer	*Soil Screening Guidance* (USEPA 1996a,b), *Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites* (ASTM 1995)
Ingestion via plant uptake	*Soil Screening Guidance* (USEPA 1996a,b)
Ingestion via meat, dairy products, human milk	*Estimating Exposure to Dioxin-Like Compounds* (USEPA 1994a)
Inhalation of volatiles that have migrated into basements	*User's Guide for Johnson and Ettinger (1991) Model for Subsurface Vapor Intrusion into Buildings* (USEPA 1997a)
Ecological pathways	*Ecological Risk Assessment: Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments*, (USEPA 1997b), *Guidance for Ecological Risk Assessment at Hazardous Waste Sites and Permitted Facilities* (CAL-EPA 1996)

3.2 Background Levels Evaluation

A necessary step in determining the usefulness of Region 9 PRGs is the consideration of background contaminant concentrations. EPA may be concerned with two types of background at sites: naturally occurring and anthropogenic. Natural background is usually limited to metals whereas anthropogenic (i.e. human-made) “background” includes both organic and inorganic contaminants. Before embarking on an extensive sampling and analysis program to determine local background concentrations in the area, one should first compile existing data on the subject. Far too often there is pertinent information in the literature that gets ignored, resulting in needless expenditures of time and money.
Generally EPA does not clean up below natural background. In some cases, the predictive risk-

based models generate PRG levels that lie within or even below typical background. If natural background concentrations are higher than the risk-based PRGs, an adjustment of the PRG is probably needed. Exhibit 3-2 presents summary statistics for selected elements in soils that have background levels that may exceed risk-based PRGs. An illustrative example of this is naturally occurring arsenic in soils which frequently is higher than the risk-based concentration set at a one-in-one-million cancer risk (the PRG for residential soils is 0.39 mg/kg). After considering background concentrations in a local area, EPA Region 9 has at times used the non-cancer PRG (22 mg/kg) to evaluate sites recognizing that this value tends to be above background levels yet still falls within the range of soil concentrations (0.39-39 mg/kg) that equates to EPA's "acceptable" cancer risk range of 10E-6 to 10E-4.

Where anthropogenic "background" levels exceed PRGs and EPA has determined that a response action is necessary and feasible, EPA's goal will be to develop a comprehensive response to the widespread contamination. This will often require coordination with different authorities that have jurisdiction over the sources of contamination in the area.

EXHIBIT 3-2
BACKGROUND CONCENTRATIONS OF SELECTED ELEMENTS IN SOILS

TRACE	**U.S. STUDY DATA[1]**			**CALIFORNIA DATA[2]**		
ELEMENT	Range	GeoMean	ArMean	Range	GeoMean	ArMean
Arsenic	<.1-97	5.2 mg/kg	7.2 mg/kg	0.59-11	2.75 mg/kg	3.54 mg/kg
Beryllium	<1-15	0.63 "	0.92 "	0.10-2.7	1.14 "	1.28 "
Cadmium	<1-10	--	<1	0.05-1.7	0.26	0.36
Chromium	1-2000	37	54	23-1579	76.25	122.08
Nickel	<5-700	13	19	9.0-509	35.75	56.60

[1]Shacklette and Hansford, "Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States",USGS Professional Paper 1270, 1984.

[2]Bradford et. al, "Background Concentrations of Trace and Major Elements in California Soils", Kearney Foundation Special Report, UC-Riverside and CAL-EPA DTSC, March 1996.

3.3 Screening Sites with Multiple Pollutants

A suggested stepwise approach for PRG-screening of sites with multiple pollutants is as follows:

- Perform an extensive records search and compile existing data.

- Identify site contaminants in the PRG table. Record the PRG concentrations for various media and note whether PRG is based on cancer risk (indicated by "ca") or noncancer hazard (indicated by "nc"). Segregate cancer PRGs from non-cancer PRGs and exclude (but don't eliminate) non-risk based PRGs ("sat" or "max").

- For cancer risk estimates, take the site-specific concentration (maximum or 95 UCL) and divide by the PRG concentrations that are designated for cancer evaluation ("ca"). Multiply this ratio by 10^{-6} to estimate chemical-specific risk for a reasonable maximum exposure (RME). For multiple pollutants, simply add the risk for each chemical:

$$Risk = [(\frac{conc_x}{PRG_x}) + (\frac{conc_y}{PRG_y}) + (\frac{conc_z}{PRG_z})] \ x \ 10^6$$

- For non-cancer hazard estimates. Divide the concentration term by its respective non-cancer PRG designated as "nc" and sum the ratios for multiple contaminants. The cumulative ratio represents a non-carcinogenic hazard index (HI). A hazard index of 1 or less is generally considered "safe". A ratio greater than 1 suggests further evaluation. **[Note that carcinogens may also have an associated non-cancer PRG that is not listed in the printed copy of the table sent to folks on the mailing list. To obtain these values, the user should view or download the PRG table at our website and display the appropriate sections.]**

$$Hazard\ Index = [(\frac{conc_x}{PRG_x}) + (\frac{conc_y}{PRG_y}) + (\frac{conc_z}{PRG_z})]$$

For more information on screening site risks, the reader should contact EPA Region 9's Technical Support Team.

3. 4 Potential Problems

As with any risk-based tool, the potential exists for misapplication. In most cases the root cause will be a lack of understanding of the intended use of Region 9 PRGs. In order to prevent misuse of PRGs, the following should be avoided:

- Applying PRGs to a site without adequately developing a conceptual site model that identifies relevant exposure pathways and exposure scenarios,

- Not considering background concentrations when choosing PRGs as cleanup goals,

- Use of PRGs as cleanup levels without the nine-criteria analysis specified in the National Contingency Plan (or, comparable analysis for programs outside of Superfund),

- Use of PRGs as cleanup levels without verifying numbers with a toxicologist or regional risk assessor,

- Use of antiquated PRG tables that have been superseded by more recent publications,

- Not considering the effects of additivity when screening multiple chemicals, and

- Adjusting PRGs upward by factors of 10 or 100 without consulting a toxicologist or regional risk assessor.

4.0 TECHNICAL SUPPORT DOCUMENTATION

Region 9 PRGs consider human exposure hazards to chemicals from contact with contaminated soils, air, and water. The emphasis of the PRG equations and technical discussion are aimed at developing screening criteria for soils, since this is an area where few standards exist. For air and water, additional reference concentrations or standards are available for many chemicals (e.g. MCLs, non-zero MCLGs, AWQC, and NAAQS) and consequently the discussion of these media are brief.

4.1 Soils - Direct Ingestion

Calculation of risk-based PRGs for direct ingestion of soil is based on methods presented in RAGS HHEM, Part B (USEPA 1991a) and *Soil Screening Guidance* (USEPA 1996a,b). Briefly, these methods backcalculate a soil concentration level from a target risk (for carcinogens) or hazard quotient (for noncarcinogens).

A number of studies have shown that inadvertent ingestion of soil is common among children 6 years old and younger (Calabrese et al. 1989, Davis et al. 1990, Van Wijnen et al. 1990). To take into account the higher soil intake rate for children, two different approaches are used to estimate PRGs, depending on whether the adverse health effect is cancer or some effect other than cancer.

For carcinogens, the method for calculating PRGs uses an age-adjusted soil ingestion factor that takes into account the difference in daily soil ingestion rates, body weights, and exposure duration for children from 1 to 6 years old and others from 7 to 31 years old. This health-protective approach is chosen to take into account the higher daily rates of soil ingestion in children as well as the longer duration of exposure that is anticipated for a long-term resident. For more on this method, see USEPA RAGs Part B (1991a).

For noncarcinogenic concerns, the more protective method of calculating a soil PRG is to evaluate childhood exposures separately from adult exposures. In other words, an age-adjustment factor is not applied as was done for carcinogens. This approach is considered conservative because it combines the higher 6-year exposure for children with chronic toxicity criteria. In their analysis of the method, the Science Advisory Board (SAB) indicated that, for most chemicals, the approach may be overly protective. However, they noted that there are specific instances when the chronic RfD may be based on endpoints of toxicity that are specific to children (e.g. fluoride and nitrates) or when the dose-response is steep (i.e., the dosage difference between the no-observed-adverse-effects level [NOAEL] and an adverse effects level is small). Thus, for the purposes of screening, EPA Region 9 has adopted this approach for calculating soil PRGs for noncarcinogenic health concerns.

4.2 Soils - Vapor and Particulate Inhalation

Agency toxicity criteria indicate that risks from exposure to some chemicals via inhalation far outweigh the risk via ingestion; therefore soil PRGs have been designed to address this pathway as well. The models used to calculate PRGs for inhalation of volatiles/particulates are updates of risk assessment methods presented in RAGS Part B (USEPA 1991a) and are identical to the *Soil Screening Guidance: User's Guide and Technical Background Document* (USEPA 1996a,b).

To address the soil-to-air pathways the PRG calculations incorporate volatilization factors (VF_s) for volatile contaminants and particulate emission factors (PEF) for nonvolatile contaminants. These factors relate soil contaminant concentrations to air contaminant concentrations that may be inhaled on-site. The VF_s and PEF equations can be broken into two separate models: an emission model to estimate emissions of the contaminant from the soil and a dispersion model to simulate the dispersion of the contaminant in the atmosphere.

It should be noted that the box model in RAGS Part B has been replaced with a dispersion term (Q/C) derived from a modeling exercise using meteorological data from 29 locations across the United States because the box model may not be applicable to a broad range of site types and meteorology and does not utilize state-of-the-art techniques developed for regulatory dispersion modeling. The dispersion model for both volatiles and particulates is the AREA-ST, an updated version of the Office of Air Quality Planning and Standards, Industrial Source Complex Model, ISC2. However, different Q/C terms are used in the VF and PEF equations. Los Angeles was selected as the 90th percentile data set for volatiles and Minneapolis was selected as the 90th percentile data set for fugitive dusts (USEPA 1996 a,b). A default source size of 0.5 acres was chosen for the PRG calculations. This is consistent with the default exposure area over which Region 9 typically averages contaminant concentrations in soils. If unusual site conditions exist such that the area source is substantially larger than the default source size assumed here, an alternative Q/C could be applied (see USEPA 1996a,b).

Volatilization Factor for Soils

Volatile chemicals, defined as those chemicals having a Henry's Law constant greater than 10^{-5} (atm-m^3/mol) and a molecular weight less than 200 g/mole, were screened for inhalation exposures using a volatilization factor for soils (VF_s). Please note that VF_s's are available at our website.

The emission terms used in the VF_s are chemical-specific and were calculated from physical-chemical information obtained from several sources. The priority of these sources were as follows: *Soil Screening Guidance* (USEPA 1996a,b), *Superfund Chemical Data Matrix* (USEPA 1996c), *Fate and Exposure Data* (Howard 1991), *Subsurface Contamination Reference Guide* (EPA 1990a), and *Superfund Exposure Assessment Manual* (SEAM, EPA 1988). In those cases where Diffusivity Coefficients (Di) were not provided in existing literature, Di's were calculated using Fuller's Method described in SEAM. A surrogate term was required for some chemicals that lacked physico-chemical information. In these cases, a proxy chemical of similar structure was used that may over- or under-estimate the PRG for soils.

Equation 4-9 forms the basis for deriving generic soil PRGs for the inhalation pathway. The following parameters in the standardized equation can be replaced with specific site data to develop a simple site-specific PRG

- Source area
- Average soil moisture content
- Average fraction organic carbon content
- Dry soil bulk density

The basic principle of the VF_s model (Henry's law) is applicable only if the soil contaminant concentration is at or below soil saturation "sat". Above the soil saturation limit, the model cannot predict an accurate VF-based PRG. How these particular cases are handled, depends on whether the contaminant is liquid or solid at ambient soil temperatures (see Section 4.5).

Particulate Emission Factor for Soils

Inhalation of chemicals adsorbed to respirable particles (PM_{10}) were assessed using a default PEF equal to 1. 316 x 10^9 m^3/kg that relates the contaminant concentration in soil with the concentration of respirable particles in the air due to fugitive dust emissions from contaminated soils. The generic PEF was derived using default values in Equation 4-11, which corresponds to a receptor point concentration of approximately 0.76 ug/m^3. The relationship is derived by Cowherd (1985) for a rapid assessment procedure applicable to a typical hazardous waste site where the surface contamination provides a relatively continuous and constant potential for emission over an extended period of time (e.g. years). This represents an annual average emission rate based on wind erosion that should be compared with chronic health criteria; it is not appropriate for evaluating the potential for more acute exposures.

The impact of the PEF on the resultant PRG concentration (that combines soil exposure pathways for ingestion, skin contact, and inhalation) can be assessed by accessing the Region 9 PRG website and viewing the pathway-specific soil concentrations. Equation 4-11 forms the basis for deriving a generic PEF for the inhalation pathway. For more details regarding specific parameters used in the PEF model, the reader is referred to *Soil Screening Guidance: Technical Background Document* (USEPA 1996a).

Note: the generic PEF evaluates windborne emissions and does not consider dust emissions from traffic or other forms of mechanical disturbance that could lead to greater emissions than assumed here.

4.3 Soils - Dermal Exposure

Dermal Contact Assumptions

Since the 1998 PRG table was issued, exposure factors for dermal contact with soil have changed in a few cases (USEPA 1999a). Recommended RME (reasonable maximum exposure) defaults for adult workers' skin surface areas (3300 cm^2/day) and soil adherence factors (0.2 mg/cm^2) now differ from the defaults recommended for adult residents (5700 cm^2/day, 0.07 mg/cm^2) as noted in Exhibit 4-1. This is due to differences in the range of activities experienced by workers versus residents.

Dermal Absorption

Chemical-specific skin absorption values recommended by the Superfund Dermal Workgroup were applied when available. Chemical-specific values are included for the following chemicals: arsenic, cadmium, chlordane, 2,4-D, DDT, lindane, TCDD, PAHs, PCBs, and pentachlorophenols.

The recently issued "Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim Guidance" (USEPA 1999a) recommends a default dermal absorption factor for semivolatile organic compounds of 10% as a screening method for the majority of SVOCs without dermal absorption factors. Default dermal absorption values for other chemicals (VOCs and inorganics) are not recommended in the new guidance. Therefore, the assumption of 1% for inorganics and 10% for volatiles is no longer included in the Region 9 PRG table. This change has minimal impact on the final risk-based calculations because human exposure to VOCs and inorganics in soils is generally driven by other pathways of exposure.

4.4 Soils - Migration to Groundwater

The methodology for calculating SSLs for the migration to groundwater was developed to identify chemical concentrations in soil that have the potential to contaminate groundwater. Migration of contaminants from soil to groundwater can be envisioned as a two-stage process:

(1) release of contaminant in soil leachate and (2) transport of the contaminant through the underlying soil and aquifer to a receptor well. The SSL methodology considers both of these fate and transport mechanisms.

SSLs are backcalculated from acceptable ground water concentrations (i.e. nonzero MCLGs, MCLs, or risk-based PRGs). First, the acceptable groundwater concentration is multiplied by a dilution factor to obtain a target leachate concentration. For example, if the dilution factor is 10 and the acceptable ground water concentration is 0.05 mg/L, the target soil leachate concentration would be 0.5 mg/L. The partition equation (presented in the *Soil Screening Guidance* document) is then used to calculate the total soil concentration (i.e. SSL) corresponding to this soil leachate concentration.

The SSL methodology was designed for use during the early stages of a site evaluation when information about subsurface conditions may be limited. Because of this constraint, the methodology is based on conservative, simplifying assumptions about the release and transport of contaminants in the subsurface. For more on SSLs, and how to calculate site-specific SSLs versus generic SSLs presented in the PRG table, the reader is referred to the *Soil Screening Guidance* document (USEPA 1996a,b).

4.5 Soil Saturation Limit

The soil saturation concentration "sat" corresponds to the contaminant concentration in soil at which the absorptive limits of the soil particles, the solubility limits of the soil pore water, and saturation of soil pore air have been reached. Above this concentration, the soil contaminant may be present in free phase, i.e., nonaqueous phase liquids (NAPLs) for contaminants that are liquid at ambient soil temperatures and pure solid phases for compounds that are solid at ambient soil temperatures.

Equation 4-10 is used to calculate "sat" for each volatile contaminant. As an update to RAGS HHEM, Part B (USEPA 1991a), this equation takes into account the amount of contaminant that is in the vapor phase in soil in addition to the amount dissolved in the soil's pore water and sorbed to soil particles.

Chemical-specific "sat" concentrations must be compared with each VF-based PRG because a basic principle of the PRG volatilization model is not applicable when free-phase contaminants are present. How these cases are handled depends on whether the contaminant is liquid or solid at ambient temperatures. Liquid contaminant that have a VF-based PRG that exceeds the "sat" concentration are set equal to "sat" whereas for solids (e.g., PAHs), soil screening decisions are based on the appropriate PRGs for other pathways of concern at the site (e.g., ingestion and dermal contact).

4.6 Ground Water/Surface Water - Ingestion and Inhalation

Calculation of PRGs for ingestion and inhalation of contaminants in domestic water is based on the methodology presented in RAGS HHEM, Part B (USEPA 1991a). Ingestion of drinking water is an appropriate pathway for all chemicals. For the purposes of this guidance, however, inhalation of volatile chemicals from water is considered routinely only for chemicals with a Henry's Law constant of 1×10^{-5} atm-m^3/mole or greater <u>and</u> with a molecular weight of less than 200 g/mole.

For volatile chemicals, an upperbound volatilization constant (VF_w) is used that is based on all uses of household water (e.g showering, laundering, and dish washing). Certain assumptions were made. For example, it is assumed that the volume of water used in a residence for a family of four is 720 L/day, the volume of the dwelling is 150,000 L and the air exchange rate is 0.25 air changes/hour (Andelman in RAGS Part B). Furthermore, it is assumed that the average transfer efficiency weighted by water use is 50 percent (i.e. half of the concentration of each chemical in water will be transferred into air by all water uses). Note: the range of transfer efficiencies extends from 30% for toilets to 90% for dishwashers.

4.7 Default Exposure Factors

Default exposure factors were obtained primarily from RAGS Supplemental Guidance Standard Default *Exposure Factors* (OSWER Directive, 9285.6-03) dated March 25, 1991 and more recent information from U.S. EPA's Office of Solid Waste and Emergency Response, U.S. EPA's Office of Research and Development, and California EPA's Department of Toxic Substances Control (see Exhibit 4-1).

Because contact rates may be different for children and adults, carcinogenic risks during the first 30 years of life were calculated using age-adjusted factors ("adj"). Use of age-adjusted factors are especially important for soil ingestion exposures, which are higher during childhood and decrease with age. However, for purposes of combining exposures across pathways, additional age-adjusted factors are used for inhalation and dermal exposures. These factors approximate the integrated exposure from birth until age 30 combining contact rates, body weights, and exposure durations for two age groups - small children and adults. Age-adjusted factors were obtained from RAGS PART B or developed by analogy (see derivations next page).

For soils only, noncarcinogenic contaminants are evaluated in children separately from adults. No age-adjustment factor is used in this case. The focus on children is considered protective of the higher daily intake rates of soil by children and their lower body weight. For maintaining consistency when evaluating soils, dermal and inhalation exposures are also based on childhood contact rates.

(1) ingestion([mg-yr]/[kg-d]:

$$IFS_{adj} = \frac{ED_c \ x \ IRS_c}{BW_c} + \frac{(ED_r \ \ ED_c) \ x \ IRS_a}{BW_a}$$

(2) skin contact([mg-yr]/[kg-d]:

$$SFS_{adj} = \frac{ED_c \ x \ AF \ x \ SA_c}{BW_c} + \frac{(ED_r \ \ ED_c) \ x \ AF \ x \ SA_a}{BW_a}$$

(3) inhalation ([m^3-yr]/[kg-d]):

$$InhF_{adj} = \frac{ED_c \ x \ IRA_c}{BW_c} + \frac{(ED_r \ \ ED_c) \ x \ IRA_a}{BW_a}$$

EXHIBIT 4-1
STANDARD DEFAULT FACTORS

Symbol	Definition (units)	Default	Reference
CSFo	Cancer slope factor oral (mg/kg-d)-1	--	IRIS, HEAST, or NCEA
CSFi	Cancer slope factor inhaled (mg/kg-d)-1	--	IRIS, HEAST, or NCEA
RfDo	Reference dose oral (mg/kg-d)	--	IRIS, HEAST, or NCEA
RfDi	Reference dose inhaled (mg/kg-d)	--	IRIS, HEAST, or NCEA
TR	Target cancer risk	10^{-6}	--
THQ	Target hazard quotient	1	--
BWa	Body weight, adult (kg)	70	RAGS (Part A), EPA 1989 (EPA/540/1-89/002)
BWc	Body weight, child (kg)	15	Exposure Factors, EPA 1991 (OSWER No. 9285.6-03)
ATc	Averaging time - carcinogens (days)	25550	RAGS(Part A), EPA 1989 (EPA/540/1-89/002)
ATn	Averaging time - noncarcinogens (days)	ED*365	
SAa	Exposed surface area for soil/dust (cm^2/day)		Dermal Assessment, EPA 1999 (EPA/540/R-99/005)
	– adult resident	5700	
	– adult worker	**3300**	
SAc	Exposed surface area, child in soil (cm^2/day)	**2800**	Dermal Assessment, EPA 1999 (EPA/540/R-99/005)
AFa	Adherence factor, soils (mg/cm^2)		Dermal Assessment, EPA 1999 (EPA/540/R-99/005)
	– adult resident	**0.07**	
	– adult worker	**0.2**	
AFc	Adherence factor, child (mg/cm^2)	0.2	Dermal Assessment, EPA 1999 (EPA/540/R-99/005)
ABS	Skin absorption defaults (unitless):		
	– semi-volatile organics	0.1	Dermal Assessment, EPA 1999 (EPA/540/R-99/005)
	– volatile organics	**--**	Dermal Assessment, EPA 1999 (EPA/540/R-99/005)
	– inorganics	**--**	Dermal Assessment, EPA 1999 (EPA/540/R-99/005)
IRAa	Inhalation rate - adult (m^3/day)	20	Exposure Factors, EPA 1991 (OSWER No. 9285.6-03)
IRAc	Inhalation rate - child (m^3/day)	10	Exposure Factors, EPA 1997 (EPA/600/P-95/002Fa)
IRWa	Drinking water ingestion - adult (L/day	2	RAGS(Part A), EPA 1989 (EPA/540/1-89/002)
IRWc	Drinking water ingestion - child (L/day)	1	PEA, Cal-EPA (DTSC, 1994)
IRSa	Soil ingestion - adult (mg/day)	100	Exposure Factors, EPA 1991 (OSWER No. 9285.6-03)
IRSc	Soil ingestion - child (mg/day),	200	Exposure Factors, EPA 1991 (OSWER No. 9285.6-03)
IRSo	Soil ingestion - occupational (mg/day)	50	Exposure Factors, EPA 1991 (OSWER No. 9285.6-03)
EFr	Exposure frequency - residential (d/y)	350	Exposure Factors, EPA 1991 (OSWER No. 9285.6-03)
EFo	Exposure frequency - occupational (d/y)	250	Exposure Factors, EPA 1991 (OSWER No. 9285.6-03)
EDr	Exposure duration - residential (years)	30[a]	Exposure Factors, EPA 1991 (OSWER No. 9285.6-03)
EDc	Exposure duration - child (years)	6	Exposure Factors, EPA 1991 (OSWER No. 9285.6-03)
EDo	Exposure duration - occupational (years)	25	Exposure Factors, EPA 1991 (OSWER No. 9285.6-03)
	Age-adjusted factors for carcinogens:		
IFSadj	Ingestion factor, soils ([mg-yr]/[kg-d])	114	RAGS(Part B), EPA 1991 (OSWER No. 9285.7-01B)
SFSadj	Dermal factor, soils ([mg-yr]/[kg-d])	**361**	By analogy to RAGS (Part B)
InhFadj	Inhalation factor, air ([m^3-yr]/[kg-d])	11	By analogy to RAGS (Part B)
IFWadj	Ingestion factor, water ([L-yr]/[kg-d])	1.1	By analogy to RAGS (Part B)
VFw	Volatilization factor for water (L/m^3)	0.5	RAGS(Part B), EPA 1991 (OSWER No. 9285.7-01B)
PEF	Particulate emission factor (m^3/kg)	See below	Soil Screening Guidance (EPA 1996a,b)
VFs	Volatilization factor for soil (m^3/kg)	See below	Soil Screening Guidance (EPA 1996a,b)
sat	Soil saturation concentration (mg/kg)	See below	Soil Screening Guidance (EPA 1996a,b)

Footnote:
[a]Exposure duration for lifetime residents is assumed to be 30 years total. For carcinogens, exposures are combined for children (6 years) and adults (24 years) .

