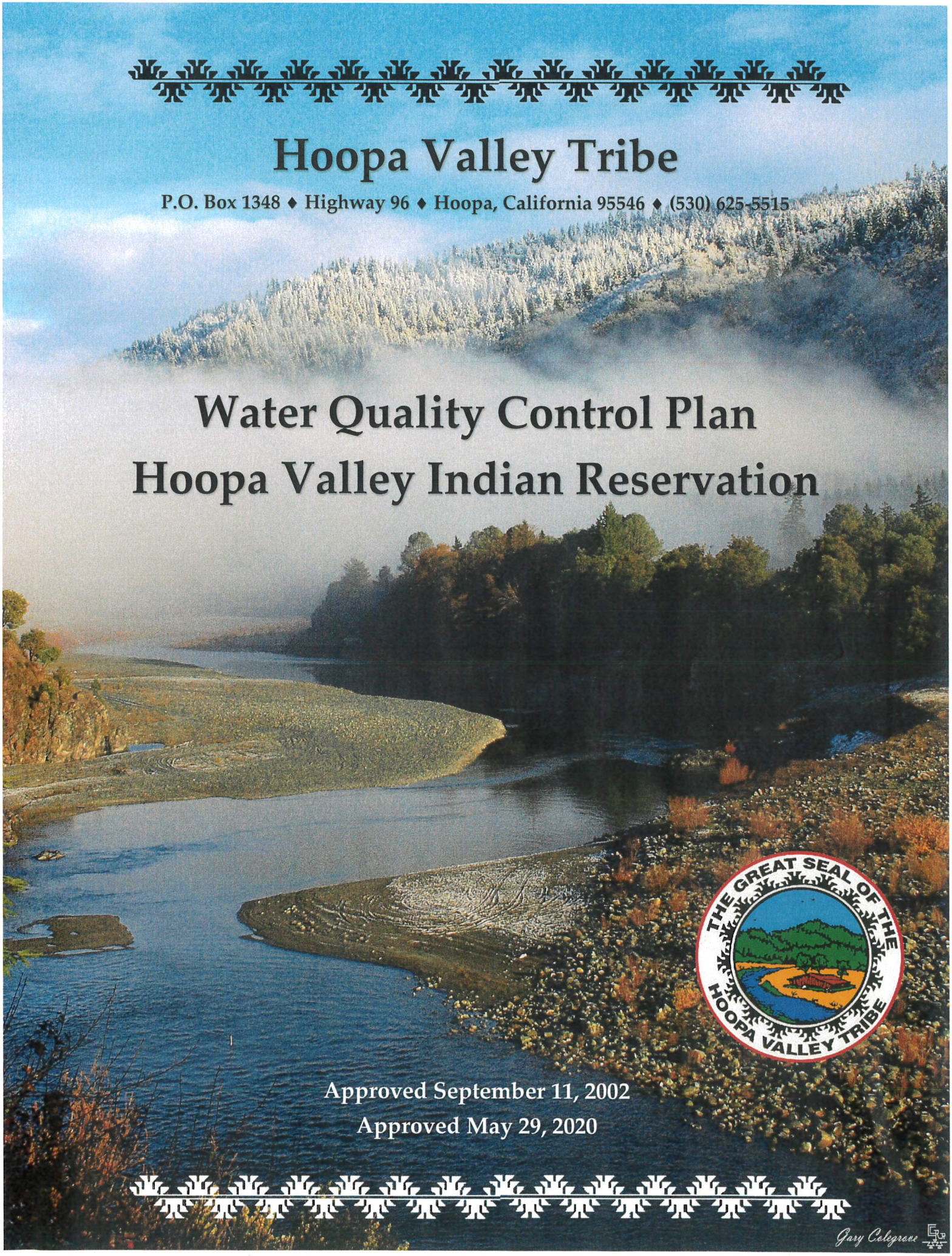

Hoopa Valley Tribe

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Water Quality Control Plan
Hoopa Valley Indian Reservation