4.8 Standardized Equations

The equations used to calculate the PRGs for carcinogenic and noncarcinogenic contaminants are presented in Equations 4-1 through 4-8. The PRG equations update RAGS Part B equations. The methodology backcalculates a soil, air, or water concentration level from a target risk (for carcinogens) or hazard quotient (for noncarcinogens). For completeness, the soil equations combine risks from ingestion, skin contact, and inhalation simultaneously. Note: the electronic version of the table also includes pathway-specific PRGs, should the user decide against combining specific exposure pathways; or, the user wants to identify the relative contribution of each pathway to exposure.

To calculate PRGs for volatile chemicals in soil, a chemical-specific volatilization factor is calculated per Equation 4-9. Because of its reliance on Henry's law, the VF_s model is applicable only when the contaminant concentration in soil is at or below saturation (i.e. there is no free-phase contaminant present). Soil saturation ("sat") corresponds to the contaminant concentration in soil at which the adsorptive limits of the soil particles and the solubility limits of the available soil moisture have been reached. Above this point, pure liquid-phase contaminant is expected in the soil. If the PRG calculated using VF_s was greater than the calculated sat, the PRG was set equal to sat, in accordance with *Soil Screening Guidance* (USEPA 1996 a,b). The equation for deriving sat is presented in Equation 4-10.

PRG EQUATIONS

$$C(mg/kg) = \frac{TR \ x \ AT_c}{EF_r \ [(\frac{IFS_{adj} \ x \ CSF_o}{10^6 \ mg/kg}) + (\frac{SFS_{adj} \ x \ ABS \ x \ CSF_o}{10^6 \ mg/kg}) + (\frac{InhF_{adj} \ x \ CSF_i}{VF_s^a})]}$$

<u>Soil Equations</u>: For soils, equations were based on three exposure routes (ingestion, skin contact, and inhalation).

Equation 4-1: Combined Exposures to Carcinogenic Contaminants in Residential Soil

Equation 4-2: Combined Exposures to Noncarcinogenic Contaminants in Residential Soil

$$C(mg/kg) = \frac{THQ \ x \ BW_c \ x \ AT_n}{EF_r \ x \ ED_c \ [(\frac{1}{RfD_o} \ x \ \frac{IRS_c}{10^6 \ mg/kg}) + (\frac{1}{RfD_o} \ x \ \frac{SA_c \ x \ AF \ x \ ABS}{10^6 mg/kg}) + (\frac{1}{RfD_i} \ x \ \frac{IRA_c}{VF_s^a})]}$$

Equation 4-3: Combined Exposures to Carcinogenic Contaminants in Industrial Soil

$$C(mg/kg) = \frac{TR \ x \ BW_a \ x \ AT_c}{EF_o \ x \ ED_o \ [(\frac{IRS_o \ x \ CSF_o}{10^6 \ mg/kg}) + (\frac{SA_a \ x \ AF \ x \ ABS \ x \ CSF_o}{10^6 \ mg/kg}) + (\frac{IRA_a \ x \ CSF_i}{VF_s^a})]}$$

$$C(mg/kg) = \frac{THQ \ x \ BW_a \ x \ AT_n}{EF_o \ x \ ED_o[(\frac{1}{RfD_o} \ x \ \frac{IRS_o}{10^6 \ mg/kg}) + (\frac{1}{RfD_o} \ x \ \frac{SA_a \ x \ AF \ x \ ABS}{10^6 \ mg/kg}) + (\frac{1}{RfD_i} \ x \ \frac{IRA_a}{VF_s^a})]}$$

Footnote:
[a]Use VF_s for volatile chemicals (defined as having a Henry's Law Constant [atm-m^3/mol] greater than 10^{-5} and a molecular weight less than 200 grams/mol) or PEF for non-volatile chemicals.

Equation 4-4: Combined Exposures to Noncarcinogenic Contaminants in Industrial Soil

Tap Water Equations:

Equation 4-5: Ingestion and Inhalation Exposures to Carcinogenic Contaminants in Water

$$C(ug/L) = \frac{TR \ x \ AT_c \ x \ 1000ug/mg}{EF_r \ [(IFW_{adj} \ x \ CSF_o) + (VF_w \ x \ InhF_{adj} \ x \ CSF_i)]}$$

Equation 4-6: Ingestion and Inhalation Exposures to Noncarcinogenic Contaminants in Water

$$C(ug/L) = \frac{THQ \ x \ BW_a \ x \ AT_n \ x \ 1000ug/mg}{EF_r \ x \ ED_r \ [(\frac{IRW_a}{RfD_o}) + (\frac{VF_w \ x \ IRA_a}{RfD_i})]}$$

Air Equations:

Equation 4-7: Inhalation Exposures to Carcinogenic Contaminants in Air

$$C(ug/m^3) = \frac{TR \ x \ AT_c \ x \ 1000ug/mg}{EF_r \ x \ InhF_{adj} \ x \ CSF_i}$$

Equation 4-8: Inhalation Exposures to Noncarcinogenic Contaminants in Air

$$C(ug/m^3) = \frac{THQ \ x \ RfD_i \ x \ BW_a \ x \ AT_n \ x \ 1000ug/mg}{EF_r \ x \ ED_r \ x \ IRA_a}$$

Footnote:
[a]Use VF_s for volatile chemicals (defined as having a Henry's Law Constant [atm-m^3/mol] greater than 10^{-5} and a molecular weight less than 200 grams/mol) or PEF for non-volatile chemicals.

SOIL-TO-AIR VOLATILIZATION FACTOR (VF_s)

$$VF_s(m^3/kg) = (Q/C) \times \frac{(3.14 \times D_A \times T)^{1/2}}{(2 \times \rho_b \times D_A)} \times 10^4 (m^2/cm^2)$$

Equation 4-9: Derivation of the Volatilization Factor

$$D_A = \frac{[(\Theta_a^{10/3} D_i H' + \Theta_w^{10/3} D_w)/n^2]}{\rho_B K_d + \Theta_w + \Theta_a H'}$$

where:

Parameter	Definition (units)	Default
VF_s	Volatilization factor (m^3/kg)	--
D_A	Apparent diffusivity (cm^2/s)	--
Q/C	Inverse of the mean conc. at the center of a 0.5-acre square source (g/m^2-s per kg/m^3)	68.81
T	Exposure interval (s)	9.5×10^8
ρ_b	Dry soil bulk density (g/cm^3)	1.5
Θ_a	Air filled soil porosity (L_{air}/L_{soil})	0.28 or n-Θ_w
n	Total soil porosity (L_{pore}/L_{soil})	0.43 or 1 - (ρ_b/ρ_s)
Θ_w	Water-filled soil porosity (L_{water}/L_{soil})	0.15
ρ_s	Soil particle density (g/cm^3)	2.65
Di	Diffusivity in air (cm^2/s)	Chemical-specific
H	Henry's Law constant (atm-m^3/mol)	Chemical-specific
H'	Dimensionless Henry's Law constant	Calculated from H by multiplying by 41 (USEPA 1991a)
D_w	Diffusivity in water (cm^2/s)	Chemical-specific
K_d	Soil-water partition coefficient (cm^3/g) = $K_{oc}f_{oc}$	Chemical-specific
K_{oc}	Soil organic carbon-water partition coefficient (cm^3/g)	Chemical-specific
f_{oc}	Fraction organic carbon in soil (g/g)	0.006 (0.6%)

SOIL SATURATION CONCENTRATION (sat)

Equation 4-10: Derivation of the Soil Saturation Limit

$$sat = \frac{S}{\rho_b}(K_d \rho_b + \Theta_w + H' \Theta_a)$$

Parameter	Definition (units)	Default
sat	Soil saturation concentration (mg/kg)	--
S	Solubility in water (mg/L-water)	Chemical-specific
ρ_b	Dry soil bulk density (kg/L)	1.5
n	Total soil porosity (L_{pore}/L_{soil})	0.43 or 1 - (ρ_b/ρ_s)
ρ_s	Soil particle density (kg/L)	2.65
K_d	Soil-water partition coefficient (L/kg)	K_{oc} x f_{oc} (chemical-specific)
k_{oc}	Soil organic carbon/water partition coefficient (L/kg)	Chemical-specific
f_{oc}	Fraction organic carbon content of soil (g/g)	0.006 or site-specific
Θ_w	Water-filled soil porosity (L_{water}/L_{soil})	0.15
Θ_a	Air filled soil porosity (L_{air}/L_{soil})	0.28 or n-Θ_w
w	Average soil moisture content (kg_{water}/kg_{soil} or L_{water}/kg_{soil})	0.1
H	Henry's Law constant (atm-m^3/mol)	Chemical-specific
H'	Dimensionless Henry's Law constant	H x 41, where 41 is a units conversion factor

SOIL-TO-AIR PARTICULATE EMISSION FACTOR (PEF)

Equation 4-11: Derivation of the Particulate Emission Factor

$$PEF(m^3/kg) = Q/C \ x \ \frac{3600s/h}{0.036 \ x \ (1V) \ x \ (U_m / U_t)^3 \ x \ F(x)}$$

Parameter	Definition (units)	Default
PEF	Particulate emission factor (m^3/kg)	1.316 x 10^9
Q/C	Inverse of the mean concentration at the center of a 0.5-acre-square source (g/m^2-s per kg/m^3)	90.80
V	Fraction of vegetative cover (unitless)	0.5
U_m	Mean annual windspeed (m/s)	4.69
U_t	Equivalent threshold value of windspeed at 7 m (m/s)	11.32
F(x)	Function dependent on U_m/U_t derived using Cowherd (1985) (unitless)	0.194

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Key : i=IRIS h=HEAST n=NCEA x=WITHDRAWN o=Other EPA DOCUMENTS r=ROUTE EXTRAPOLATION ca=CANCER PRG nc=NONCANCER PRG sat=SOIL SATURATION max=CEILING LIMIT *(where: nc < 100X ca) **(where: nc < 10X ca)

FOR PLANNING PURPOSES

TOXICITY INFORMATION											CONTAMINANT	PRELIMINARY REMEDIATION GOALS (PRGs)								SOIL SCREENING LEVELS Migration to Ground Water	
SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		VOC	skin abs. soils	CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		DAF 20 (mg/kg)	DAF 1 (mg/kg)
8.7E-03	i	4.0E-03	i	8.7E-03	r	4.0E-03	r	0		30560-19-1	Acephate	5.6E+01	ca**	2.8E+02	ca*	7.7E-01	ca*	7.7E+00	ca*		
				7.7E-03	i	2.6E-03	i	1		75-07-0	Acetaldehyde	1.1E+01	ca**	2.3E+01	ca**	8.7E-01	ca*	1.7E+00	ca		
		2.0E-02	i			2.0E-02	r	0	0.1	34256-82-1	Acetochlor	1.2E+03	nc	1.8E+04	nc	7.3E+01	nc	7.3E+02	nc		
		1.0E-01	i			1.0E-01	r	1		67-64-1	Acetone	1.6E+03	nc	6.2E+03	nc	3.7E+02	nc	6.1E+02	nc	1.6E+01	8.0E-01
		8.0E-04	h			8.0E-04	r	0	0.1	75-86-5	Acetone cyanohydrin	4.9E+01	nc	7.0E+02	nc	2.9E+00	nc	2.9E+01	nc		
		6.0E-03	x			1.7E-02	i	1		75-05-8	Acetonitrile	2.7E+02	nc	1.7E+03	nc	6.2E+01	nc	7.9E+01	nc		
		1.0E-01	i			5.7E-06	x	1		98-86-2	Acetophenone	4.9E-01	nc	1.6E+00	nc	2.1E-02	nc	4.2E-02	nc		
1.1E-01	o	1.3E-02	i	1.1E-01	r	1.3E-02	r	0	0.1	50594-66-6	Acifluorfen	4.4E+00	ca	2.2E+01	ca	6.1E-02	ca	6.1E-01	ca		
		2.0E-02	h			5.7E-06	i	1		107-02-8	Acrolein	1.0E-01	nc	3.4E-01	nc	2.1E-02	nc	4.2E-02	nc		
4.6E+00	i	2.0E-04	i	4.6E+00	i	2.0E-04	r	0	0.1	79-06-1	Acrylamide	1.1E-01	ca	5.4E-01	ca	1.5E-03	ca	1.5E-02	ca		
		5.0E-01	i			2.9E-04	i	0	0.1	79-10-7	Acrylic acid	2.9E+04	nc	1.0E+05	max	1.0E+00	nc	1.8E+04	nc		
5.4E-01	i	1.0E-03	h	2.4E-01	i	5.7E-04	i	1		107-13-1	Acrylonitrile	2.1E-01	ca*	5.1E-01	ca*	2.8E-02	ca*	3.9E-02	ca*		
8.1E-02	h	1.0E-02	i	8.0E-02	r	1.0E-02	r	0	0.1	15972-60-8	Alachlor	6.0E+00	ca	3.1E+01	ca	8.4E-02	ca	8.4E-01	ca		
		1.5E-01	i			1.5E-01	r	0	0.1	1596-84-5	Alar	9.2E+03	nc	1.0E+05	max	5.5E+02	nc	5.5E+03	nc		
		1.0E-03	i			1.0E-03	r	0	0.1	116-06-3	Aldicarb	6.1E+01	nc	8.8E+02	nc	3.7E+00	nc	3.6E+01	nc		
		1.0E-03	i			1.0E-03	r	0	0.1	1646-88-4	Aldicarb sulfone	6.1E+01	nc	8.8E+02	nc	3.7E+00	nc	3.6E+01	nc		
1.7E+01	i	3.0E-05	i	1.7E+01	i	3.0E-05	r	0	0.1	309-00-2	Aldrin	2.9E-02	ca*	1.5E-01	ca	3.9E-04	ca	4.0E-03	ca	5.0E-01	2.0E-02
		2.5E-01	i			2.5E-01	r	0	0.1	5585-64-8	Ally	1.5E+04	nc	1.0E+05	max	9.1E+02	nc	9.1E+03	nc		
		5.0E-03	i			5.0E-03	r	0	0.1	107-18-6	Allyl alcohol	3.1E+02	nc	4.4E+03	nc	1.8E+01	nc	1.8E+02	nc		
		5.0E-02	x			2.9E-04	i	0	0.1	107-05-1	Allyl chloride	3.0E+03	nc	4.3E+04	nc	1.0E+00	nc	1.8E+03	nc		
		1.0E+00	n			1.4E-03	n	0		7429-90-5	Aluminum	7.6E+04	nc	1.0E+05	max	5.1E+00	nc	3.6E+04	nc		
		4.0E-04	i					0		20859-73-8	Aluminum phosphide	3.1E+01	nc	8.2E+02	nc			1.5E+01	nc		
		3.0E-04	i			3.0E-04	r	0	0.1	67485-29-4	Amdro	1.8E+01	nc	2.6E+02	nc	1.1E+00	nc	1.1E+01	nc		
		9.0E-03	i			9.0E-03	r	0	0.1	834-12-8	Ametryn	5.5E+02	nc	7.9E+03	nc	3.3E+01	nc	3.3E+02	nc		
		7.0E-02	h			7.0E-02	r	0	0.1	591-27-5	m-Aminophenol	4.3E+03	nc	6.2E+04	nc	2.6E+02	nc	2.6E+03	nc		
		2.0E-05	h			2.0E-05	r	0	0.1	504-24-5	4-Aminopyridine	1.2E+00	nc	1.8E+01	nc	7.3E-02	nc	7.3E-01	nc		
		2.5E-03	i			2.5E-03	r	0	0.1	33089-61-1	Amitraz	1.5E+02	nc	2.2E+03	nc	9.1E+00	nc	9.1E+01	nc		
						2.9E-02	i			7664-41-7	Ammonia					1.0E+02	nc				
		2.0E-01	i					0	0.1	7773-06-0	Ammonium sulfamate	1.2E+04	nc	1.0E+05	max			7.3E+03	nc		
5.7E-03	i	7.0E-03	n	5.7E-03	r	2.9E-04	i	0	0.1	62-53-3	Aniline	8.5E+01	ca**	4.3E+02	ca*	1.0E+00	nc	1.2E+01	ca*		
		4.0E-04	i					0		7440-36-0	Antimony and compounds	3.1E+01	nc	8.2E+02	nc			1.5E+01	nc	5.0E+00	3.0E-01
		5.0E-04	h					0		1314-60-9	Antimony pentoxide	3.9E+01	nc	1.0E+03	nc			1.8E+01	nc		
		9.0E-04	h					0		28300-74-5	Antimony potassium tartrate	7.0E+01	nc	1.8E+03	nc			3.3E+01	nc		
		4.0E-04	h					0		1332-81-6	Antimony tetroxide	3.1E+01	nc	8.2E+02	nc			1.5E+01	nc		
		4.0E-04	h			5.7E-05	i	0		1309-64-4	Antimony trioxide	3.1E+01	nc	8.2E+02	nc	2.1E-01	nc	1.5E+01	nc		
		1.3E-02	i			1.3E-02	r	0	0.1	74115-24-5	Apollo	7.9E+02	nc	1.1E+04	nc	4.7E+01	nc	4.7E+02	nc		
2.5E-02	i	5.0E-02	h	2.5E-02	i	5.0E-02	r	0	0.1	140-57-8	Aramite	1.9E+01	ca	9.9E+01	ca	2.7E-01	ca	2.7E+00	ca		
		3.0E-04	i					0	0.03	7440-38-2	Arsenic (noncancer endpoint)	2.2E+01	nc	4.4E+02	nc						
1.5E+00	i	3.0E-04	i	1.5E+01	i			0	0.03	7440-38-2	Arsenic (cancer endpoint)	3.9E-01	ca*	2.7E+00	ca	4.5E-04	ca	4.5E-02	ca	2.9E+01	1.0E+00
						1.4E-05	i	0		7784-42-1	Arsine (see arsenic for cancer endpoint)					5.2E-02	nc				
		9.0E-03	i			9.0E-03	r		0.1	76578-12-6	Assure	5.5E+02	nc	7.9E+03	nc	3.3E+01	nc	3.3E+02	nc		
		5.0E-02	i			5.0E-02	r	0	0.1	3337-71-1	Asulam	3.1E+03	nc	4.4E+04	nc	1.8E+02	nc	1.8E+03	nc		
2.2E-01	h	3.5E-02	h	2.2E-01	r	3.5E-02	r	0	0.1	1912-24-9	Atrazine	2.2E+00	ca	1.1E+01	ca	3.1E-02	ca	3.0E-01	ca		
		4.0E-04	i			4.0E-04	r	0	0.1	71751-41-2	Avermectin B1	2.4E+01	nc	3.5E+02	nc	1.5E+00	nc	1.5E+01	nc		
1.1E-01	i			1.1E-01	i			0	0.1	103-33-3	Azobenzene	4.4E+00	ca	2.2E+01	ca	6.2E-02	ca	6.1E-01	ca		
		7.0E-02	i			1.4E-04	h	0		7440-39-3	Barium and compounds	5.4E+03	nc	1.0E+05	max	5.2E-01	nc	2.6E+03	nc	1.6E+03	8.2E+01
		4.0E-03	i			4.0E-03	r	0	0.1	114-26-1	Baygon	2.4E+02	nc	3.5E+03	nc	1.5E+01	nc	1.5E+02	nc		
		3.0E-02	i			3.0E-02	r	0	0.1	43121-43-3	Bayleton	1.8E+03	nc	2.6E+04	nc	1.1E+02	nc	1.1E+03	nc		
		2.5E-02	i			2.5E-02	r	0	0.1	68359-37-5	Baythroid	1.5E+03	nc	2.2E+04	nc	9.1E+01	nc	9.1E+02	nc		
		3.0E-01	i			3.0E-01	r	0	0.1	1861-40-1	Benefin	1.8E+04	nc	1.0E+05	max	1.1E+03	nc	1.1E+04	nc		
		5.0E-02	i			5.0E-02	r	0	0.1	17804-35-2	Benomyl	3.1E+03	nc	4.4E+04	nc	1.8E+02	nc	1.8E+03	nc		
		3.0E-02	i			3.0E-02	r	0	0.1	25057-89-0	Bentazon	1.8E+03	nc	2.6E+04	nc	1.1E+02	nc	1.1E+03	nc		
		1.0E-01	i			1.0E-01	r	0	0.1	100-52-7	Benzaldehyde	6.1E+03	nc	8.8E+04	nc	3.7E+02	nc	3.6E+03	nc		
5.5E-02	i	3.0E-03	n	2.7E-02	i	1.7E-03	n	1		71-43-2	**Benzene**	6.5E-01	ca*	1.5E+00	ca*	2.5E-01	ca*	3.5E-01	ca*	3.0E-02	2.0E-03

Key : i=IRIS h=HEAST n=NCEA x=WITHDRAWN o=Other EPA DOCUMENTS r=ROUTE EXTRAPOLATION ca=CANCER PRG nc=NONCANCER PRG sat=SOIL SATURATION max=CEILING LIMIT *(where: nc < 100X ca) **(where: nc < 10X ca)

FOR PLANNING PURPOSES

TOXICITY INFORMATION											CONTAMINANT	PRELIMINARY REMEDIATION GOALS (PRGs)								SOIL SCREENING LEVELS Migration to Ground Water	
SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		VOC	skin abs. soils	CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		DAF 20 (mg/kg)	DAF 1 (mg/kg)
2.3E+02	i	3.0E-03	i	2.3E+02	i	3.0E-03	r	0	0.1	92-87-5	Benzidine	2.1E-03	ca	1.1E-02	ca	2.9E-05	ca	2.9E-04	ca		
		4.0E+00	i			4.0E+00	r	0	0.1	65-85-0	Benzoic acid	1.0E+05	max	1.0E+05	max	1.5E+04	nc	1.5E+05	nc	4.0E+02	2.0E+01
1.3E+01	i			1.3E+01	r			0	0.1	98-07-7	Benzotrichloride	3.7E-02	ca	1.9E-01	ca	5.2E-04	ca	5.2E-03	ca		
		3.0E-01	h			3.0E-01	r	0	0.1	100-51-6	Benzyl alcohol	1.8E+04	nc	1.0E+05	max	1.1E+03	nc	1.1E+04	nc		
1.7E-01	i			1.7E-01	r			1		100-44-7	Benzyl chloride	8.9E-01	ca	2.3E+00	ca	4.0E-02	ca	6.6E-02	ca		
		2.0E-03	i	8.4E+00	i	5.7E-06	i	0		7440-41-7	Beryllium and compounds	1.5E+02	nc	2.2E+03	ca**	8.0E-04	ca*	7.3E+01	nc	6.3E+01	3.0E+00
		1.0E-04	i			1.0E-04	r	0	0.1	141-66-2	Bidrin	6.1E+00	nc	8.8E+01	nc	3.7E-01	nc	3.6E+00	nc		
		1.5E-02	i			1.5E-02	r	0	0.1	82657-04-3	Biphenthrin (Talstar)	9.2E+02	nc	1.3E+04	nc	5.5E+01	nc	5.5E+02	nc		
		5.0E-02	i			5.0E-02	r	1		92-52-4	1,1-Biphenyl	3.5E+02	sat	3.5E+02	sat	1.8E+02	nc	3.0E+02	nc		
1.1E+00	i			1.2E+00	i			1		111-44-4	Bis(2-chloroethyl)ether	2.1E-01	ca	6.2E-01	ca	5.8E-03	ca	9.8E-03	ca	4.0E-04	2.0E-05
7.0E-02	h	4.0E-02	i	3.5E-02	h	4.0E-02	r	1		108-60-1	Bis(2-chloroisopropyl)ether	2.9E+00	ca	8.1E+00	ca	1.9E-01	ca	2.7E-01	ca		
2.2E+02	i			2.2E+02	i			1		542-88-1	Bis(chloromethyl)ether	1.9E-04	ca	4.4E-04	ca	3.1E-05	ca	5.2E-05	ca		
7.0E-02	h	4.0E-02	i	3.5E-02	h	4.0E-02	r	1		108-60-1	Bis(2-chloro-1-methylethyl)ether	2.9E+00	ca	8.1E+00	ca	1.9E-01	ca	2.7E-01	ca		
1.4E-02	i	2.0E-02	i	1.4E-02	r	2.2E-02	r	0	0.1	117-81-7	Bis(2-ethylhexyl)phthalate (DEHP)	3.5E+01	ca*	1.8E+02	ca	4.8E-01	ca	4.8E+00	ca		
		5.0E-02	i			5.0E-02	r	0	0.1	80-05-7	Bisphenol A	3.1E+03	nc	4.4E+04	nc	1.8E+02	nc	1.8E+03	nc		
		9.0E-02	i			5.7E-03	h	0	0.1	7440-42-8	Boron	5.5E+03	nc	7.9E+04	nc	2.1E+01	nc	3.3E+03	nc		
						2.0E-04	h	0	0.1	7637-07-2	Boron trifluoride					7.3E-01	nc				
		2.0E-02	n			2.9E-03	n	1		108-86-1	Bromobenzene	2.8E+01	nc	9.2E+01	nc	1.0E+01	nc	2.0E+01	nc		
6.2E-02	i	2.0E-02	i	6.2E-02	r	2.0E-02	r	1		75-27-4	Bromodichloromethane	1.0E+00	ca	2.4E+00	ca	1.1E-01	ca	1.8E-01	ca	6.0E-01	3.0E-02
7.9E-03	i	2.0E-02	i	3.9E-03	i	2.0E-02	r	0	0.1	75-25-2	Bromoform (tribromomethane)	6.2E+01	ca*	3.1E+02	ca*	1.7E+00	ca*	8.5E+00	ca*	8.0E-01	4.0E-02
		1.4E-03	i			1.4E-03	i	1		74-83-9	Bromomethane (Methyl bromide)	3.9E+00	nc	1.3E+01	nc	5.2E+00	nc	8.7E+00	nc	2.0E-01	1.0E-02
								0	0.1	101-55-3	4-Bromophenyl phenyl ether										
		5.0E-03	h			5.0E-03	r	0	0.1	2104-96-3	Bromophos	3.1E+02	nc	4.4E+03	nc	1.8E+01	nc	1.8E+02	nc		
		2.0E-02	i			2.0E-02	r	0	0.1	1689-84-5	Bromoxynil	1.2E+03	nc	1.8E+04	nc	7.3E+01	nc	7.3E+02	nc		
		2.0E-02	i			2.0E-02	r	0	0.1	1689-99-2	Bromoxynil octanoate	1.2E+03	nc	1.8E+04	nc	7.3E+01	nc	7.3E+02	nc		
1.8E+00	r			1.8E+00	i			1		106-99-0	1,3-Butadiene	3.5E-03	ca	7.6E-03	ca	3.7E-03	ca	6.2E-03	ca		
		1.0E-01	i			1.0E-01	r	0	0.1	71-36-3	1-Butanol	6.1E+03	nc	8.8E+04	nc	3.7E+02	nc	3.6E+03	nc	1.7E+01	9.0E-01
		5.0E-02	i			5.0E-02	r	0	0.1	2008-41-5	Butylate	3.1E+03	nc	4.4E+04	nc	1.8E+02	nc	1.8E+03	nc		
		1.0E-02	n			1.0E-02	r	1		104-51-8	n-Butylbenzene	1.4E+02	nc	2.4E+02	sat	3.7E+01	nc	6.1E+01	nc		
		1.0E-02	n			1.0E-02	r	1		135-98-8	sec-Butylbenzene	1.1E+02	nc	2.2E+02	sat	3.7E+01	nc	6.1E+01	nc		
		1.0E-02	n			1.0E-02	r	1		98-06-6	tert-Butylbenzene	1.3E+02	nc	3.9E+02	sat	3.7E+01	nc	6.1E+01	nc		
		2.0E-01	i			2.0E-01	r	0	0.1	85-68-7	Butyl benzyl phthalate	1.2E+04	nc	1.0E+05	max	7.3E+02	nc	7.3E+03	nc	9.3E+02	8.1E+02
		1.0E+00	i			1.0E+00	r	0	0.1	85-70-1	Butylphthalyl butylglycolate	6.1E+04	nc	1.0E+05	max	3.7E+03	nc	3.6E+04	nc		
		3.0E-03	h			3.0E-03	r	0	0.1	75-60-5	Cacodylic acid	1.8E+02	nc	2.6E+03	nc	1.1E+01	nc	1.1E+02	nc		
		5.0E-04	i	6.3E+00	i			0	0.001	7440-43-9	Cadmium and compounds	3.7E+01	nc	8.1E+02	nc	1.1E-03	ca	1.8E+01	nc	8.0E+00	4.0E-01
											"CAL-Modified PRG" (PEA, 1994)	9.0E+00									
		5.0E-01	i			5.0E-01	r	0	0.1	105-60-2	Caprolactam	3.1E+04	nc	1.0E+05	max	1.8E+03	nc	1.8E+04	nc		
8.6E-03	h	2.0E-03	i	8.6E-03	r	2.0E-03	r	0	0.1	2425-06-1	Captafol	5.7E+01	ca**	2.9E+02	ca**	7.8E-01	ca**	7.8E+00	ca**		
3.5E-03	h	1.3E-01	i	3.5E-03	r	1.3E-01	r	0	0.1	133-06-2	Captan	1.4E+02	ca*	7.0E+02	ca	1.9E+00	ca	1.9E+01	ca		
		1.0E-01	i			1.1E-01	r	0	0.1	63-25-2	Carbaryl	6.1E+03	nc	8.8E+04	nc	4.0E+02	nc	3.6E+03	nc		
2.0E-02	h			2.0E-02	r			0	0.1	86-74-8	Carbazole	2.4E+01	ca	1.2E+02	ca	3.4E-01	ca	3.4E+00	ca	6.0E-01	3.0E-02
		5.0E-03	i			5.0E-03	r	0	0.1	1563-66-2	Carbofuran	3.1E+02	nc	4.4E+03	nc	1.8E+01	nc	1.8E+02	nc		
		1.0E-01	i			2.0E-01	i	1		75-15-0	Carbon disulfide	3.6E+02	nc	7.2E+02	sat	7.3E+02	nc	1.0E+03	nc	3.2E+01	2.0E+00
1.3E-01	i	7.0E-04	i	5.3E-02	i	7.0E-04	r	1		56-23-5	Carbon tetrachloride	2.4E-01	ca**	5.3E-01	ca*	1.3E-01	ca*	1.7E-01	ca*	7.0E-02	3.0E-03
		1.0E-02	i			1.0E-02	r	0	0.1	55285-14-8	Carbosulfan	6.1E+02	nc	8.8E+03	nc	3.7E+01	nc	3.6E+02	nc		
		1.0E-01	i			1.0E-01	r	0	0.1	5234-68-4	Carboxin	6.1E+03	nc	8.8E+04	nc	3.7E+02	nc	3.6E+03	nc		
		1.5E-02	i			1.5E-02	r	0	0.1	133-90-4	Chloramben	9.2E+02	nc	1.3E+04	nc	5.5E+01	nc	5.5E+02	nc		
4.0E-01	h			4.0E-01	r			0	0.1	118-75-2	Chloranil	1.2E+00	ca	6.1E+00	ca	1.7E-02	ca	1.7E-01	ca		
3.5E-01	i	5.0E-04	i	3.5E-01	i	2.0E-04	i	0	0.04	12789-03-6	Chlordane	1.6E+00	ca*	1.1E+01	ca*	1.9E-02	ca*	1.9E-01	ca*	1.0E+01	5.0E-01
		2.0E-02	i			2.0E-02	r	0	0.1	90982-32-4	Chlorimuron-ethyl	1.2E+03	nc	1.8E+04	nc	7.3E+01	nc	7.3E+02	nc		
		1.0E-01	i			5.7E-05	n			7782-50-5	**Chlorine**					2.1E-01	nc				
						5.7E-05	i			10049-04-4	Chlorine dioxide					2.1E-01	nc				
								1		107-20-0	Chloroacetaldehyde										
		2.0E-03	h			2.0E-03	r	0	0.1	79-11-8	Chloroacetic acid	1.2E+02	nc	1.8E+03	nc	7.3E+00	nc	7.3E+01	nc		

Key : i=IRIS h=HEAST n=NCEA x=WITHDRAWN o=Other EPA DOCUMENTS r=ROUTE EXTRAPOLATION ca=CANCER PRG nc=NONCANCER PRG sat=SOIL SATURATION max=CEILING LIMIT *(where: nc < 100X ca) **(where: nc < 10X ca)

FOR PLANNING PURPOSES

TOXICITY INFORMATION											CONTAMINANT	PRELIMINARY REMEDIATION GOALS (PRGs)								SOIL SCREENING LEVELS	
SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		VOC	skin abs. soils	CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		Migration to Ground Water DAF 20 (mg/kg)	DAF 1 (mg/kg)
		8.6E-06	r			8.6E-06	i	1		532-27-4	2-Chloroacetophenone	3.3E-02	nc	1.1E-01	nc	3.1E-02	nc	5.2E-02	nc		
		4.0E-03	i			4.0E-03	r	0	0.1	106-47-8	4-Chloroaniline	2.4E+02	nc	3.5E+03	nc	1.5E+01	nc	1.5E+02	nc	7.0E-01	3.0E-02
		2.0E-02	i			1.7E-02	n	1		108-90-7	Chlorobenzene	1.5E+02	nc	5.4E+02	nc	6.2E+01	nc	1.1E+02	nc	1.0E+00	7.0E-02
2.7E-01	h	2.0E-02	i	2.7E-01	h	2.0E-02	r	0	0.1	510-15-6	Chlorobenzilate	1.8E+00	ca	9.1E+00	ca	2.5E-02	ca	2.5E-01	ca		
		2.0E-01	h			2.0E-01	r	0	0.1	74-11-3	p-Chlorobenzoic acid	1.2E+04	nc	1.0E+05	max	7.3E+02	nc	7.3E+03	nc		
		2.0E-02	h			2.0E-02	r	0	0.1	98-56-6	4-Chlorobenzotrifluoride	1.2E+03	nc	1.8E+04	nc	7.3E+01	nc	7.3E+02	nc		
		2.0E-02	h			2.0E-03	h	1		126-99-8	2-Chloro-1,3-butadiene	3.6E+00	nc	1.2E+01	nc	7.3E+00	nc	1.4E+01	nc		
		4.0E-01	h			4.0E-01	r	1		109-69-3	1-Chlorobutane	4.8E+02	sat	4.8E+02	sat	1.5E+03	nc	2.4E+03	nc		
		1.4E+01	r			1.4E+01	i	1		75-68-3	1-Chloro-1,1-difluoroethane (HCFC-142b)	3.4E+02	sat	3.4E+02	sat	5.2E+04	nc	8.7E+04	nc		
		1.4E+01	r			1.4E+01	i	1		75-45-6	Chlorodifluoromethane	3.4E+02	sat	3.4E+02	sat	5.1E+04	nc	8.5E+04	nc		
2.9E-03	n	4.0E-01	n	2.9E-03	r	2.9E+00	i	1		75-00-3	Chloroethane	3.0E+00	ca	6.5E+00	ca	2.3E+00	ca	4.6E+00	ca		
								1		110-75-8	2-Chloroethyl vinyl ether										
6.1E-03	i	1.0E-02	i	8.1E-02	i	8.6E-05	n	1		67-66-3	Chloroform	2.4E-01	ca**	5.2E-01	ca**	8.4E-02	ca**	1.6E-01	ca**	6.0E-01	3.0E-02
1.3E-02	h			6.3E-03	h	8.6E-02	n	1		74-87-3	Chloromethane	1.2E+00	ca	2.7E+00	ca	1.1E+00	ca	1.5E+00	ca		
5.8E-01	h			5.8E-01	r			0	0.1	95-69-2	4-Chloro-2-methylaniline	8.4E-01	ca	4.3E+00	ca	1.2E-02	ca	1.2E-01	ca		
4.6E-01	h			4.6E-01	r			0	0.1	3165-93-3	4-Chloro-2-methylaniline hydrochloride	1.1E+00	ca	5.4E+00	ca	1.5E-02	ca	1.5E-01	ca		
		8.0E-02	i			8.0E-02	r	1		91-58-7	beta-Chloronaphthalene	3.9E+03	nc	2.7E+04	nc	2.9E+02	nc	4.9E+02	nc		
2.5E-02	h			2.5E-02	r		r	1		88-73-3	o-Chloronitrobenzene	8.1E+00	ca	2.3E+01	ca	2.7E-01	ca	4.5E-01	ca		
1.8E-02	h			1.8E-02	r		r	1		100-00-5	p-Chloronitrobenzene	1.1E+01	ca	3.2E+01	ca	3.7E-01	ca	6.2E-01	ca		
		5.0E-03	i			5.0E-03	r	1		95-57-8	2-Chlorophenol	6.3E+01	nc	2.4E+02	nc	1.8E+01	nc	3.0E+01	nc	4.0E+00	2.0E-01
		2.9E-02	r			2.9E-02	h	1		75-29-6	2-Chloropropane	1.7E+02	nc	5.9E+02	nc	1.0E+02	nc	1.7E+02	nc		
1.1E-02	h	1.5E-02	i	1.1E-02	r	1.5E-02	r	0	0.1	1897-45-6	Chlorothalonil	4.4E+01	ca*	2.2E+02	ca*	6.1E-01	ca*	6.1E+00	ca*		
		2.0E-02	i			2.0E-02	r	1		95-49-8	o-Chlorotoluene	1.6E+02	nc	5.7E+02	nc	7.3E+01	nc	1.2E+02	nc		
		2.0E-01	i			2.0E-01	r	0	0.1	101-21-3	Chlorpropham	1.2E+04	nc	1.0E+05	max	7.3E+02	nc	7.3E+03	nc		
		3.0E-03	i			3.0E-03	r	0	0.1	2921-88-2	Chlorpyrifos	1.8E+02	nc	2.6E+03	nc	1.1E+01	nc	1.1E+02	nc		
		1.0E-02	h			1.0E-02	r	0	0.1	5598-13-0	Chlorpyrifos-methyl	6.1E+02	nc	8.8E+03	nc	3.7E+01	nc	3.6E+02	nc		
		5.0E-02	i			5.0E-02	r	0	0.1	64902-72-3	Chlorsulfuron	3.1E+03	nc	4.4E+04	nc	1.8E+02	nc	1.8E+03	nc		
		8.0E-04	h			8.0E-04	r	0	0.1	60238-56-4	Chlorthiophos	4.9E+01	nc	7.0E+02	nc	2.9E+00	nc	2.9E+01	nc		
				4.2E+01	i			0			Total Chromium (1:6 ratio Cr VI:Cr III)	2.1E+02	ca	4.5E+02	ca	1.6E-04	ca			3.8E+01	2.0E+00
		1.5E+00	i							16065-83-1	Chromium III	1.0E+05	max	1.0E+05	max	0.0E+00		5.5E+04	nc		
		3.0E-03	i	2.9E+02	i			0		18540-29-9	Chromium VI	3.0E+01	ca**	6.4E+01	ca	2.3E-05	ca	1.1E+02	nc	3.8E+01	2.0E+00
											"CAL-Modified PRG" (PEA, 1994)	2.0E-01						1.6E-01			
		6.0E-02	n							7440-48-4	Cobalt	4.7E+03	nc	1.0E+05	max			2.2E+03	nc		
				2.2E+00	i			0		8007-45-2	Coke Oven Emissions					3.1E-03	ca				
		3.7E-02	h					0		7440-50-8	Copper and compounds	2.9E+03	nc	7.6E+04	nc			1.4E+03	nc		
1.9E+00	h			1.9E+00	r			1		123-73-9	Crotonaldehyde	5.3E-03	ca	1.1E-02	ca	3.5E-03	ca	5.9E-03	ca		
		1.0E-01	i			1.1E-01	i	1		98-82-8	Cumene (isopropylbenzene)	1.6E+02	nc	5.2E+02	nc	4.0E+02	nc	6.6E+02	nc		
8.4E-01	h	2.0E-03	h	8.4E-01	r	2.0E-03	r	0	0.1	21725-46-2	Cyanazine	5.8E-01	ca	2.9E+00	ca	8.0E-03	ca	8.0E-02	ca		
		2.0E-02	i			8.6E-04	i	1		74-90-8	Cyanide and compounds	1.1E+01	nc	3.5E+01	nc	3.1E+00	nc	6.2E+00	nc		
		4.0E-02	i			4.0E-02	r	1		460-19-5	Cyanogen	1.3E+02	nc	4.3E+02	nc	1.5E+02	nc	2.4E+02	nc		
		9.0E-02	i			9.0E-02	r	1		506-68-3	Cyanogen bromide	2.9E+02	nc	9.7E+02	nc	3.3E+02	nc	5.5E+02	nc		
		5.0E-02	i			5.0E-02	r	1		506-77-4	Cyanogen chloride	1.6E+02	nc	5.4E+02	nc	1.8E+02	nc	3.0E+02	nc		
		5.7E+00	r			5.7E+00	n	1		110-82-7	**Cyclohexane**	1.4E+02	sat	1.4E+02	sat	2.1E+04	nc	3.5E+04	nc		
		5.0E+00	i			5.0E+00	r	0	0.1	108-94-1	Cyclohexanone	1.0E+05	max	1.0E+05	max	1.8E+04	nc	1.8E+05	nc		
		2.0E-01	i			2.0E-01	r	0	0.1	108-91-8	Cyclohexylamine	1.2E+04	nc	1.0E+05	max	7.3E+02	nc	7.3E+03	nc		
		5.0E-03	i			5.0E-03	r	0	0.1	68085-85-8	Cyhalothrin/Karate	3.1E+02	nc	4.4E+03	nc	1.8E+01	nc	1.8E+02	nc		
		1.0E-02	i			1.0E-02	r	0	0.1	52315-07-8	Cypermethrin	6.1E+02	nc	8.8E+03	nc	3.7E+01	nc	3.6E+02	nc		
		7.5E-03	i			7.5E-03	r	0	0.1	66215-27-8	Cyromazine	4.6E+02	nc	6.6E+03	nc	2.7E+01	nc	2.7E+02	nc		
		1.0E-02	i			1.0E-02	r	0	0.1	1861-32-1	Dacthal	6.1E+02	nc	8.8E+03	nc	3.7E+01	nc	3.6E+02	nc		
		3.0E-02	i			3.0E-02	r	0	0.1	75-99-0	Dalapon	1.8E+03	nc	2.6E+04	nc	1.1E+02	nc	1.1E+03	nc		
		2.5E-02	i			2.5E-02	r	0	0.1	39515-41-8	Danitol	1.5E+03	nc	2.2E+04	nc	9.1E+01	nc	9.1E+02	nc		
2.4E-01	i			2.4E-01	r			0	0.03	72-54-8	DDD	2.4E+00	ca	1.7E+01	ca	2.8E-02	ca	2.8E-01	ca	1.6E+01	8.0E-01
3.4E-01	i			3.4E-01	r			0	0.03	72-55-9	DDE	1.7E+00	ca	1.2E+01	ca	2.0E-02	ca	2.0E-01	ca	5.4E+01	3.0E+00
3.4E-01	i	5.0E-04	i	3.4E-01	i	5.0E-04	r	0	0.03	50-29-3	DDT	1.7E+00	ca*	1.2E+01	ca*	2.0E-02	ca*	2.0E-01	ca*	3.2E+01	2.0E+00

Key : i=IRIS h=HEAST n=NCEA x=WITHDRAWN o=Other EPA DOCUMENTS r=ROUTE EXTRAPOLATION ca=CANCER PRG nc=NONCANCER PRG sat=SOIL SATURATION max=CEILING LIMIT *(where: nc < 100X ca) **(where: nc < 10X ca)

FOR PLANNING PURPOSES

TOXICITY INFORMATION											CONTAMINANT	PRELIMINARY REMEDIATION GOALS (PRGs)								SOIL SCREENING LEVELS	
SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		VOC	skin abs. soils	CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		Migration to Ground Water DAF 20 (mg/kg)	DAF 1 (mg/kg)
		1.0E-02	i			1.0E-02	r	0	0.1	1163-19-5	Decabromodiphenyl ether	6.1E+02	nc	8.8E+03	nc	3.7E+01	nc	3.6E+02	nc		
		4.0E-05	i			4.0E-05	r	0	0.1	8065-48-3	Demeton	2.4E+00	nc	3.5E+01	nc	1.5E-01	nc	1.5E+00	nc		
6.1E-02	h			6.1E-02	r			0	0.1	2303-16-4	Diallate	8.0E+00	ca	4.0E+01	ca	1.1E-01	ca	1.1E+00	ca		
		9.0E-04	h			9.0E-04	r	0	0.1	333-41-5	Diazinon	5.5E+01	nc	7.9E+02	nc	3.3E+00	nc	3.3E+01	nc		
		4.0E-03	n			4.0E-03	r	1		132-64-9	Dibenzofuran	2.9E+02	nc	5.1E+03	nc	1.5E+01	nc	2.4E+01	nc		
		1.0E-02	i			1.0E-02	r	0	0.1	106-37-6	1,4-Dibromobenzene	6.1E+02	nc	8.8E+03	nc	3.7E+01	nc	3.6E+02	nc		
8.4E-02	i	2.0E-02	i	8.4E-02	r	2.0E-02	r	1		124-48-1	Dibromochloromethane	1.1E+00	ca	2.7E+00	ca	8.0E-02	ca	1.3E-01	ca	4.0E-01	2.0E-02
1.4E+00	h	5.7E-05	r	2.4E-03	h	5.7E-05	i	1		96-12-8	1,2-Dibromo-3-chloropropane	4.5E-01	ca**	4.0E+00	ca**	2.1E-01	nc	4.8E-02	ca**		
											"CAL-Modified PRG" (PEA, 1994)	6.0E-02				9.6E-04		4.7E-03			
8.5E+01	i	5.7E-05	r	7.7E-01	i	5.7E-05	h	1		106-93-4	1,2-Dibromoethane	6.9E-03	ca	4.8E-02	ca*	8.7E-03	ca*	7.6E-04	ca		
		1.0E-01	i			1.0E-01	r	0	0.1	84-74-2	Dibutyl phthalate	6.1E+03	nc	8.8E+04	nc	3.7E+02	nc	3.6E+03	nc	2.3E+03	2.7E+02
		3.0E-02	i			3.0E-02	r	0	0.1	1918-00-9	Dicamba		nc	2.6E+04	nc	1.1E+02	nc	1.1E+03	nc		
		9.0E-02	i			5.7E-02	h	1		95-50-1	1,2-Dichlorobenzene	3.7E+02	sat	3.7E+02	sat	2.1E+02	nc	3.7E+02	nc	1.7E+01	9.0E-01
		9.0E-04	n			9.0E-04	r	1		541-73-1	1,3-Dichlorobenzene	1.3E+01	nc	5.2E+01	nc	3.3E+00	nc	5.5E+00	nc		
2.4E-02	h	3.0E-02	n	2.2E-02	n	2.3E-01	i	1		106-46-7	1,4-Dichlorobenzene	3.4E+00	ca	8.1E+00	ca	3.1E-01	ca	5.0E-01	ca	2.0E+00	1.0E-01
4.5E-01	i			4.5E-01	r			0	0.1	91-94-1	3,3-Dichlorobenzidine	1.1E+00	ca	5.5E+00	ca	1.5E-02	ca	1.5E-01	ca	7.0E-03	3.0E-04
		3.0E-02	n			3.0E-02	r		0.1	90-98-2	**4,4'-Dichlorobenzophenone**	1.8E+03	nc	2.6E+04	nc	1.1E+02	nc	1.1E+03	nc		
9.3E+00	r			9.3E+00	h			1		764-41-0	1,4-Dichloro-2-butene	7.9E-03	ca	1.8E-02	ca	7.2E-04	ca	1.2E-03	ca		
		2.0E-01	i			5.7E-02	h	1		75-71-8	Dichlorodifluoromethane	9.4E+01	nc	3.1E+02	nc	2.1E+02	nc	3.9E+02	nc		
		1.0E-01	h			1.4E-01	h	1		75-34-3	1,1-Dichloroethane	5.9E+02	nc	2.1E+03	nc	5.2E+02	nc	8.1E+02	nc	2.3E+01	1.0E+00
5.7E-03				5.7E-03				1			**"CAL-Modified PRG"**	3.3E+00	ca	7.1E+00	ca	1.2E+00	ca	2.0E+00	ca		
9.1E-02	i	3.0E-02	n	9.1E-02	i	1.4E-03	n	1		107-06-2	1,2-Dichloroethane (EDC)	3.5E-01	ca*	7.6E-01	ca*	7.4E-02	ca*	1.2E-01	ca*	2.0E-02	1.0E-03
6.0E-01	i	9.0E-03	i	1.8E-01	i	9.0E-03	r	1		75-35-4	1,1-Dichloroethylene	5.4E-02	ca	1.2E-01	ca	3.8E-02	ca	4.6E-02	ca	6.0E-02	3.0E-03
		1.0E-02	h			1.0E-02	r	1		156-59-2	1,2-Dichloroethylene (cis)	4.3E+01	nc	1.5E+02	nc	3.7E+01	nc	6.1E+01	nc	4.0E-01	2.0E-02
		2.0E-02	i			2.0E-02	r	1		156-60-5	1,2-Dichloroethylene (trans)	6.3E+01	nc	2.1E+02	nc	7.3E+01	nc	1.2E+02	nc	7.0E-01	3.0E-02
		3.0E-03	i			3.0E-03	r	0	0.1	120-83-2	2,4-Dichlorophenol	1.8E+02	nc	2.6E+03	nc	1.1E+01	nc	1.1E+02	nc	1.0E+00	5.0E-02
		8.0E-03	i			8.0E-03	r	0	0.1	94-82-6	4-(2,4-Dichlorophenoxy)butyric Acid (2,4-DB)	4.9E+02	nc	7.0E+03	nc	2.9E+01	nc	2.9E+02	nc		
		1.0E-02	i			1.0E-02	r	0	0.05	94-75-7	2,4-Dichlorophenoxyacetic Acid (2,4-D)	6.9E+02	nc	1.2E+04	nc	3.7E+01	nc	3.6E+02	nc		
6.8E-02	h	1.1E-03	r	6.8E-02	r	1.1E-03	i	1		78-87-5	1,2-Dichloropropane	3.5E-01	ca*	7.7E-01	ca*	9.9E-02	ca*	1.6E-01	ca*	3.0E-02	1.0E-03
1.0E-01	i	3.0E-02	i	1.4E-02	i	5.7E-03	i	1		542-75-6	**1,3-Dichloropropene**	7.0E-01	ca	1.6E+00	ca	4.8E-01	ca	4.0E-01	ca	4.0E-03	2.0E-04
		3.0E-03	i			3.0E-03	r	0	0.1	616-23-9	2,3-Dichloropropanol	1.8E+02	nc	2.6E+03	nc	1.1E+01	nc	1.1E+02	nc		
2.9E-01	i	5.0E-04	i	2.9E-01	r	1.4E-04	i	0	0.1	62-73-7	Dichlorvos	1.7E+00	ca*	8.5E+00	ca*	2.3E-02	ca*	2.3E-01	ca*		
4.4E-01	x			4.4E-01	r			0	0.1	115-32-2	Dicofol	1.1E+00	ca	5.6E+00	ca	1.5E-02	ca	1.5E-01	ca		
		3.0E-02	h			5.7E-05	h	1		77-73-6	Dicyclopentadiene	5.4E-01	nc	1.8E+00	nc	2.1E-01	nc	4.2E-01	nc		
1.6E+01	i	5.0E-05	i	1.6E+01	i	5.0E-05	r	0	0.1	60-57-1	Dieldrin	3.0E-02	ca	1.5E-01	ca	4.2E-04	ca	4.2E-03	ca	4.0E-03	2.0E-04
		5.7E-03	r			5.7E-03	h	0	0.1	112-34-5	Diethylene glycol, monobutyl ether	3.5E+02	nc	5.0E+03	nc	2.1E+01	nc	2.1E+02	nc		
		2.0E+00	h			2.0E+00	r	0	0.1	111-90-0	Diethylene glycol, monoethyl ether	1.0E+05	max	1.0E+05	max	7.3E+03	nc	7.3E+04	nc		
		1.1E-02	h			1.1E-02	r	0	0.1	617-84-5	Diethylformamide	6.7E+02	nc	9.7E+03	nc	4.0E+01	nc	4.0E+02	nc		
1.2E-03	i	6.0E-01	i	1.2E-03	r	6.0E-01	r	0	0.1	103-23-1	Di(2-ethylhexyl)adipate	4.1E+02	ca	2.1E+03	ca	5.6E+00	ca	5.6E+01	ca		
		8.0E-01	i			8.0E-01	r	0	0.1	84-66-2	Diethyl phthalate	4.9E+04	nc	1.0E+05	max	2.9E+03	nc	2.9E+04	nc		
4.7E+03	h			4.7E+03	r			0	0.1	56-53-1	Diethylstilbestrol	1.0E-04	ca	5.2E-04	ca	1.4E-06	ca	1.4E-05	ca		
		8.0E-02	i			8.0E-02	r	0	0.1	43222-48-6	Difenzoquat (Avenge)	4.9E+03	nc	7.0E+04	nc	2.9E+02	nc	2.9E+03	nc		
		2.0E-02	i			2.0E-02	r	0	0.1	35367-38-5	Diflubenzuron	1.2E+03	nc	1.8E+04	nc	7.3E+01	nc	7.3E+02	nc		
		1.1E+01	r			1.1E+01	i	1		75-37-6	1,1-Difluoroethane					4.2E+04	nc	6.9E+04	nc		
		2.0E-02	n			2.0E-02	r		0.1	28553-12-0	**Diisononyl phthalate**	1.2E+03	nc	1.8E+04	nc	7.3E+01	nc	7.3E+02	nc		
		8.0E-02	i			8.0E-02	r	0	0.1	1445-75-6	Diisopropyl methylphosphonate	4.9E+03	nc	7.0E+04	nc	2.9E+02	nc	2.9E+03	nc		
		2.0E-02	i			2.0E-02	r	0	0.1	55290-64-7	Dimethipin	1.2E+03	nc	1.8E+04	nc	7.3E+01	nc	7.3E+02	nc		
		2.0E-04	i			2.0E-04	r	0	0.1	60-51-5	Dimethoate	1.2E+01	nc	1.8E+02	nc	7.3E-01	nc	7.3E+00	nc		
1.4E-02	h			1.4E-02	r			0	0.1	119-90-4	3,3'-Dimethoxybenzidine	3.5E+01	ca	1.8E+02	ca	4.8E-01	ca	4.8E+00	ca		
		5.7E-06	r			5.7E-06	x	1		124-40-3	Dimethylamine	6.7E-02	nc	2.5E-01	nc	2.1E-02	nc	3.5E-02	nc		
		2.0E-03	i			2.0E-03	r	0	0.1	121-69-7	N-N-Dimethylaniline	1.2E+02	nc	1.8E+03	nc	7.3E+00	nc	7.3E+01	nc		
7.5E-01	h			7.5E-01	r			0	0.1	95-68-1	2,4-Dimethylaniline	6.5E-01	ca	3.3E+00	ca	9.0E-03	ca	9.0E-02	ca		
5.8E-01	h			5.8E-01	r			0	0.1	21436-96-4	2,4-Dimethylaniline hydrochloride	8.4E-01	ca	4.3E+00	ca	1.2E-02	ca	1.2E-01	ca		
9.2E+00	h			9.2E+00	r			0	0.1	119-93-7	3,3'-Dimethylbenzidine	5.3E-02	ca	2.7E-01	ca	7.3E-04	ca	7.3E-03	ca		

Key : i=IRIS h=HEAST n=NCEA x=WITHDRAWN o=Other EPA DOCUMENTS r=ROUTE EXTRAPOLATION ca=CANCER PRG nc=NONCANCER PRG sat=SOIL SATURATION max=CEILING LIMIT *(where: nc < 100X ca) **(where: nc < 10X ca)

FOR PLANNING PURPOSES

TOXICITY INFORMATION											CONTAMINANT	PRELIMINARY REMEDIATION GOALS (PRGs)								SOIL SCREENING LEVELS	
SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		V O C	skin abs. soils	CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		Migration to Ground Water DAF 20 (mg/kg)	DAF 1 (mg/kg)
2.6E+00	x			3.5E+00	x			0	0.1	57-14-7	1,1-Dimethylhydrazine	1.9E-01	ca	9.5E-01	ca	1.9E-03	ca	2.6E-02	ca		
3.7E+01	x			3.7E+01	x			0	0.1	540-73-8	1,2-Dimethylhydrazine	1.3E-02	ca	6.7E-02	ca	1.8E-04	ca	1.8E-03	ca		
		1.0E-01	h			8.6E-03	i	0	0.1	68-12-2	N,N-Dimethylformamide	6.1E+03	nc	8.8E+04	nc	3.1E+01	nc	3.6E+03	nc		
		1.0E-03	n			1.0E-03	r	0	0.1	122-09-8	Dimethylphenethylamine	6.1E+01	nc	8.8E+02	nc	3.7E+00	nc	3.6E+01	nc		
		2.0E-02	i			2.0E-02	r	0	0.1	105-67-9	2,4-Dimethylphenol	1.2E+03	nc	1.8E+04	nc	7.3E+01	nc	7.3E+02	nc	9.0E+00	4.0E-01
		6.0E-04	i			6.0E-04	r	0	0.1	576-26-1	2,6-Dimethylphenol	3.7E+01	nc	5.3E+02	nc	2.2E+00	nc	2.2E+01	nc		
		1.0E-03	i			1.0E-03	r	0	0.1	95-65-8	3,4-Dimethylphenol	6.1E+01	nc	8.8E+02	nc	3.7E+00	nc	3.6E+01	nc		
		1.0E+01	x			1.0E+01	r	0	0.1	131-11-3	Dimethyl phthalate	1.0E+05	max	1.0E+05	max	3.7E+04	nc	3.6E+05	nc		
		1.0E-01	i			1.0E-01	r	0	0.1	120-61-6	Dimethyl terephthalate	6.1E+03	nc	8.8E+04	nc	3.7E+02	nc	3.6E+03	nc		
		2.0E-03	i			2.0E-03	r	0	0.1	131-89-5	4,6-Dinitro-o-cyclohexyl phenol	1.2E+02	nc	1.8E+03	nc	7.3E+00	nc	7.3E+01	nc		
		4.0E-04	h			4.0E-04	r	0	0.1	528-29-0	1,2-Dinitrobenzene	2.4E+01	nc	3.5E+02	nc	1.5E+00	nc	1.5E+01	nc		
		1.0E-04	i			1.0E-04	r	0	0.1	99-65-0	1,3-Dinitrobenzene	6.1E+00	nc	8.8E+01	nc	3.7E-01	nc	3.6E+00	nc		
		4.0E-04	h			4.0E-04	r	0	0.1	100-25-4	1,4-Dinitrobenzene	2.4E+01	nc	3.5E+02	nc	1.5E+00	nc	1.5E+01	nc		
		2.0E-03	i			2.0E-03	r	0	0.1	51-28-5	2,4-Dinitrophenol	1.2E+02	nc	1.8E+03	nc	7.3E+00	nc	7.3E+01	nc	3.0E-01	1.0E-02
6.8E-01	i			6.8E-01	r			0	0.1	25321-14-6	Dinitrotoluene mixture	7.2E-01	ca	3.6E+00	ca	9.9E-03	ca	9.9E-02	ca	8.0E-04	4.0E-05
		2.0E-03	i			2.0E-03	r	0	0.1	121-14-2	2,4-Dinitrotoluene (see Dinitrotoluene mixture)	1.2E+02	nc	1.8E+03	nc	7.3E+00	nc	7.3E+01	nc	8.0E-04	4.0E-05
		1.0E-03	h			1.0E-03	r	0	0.1	606-20-2	2,6-Dinitrotoluene (see Dinitrotoluene mixture)	6.1E+01	nc	8.8E+02	nc	3.7E+00	nc	3.6E+01	nc	7.0E-04	3.0E-05
		1.0E-03	i			1.0E-03	r	0	0.1	88-85-7	Dinoseb	6.1E+01	nc	8.8E+02	nc	3.7E+00	nc	3.6E+01	nc		
		2.0E-02	h			2.0E-02	r	0	0.1	117-84-0	di-n-Octyl phthalate	1.2E+03	nc	1.0E+04	sat	7.3E+01	nc	7.3E+02	nc	1.0E+04	1.0E+04
1.1E-02	i			1.1E-02	r			0	0.1	123-91-1	1,4-Dioxane	4.4E+01	ca	2.2E+02	ca	6.1E-01	ca	6.1E+00	ca		
1.5E+05	h			1.5E+05	h			0	0.03	1746-01-6	Dioxin (2,3,7,8-TCDD)	3.9E-06	ca	2.7E-05	ca	4.5E-08	ca	4.5E-07	ca		
		3.0E-02	i			3.0E-02	r	0	0.1	957-51-7	Diphenamid	1.8E+03	nc	2.6E+04	nc	1.1E+02	nc	1.1E+03	nc		
		2.5E-02	i			2.5E-02	r	0	0.1	122-39-4	Diphenylamine	1.5E+03	nc	2.2E+04	nc	9.1E+01	nc	9.1E+02	nc		
		3.0E-04	n			3.0E-04	r		0.1	74-31-7	**N,N-Diphenyl-1,4 benzenediamine (DPPD)**	1.8E+01	nc	2.6E+02	nc	1.1E+00	nc	1.1E+01	nc		
8.0E-01	i			7.7E-01	i			0	0.1	122-66-7	1,2-Diphenylhydrazine	6.1E-01	ca	3.1E+00	ca	8.7E-03	ca	8.4E-02	ca		
		9.0E-03	n			9.0E-03	r	0	0.1	127-63-9	Diphenyl sulfone	5.5E+02	nc	7.9E+03	nc	3.3E+01	nc	3.3E+02	nc		
		2.2E-03	i			2.2E-03	r	0	0.1	85-00-7	Diquat	1.3E+02	nc	1.9E+03	nc	8.0E+00	nc	8.0E+01	nc		
8.6E+00	h			8.6E+00	r			0	0.1	1937-37-7	Direct black 38	5.7E-02	ca	2.9E-01	ca	7.8E-04	ca	7.8E-03	ca		
8.1E+00	h			8.1E+00	r			0	0.1	2602-46-2	Direct blue 6	6.0E-02	ca	3.0E-01	ca	8.3E-04	ca	8.3E-03	ca		
9.3E+00	h			9.3E+00	r			0	0.1	16071-86-6	Direct brown 95	5.2E-02	ca	2.7E-01	ca	7.2E-04	ca	7.2E-03	ca		
		4.0E-05	i			4.0E-05	r	0	0.1	298-04-4	Disulfoton	2.4E+00	nc	3.5E+01	nc	1.5E-01	nc	1.5E+00	nc		
		1.0E-02	i			1.0E-02	r	0	0.1	505-29-3	1,4-Dithiane	6.1E+02	nc	8.8E+03	nc	3.7E+01	nc	3.6E+02	nc		
		2.0E-03	i			2.0E-03	r	0	0.1	330-54-1	Diuron	1.2E+02	nc	1.8E+03	nc	7.3E+00	nc	7.3E+01	nc		
		4.0E-03	i			4.0E-03	r	0	0.1	2439-10-3	Dodine	2.4E+02	nc	3.5E+03	nc	1.5E+01	nc	1.5E+02	nc		
		2.0E-01	n							7429-91-6	**Dysprosium**	1.6E+04	nc	1.0E+05	max			7.3E+03	nc		
		6.0E-03	i			6.0E-03	r	0	0.1	115-29-7	Endosulfan	3.7E+02	nc	5.3E+03	nc	2.2E+01	nc	2.2E+02	nc	1.8E+01	9.0E-01
		2.0E-02	i			2.0E-02	r	0	0.1	145-73-3	Endothall	1.2E+03	nc	1.8E+04	nc	7.3E+01	nc	7.3E+02	nc		
		3.0E-04	i			3.0E-04	r	0	0.1	72-20-8	Endrin	1.8E+01	nc	2.6E+02	nc	1.1E+00	nc	1.1E+01	nc	1.0E+00	5.0E-02
9.9E-03	i	2.0E-03	h	4.2E-03	i	2.9E-04	i	1		106-89-8	Epichlorohydrin	7.6E+00	nc	2.6E+01	nc	1.0E+00	nc	2.0E+00	nc		
		5.7E-03	r			5.7E-03	i	0	0.1	106-88-7	1,2-Epoxybutane	3.5E+02	nc	5.0E+03	nc	2.1E+01	nc	2.1E+02	nc		
		2.5E-02	i			2.5E-02	r	0	0.1	759-94-4	EPTC (S-Ethyl dipropylthiocarbamate)	1.5E+03	nc	2.2E+04	nc	9.1E+01	nc	9.1E+02	nc		
		5.0E-03	i			5.0E-03	r	0	0.1	16672-87-0	Ethephon (2-chloroethyl phosphonic acid)	3.1E+02	nc	4.4E+03	nc	1.8E+01	nc	1.8E+02	nc		
		5.0E-04	i			5.0E-04	r	0	0.1	563-12-2	Ethion	3.1E+01	nc	4.4E+02	nc	1.8E+00	nc	1.8E+01	nc		
		4.0E-01	h			5.7E-02	i	0	0.1	110-80-5	2-Ethoxyethanol	2.4E+04	nc	1.0E+05	max	2.1E+02	nc	1.5E+04	nc		
		3.0E-01	h			3.0E-01	r	0	0.1	111-15-9	2-Ethoxyethanol acetate	1.8E+04	nc	1.0E+05	max	1.1E+03	nc	1.1E+04	nc		
		9.0E-01	i			9.0E-01	r	1		141-78-6	Ethyl acetate	1.9E+04	nc	3.7E+04	sat	3.3E+03	nc	5.5E+03	nc		
4.8E-02	h			4.8E-02	r			1		140-88-5	Ethyl acrylate	2.1E-01	ca	4.5E-01	ca	1.4E-01	ca	2.3E-01	ca		
		1.0E-01	i			2.9E-01	i	1		100-41-4	Ethylbenzene	2.3E+02	sat	2.3E+02	sat	1.1E+03	nc	1.3E+03	nc	1.3E+01	7.0E-01
2.9E-03	n	4.0E-01	n	2.9E-03	r	2.9E+00	i	1		75-00-3	Ethyl chloride	3.0E+00	ca	6.5E+00	ca	2.3E+00	ca	4.6E+00	ca		
		3.0E-01	h			3.0E-01	r	0	0.1	109-78-4	Ethylene cyanohydrin	1.8E+04	nc	1.0E+05	max	1.1E+03	nc	1.1E+04	nc		
		2.0E-02	h			2.0E-02	r	0	0.1	107-15-3	Ethylene diamine	1.2E+03	nc	1.8E+04	nc	7.3E+01	nc	7.3E+02	nc		
		2.0E+00	i			2.0E+00	r	0	0.1	107-21-1	Ethylene glycol	1.0E+05	max	1.0E+05	max	7.3E+03	nc	7.3E+04	nc		
		5.0E-01	i			3.7E+00	i	0	0.1	111-76-2	**Ethylene glycol, monobutyl ether**	3.1E+04	nc	1.0E+05	max	1.4E+04	nc	1.8E+04	nc		
1.0E+00	h			3.5E-01	h			1		75-21-8	Ethylene oxide	1.4E-01	ca	3.6E-01	ca	1.9E-02	ca	2.4E-02	ca		

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FOR PLANNING PURPOSES

TOXICITY INFORMATION											CONTAMINANT	PRELIMINARY REMEDIATION GOALS (PRGs)								SOIL SCREENING LEVELS Migration to Ground Water	
SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		VOC	skin abs. soils	CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		DAF 20 (mg/kg)	DAF 1 (mg/kg)
1.1E-01	h	8.0E-05	i	1.1E-01	r	8.0E-05	r	0	0.1	96-45-7	Ethylene thiourea (ETU)	4.4E+00	ca**	2.2E+01	ca**	6.1E-02	ca**	6.1E-01	ca**		
		2.0E-01	i			2.0E-01	r	1		60-29-7	Ethyl ether	1.8E+03	sat	1.8E+03	sat	7.3E+02	nc	1.2E+03	nc		
		9.0E-02	h			9.0E-02	r	1		97-63-2	Ethyl methacrylate	1.4E+02	sat	1.4E+02	sat	3.3E+02	nc	5.5E+02	nc		
		1.0E-05	i			1.0E-05	r	0	0.1	2104-64-5	Ethyl p-nitrophenyl phenylphosphorothioate	6.1E-01	nc	8.8E+00	nc	3.7E-02	nc	3.6E-01	nc		
		3.0E+00	i			3.0E+00	r	0	0.1	84-72-0	Ethylphthalyl ethyl glycolate	1.0E+05	max	1.0E+05	max	1.1E+04	nc	1.1E+05	nc		
		8.0E-03	i			8.0E-03	r	0	0.1	101200-48-0	Express	4.9E+02	nc	7.0E+03	nc	2.9E+01	nc	2.9E+02	nc		
		2.5E-04	i			2.5E-04	r	0	0.1	22224-92-6	Fenamiphos	1.5E+01	nc	2.2E+02	nc	9.1E-01	nc	9.1E+00	nc		
		1.3E-02	i			1.3E-02	r	0	0.1	2164-17-2	Fluometuron	7.9E+02	nc	1.1E+04	nc	4.7E+01	nc	4.7E+02	nc		
		6.0E-02	i					0	0.1	16984-48-8	Flouride	3.7E+03	nc	5.3E+04	nc			2.2E+03	nc		
		8.0E-02	i			8.0E-02	r	0	0.1	59756-60-4	Fluoridone	4.9E+03	nc	7.0E+04	nc	2.9E+02	nc	2.9E+03	nc		
		2.0E-02	i			2.0E-02	r	0	0.1	56425-91-3	Flurprimidol	1.2E+03	nc	1.8E+04	nc	7.3E+01	nc	7.3E+02	nc		
		6.0E-02	i			6.0E-02	r	0	0.1	66332-96-5	Flutolanil	3.7E+03	nc	5.3E+04	nc	2.2E+02	nc	2.2E+03	nc		
		1.0E-02	i			1.0E-02	r	0	0.1	69409-94-5	Fluvalinate	6.1E+02	nc	8.8E+03	nc	3.7E+01	nc	3.6E+02	nc		
3.5E-03	i	1.0E-01	i	3.5E-03	r	1.0E-01	r	0	0.1	133-07-3	Folpet	1.4E+02	ca*	7.0E+02	ca	1.9E+00	ca	1.9E+01	ca		
1.9E-01	i			1.9E-01	r			0	0.1	72178-02-0	Fomesafen	2.6E+00	ca	1.3E+01	ca	3.5E-02	ca	3.5E-01	ca		
		2.0E-03	i			2.0E-03	r	0	0.1	944-22-9	Fonofos	1.2E+02	nc	1.8E+03	nc	7.3E+00	nc	7.3E+01	nc		
		1.5E-01	i	4.6E-02	i			0	0.1	50-00-0	Formaldehyde	9.2E+03	nc	1.0E+05	nc	1.5E-01	ca	5.5E+03	nc		
		2.0E+00	h			2.0E+00	r	0	0.1	64-18-6	Formic Acid	1.0E+05	max	1.0E+05	max	7.3E+03	nc	7.3E+04	nc		
		3.0E+00	i			3.0E+00	r	0	0.1	39148-24-8	Fosetyl-al	1.0E+05	max	1.0E+05	max	1.1E+04	nc	1.1E+05	nc		
		3.0E+01	i			8.6E+00	h	1		76-13-1	Freon 113	5.6E+03	sat	5.6E+03	sat	3.1E+04	nc	5.9E+04	nc		
		1.0E-03	i			1.0E-03	r	1		110-00-9	Furan	2.5E+00	nc	8.5E+00	nc	3.7E+00	nc	6.1E+00	nc		
3.8E+00	h			3.8E+00	r			0	0.1	67-45-8	Furazolidone	1.3E-01	nc	6.5E-01	nc	1.8E-03	nc	1.8E-02	ca		
		3.0E-03	i			1.4E-02	h	0	0.1	98-01-1	Furfural	1.8E+02	nc	2.6E+03	nc	5.2E+01	nc	1.1E+02	nc		
5.0E+01	h			5.0E+01	r			0	0.1	531-82-8	Furium	9.7E-03	ca	4.9E-02	ca	1.3E-04	ca	1.3E-03	ca		
3.0E-02	i			3.0E-02	r			0	0.1	60568-05-0	Furmecyclox	1.6E+01	ca	8.2E+01	ca	2.2E-01	ca	2.2E+00	ca		
		4.0E-04	i			4.0E-04	r	0	0.1	77182-82-2	Glufosinate-ammonium	2.4E+01	nc	3.5E+02	nc	1.5E+00	nc	1.5E+01	nc		
		4.0E-04	i			2.9E-04	h	0	0.1	765-34-4	Glycidaldehyde	2.4E+01	nc	3.5E+02	nc	1.0E+00	nc	1.5E+01	nc		
		1.0E-01	i			1.0E-01	r	0	0.1	1071-83-6	Glyphosate	6.1E+03	nc	8.8E+04	nc	3.7E+02	nc	3.6E+03	nc		
		5.0E-05	i			5.0E-05	r	0	0.1	69806-40-2	Haloxyfop-methyl	3.1E+00	nc	4.4E+01	nc	1.8E-01	nc	1.8E+00	nc		
		1.3E-02	i			1.3E-02	r	0	0.1	79277-27-3	Harmony	7.9E+02	nc	1.1E+04	nc	4.7E+01	nc	4.7E+02	nc		
4.5E+00	i	5.0E-04	i	4.6E+00	i	5.0E-04	r	0	0.1	76-44-8	Heptachlor	1.1E-01	ca	5.5E-01	ca	1.5E-03	ca	1.5E-02	ca	2.3E+01	1.0E+00
9.1E+00	i	1.3E-05	i	9.1E+00	i	1.3E-05	r	0	0.1	1024-57-3	Heptachlor epoxide	5.3E-02	ca*	2.7E-01	ca*	7.4E-04	ca*	7.4E-03	ca*	7.0E-01	3.0E-02
		2.0E-03	i			2.0E-03	r	0	0.1	87-82-1	Hexabromobenzene	1.2E+02	nc	1.8E+03	nc	7.3E+00	nc	7.3E+01	nc		
1.6E+00	i	8.0E-04	i	1.6E+00	i	8.0E-04	r	0	0.1	118-74-1	Hexachlorobenzene	3.0E-01	ca	1.5E+00	ca	4.2E-03	ca	4.2E-02	ca	2.0E+00	1.0E-01
7.8E-02	i	3.0E-04	n	7.8E-02	i	3.0E-04	r	0	0.1	87-68-3	**Hexachlorobutadiene**	6.2E+00	ca**	3.2E+01	ca**	8.6E-02	ca*	8.6E-01	ca*	2.0E+00	1.0E-01
6.3E+00	i			6.3E+00	i			0	0.04	319-84-6	HCH (alpha)	9.0E-02	ca	5.9E-01	ca	1.1E-03	ca	1.1E-02	ca	5.0E-04	3.0E-05
1.8E+00	i			1.8E+00	i			0	0.04	319-85-7	HCH (beta)	3.2E-01	ca	2.1E+00	ca	3.7E-03	ca	3.7E-02	ca	3.0E-03	1.0E-04
1.3E+00	h	3.0E-04	i	1.3E+00	r	3.0E-04	r	0	0.04	58-89-9	HCH (gamma) Lindane	4.4E-01	ca*	2.9E+00	ca	5.2E-03	ca	5.2E-02	ca	9.0E-03	5.0E-04
1.8E+00	i			1.8E+00	i			0	0.04	608-73-1	HCH-technical	3.2E-01	ca	2.1E+00	ca	3.8E-03	ca	3.7E-02	ca	3.0E-03	1.0E-04
		7.0E-03	i			2.0E-05	h	0	0.1	77-47-4	Hexachlorocyclopentadiene	4.2E+02	nc	5.9E+03	nc	7.3E-02	nc	2.6E+02	nc	4.0E+02	2.0E+01
6.2E+03	i			4.6E+03	i			0	0.1	19408-74-3	Hexachlorodibenzo-p-dioxin mixture (HxCDD)	7.8E-05	ca	4.0E-04	ca	1.5E-06	ca	1.1E-05	ca		
1.4E-02	i	1.0E-03	i	1.4E-02	i	1.0E-03	r	0	0.1	67-72-1	Hexachloroethane	3.5E+01	ca**	1.8E+02	ca**	4.8E-01	ca**	4.8E+00	ca**	5.0E-01	2.0E-02
		3.0E-04	i			3.0E-04	r	0	0.1	70-30-4	Hexachlorophene	1.8E+01	nc	2.6E+02	nc	1.1E+00	nc	1.1E+01	nc		
1.1E-01	i	3.0E-03	i	1.1E-01	r	3.0E-03	r	0	0.1	121-82-4	Hexahydro-1,3,5-trinitro-1,3,5-triazine	4.4E+00	ca*	2.2E+01	ca	6.1E-02	ca	6.1E-01	ca		
		2.9E-06	r			2.9E-06	i	0	0.1	822-06-0	1,6-Hexamethylene diisocyanate	1.7E-01	nc	2.5E+00	nc	1.0E-02	nc	1.0E-01	nc		
		6.0E-02	h			5.7E-02	i	1		110-54-3	n-Hexane	1.1E+02	sat	1.1E+02	sat	2.1E+02	nc	3.5E+02	nc		
		3.3E-02	i			3.3E-02	r	0	0.1	51235-04-2	Hexazinone	2.0E+03	nc	2.9E+04	nc	1.2E+02	nc	1.2E+03	nc		
		5.0E-02	i			5.0E-02	r	0	0.1	2691-41-0	HMX	3.1E+03	nc	4.4E+04	nc	1.8E+02	nc	1.8E+03	nc		
3.0E+00	i			1.7E+01	i			0	0.1	302-01-2	Hydrazine, hydrazine sulfate	1.6E-01	ca	8.2E-01	ca	3.9E-04	ca	2.2E-02	ca		
3.0E+00	n			1.7E+01	n				0.1	60-34-4	**Hydrazine, monomethyl**	1.6E-01	ca	8.2E-01	ca	4.0E-04	ca	2.2E-02	ca		
3.0E+00	n			1.7E+01	n				0.1	57-14-7	**Hydrazine, dimethyl**	1.6E-01	ca	8.2E-01	ca	4.0E-04	ca	2.2E-02	ca		
						5.7E-03	i			7647-01-0	Hydrogen chloride					2.1E+01	nc				
		3.0E-03	i			2.9E-04	i			7783-06-4	Hydrogen sulfide					1.0E+00	nc	1.1E+02	nc		
		4.0E-02	h			4.0E-02	r	0	0.1	123-31-9	p-Hydroquinone	2.4E+03	nc	3.5E+04	nc	1.5E+02	nc	1.5E+03	nc		

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FOR PLANNING PURPOSES

TOXICITY INFORMATION											CONTAMINANT	PRELIMINARY REMEDIATION GOALS (PRGs)								SOIL SCREENING LEVELS (Migration to Ground Water)	
SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		VOC	skin abs. soils	CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		DAF 20 (mg/kg)	DAF 1 (mg/kg)
		1.3E-02	i			1.3E-02	r	0	0.1	35554-44-0	Imazalil	7.9E+02	nc	1.1E+04	nc	4.7E+01	nc	4.7E+02	nc		
		2.5E-01	i			2.5E-01	r	0	0.1	81335-37-7	Imazaquin	1.5E+04	nc	1.0E+05	max	9.1E+02	nc	9.1E+03	nc		
		4.0E-02	i			4.0E-02	r	0	0.1	36734-19-7	Iprodione	2.4E+03	nc	3.5E+04	nc	1.5E+02	nc	1.5E+03	nc		
		3.0E-01	n					0		7439-89-6	Iron	2.3E+04	nc	1.0E+05	max			1.1E+04	nc		
		3.0E-01	i			3.0E-01	r	1		78-83-1	Isobutanol	1.3E+04	nc	4.0E+04	sat	1.1E+03	nc	1.8E+03	nc		
9.5E-04	i	2.0E-01	i	9.5E-04	r	2.0E-01	r	0	0.1	78-59-1	Isophorone	5.1E+02	ca*	2.6E+03	ca*	7.1E+00	ca	7.1E+01	ca	5.0E-01	3.0E-02
		1.5E-02	i			1.5E-02	r	0	0.1	33820-53-0	Isopropalin	9.2E+02	nc	1.3E+04	nc	5.5E+01	nc	5.5E+02	nc		
		1.0E-01	i			1.1E-01	r	0	0.1	1832-54-8	Isopropyl methyl phosphonic acid	6.1E+03	nc	8.8E+04	nc	4.0E+02	nc	3.6E+03	nc		
		5.0E-02	i			5.0E-02	r	0	0.1	82558-50-7	Isoxaben	3.1E+03	nc	4.4E+04	nc	1.8E+02	nc	1.8E+03	nc		
1.8E+01	n			1.8E+01	r			0	0.1	143-50-0	Kepone	2.7E-02	ca	1.4E-01	ca	3.7E-04	ca	3.7E-03	ca		
		2.0E-03	i			2.0E-03	r	0	0.1	77501-63-4	Lactofen	1.2E+02	nc	1.8E+03	nc	7.3E+00	nc	7.3E+01	nc		
PRGs Based on EPA Models (IEUBK 1994 and TRW 1996)										7439-92-1	**Lead**	4.0E+02	nc	7.5E+02	nc						
		1.0E-07	i					0	0.1	78-00-2	Lead (tetraethyl)	6.1E-03	nc	8.8E-02	nc			3.6E-03	nc		
		2.0E-03	i			2.0E-03	r	0	0.1	330-55-2	Linuron	1.2E+02	nc	1.8E+03	nc	7.3E+00	nc	7.3E+01	nc		
		2.0E-02	x					0		7439-93-2	Lithium	1.6E+03	nc	4.1E+04	nc			7.3E+02	nc		
		2.0E-01	i			2.0E-01	r	0	0.1	83055-99-6	Londax	1.2E+04	nc	1.0E+05	max	7.3E+02	nc	7.3E+03	nc		
		2.0E-02	i			2.0E-02	r	0	0.1	121-75-5	Malathion	1.2E+03	nc	1.8E+04	nc	7.3E+01	nc	7.3E+02	nc		
		1.0E-01	i			1.0E-01	r	0	0.1	108-31-6	Maleic anhydride	6.1E+03	nc	8.8E+04	nc	3.7E+02	nc	3.6E+03	nc		
		5.0E-01	i			5.0E-01	r	1		123-33-1	Maleic hydrazide	1.7E+03	nc	2.4E+03	sat	1.8E+03	nc	3.0E+03	nc		
		2.0E-05	h			2.0E-05	r	0	0.1	109-77-3	Malononitrile	1.2E+00	nc	1.8E+01	nc	7.3E-02	nc	7.3E-01	nc		
		3.0E-02	h			3.0E-02	r	0	0.1	8018-01-7	Mancozeb	1.8E+03	nc	2.6E+04	nc	1.1E+02	nc	1.1E+03	nc		
6.0E-02	o	5.0E-03	i	6.0E-02	r	5.0E-03	r	0	0.1	12427-38-2	Maneb	8.1E+00	ca*	4.1E+01	ca	1.1E-01	ca	1.1E+00	ca		
		2.4E-02	i			1.4E-05	i	0		7439-96-5	Manganese and compounds	1.8E+03	nc	3.2E+04	nc	5.1E-02	nc	8.8E+02	nc		
		9.0E-05	h			9.0E-05	r	0	0.1	950-10-7	Mephosfolan	5.5E+00	nc	7.9E+01	nc	3.3E-01	nc	3.3E+00	nc		
		3.0E-02	i			3.0E-02	r	0	0.1	24307-26-4	Mepiquat	1.8E+03	nc	2.6E+04	nc	1.1E+02	nc	1.1E+03	nc		
2.9E-02	n	1.0E-01	n	2.9E-02	r	1.0E-01	r	0	0.1	149-30-4	2-Mercaptobenzothiazole	1.7E+01	ca	8.5E+01	ca	2.3E-01	ca	2.3E+00	ca		
		3.0E-04	i					0		7487-94-7	Mercury and compounds	2.3E+01	nc	6.1E+02	nc			1.1E+01	nc		
						8.6E-05	i			7439-97-6	Mercury (elemental)					3.1E-01	nc				
		1.0E-04	i					0	0.1	22967-92-6	Mercury (methyl)	6.1E+00	nc	8.8E+01	nc			3.6E+00	nc		
		3.0E-05	i			3.0E-05	r	0	0.1	150-50-5	Merphos	1.8E+00	nc	2.6E+01	nc	1.1E-01	nc	1.1E+00	nc		
		3.0E-05	i			3.0E-05	r	0	0.1	78-48-8	Merphos oxide	1.8E+00	nc	2.6E+01	nc	1.1E-01	nc	1.1E+00	nc		
		6.0E-02	i			6.0E-02	r	0	0.1	57837-19-1	Metalaxyl	3.7E+03	nc	5.3E+04	nc	2.2E+02	nc	2.2E+03	nc		
		1.0E-04	i			2.0E-04	h	1		126-98-7	Methacrylonitrile	2.1E+00	nc	8.8E+00	nc	7.3E-01	nc	1.0E+00	nc		
		5.0E-05	i			5.0E-05	r	0	0.1	10265-92-6	Methamidophos	3.1E+00	nc	4.4E+01	nc	1.8E-01	nc	1.8E+00	nc		
		5.0E-01	i			5.0E-01	r	0	0.1	67-56-1	Methanol	3.1E+04	nc	1.0E+05	max	1.8E+03	nc	1.8E+04	nc		
		1.0E-03	i			1.0E-03	r	0	0.1	950-37-8	Methidathion	6.1E+01	nc	8.8E+02	nc	3.7E+00	nc	3.6E+01	nc		
		2.5E-02	i			2.5E-02	r	1		16752-77-5	Methomyl	4.4E+01	nc	1.5E+02	nc	9.1E+01	nc	1.5E+02	nc		
		5.0E-03	i			5.0E-03	r	0	0.1	72-43-5	Methoxychlor	3.1E+02	nc	4.4E+03	nc	1.8E+01	nc	1.8E+02	nc	1.6E+02	8.0E+00
		1.0E-03	h			5.7E-03	i	0	0.1	109-86-4	2-Methoxyethanol	6.1E+01	nc	8.8E+02	nc	2.1E+01	nc	3.6E+01	nc		
		2.0E-03	h			2.0E-03	r	0	0.1	110-49-6	2-Methoxyethanol acetate	1.2E+02	nc	1.8E+03	nc	7.3E+00	nc	7.3E+01	nc		
4.6E-02	h			4.6E-02	r			0	0.1	99-59-2	2-Methoxy-5-nitroaniline	1.1E+01	ca	5.4E+01	ca	1.5E-01	ca	1.5E+00	ca		
		1.0E+00	h			1.0E+00	r	1		79-20-9	Methyl acetate	2.2E+04	nc	9.6E+04	nc	3.7E+03	nc	6.1E+03	nc		
		3.0E-02	h			3.0E-02	r	1		96-33-3	Methyl acrylate	7.0E+01	nc	2.3E+02	nc	1.1E+02	nc	1.8E+02	nc		
2.4E-01	h			2.4E-01	r			0	0.1	95-53-4	2-Methylaniline (o-toluidine)	2.0E+00	ca	1.0E+01	ca	2.8E-02	ca	2.8E-01	ca		
1.8E-01	h			1.8E-01	r			0	0.1	636-21-5	2-Methylaniline hydrochloride	2.7E+00	ca	1.4E+01	ca	3.7E-02	ca	3.7E-01	ca		
		1.0E+00	x			1.0E+00	r	0	0.1	79-22-1	Methyl chlorocarbonate	6.1E+04	nc	1.0E+05	max	3.7E+03	nc	3.6E+04	nc		
		5.0E-04	i			5.0E-04	r	0	0.1	94-74-6	2-Methyl-4-chlorophenoxyacetic acid	3.1E+01	nc	4.4E+02	nc	1.8E+00	nc	1.8E+01	nc		
		1.0E-02	i			1.0E-02	r	0	0.1	94-81-5	4-(2-Methyl-4-chlorophenoxy) butyric acid	6.1E+02	nc	8.8E+03	nc	3.7E+01	nc	3.6E+02	nc		
		1.0E-03	i			1.0E-03	r	0	0.1	93-65-2	2-(2-Methyl-4-chlorophenoxy) propionic acid	6.1E+01	nc	8.8E+02	nc	3.7E+00	nc	3.6E+01	nc		
		1.0E-03	i			1.0E-03	r	0	0.1	16484-77-8	2-(2-Methyl-1,4-chlorophenoxy) propionic acid	6.1E+01	nc	8.8E+02	nc	3.7E+00	nc	3.6E+01	nc		
		8.6E-01	r			8.6E-01	h	1		108-87-2	Methylcyclohexane	2.6E+03	nc	8.8E+03	nc	3.1E+03	nc	5.2E+03	nc		
2.5E-01	h			2.5E-01	r			0	0.1	101-77-9	4,4'-Methylenebisbenzeneamine	1.9E+00	ca	9.9E+00	ca	2.7E-02	ca	2.7E-01	ca		
1.3E-01	h	7.0E-04	h	1.3E-01	h	7.0E-04	r	0	0.1	101-14-4	4,4'-Methylene bis(2-chloroaniline)	3.7E+00	ca*	1.9E+01	ca*	5.2E-02	ca*	5.2E-01	ca*		
4.6E-02	i			4.6E-02	r			0	0.1	101-61-1	4,4'-Methylene bis(N,N'-dimethyl)aniline	1.1E+01	ca	5.4E+01	ca	1.5E-01	ca	1.5E+00	ca		

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FOR PLANNING PURPOSES

SFo 1/(mg/kg-d)	RfDo (mg/kg-d)	SFi 1/(mg/kg-d)	RfDi (mg/kg-d)	VOC	skin abs. soils	CAS No.	CONTAMINANT	Residential Soil (mg/kg)	Industrial Soil (mg/kg)	Ambient Air (ug/m^3)	Tap Water (ug/l)	Migration to Ground Water DAF 20 (mg/kg)	DAF 1 (mg/kg)
	1.0E-02 h		1.0E-02 r	1		74-95-3	Methylene bromide	6.7E+01 nc	2.4E+02 nc	3.7E+01 nc	6.1E+01 nc		
7.5E-03 i	6.0E-02 i	1.6E-03 i	8.6E-01 h	1		75-09-2	Methylene chloride	8.9E+00 ca	2.1E+01 ca	4.1E+00 ca	4.3E+00 ca	2.0E-02	1.0E-03
	1.7E-04 r		1.7E-04 i	0	0.1	101-68-8	4,4'-Methylene diphenyl diisocyanate	1.0E+01 nc	1.5E+02 nc	6.2E-01 nc	6.2E+00 nc		
	6.0E-01 i		2.9E-01 i	1		78-93-3	Methyl ethyl ketone	7.3E+03 nc	2.8E+04 nc	1.0E+03 nc	1.9E+03 nc		
1.1E+00 h		1.1E+00 r		0	0.1	60-34-4	Methyl hydrazine	4.4E-01 ca	2.2E+00 ca	6.1E-03 ca	6.1E-02 ca		
	8.0E-02 h		2.3E-02 h	1		108-10-1	Methyl isobutyl ketone	7.9E+02 nc	2.9E+03 nc	8.3E+01 nc	1.6E+02 nc		
	5.7E-04 r		5.7E-04 n	0	0.1	74-93-1	Methyl Mercaptan	3.5E+01 nc	5.0E+02 nc	2.1E+00 nc	2.1E+01 nc		
	1.4E+00 i		2.0E-01 i	1		80-62-6	Methyl methacrylate	2.2E+03 nc	2.7E+03 sat	7.3E+02 nc	1.4E+03 nc		
3.3E-02 h		3.3E-02 r		0	0.1	99-55-8	2-Methyl-5-nitroaniline	1.5E+01 ca	7.5E+01 ca	2.0E-01 ca	2.0E+00 ca		
	2.5E-04 i		2.5E-04 r	0	0.1	298-00-0	Methyl parathion	1.5E+01 nc	2.2E+02 nc	9.1E-01 nc	9.1E+00 nc		
	5.0E-02 i		5.0E-02 r	0	0.1	95-48-7	2-Methylphenol	3.1E+03 nc	4.4E+04 nc	1.8E+02 nc	1.8E+03 nc	1.5E+01	8.0E-01
	5.0E-02 i		5.0E-02 r	0	0.1	108-39-4	3-Methylphenol	3.1E+03 nc	4.4E+04 nc	1.8E+02 nc	1.8E+03 nc		
	5.0E-03 h		5.0E-03 r	0	0.1	106-44-5	4-Methylphenol	3.1E+02 nc	4.4E+03 nc	1.8E+01 nc	1.8E+02 nc		
	2.0E-02 n		2.0E-02 r	0	0.1	993-13-5	Methyl phosphonic acid	1.2E+03 nc	1.8E+04 nc	7.3E+01 nc	7.3E+02 nc		
	6.0E-03 h		1.1E-02 h	1		25013-15-4	Methyl styrene (mixture)	1.3E+02 nc	5.6E+02 nc	4.2E+01 nc	6.0E+01 nc		
	7.0E-02 h		7.0E-02 r	1		98-83-9	Methyl styrene (alpha)	6.8E+02 sat	6.8E+02 sat	2.6E+02 nc	4.3E+02 nc		
			8.6E-01 i	1		1634-04-4	Methyl tertbutyl ether (MTBE)			3.1E+03 nc	2.0E+01 nc/ca		
1.8E-03		1.8E-03		1			**"CAL-Modified PRG"**	1.7E+01 ca	3.7E+01 ca	3.7E+00 ca	6.2E+00 ca		
	1.5E-01 i		1.5E-01 r	0	0.1	51218-45-2	Metolaclor (Dual)	9.2E+03 nc	1.0E+05 max	5.5E+02 nc	5.5E+03 nc		
	2.5E-02 i		2.5E-02 r	0	0.1	21087-64-9	Metribuzin	1.5E+03 nc	2.2E+04 nc	9.1E+01 nc	9.1E+02 nc		
1.8E+00 x	2.0E-04 i	1.8E+00 r	2.0E-04 r	0	0.1	2385-85-5	Mirex	2.7E-01 ca*	1.4E+00 ca	3.7E-03 ca	3.7E-02 ca		
	2.0E-03 i		2.0E-03 r	0	0.1	2212-67-1	Molinate	1.2E+02 nc	1.8E+03 nc	7.3E+00 nc	7.3E+01 nc		
	5.0E-03 h			0		7439-98-7	Molybdenum	3.9E+02 nc	1.0E+04 nc		1.8E+02 nc		
	1.0E-01 h		1.0E-01 h	0	0.1	10599-90-3	Monochloramine	6.1E+03 nc	8.8E+04 nc	3.7E+02 nc	3.6E+03 nc		
	2.0E-03 i		2.0E-03 r	0	0.1	300-76-5	Naled	1.2E+02 nc	1.8E+03 nc	7.3E+00 nc	7.3E+01 nc		
	1.0E-01 i		1.0E-01 r	0	0.1	15299-99-7	Napropamide	6.1E+03 nc	8.8E+04 nc	3.7E+02 nc	3.6E+03 nc		
	2.0E-02 i			0		7440-02-0	Nickel (soluble salts)	1.6E+03 nc	4.1E+04 nc		7.3E+02 nc	1.3E+02	7.0E+00
							"CAL-Modified PRG" (PEA, 1994)	1.5E+02					
		8.4E-01 i		0			Nickel refinery dust			8.0E-03 ca			
		1.7E+00 i		0		12035-72-2	Nickel subsulfide		1.1E+04 ca	4.0E-03 ca			
	1.5E-03 x		1.5E-03 r	0	0.1	1929-82-4	Nitrapyrin	9.2E+01 nc	1.3E+03 nc	5.5E+00 nc	5.5E+01 nc		
Tap Water PRG Based on Infant NOAEL (see IRIS)						14797-55-8	Nitrate				1.0E+04 nc		
	1.0E-01 x					10102-43-9	Nitric Oxide	7.8E+03 nc	1.0E+05 max		3.6E+03 nc		
Tap Water PRG Based on Infant NOAEL (see IRIS)						14797-65-0	Nitrite				1.0E+03 nc		
	5.7E-05 r		5.7E-05 h	0	0.1	88-74-4	2-Nitroaniline	3.5E+00 nc	5.0E+01 nc	2.1E-01 nc	2.1E+00 nc		
	5.0E-04 i		5.7E-04 h	1		98-95-3	Nitrobenzene	2.0E+01 nc	1.1E+02 nc	2.1E+00 nc	3.4E+00 nc	1.0E-01	7.0E-03
	7.0E-02 h		7.0E-02 r	0	0.1	67-20-9	Nitrofurantoin	4.3E+03 nc	6.2E+04 nc	2.6E+02 nc	2.6E+03 nc		
1.5E+00 h		9.4E+00 h		0	0.1	59-87-0	Nitrofurazone	3.2E-01 ca	1.6E+00 ca	7.2E-04 ca	4.5E-02 ca		
1.4E-02 n		1.4E-02 r		0	0.1	55-63-0	Nitroglycerin	3.5E+01 ca	1.8E+02 ca	4.8E-01 ca	4.8E+00 ca		
	1.0E-01 i		1.0E-01 r	0	0.1	556-88-7	Nitroguanidine	6.1E+03 nc	8.8E+04 nc	3.7E+02 nc	3.6E+03 nc		
	8.0E-03 n		8.0E-03 r	0	0.1	100-02-7	4-Nitrophenol	4.9E+02 nc	7.0E+03 nc	2.9E+01 nc	2.9E+02 nc		
9.4E+00 r	5.7E-03 r	9.4E+00 h	5.7E-03 i	1		79-46-9	2-Nitropropane			7.2E-04 ca	1.2E-03 ca		
5.4E+00 i		5.6E+00 i		1		924-16-3	N-Nitrosodi-n-butylamine	2.4E-02 ca	6.1E-02 ca	1.2E-03 ca	2.0E-03 ca		
2.8E+00 i		2.8E+00 r		0	0.1	1116-54-7	N-Nitrosodiethanolamine	1.7E-01 ca	8.8E-01 ca	2.4E-03 ca	2.4E-02 ca		
1.5E+02 i		1.5E+02 i		0	0.1	55-18-5	N-Nitrosodiethylamine	3.2E-03 ca	1.6E-02 ca	4.5E-05 ca	4.5E-04 ca		
5.1E+01 i		4.9E+01 i		0	0.1	62-75-9	N-Nitrosodimethylamine	9.5E-03 ca	4.8E-02 ca	1.4E-04 ca	1.3E-03 ca		
4.9E-03 i		4.9E-03 r		0	0.1	86-30-6	N-Nitrosodiphenylamine	9.9E+01 ca	5.0E+02 ca	1.4E+00 ca	1.4E+01 ca	1.0E+00	6.0E-02
7.0E+00 i		7.0E+00 r		0	0.1	621-64-7	N-Nitroso di-n-propylamine	6.9E-02 ca	3.5E-01 ca	9.6E-04 ca	9.6E-03 ca	5.0E-05	2.0E-06
2.2E+01 i		2.2E+01 r		0	0.1	10595-95-6	N-Nitroso-N-methylethylamine	2.2E-02 ca	1.1E-01 ca	3.1E-04 ca	3.1E-03 ca		
2.1E+00 i		2.1E+00 i		0	0.1	930-55-2	N-Nitrosopyrrolidine	2.3E-01 ca	1.2E+00 ca	3.1E-03 ca	3.2E-02 ca		
	1.0E-02 h		1.0E-02 r	1		99-08-1	m-Nitrotoluene	3.7E+02 nc	1.0E+03 sat	3.7E+01 nc	6.1E+01 nc		
	1.0E-02 h		1.0E-02 r	1		88-72-2	o-Nitrotoluene	3.7E+02 nc	1.0E+03 sat	3.7E+01 nc	6.1E+01 nc		
	1.0E-02 h		1.0E-02 r	1		99-99-0	p-Nitrotoluene	3.7E+02 nc	1.0E+03 sat	3.7E+01 nc	6.1E+01 nc		
	4.0E-02 i		4.0E-02 r	0	0.1	27314-13-2	Norflurazon	2.4E+03 nc	3.5E+04 nc	1.5E+02 nc	1.5E+03 nc		

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FOR PLANNING PURPOSES

TOXICITY INFORMATION											CONTAMINANT	PRELIMINARY REMEDIATION GOALS (PRGs)								SOIL SCREENING LEVELS Migration to Ground Water	
SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		VOC	skin abs. soils	CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		DAF 20 (mg/kg)	DAF 1 (mg/kg)
		7.0E-04	i			7.0E-04	r	0	0.1	85509-19-9	NuStar	4.3E+01	nc	6.2E+02	nc	2.6E+00	nc	2.6E+01	nc		
		3.0E-03	i			3.0E-03	r	0	0.1	32536-52-0	Octabromodiphenyl ether	1.8E+02	nc	2.6E+03	nc	1.1E+01	nc	1.1E+02	nc		
		2.0E-03	h			2.0E-03	r	0	0.1	152-16-9	Octamethylpyrophosphoramide	1.2E+02	nc	1.8E+03	nc	7.3E+00	nc	7.3E+01	nc		
		5.0E-02	i			5.0E-02	r	0	0.1	19044-88-3	Oryzalin	3.1E+03	nc	4.4E+04	nc	1.8E+02	nc	1.8E+03	nc		
		5.0E-03	i			5.0E-03	r	0	0.1	19666-30-9	Oxadiazon	3.1E+02	nc	4.4E+03	nc	1.8E+01	nc	1.8E+02	nc		
		2.5E-02	i			2.5E-02	r	0	0.1	23135-22-0	Oxamyl	1.5E+03	nc	2.2E+04	nc	9.1E+01	nc	9.1E+02	nc		
		3.0E-03	i			3.0E-03	r	0	0.1	42874-03-3	Oxyfluorfen	1.8E+02	nc	2.6E+03	nc	1.1E+01	nc	1.1E+02	nc		
		1.3E-02	i			1.3E-02	r	0	0.1	76738-62-0	Paclobutrazol	7.9E+02	nc	1.1E+04	nc	4.7E+01	nc	4.7E+02	nc		
		4.5E-03	i			4.5E-03	r	0	0.1	4685-14-7	Paraquat	2.7E+02	nc	4.0E+03	nc	1.6E+01	nc	1.6E+02	nc		
		6.0E-03	h			6.0E-03	r	0	0.1	56-38-2	Parathion	3.7E+02	nc	5.3E+03	nc	2.2E+01	nc	2.2E+02	nc		
		5.0E-02	h			5.0E-02	r	0	0.1	1114-71-2	Pebulate	3.1E+03	nc	4.4E+04	nc	1.8E+02	nc	1.8E+03	nc		
		4.0E-02	i			4.0E-02	r	0	0.1	40487-42-1	Pendimethalin	2.4E+03	nc	3.5E+04	nc	1.5E+02	nc	1.5E+03	nc		
2.3E-02	h			2.3E-02	r			0	0.1	87-84-3	Pentabromo-6-chloro cyclohexane	2.1E+01	ca	1.1E+02	ca	2.9E-01	ca	2.9E+00	ca		
		2.0E-03	i			2.0E-03	r	0	0.1	32534-81-9	Pentabromodiphenyl ether	1.2E+02	nc	1.8E+03	nc	7.3E+00	nc	7.3E+01	nc		
		8.0E-04	i			8.0E-04	r	0	0.1	608-93-5	Pentachlorobenzene	4.9E+01	nc	7.0E+02	nc	2.9E+00	nc	2.9E+01	nc		
2.6E-01	h	3.0E-03	i	2.6E-01	r	3.0E-03	r	0	0.1	82-68-8	Pentachloronitrobenzene	1.9E+00	ca*	9.5E+00	ca	2.6E-02	ca	2.6E-01	ca		
1.2E-01	i	3.0E-02	i	1.2E-01	r	3.0E-02	r	0	0.25	87-86-5	Pentachlorophenol	3.0E+00	ca	1.1E+01	ca	5.6E-02	ca	5.6E-01	ca	3.0E-02	1.0E-03
		5.0E-04	x					0		7601-90-3	Perchlorate	3.9E+01	nc	1.0E+03	nc			1.8E+01	nc		
		5.0E-02	i			5.0E-02	r	0	0.1	52645-53-1	Permethrin	3.1E+03	nc	4.4E+04	nc	1.8E+02	nc	1.8E+03	nc		
		2.5E-01	i			2.5E-01	r	0	0.1	13684-63-4	Phenmedipham	1.5E+04	nc	1.0E+05	max	9.1E+02	nc	9.1E+03	nc		
		6.0E-01	i			6.0E-01	r	0	0.1	108-95-2	Phenol	3.7E+04	nc	1.0E+05	max	2.2E+03	nc	2.2E+04	nc	1.0E+02	5.0E+00
		2.0E-03	n			2.0E-03	r	0	0.1	92-84-2	Phenothiazine	1.2E+02	nc	1.8E+03	nc	7.3E+00	nc	7.3E+01	nc		
		6.0E-03	i			6.0E-03	r	0	0.1	108-45-2	m-Phenylenediamine	3.7E+02	nc	5.3E+03	nc	2.2E+01	nc	2.2E+02	nc		
		1.9E-01	h			1.9E-01	r	0	0.1	106-50-3	p-Phenylenediamine	1.2E+04	nc	1.0E+05	max	6.9E+02	nc	6.9E+03	nc		
		8.0E-05	i			8.0E-05	r	0	0.1	62-38-4	Phenylmercuric acetate	4.9E+00	nc	7.0E+01	nc	2.9E-01	nc	2.9E+00	nc		
1.9E-03	h			1.9E-03	r			0	0.1	90-43-7	2-Phenylphenol	2.5E+02	ca	1.3E+03	ca	3.5E+00	ca	3.5E+01	ca		
		2.0E-04	h			2.0E-04	r	0	0.1	298-02-2	Phorate	1.2E+01	nc	1.8E+02	nc	7.3E-01	nc	7.3E+00	nc		
		2.0E-02	i			2.0E-02	r	0	0.1	732-11-6	Phosmet	1.2E+03	nc	1.8E+04	nc	7.3E+01	nc	7.3E+02	nc		
		3.0E-04	h			8.6E-05	i	0	0.1	7803-51-2	Phosphine	1.8E+01	nc	2.6E+02	nc	3.1E-01	nc	1.1E+01	nc		
						2.9E-03	i			7664-38-2	Phosphoric acid					1.0E+01	nc				
		2.0E-05	i					0		7723-14-0	Phosphorus (white)	1.6E+00	nc	4.1E+01	nc			7.3E-01	nc		
		1.0E+00	h			1.0E+00	r	0	0.1	100-21-0	p-Phthalic acid	6.1E+04	nc	1.0E+05	max	3.7E+03	nc	3.6E+04	nc		
		2.0E+00	i			3.4E-02	h	0	0.1	85-44-9	Phthalic anhydride	1.0E+05	max	1.0E+05	max	1.2E+02	nc	7.3E+04	nc		
		7.0E-02	i			7.0E-02	r	0	0.1	1918-02-1	Picloram	4.3E+03	nc	6.2E+04	nc	2.6E+02	nc	2.6E+03	nc		
		1.0E-02	i			1.0E-02	r	0	0.1	23505-41-1	Pirimiphos-methyl	6.1E+02	nc	8.8E+03	nc	3.7E+01	nc	3.6E+02	nc		
8.9E+00	h	7.0E-06	h	8.9E+00	r	7.0E-06	r	0	0.1		Polybrominated biphenyls	5.5E-02	ca**	2.8E-01	ca*	7.6E-04	ca*	7.6E-03	ca*		
2.0E+00	i			2.0E+00	i			0	0.14	1336-36-3	Polychlorinated biphenyls (PCBs)	2.2E-01	ca	1.0E+00	ca	3.4E-03	ca	3.4E-02	ca		
7.0E-02	i	7.0E-05	i	7.0E-02	i	7.0E-05	r	0	0.14	12674-11-2	Aroclor 1016	3.9E+00	nc	2.9E+01	ca**	9.6E-02	ca**	9.6E-01	ca**		
2.0E+00	i			2.0E+00	i			0	0.14	11104-28-2	Aroclor 1221	2.2E-01	ca	1.0E+00	ca	3.4E-03	ca	3.4E-02	ca		
2.0E+00	i			2.0E+00	i			0	0.14	11141-16-5	Aroclor 1232	2.2E-01	ca	1.0E+00	ca	3.4E-03	ca	3.4E-02	ca		
2.0E+00	i			2.0E+00	i			0	0.14	53469-21-9	Aroclor 1242	2.2E-01	ca	1.0E+00	ca	3.4E-03	ca	3.4E-02	ca		
2.0E+00	i			2.0E+00	i			0	0.14	12672-29-6	Aroclor 1248	2.2E-01	ca	1.0E+00	ca	3.4E-03	ca	3.4E-02	ca		
2.0E+00	i	2.0E-05	i	2.0E+00	i	2.0E-05	r	0	0.14	11097-69-1	Aroclor 1254	2.2E-01	ca**	1.0E+00	ca*	3.4E-03	ca*	3.4E-02	ca*		
2.0E+00	i			2.0E+00	i			0	0.14	11096-82-5	Aroclor 1260	2.2E-01	ca	1.0E+00	ca	3.4E-03	ca	3.4E-02	ca		
									0.13		Polynuclear aromatic hydrocarbons (PAHs)										
		6.0E-02	i			6.0E-02	r	1		83-32-9	Acenaphthene	3.7E+03	nc	3.8E+04	nc	2.2E+02	nc	3.7E+02	nc	5.7E+02	2.9E+01
		3.0E-01	i			3.0E-01	r	1		120-12-7	Anthracene	2.2E+04	nc	1.0E+05	max	1.1E+03	nc	1.8E+03	nc	1.2E+04	5.9E+02
7.3E-01	n			3.1E-01	n			0	0.13	56-55-3	Benz[a]anthracene	6.2E-01	ca	2.9E+00	ca	2.2E-02	ca	9.2E-02	ca	2.0E+00	8.0E-02
7.3E-01	n			3.1E-01	n			0	0.13	205-99-2	Benzo[b]fluoranthene	6.2E-01	ca	2.9E+00	ca	2.2E-02	ca	9.2E-02	ca	5.0E+00	2.0E-01
7.3E-02	n			3.1E-02	n			0	0.13	207-08-9	Benzo[k]fluoranthene	6.2E+00	ca	2.9E+01	ca	2.2E-01	ca	9.2E-01	ca	4.9E+01	2.0E+00
											"CAL-Modified PRG" (PEA, 1994)	6.1E-01									
7.3E+00	i			3.1E+00	n			0	0.13	50-32-8	Benzo[a]pyrene	6.2E-02	ca	2.9E-01	ca	2.2E-03	ca	9.2E-03	ca	8.0E+00	4.0E-01
											"CAL-Modified PRG" (PEA, 1994)							1.5E-03			
7.3E-03	n			3.1E-03	n			0	0.13	218-01-9	Chrysene	6.2E+01	ca	2.9E+02	ca	2.2E+00	ca	9.2E+00	ca	1.6E+02	8.0E+00

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FOR PLANNING PURPOSES

TOXICITY INFORMATION											CONTAMINANT	PRELIMINARY REMEDIATION GOALS (PRGs)								SOIL SCREENING LEVELS Migration to Ground Water	
SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		VOC	skin abs. soils	CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		DAF 20 (mg/kg)	DAF 1 (mg/kg)
											"CAL-Modified PRG" (PEA, 1994)	6.1E+00									
7.3E+00	n			3.1E+00	n			0	0.13	53-70-3	Dibenz[ah]anthracene	6.2E-02	ca	2.9E-01	ca	2.2E-03	ca	9.2E-03	ca	2.0E+00	8.0E-02
		4.0E-02	i			4.0E-02	r	0	0.13	206-44-0	Fluoranthene	2.3E+03	nc	3.0E+04	nc	1.5E+02	nc	1.5E+03	nc	4.3E+03	2.1E+02
		4.0E-02	i			4.0E-02	r	1		86-73-7	Fluorene	2.6E+03	nc	3.3E+04	nc	1.5E+02	nc	2.4E+02	nc	5.6E+02	2.8E+01
7.3E-01	n			3.1E-01	n			0	0.13	193-39-5	Indeno[1,2,3-cd]pyrene	6.2E-01	ca	2.9E+00	ca	2.2E-02	ca	9.2E-02	ca	1.4E+01	7.0E-01
		2.0E-02	i			8.6E-04	i	1		91-20-3	Naphthalene	5.6E+01	nc	1.9E+02	nc	3.1E+00	nc	6.2E+00	nc	8.4E+01	4.0E+00
		3.0E-02	i			3.0E-02	r	1		129-00-0	Pyrene	2.3E+03	nc	5.4E+04	nc	1.1E+02	nc	1.8E+02	nc	4.2E+03	2.1E+02
1.5E-01	i	9.0E-03	i	1.5E-01	r	9.0E-03	r	0	0.1	67747-09-5	Prochloraz	3.2E+00	ca	1.6E+01	ca	4.5E-02	ca	4.5E-01	ca		
		6.0E-03	h			6.0E-03	r	0	0.1	26399-36-0	Profluralin	3.7E+02	nc	5.3E+03	nc	2.2E+01	nc	2.2E+02	nc		
		1.5E-02	i			1.5E-02	r	0	0.1	1610-18-0	Prometon	9.2E+02	nc	1.3E+04	nc	5.5E+01	nc	5.5E+02	nc		
		4.0E-03	i			4.0E-03	r	0	0.1	7287-19-6	Prometryn	2.4E+02	nc	3.5E+03	nc	1.5E+01	nc	1.5E+02	nc		
		7.5E-02	i			7.5E-02	r	0	0.1	23950-58-5	Pronamide	4.6E+03	nc	6.6E+04	nc	2.7E+02	nc	2.7E+03	nc		
		1.3E-02	i			1.3E-02	r	0	0.1	1918-16-7	Propachlor	7.9E+02	nc	1.1E+04	nc	4.7E+01	nc	4.7E+02	nc		
		5.0E-03	i			5.0E-03	r	0	0.1	709-98-8	Propanil	3.1E+02	nc	4.4E+03	nc	1.8E+01	nc	1.8E+02	nc		
		2.0E-02	i			2.0E-02	r	0	0.1	2312-35-8	Propargite	1.2E+03	nc	1.8E+04	nc	7.3E+01	nc	7.3E+02	nc		
		2.0E-03	i			2.0E-03	r	0	0.1	107-19-7	Propargyl alcohol	1.2E+02	nc	1.8E+03	nc	7.3E+00	nc	7.3E+01	nc		
		2.0E-02	i			2.0E-02	r	0	0.1	139-40-2	Propazine	1.2E+03	nc	1.8E+04	nc	7.3E+01	nc	7.3E+02	nc		
		2.0E-02	i			2.0E-02	r	0	0.1	122-42-9	Propham	1.2E+03	nc	1.8E+04	nc	7.3E+01	nc	7.3E+02	nc		
		1.3E-02	i			1.3E-02	r	0	0.1	60207-90-1	Propiconazole	7.9E+02	nc	1.1E+04	nc	4.7E+01	nc	4.7E+02	nc		
		1.0E-01	i			1.1E-01	i	1		98-82-8	Isopropylbenzene (Cumene)	1.6E+02	nc	5.2E+02	nc	4.0E+02	nc	6.6E+02	nc		
		1.0E-02	n			1.0E-02	r	1		103-65-1	n-Propylbenzene	1.4E+02	nc	2.4E+02	sat	3.7E+01	nc	6.1E+01	nc		
		2.0E+01	h			2.0E+01	r	0	0.1	57-55-6	Propylene glycol	1.0E+05	max	1.0E+05	max	7.3E+04	nc	7.3E+05	nc		
		7.0E-01	h			7.0E-01	r	0	0.1	111-35-3	Propylene glycol, monoethyl ether	4.3E+04	nc	1.0E+05	max	2.6E+03	nc	2.6E+04	nc		
		7.0E-01	h			5.7E-01	i	0	0.1	107-98-2	Propylene glycol, monomethyl ether	4.3E+04	nc	1.0E+05	max	2.1E+03	nc	2.6E+04	nc		
2.4E-01	i	8.6E-03	r	1.3E-02	i	8.6E-03	i	1		75-56-9	Propylene oxide	1.9E+00	ca*	9.1E+00	ca*	5.2E-01	ca*	2.2E-01	ca		
		2.5E-01	i			2.5E-01	r	0	0.1	81335-77-5	Pursuit	1.5E+04	nc	1.0E+05	max	9.1E+02	nc	9.1E+03	nc		
		2.5E-02	i			2.5E-02	r	0	0.1	51630-58-1	Pydrin	1.5E+03	nc	2.2E+04	nc	9.1E+01	nc	9.1E+02	nc		
		1.0E-03	i			1.0E-03	r	0	0.1	110-86-1	Pyridine	6.1E+01	nc	8.8E+02	nc	3.7E+00	nc	3.6E+01	nc		
		5.0E-04	i			5.0E-04	r	0	0.1	13593-03-8	Quinalphos	3.1E+01	nc	4.4E+02	nc	1.8E+00	nc	1.8E+01	nc		
1.2E+01	h			1.2E+01	r			0	0.1	91-22-5	Quinoline	4.1E-02	ca	2.1E-01	ca	5.6E-04	ca	5.6E-03	ca		
1.1E-01	i	3.0E-03	i	1.1E-01	r	3.0E-03	r	0	0.1	121-82-4	RDX (Cyclonite)	4.4E+00	ca*	2.2E+01	ca	6.1E-02	ca	6.1E-01	ca		
		3.0E-02	i			3.0E-02	r	0	0.1	10453-86-8	Resmethrin	1.8E+03	nc	2.6E+04	nc	1.1E+02	nc	1.1E+03	nc		
		5.0E-02	h			5.0E-02	r	0	0.1	299-84-3	Ronnel	3.1E+03	nc	4.4E+04	nc	1.8E+02	nc	1.8E+03	nc		
		4.0E-03	i			4.0E-03	r	0	0.1	83-79-4	Rotenone	2.4E+02	nc	3.5E+03	nc	1.5E+01	nc	1.5E+02	nc		
		2.5E-02	i			2.5E-02	r	0	0.1	78587-05-0	Savey	1.5E+03	nc	2.2E+04	nc	9.1E+01	nc	9.1E+02	nc		
		5.0E-03	i					0	0.1	7783-00-8	Selenious Acid	3.1E+02	nc	4.4E+03	nc			1.8E+02	nc		
		5.0E-03	i					0		7782-49-2	Selenium	3.9E+02	nc	1.0E+04	nc			1.8E+02	nc	5.0E+00	3.0E-01
		5.0E-03	h					0	0.1	630-10-4	Selenourea	3.1E+02	nc	4.4E+03	nc			1.8E+02	nc		
		9.0E-02	i			9.0E-02	r	0	0.1	74051-80-2	Sethoxydim	5.5E+03	nc	7.9E+04	nc	3.3E+02	nc	3.3E+03	nc		
		5.0E-03	i					0		7440-22-4	Silver and compounds	3.9E+02	nc	1.0E+04	nc			1.8E+02	nc	3.4E+01	2.0E+00
1.2E-01	h	5.0E-03	i	1.2E-01	r	2.0E-03	r	0	0.1	122-34-9	Simazine	4.1E+00	ca*	2.1E+01	ca	5.6E-02	ca	5.6E-01	ca		
		4.0E-03	i							26628-22-8	Sodium azide										
2.7E-01	h	3.0E-02	i	2.7E-01	r	3.0E-02	r	0	0.1	148-18-5	Sodium diethyldithiocarbamate	1.8E+00	ca	9.1E+00	ca	2.5E-02	ca	2.5E-01	ca		
		2.0E-05	i			2.0E-05	r	0	0.1	62-74-8	Sodium fluoroacetate	1.2E+00	nc	1.8E+01	nc	7.3E-02	nc	7.3E-01	nc		
		1.0E-03	h			1.0E-03	r	0	0.1	13718-26-8	Sodium metavanadate	6.1E+01	nc	8.8E+02	nc	3.7E+00	nc	3.6E+01	nc		
		6.0E-01	i					0		7440-24-6	Strontium, stable	4.7E+04	nc	1.0E+05	max			2.2E+04	nc		
		3.0E-04	i			3.0E-04	r	0	0.1	57-24-9	Strychnine	1.8E+01	nc	2.6E+02	nc	1.1E+00	nc	1.1E+01	nc		
		2.0E-01	i			2.9E-01	i	1		100-42-5	Styrene	1.7E+03	sat	1.7E+03	sat	1.1E+03	nc	1.6E+03	nc	4.0E+00	2.0E-01
		1.0E-03	n			1.0E-03	r			80-07-9	**1,1'-Sulfonylbis (4-chlorobenzene)**	7.8E+01	nc	2.0E+03	nc	3.7E+00	nc	3.6E+01	nc		
		2.5E-02	i			2.5E-02	r	0	0.1	88671-89-0	Systhane	1.5E+03	nc	2.2E+04	nc	9.1E+01	nc	9.1E+02	nc		
1.5E+05	h			1.5E+05	h			0	0.03	1746-01-6	2,3,7,8-TCDD (dioxin)	3.9E-06	ca	2.7E-05	ca	4.5E-08	ca	4.5E-07	ca		
		7.0E-02	i			7.0E-02	r	0	0.1	34014-18-1	Tebuthiuron	4.3E+03	nc	6.2E+04	nc	2.6E+02	nc	2.6E+03	nc		
		2.0E-02	h			2.0E-02	r	0	0.1	3383-96-8	Temephos	1.2E+03	nc	1.8E+04	nc	7.3E+01	nc	7.3E+02	nc		
		1.3E-02	i			1.3E-02	r	0	0.1	5902-51-2	Terbacil	7.9E+02	nc	1.1E+04	nc	4.7E+01	nc	4.7E+02	nc		

Key : i=IRIS h=HEAST n=NCEA x=WITHDRAWN o=Other EPA DOCUMENTS r=ROUTE EXTRAPOLATION ca=CANCER PRG nc=NONCANCER PRG sat=SOIL SATURATION max=CEILING LIMIT *(where: nc < 100X ca) **(where: nc < 10X ca)

FOR PLANNING PURPOSES

TOXICITY INFORMATION											CONTAMINANT	PRELIMINARY REMEDIATION GOALS (PRGs)								SOIL SCREENING LEVELS Migration to Ground Water	
SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		VOC	skin abs. soils	CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		DAF 20 (mg/kg)	DAF 1 (mg/kg)
		2.5E-05	h			2.5E-05	r	0	0.1	13071-79-9	Terbufos	1.5E+00	nc	2.2E+01	nc	9.1E-02	nc	9.1E-01	nc		
		1.0E-03	i			1.0E-03	r	0	0.1	886-50-0	Terbutryn	6.1E+01	nc	8.8E+02	nc	3.7E+00	nc	3.6E+01	nc		
		3.0E-04	i			3.0E-04	r	0	0.1	95-94-3	1,2,4,5-Tetrachlorobenzene	1.8E+01	nc	2.6E+02	nc	1.1E+00	nc	1.1E+01	nc		
2.6E-02	i	3.0E-02	i	2.6E-02	i	3.0E-02	r	1		630-20-6	1,1,1,2-Tetrachloroethane	3.0E+00	ca	7.0E+00	ca	2.6E-01	ca	4.3E-01	ca		
2.0E-01	i	6.0E-02	n	2.0E-01	i	6.0E-02	r	1		79-34-5	1,1,2,2-Tetrachloroethane	3.8E-01	ca	9.0E-01	ca	3.3E-02	ca	5.5E-02	ca	3.0E-03	2.0E-04
5.2E-02	n	1.0E-02	i	2.0E-03	n	1.1E-01	n	1		127-18-4	Tetrachloroethylene (PCE)	5.7E+00	ca*	1.9E+01	ca*	3.3E+00	ca	1.1E+00	ca	6.0E-02	3.0E-03
											"CAL-Modified PRG" (PEA, 1994)					3.2E-01					
		3.0E-02	i			3.0E-02	r	0	0.1	58-90-2	2,3,4,6-Tetrachlorophenol	1.8E+03	nc	2.6E+04	nc	1.1E+02	nc	1.1E+03	nc		
2.0E+01	h			2.0E+01	r			0	0.1	5216-25-1	p,a,a,a-Tetrachlorotoluene	2.4E-02	ca	1.2E-01	ca	3.4E-04	ca	3.4E-03	ca		
2.4E-02	h	3.0E-02	i	2.4E-02	r	3.0E-02	r	0	0.1	961-11-5	Tetrachlorovinphos	2.0E+01	ca*	1.0E+02	ca	2.8E-01	ca	2.8E+00	ca		
		5.0E-04	i			5.0E-04	r	0	0.1	3689-24-5	Tetraethyldithiopyrophosphate	3.1E+01	nc	4.4E+02	nc	1.8E+00	nc	1.8E+01	nc		
7.6E-03	n	2.1E-01	n	6.8E-03	n	8.6E-02	n	0	0.1	109-99-9	Tetrahydrofuran	6.4E+01	ca	3.2E+02	ca	9.9E-01	ca	8.8E+00	ca		
		6.6E-05	i					0		7446-18-6	**Thallium and compounds**	5.2E+00	nc	1.3E+02	nc			2.4E+00	nc		
		1.0E-02	i			1.0E-02	r	0	0.1	28249-77-6	Thiobencarb	6.1E+02	nc	8.8E+03	nc	3.7E+01	nc	3.6E+02	nc		
		1.0E-01	n			1.0E-01	r	0	0.1	N/A	Thiocyanate	6.1E+03	nc	1.0E+05	max	3.7E+02	nc	3.6E+03	nc		
		3.0E-04	h			3.0E-04	r	0	0.1	39196-18-4	Thiofanox	1.8E+01	nc	2.6E+02	nc	1.1E+00	nc	1.1E+01	nc		
		8.0E-02	i			8.0E-02	r	0	0.1	23564-05-8	Thiophanate-methyl	4.9E+03	nc	7.0E+04	nc	2.9E+02	nc	2.9E+03	nc		
		5.0E-03	i			5.0E-03	r	0	0.1	137-26-8	Thiram	3.1E+02	nc	4.4E+03	nc	1.8E+01	nc	1.8E+02	nc		
		6.0E-01	h					0			Tin (inorganic, see tributyltin oxide for organic tin)	4.7E+04	nc	1.0E+05	max			2.2E+04	nc		
		2.0E-01	i			1.1E-01	h	1		108-88-3	Toluene	5.2E+02	sat	5.2E+02	sat	4.0E+02	nc	7.2E+02	nc	1.2E+01	6.0E-01
3.2E+00	h			3.2E+00	r			0	0.1	95-80-7	Toluene-2,4-diamine	1.5E-01	ca	7.7E-01	ca	2.1E-03	ca	2.1E-02	ca		
		6.0E-01	h			6.0E-01	r	0	0.1	95-70-5	Toluene-2,5-diamine	3.7E+04	nc	1.0E+05	max	2.2E+03	nc	2.2E+04	nc		
		2.0E-01	h			2.0E-01	r	0	0.1	823-40-5	Toluene-2,6-diamine	1.2E+04	nc	1.0E+05	max	7.3E+02	nc	7.3E+03	nc		
1.9E-01	i			1.9E-01	r			0	0.1	106-49-0	p-Toluidine	2.6E+00	ca	1.3E+01	ca	3.5E-02	ca	3.5E-01	ca		
1.1E+00	i			1.1E+00	i			0	0.1	8001-35-2	Toxaphene	4.4E-01	ca	2.2E+00	ca	6.0E-03	ca	6.1E-02	ca	3.1E+01	2.0E+00
		7.5E-03	i			7.5E-03	r	0	0.1	66841-25-6	Tralomethrin	4.6E+02	nc	6.6E+03	nc	2.7E+01	nc	2.7E+02	nc		
		1.3E-02	i			1.3E-02	r	0	0.1	2303-17-5	Triallate	7.9E+02	nc	1.1E+04	nc	4.7E+01	nc	4.7E+02	nc		
		1.0E-02	i			1.0E-02	r	0	0.1	82097-50-5	Triasulfuron	6.1E+02	nc	8.8E+03	nc	3.7E+01	nc	3.6E+02	nc		
		5.0E-03	i			5.0E-03	r	0	0.1	615-54-3	1,2,4-Tribromobenzene	3.1E+02	nc	4.4E+03	nc	1.8E+01	nc	1.8E+02	nc		
		3.0E-04	i					0	0.1	56-35-9	Tributyltin oxide (TBTO)	1.8E+01	nc	2.6E+02	nc			1.1E+01	nc		
3.4E-02	h			3.4E-02	r			0	0.1	634-93-5	2,4,6-Trichloroaniline	1.4E+01	ca	7.3E+01	ca	2.0E-01	ca	2.0E+00	ca		
2.9E-02	h			2.9E-02	r			0	0.1	33663-50-2	2,4,6-Trichloroaniline hydrochloride	1.7E+01	ca	8.5E+01	ca	2.3E-01	ca	2.3E+00	ca		
		1.0E-02	i			5.7E-02	h	1		120-82-1	1,2,4-Trichlorobenzene	6.5E+02	nc	3.0E+03	sat	2.1E+02	nc	1.9E+02	nc	5.0E+00	3.0E-01
		2.0E-02	n			2.9E-01	n	1		71-55-6	1,1,1-Trichloroethane	6.3E+02	nc	1.4E+03	sat	1.0E+03	nc	5.4E+02	nc	2.0E+00	1.0E-01
5.7E-02	i	4.0E-03	i	5.6E-02	i	4.0E-03	r	1		79-00-5	1,1,2-Trichloroethane	8.4E-01	ca*	1.9E+00	ca*	1.2E-01	ca	2.0E-01	ca	2.0E-02	9.0E-04
1.1E-02	n	6.0E-03	x	6.0E-03	n	6.0E-03	r	1		79-01-6	Trichloroethylene (TCE)	2.8E+00	ca**	6.1E+00	ca*	1.1E+00	ca*	1.6E+00	ca*	6.0E-02	3.0E-03
		3.0E-01	i			2.0E-01	h	1		75-69-4	Trichlorofluoromethane	3.9E+02	nc	2.0E+03	sat	7.3E+02	nc	1.3E+03	nc		
		1.0E-01	i			1.0E-01	r	0	0.1	95-95-4	2,4,5-Trichlorophenol	6.1E+03	nc	8.8E+04	nc	3.7E+02	nc	3.6E+03	nc	2.7E+02	1.4E+01
1.1E-02	i			1.1E-02	i			0	0.1	88-06-2	2,4,6-Trichlorophenol	4.4E+01	ca	2.2E+02	ca	6.2E-01	ca	6.1E+00	ca	2.0E-01	8.0E-03
		1.0E-02	i			1.0E-02	r	0	0.1	93-76-5	2,4,5-Trichlorophenoxyacetic Acid	6.1E+02	nc	8.8E+03	nc	3.7E+01	nc	3.6E+02	nc		
		8.0E-03	i			8.0E-03	r	0	0.1	93-72-1	2-(2,4,5-Trichlorophenoxy) propionic acid	4.9E+02	nc	7.0E+03	nc	2.9E+01	nc	2.9E+02	nc		
		5.0E-03	i			5.0E-03	r	1		598-77-6	1,1,2-Trichloropropane	1.5E+01	nc	5.1E+01	nc	1.8E+01	nc	3.0E+01	nc		
7.0E+00	h	6.0E-03	i	7.0E+00	r	5.0E-03	r	1		96-18-4	1,2,3-Trichloropropane	1.4E-03	ca	3.1E-03	ca	9.6E-04	ca	1.6E-03	ca		
		5.0E-03	h			5.0E-03	r	1		96-19-5	1,2,3-Trichloropropene	1.2E+01	nc	3.9E+01	nc	1.8E+01	nc	3.0E+01	nc		
		3.0E+01	i			8.6E+00	h	1		76-13-1	1,1,2-Trichloro-1,2,2-trifluoroethane	5.6E+03	sat	5.6E+03	sat	3.1E+04	nc	5.9E+04	nc		
		3.0E-03	i			3.0E-03	r	0	0.1	58138-08-2	Tridiphane	1.8E+02	nc	2.6E+03	nc	1.1E+01	nc	1.1E+02	nc		
		2.0E-03	r			2.0E-03	i	1		121-44-8	Triethylamine	2.3E+01	nc	8.8E+01	nc	7.3E+00	nc	1.2E+01	nc		
7.7E-03	i	7.5E-03	i	7.7E-03	r	7.5E-03	r	0	0.1	1582-09-8	Trifluralin	6.3E+01	ca**	3.2E+02	ca*	8.7E-01	ca*	8.7E+00	ca*		
		1.4E-04	r			1.4E-04	n		0.1	552-30-7	**Trimellitic Anhydride (TMAN)**	8.6E+00	nc	1.2E+02	nc	5.1E-01	nc	5.1E+00			
		5.0E-02	n			1.7E-03	n	1		95-63-6	1,2,4-Trimethylbenzene	5.2E+01	nc	1.7E+02	nc	6.2E+00	nc	1.2E+01	nc		
		5.0E-02	n			1.7E-03	n	1		108-67-8	1,3,5-Trimethylbenzene	2.1E+01	nc	7.0E+01	nc	6.2E+00	nc	1.2E+01	nc		
3.7E-02	h			3.7E-02	r			0	0.1	512-56-1	Trimethyl phosphate	1.3E+01	ca	6.7E+01	ca	1.8E-01	ca	1.8E+00	ca		
		3.0E-02	i			3.0E-02	r	0	0.1	99-35-4	1,3,5-Trinitrobenzene	1.8E+03	nc	2.6E+04	nc	1.1E+02	nc	1.1E+03	nc		
		1.0E-02	h			1.0E-02	r	0	0.1	479-45-8	Trinitrophenylmethylnitramine	6.1E+02	nc	8.8E+03	nc	3.7E+01	nc	3.6E+02	nc		

Key : i=IRIS h=HEAST n=NCEA x=WITHDRAWN o=Other EPA DOCUMENTS r=ROUTE EXTRAPOLATION ca=CANCER PRG nc=NONCANCER PRG sat=SOIL SATURATION max=CEILING LIMIT *(where: nc < 100X ca) **(where: nc < 10X ca)

FOR PLANNING PURPOSES

TOXICITY INFORMATION											CONTAMINANT	PRELIMINARY REMEDIATION GOALS (PRGs)								SOIL SCREENING LEVELS Migration to Ground Water	
SFo 1/(mg/kg-d)		RfDo (mg/kg-d)		SFi 1/(mg/kg-d)		RfDi (mg/kg-d)		VOC	skin abs. soils	CAS No.		Residential Soil (mg/kg)		Industrial Soil (mg/kg)		Ambient Air (ug/m^3)		Tap Water (ug/l)		DAF 20 (mg/kg)	DAF 1 (mg/kg)
3.0E-02	i	5.0E-04	i	3.0E-02	r	5.0E-04	r	0	0.1	118-96-7	2,4,6-Trinitrotoluene	1.6E+01	ca**	8.2E+01	ca**	2.2E-01	ca**	2.2E+00	ca**		
		1.0E-01	n			1.0E-01	r		0.1	791-28-6	**Triphenylphosphine oxide**	6.1E+03	nc	8.8E+04	nc	3.7E+02	nc	3.6E+03	nc		
1.4E-02	n	3.0E-01	n	1.4E-02	r	3.0E-01	r		0.1	115-96-8	**Tris(2-chloroethyl) phosphate**	3.5E+01	ca	1.8E+02	ca	4.8E-01	ca	4.8E+00	ca		
		2.0E-04	n							7440-61-0	**Uranium (chemical toxicity only)**	1.6E+01	nc	4.1E+02	nc			7.3E+00	nc		
		7.0E-03	h					0		7440-62-2	Vanadium and compounds	5.5E+02	nc	1.4E+04	nc			2.6E+02	nc	6.0E+03	3.0E+02
		1.0E-03	i			1.0E-03	r	0	0.1	1929-77-7	Vernam	6.1E+01	nc	8.8E+02	nc	3.7E+00	nc	3.6E+01	nc		
		2.5E-02	i			2.5E-02	r	0	0.1	50471-44-8	Vinclozolin	1.5E+03	nc	2.2E+04	nc	9.1E+01	nc	9.1E+02	nc		
		1.0E+00	h			5.7E-02	i	1		108-05-4	Vinyl acetate	4.3E+02	nc	1.4E+03	nc	2.1E+02	nc	4.1E+02	nc	1.7E+02	8.0E+00
1.1E-01	r	8.6E-04	r	1.1E-01	h	8.6E-04	i	1		593-60-2	Vinyl bromide (bromoethene)	1.9E-01	ca*	4.2E-01	ca*	6.1E-02	ca*	1.0E-01	ca*		
1.5E+00	i	3.0E-03	i	3.1E-02	i	2.9E-02	i	1		75-01-4	**Vinyl chloride (child/adult)**	1.5E-01	ca			2.2E-01	ca	4.1E-02	ca	1.0E-02	7.0E-04
7.5E-01	i	3.0E-03	i	1.6E-02	i	2.9E-02	i	1		75-01-4	**Vinyl chloride (adult)**			8.3E-01	ca						
		3.0E-04	i			3.0E-04	r	0	0.1	81-81-2	Warfarin	1.8E+01	nc	2.6E+02	nc	1.1E+00	nc	1.1E+01	nc		
		2.0E+00	i			2.0E-01	x	1	0.1	1330-20-7	Xylenes	2.1E+02	sat	2.1E+02	sat	7.3E+02	nc	1.4E+03	nc	2.1E+02	1.0E+01
		3.0E-01	i					0		7440-66-6	Zinc	2.3E+04	nc	1.0E+05	max			1.1E+04	nc	1.2E+04	6.2E+02
		3.0E-04	i					0		1314-84-7	Zinc phosphide	2.3E+01	nc	6.1E+02	nc			1.1E+01	nc		
		5.0E-02	i			5.0E-02	r	0	0.1	12122-67-7	Zineb	3.1E+03	nc	4.4E+04	nc	1.8E+02	nc	1.8E+03	nc		

Appendix F
California Toxics Rule

A		B Freshwater (Aquatic Life)		C Human Health (10^{-6} risk for carcinogens) For consumption of:	
# Compound	CAS Number	Criterion Maximum Conc. (µ/L) [d] B1	Criterion Continuous Conc. (µ/L) [d] B2	Water & Organisms (µg/L) D1	Organisms Only (µg/L) D2
1. Antimony	7440360			14 a,q	4300 a,q
2. Arsenic	7440382	340 i,m,w	150 i,m,w		
3. Beryllium	7440417			n	n
4. Cadmium	7440439	1.0 e,i,m,w $e^{(1.0166[\ln(hardness)]-3.924})$	0.15 e,i,m,w $e^{(.7409[\ln(hardness)]-4.719}$	n	n
5a. Chromium (III)	16065831	550 e,i,m,	180 e,i,m,	n	n
5b. Chromium (VI)	18540299	16 i,m,w	11 i,m,w	n	n
6. Copper	7440508	13 e,i,m,w	9.0 e,i,m,w	1300q	
7. Lead	7439921	65 e,i,m	2.5 e,i,m	n	n
8. Mercury	7439976	[Reserved]	[Reserved]	0.050 a,q	0.051 a,q
9. Nickel	7440020	470 e,i,m,w	52 e,i,m,w	610 a,q	4600 a,q
10. Selenium	7782492	[Reserved] p	5.0 q	n	n
11. Silver	7440224	3.4 e,i,m			
12. Thallium	7440280			1.7 a,q	6.3 a,q
13. Zinc	7440666	120 e,i,m,w	120 e,i,m,w		
14. Cyanide	57125	22	5.2	700 a	220,000 a,j
15. Asbestos	1332214			7,000,000 fibers/L k	
16. 2,3,7,8-TCDD (Dioxin)	1746016			0.000000013 c	0.000000014 c
17. Acrolein	107028			320	780
18. Acrylonitrile	107131			0.059 a,c	0.66 a,c
19. Benzene	71432			1.2 a,c	71 a,c
20. Bromoform	75252			4.3 a,c	360 a,c
21. Carbon Tetrachloride	56235			0.25 a,c	4.4 a,c
22. Chlorine (Total Residual)	77822505	19	11	n	n
23. Chlorobenzene	108907			680 a	21,000 a,j
24. Chlorodibromomethane	124481			0.41 a,c	34 a,c
25. Chloroethane	75003				
26. 2-Chloroethylvinyl Ether	110758				
27. Chloroform	67663			[Reserved]	[Reserved]
28. Dichlorobromomethane	75274			0.56 a,c	46 a,c

29. 1,1-Dichloroethane	75343				
30. 1,2-Dichloroethane	107062			0.38 a,c	99 a,c
31. 1,1-Dichloroethylene	75354			0.057 a,c	3.2 a,c
32. 1,2-Dichloropropane	78875			0.52 a	39 a
33. 1,3-Dichloropropylene	542756			10 a	1,700 a
34. Ethylbenzene	100414			3,100 a	29,000 a
35. Methyl Bromide	74839			48 a	4,000 a
36. Methyl Chloride	74873			n	n
37. Methylene Chloride	75092			4.7 a,c	1,600 a,c
38. 1,1,2,2-Tetrachloroethane	79345			0.17 a,c	11 a,c
39. Tetrachloroethylene	127184			0.8 c	8.85 c
40. Toluene	108883			6,800 a	200,000 a
41. 1,2-Trans-Dichloroethylene	156605			700 a	140,000 a
42. 1,1,1-Trichloroethane	71556			n	n
43. 1,1,2-Trichloroethane	79005			0.60 a,c	42 a,c
44. Trichloroethylene	79016			2.7 c	81 c
45. Vinyl Chloride	75014			2 c	525 c
46. 2-Chlorophenol	95578			120 a	400 a
47. 2,4-Dichlorophenol	120832			93 a	790 a
48. 2,4-Dimethylphenol	105679			540 a	2,300 a
49. 2-Methyl-4,6-Dinitrophenol	534521			13.4	765
50. 2,4-Dinitrophenol	51285			70 a	14,000 a
51. 2-Nitrophenol	88755				
52. 4-Nitrophenol	100027				
53. 3-Methyl-4-Chlorophenol	59507				
54. Pentachlorophenol	87865	19 f,w	15 f,w	0.28 a,c	8.2 a,c,j
55. Phenol	108952			21,000 a	4,600,000 a,j
56. 2,4,6-Trichlorophenol	88062			2.1 a,c	6.5 a,c
57. Acenaphthene	83329			1,200 a	2,700 a
58. Acenaphthylene	208968				
59. Anthracene	120127			9,600 a	110,000 a
60. Benzidine	92875			0.00012 a,c	0.00054 a,c
61. Benzo(a)Anthracene	56553			0.0044 a,c	0.049 a,c
62. Benzo(a)Pyrene	50328			0.0044 a,c	0.049 a,c
63. Benzo(b)Fluoranthene	205992			0.0044 a,c	0.049 a,c

64. Benzo(ghi)Perylene	191242				
65. Benzo(k)Fluoranthene	207089			0.0044 a,c	0.049 a,c
66. Bis(2-Chloroethoxy)Methane	111911				
67. Bis(2-Chloroethyl)Ether	111444			0.031 a,c	1.4 a,c
68. Bis(2-Chloroisopropyl)Ether	108601			1,400 a	170,000 a
69. Bis(2-Ethylhexyl)Phthalate	117817			1.8 a,c	5.9 a,c
70. 4-Bromophenyl Phenyl Ether	101553				
71. Butylbenzyl Phthalate	85687			3,000 a	5,200 a
72. 2-Chloronaphthalene	91587			1,700 a	4,300 a
73. 4-Chlorophenyl Phenyl Ether	7005723				
74. Chrysene	218019			0.0044 a,c	0.049 a,c
75. Dibenzo(a,h)Anthracene	53703			0.0044 a,c	0.049 a,c
76. 1,2 Dichlorobenzene	95501			2,700 a	17,000 a
77. 1,3 Dichlorobenzene	541731			400	2,600
78. 1,4 Dichlorobenzene	106467			400	2,600
79. 3,3'-Dichlorobenzidine	91941			0.04 a,c	0.077 a,c
80. Diethyl Phthalate	84662			23,000 a	120,000 a
81. Dimethyl Phthalate	131113			313,000	2,900,000
82. Di-n-Butyl Phthalate	84742			2,700 a	12,000 a
83. 2,4-Dinitrotoluene	121142			0.11 c	9.1 c
84. 2,6-Dinitrotoluene	606202				
85 Di-n-Octyl Phthalate	117840				
86. 1,2-Diphenylhydrazine	122667			0.040 a,c	0.54 a,c
87. Fluoranthene	206440			300 a	370 a
88. Fluorene	86737			1,300 a	14,000 a
89. Hexachlorobenzene	118741			0.00075 a,c	0.00077 a,c
90. Hexachlorobutadiene	87683			0.44 a,c	50 a,c
91. Hexachlorocyclopentadiene	77474			240 a	17,000 a,j
92. Hexachloroethane	67721			1.9 a,c	8.9 a,c
93. Indeno(1,2,3-cd) Pyrene	193395			0.0044 a,c	0.049 a,c
94. Isophorone	78591			8.4 c	600 c
95. Naphthalene	91203				
96. Nitrobenzene	98953			17 a	1,900 a,j
97. N-Nitrosodimethylamine	62759			0.00069 a,c	8.1 a,c
98. N-Nitrosodi-n-Propylamine	621647			0.005 a	1.4 a

99. N-Nitrosodiphenylamine	86306			5.0 a,c	16 a,c
100. Phenanthrene	85018				
101. Pyrene	129000			960 a	11,000 a
102. 1,2,4-Trichlorobenzene	120821				
103. Aldrin	309002	3 g		0.00013 a,c	0.00014 a,c
104. alpha-BHC	319846			0.0039 a,c	0.013 a,c
105. beta-BHC	319857			0.014 a,c	0.046 a,c
106. gamma-BHC	58899	0.95 w		0.019 c	0.063 c
107. delta-BHC	319868				
108. Chlordane	57749	2.4 g	0.0043 g	0.00057 a,c	0.00059 a,c
109. 4,4'-DDT	50293	1.1 g	0.001 g	0.00059 a,c	0.00059 a,c
110. 4,4'-DDE	72559			0.00059 a,c	0.00059 a,c
111. 4,4'-DDD	72548			0.00083 a,c	0.00084 a,c
112. Dieldrin	60571	0.24 w	0.056 w	0.00014 a,c	0.00014 a,c
113. alpha-Endosulfan	959988	0.22 g	0.056 g	110 a	240 a
114. beta-Endosulfan	33213659	0.22 g	0.056 g	110 a	240 a
115. Endosulfan Sulfate	1031078			110 a	240 a
116. Endrin	72208	0.086 w	0.036 w	0.76 a	0.81 a,j
117. Endrin Aldehyde	7421934			0.76 a	0.81 a,j
118. Heptachlor	76448	0.52 g	0.0038 g	0.00021 a,c	0.00021 a,c
119. Heptachlor Epoxide	1024573	0.52 g	0.0038 g	0.00010 a,c	0.00011 a,c
120-125. Polychlorinated biphenyls (PCBs)			0.014 u	0.00017 c,v	0.00017 c,v
126. Toxaphene	8001352	0.73	0.0002	0.00073 a,c	0.00075 a,c
Total Number of Criteria [h]		22	21	92	90

Footnotes:

a. Criteria revised to reflect the Agency q1* or RfD, as contained in the Integrated Risk Information System (IRIS) as of October 1, 1996. The fish tissue bioconcentration factor (BCF) from the 1980 documents was retained in each case.

b. [reserved]

c. Criteria are based on carcinogenicity of 10^{-6} risk.

d. Criteria Maximum Concentration (CMC) equals the highest concentration of a pollutant to which aquatic life can be exposed for a short period of time without deleterious effects. Criteria Continuous Concentration (CCC) equals the highest concentration of a pollutant to which aquatic life can be exposed for an extended period of time (4 days) without deleterious effects. µg/L equals micrograms per liter.

e. Freshwater aquatic life criteria for metals are expressed as a function of total hardness (mg/L) in the water body. The equations are provided in matrix on page 43 of this section. Values displayed above in the matrix correspond to a total hardness of 100 mg/l.

f. Freshwater aquatic life criteria for pentachlorophenol are expressed as a function of pH, and are calculated as follows: Values displayed above in the matrix correspond to a pH of 7.8. CMC = exp(1.005(pH) - 4.869). CCC = exp(1.005(pH) - 5.134).

g. This criterion is based on 304(a) aquatic life criterion issued in 1980, and was issued in one of the following documents: Aldrin/Dieldrin (EPA 440/5-80-019), Chlordane (EPA 440/5-80-027), DDT (EPA 440/5-80-038), Endosulfan (EPA 440/5-80-046), Endrin (EPA 440/5-80-047), Heptachlor (440/5-80-052), Hexachlorocyclohexane (EPA 440/5-80-054), Silver (EPA 440/5-80-071). The Minimum Data Requirements and derivation procedures were different in the 1980 Guidelines than in the 1985 Guidelines. For example, a “CMC” derived using the 1980 Guidelines was derived to be used as an instantaneous maximum. If assessment is to be done using an averaging period, the values given should be divided by 2 to obtain a value that is more comparable to a CMC derived using the 1985 Guidelines.

h. These totals simply sum the criteria in each column. For aquatic life, there are 23 priority toxic pollutants with some type of freshwater acute or chronic criteria. For human health, there are 92 priority toxic pollutants with either "water + organism" or "organism only" criteria. Note that these totals count chromium as one pollutant even though EPA has developed criteria based on two valence states. In the matrix, EPA has assigned numbers 5a and 5b to the criteria for chromium to reflect the fact that the list of 126 priority pollutants includes only a single listing for chromium.

i. Criteria for these metals are expressed as a function of the water-effect ratio, WER, as defined in 40 CFR 131.38(c). CMC = column B1 or C1 value x WER; CCC = column B2 or C2 value x WER. To use a WER other than the default of 1, the WER must be determined as set forth in interim Guidance on Determination and Use of Water effect Ratios, U.S. EPA Office of Water, EPA-823-B-94-011, February 1994, or alternatively, other scientifically defensible methods adopted by the Tribe as part of its water quality standards program and approved by EPA.

j. No criterion for protection of human health from consumption of aquatic organisms (excluding water) was presented in the 1980 criteria document or in the 1986 Quality Criteria for Water. Nevertheless, sufficient information was presented in the 1980 document to allow a calculation of a criterion, even though the results of such a calculation were not shown in the document.

k. The criterion for asbestos is the MCL (56 FR 3526, January 30, 1991).

l. [reserved]

m. These criteria for metals are expressed in terms of the dissolved fraction of the metal in the water column. Criterion values were calculated by using EPA's Clean Water Act 304(a) guidance values (described in the total recoverable fraction) and then applying the conversion factors in 40 CFR 131.36(b)(1) and (2).

n. EPA is not promulgating human health criteria for these contaminants. However, permit authorities should address these contaminants in NPDES permit actions using the Tribe's existing narrative criteria for toxics.

o. [reserved]

p. [reserved]

q. This criterion is expressed in the total recoverable form.

r. [reserved]

s. [reserved]

t. [reserved]

u. PCBs are a class of chemicals which include aroclors 1242, 1254, 1221, 1232, 1248, 1260, and 1016, CAS numbers 53469219, 11097691, 11104282, 11141165, 12672296, 11096825, and 12674112, respectively. The aquatic life criteria apply to the sum of this set of seven aroclors.

v. This criterion applies to total PCBs, e.g., the sum of all congener or isomer or homolog or aroclor analyses.

w. This criterion has been recalculated pursuant to the 1995 Updates: Water Quality Criteria Documents for the Protection of Aquatic Life in Ambient Water, Office of Water, EPA-820-B-96-001, September 1996. See also Great Lakes Water Quality Initiative Criteria Documents for the Protection of Aquatic Life in Ambient Water, Office of Water, EPA-80-B-95-004, March 1995.

General Notes:

1. This chart lists all of EPA's priority toxic pollutants whether or not criteria guidance are available. Blank spaces indicate the absence of national section 304(a) criteria guidance. Because of variations in chemical nomenclature systems, this listing of toxic pollutants does not duplicate the listing in Appendix A to 40 CFR Part 423 - 126 Priority Pollutants. EPA has added the Chemical Abstracts Service (CAS) registry numbers, which provide a unique identification for each chemical.

2. The following chemicals have organoleptic-based criteria recommendations that are not included on this chart: zinc, 3-methyl-4-chlorophenol.

(2) Factors for Calculating Metals Criteria. Final CMC and CCC values should be rounded to two significant figures.

(i) $$CMC = WER \times (Acute\ Conversion\ Factor) \times \left(\exp\left\{m_A[\ln(hardness)] + b_A\right\}\right)$$

(ii) $$CCC = WER \times (Chronic\ Conversion\ Factor) \times \left(\exp\left\{m_C[\ln(hardness)] + b_C\right\}\right)$$

(iii) Table 1 to paragraph (b)(2) of this section:

Metal	mA	bA	mC	bC
Cadmium	1.128	-3.6867	0.7852	-2.715
Copper	0.9422	-1.700	0.8545	-1.702
Chromium (III)	0.8190	3.688	0.8190	1.561
Lead	1.273	-1.460	1.273	-4.705
Nickel	0.8460	2.255	0.8460	0.0584
Silver	1.72	-6.52	---	---
Zinc	0.8473	0.884	0.8473	0.884

Note to Table 1: The term "exp" represents the base e exponential function.

(iv) Table 2 of this section:

Metal	Conversion Factor (CF) for freshwater acute criteria	CF for freshwater chronic criteria
Antimony	(d)	(d)
Arsenic	1.000	1.000
Beryllium	(d)	(d)
Cadmium	0.944(b)	0.909(b)
Chromium (III)	0.316	0.860
Chromium (VI)	0.982	0.962
Copper	0.960	0.960
Lead	0.791(b)	0.791(b)
Mercury	---	---
Nickel	0.998	0.997
Selenium	---	(c)
Silver	0.85	(d)
Thallium	(d)	(d)
Zinc	0.978	0.986

Footnotes:

a. [reserved]

b. Conversion Factors for these pollutants in freshwater are hardness dependent. CFs are based on a hardness of 100 mg/l as calcium carbonate ($CaCO_3$). Other hardness can be used; CFs should be recalculated using the equations in table 3 to paragraph (b)(2) of this section.

c. Bioaccumulative compound and inappropriate to adjust to percent dissolved.

d. EPA has not published an aquatic life criterion value.

The term "Conversion Factor" represents the recommended conversion factor for converting a metal criterion expressed as the total recoverable fraction in the water column to a criterion expressed as the dissolved fraction in the water column. See 'Office of Water Policy and Technical Guidance on Interpretation and Implementation of Aquatic Life Metals Criteria', October 1, 1993, by Martha G. Prothro, Acting Assistant Administrator for Water available from Water Resource Center, USEPA, Mailcode RC4100, M Street SW, Washington, DC, 20460 and the note to §131.36(b)(1).

(v) Table 3 to paragraph (b)(2) of this section:

	Acute	Chronic
Cadmium	CF = 1.136672 - [(ln {hardness})(0.041838)]	CF = 1.101672 - [(ln {hardness})(0.041838)]
Lead	CF = 1.46203 - [(ln {hardness})(0.145712)]	CF = 1.46203 - [(ln {hardness})(0.145712)]

(c) Applicability.

(1) The criteria in [Table X paragraph (b) whatever it's called...] of this section apply to the Tribe's designated uses cited in [Chapter 2? paragraph (d)(or whatever it's called in the HVTWQCP)] and apply concurrently with any other criteria adopted by the Tribe.

(2) The criteria established in this section are subject to the Tribe's general rules of applicability in the same way and to the same extent as are other Federally-adopted and Tribal-adopted numeric toxics criteria when applied to the same use classifications including low flow values below which numeric standards can be exceeded in flowing fresh waters.

(3) Application of metals criteria.

(i) For purposes of calculating freshwater aquatic life criteria for metals from the equations in [paragraph (b)(2) of this section, for waters with a hardness of 400 mg/l or less as calcium carbonate, the actual ambient hardness of the surface water shall be used in those equations. For waters with a hardness of over 400 mg/l as calcium carbonate, a hardness of 400 mg/l as calcium carbonate shall be used with a default Water-Effect Ratio (WER) of 1, or the actual hardness of the ambient surface water shall be used with a WER.

(ii) The criteria for metals (compounds #1 - #13 in paragraph (b) of this section) are expressed as dissolved except where otherwise noted. For purposes of calculating aquatic life criteria for metals from the equations in footnote i in the criteria matrix in paragraph (b)(1) of this section and the equations in [paragraph (b)(2) of this section, the water effect ratio is generally computed as a specific pollutant's acute or chronic toxicity value measured in water from the site covered by the standard, divided by the respective acute or chronic toxicity value in laboratory dilution water. To use a water effect ratio other than the default of 1, the WER must be determined as set forth in Interim Guidance on Determination and Use of Water Effect Ratios, U.S. EPA Office of Water, EPA-823-B-94-001, February 1994, or alternatively, other scientifically defensible methods adopted by the State as part of its water quality standards program and approved by EPA.