Approved September 11, 2002
Approved May 29, 2020

Gary Colegrove

Hoopa Valley Indian Reservation

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Prepared By

Hoopa Valley Tribe
Hoopa Valley Tribal Environmental Protection Agency

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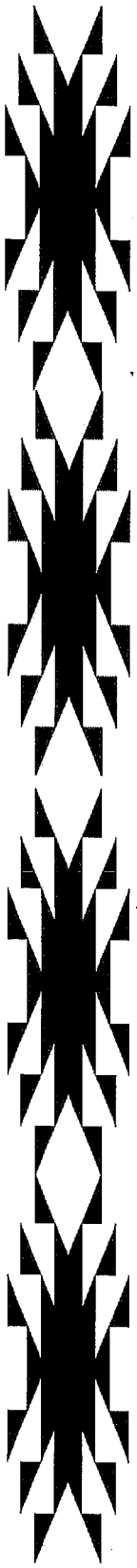
Foreword

The Hoopa Valley Tribe's Water Quality Control Plan (WQCP) was first adopted by the Hoopa Valley Tribal Council in 2001 and was approved by the United States Environmental Protection Agency (EPA) in 2002. The criteria in the WQCP were revised in 2006, 2008, and 2018. In 1990, EPA approved the Tribe's application for treatment as a state status under Section 106 of the Clean Water Act.

Comprehensive water quality planning, utilizing a watershed based approach 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 future generations. This 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 Tribal Environmental Protection Agency (TEPA) implements the WQCP under the authority of the Hoopa Valley Tribal Council. The WQCP consists of water quality criteria, standards, anti-degradation policies, and implementation plans, in accordance with the PDPO. It is the intent of the Tribal Council that the Forest Management Plan, the PDPO, Riparian Protection and Surface Mining Ordinance, and other Plans and Ordinances be used to protect and enhance the waters of the Reservation. 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. TEPA's water quality monitoring emphasizes biological evaluation of ecosystems (e.g. benthic macroinvertebrates) in Reservation tributaries and physical and chemical monitoring of the Trinity and Klamath Rivers using a combination of continuous data recorders and water samples.

Previous versions of the WQCP included appendices with supporting analyses providing scientific justification for the water quality criteria. To streamline the 2018 WQCP, these appendices are now standalone reference documents not included within the WQCP (Kier Associates, 2006; Hoopa TEPA, 2007; Hoopa TEPA, 2008a).



INTRODUCTION

1.0 INTRODUCTION

The Hoopa Valley Tribal (HVT) Council has assigned the primary responsibility for the protection and enhancement of water quality on the Hoopa Valley Indian Reservation (henceforth "Reservation") to the Hoopa Valley Tribal Environmental Protection Agency (TEPA) under Title 37 of the Hoopa Tribal Code. TEPA 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.

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 provide protection for beneficial uses of water, 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 Reservation's waters. The standards adopted by HVT in 1997 and current revisions to the WQCP supersede standards set forth in the Pollution Discharge Ordinance.

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 10 years to 20 years. The plan is concerned with all factors and activities that might affect water quality. However, the plan emphasizes actions to be taken by TEPA, the Riparian Review Committee, the Hoopa Valley Tribal Fisheries, Forestry, and Public Utility Departments, 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 Reservation waters, the quality and quantity issues, and the existing, potential and historical beneficial uses of the Reservation's waters. The plan also prescribes criteria for the protection of the Reservation waters and includes plans and policies that describe the basis for the management of water quality and protection of human health. The Hoopa Valley Tribe has recognized authority for setting water quality standards for its Reservation waters, including both the Trinity and Klamath Rivers (U.S. EPA, 2002). Included in the plan are specific criteria that apply to the Lower Klamath River on the Hoopa Valley Reservation (***Figure 1.1***).

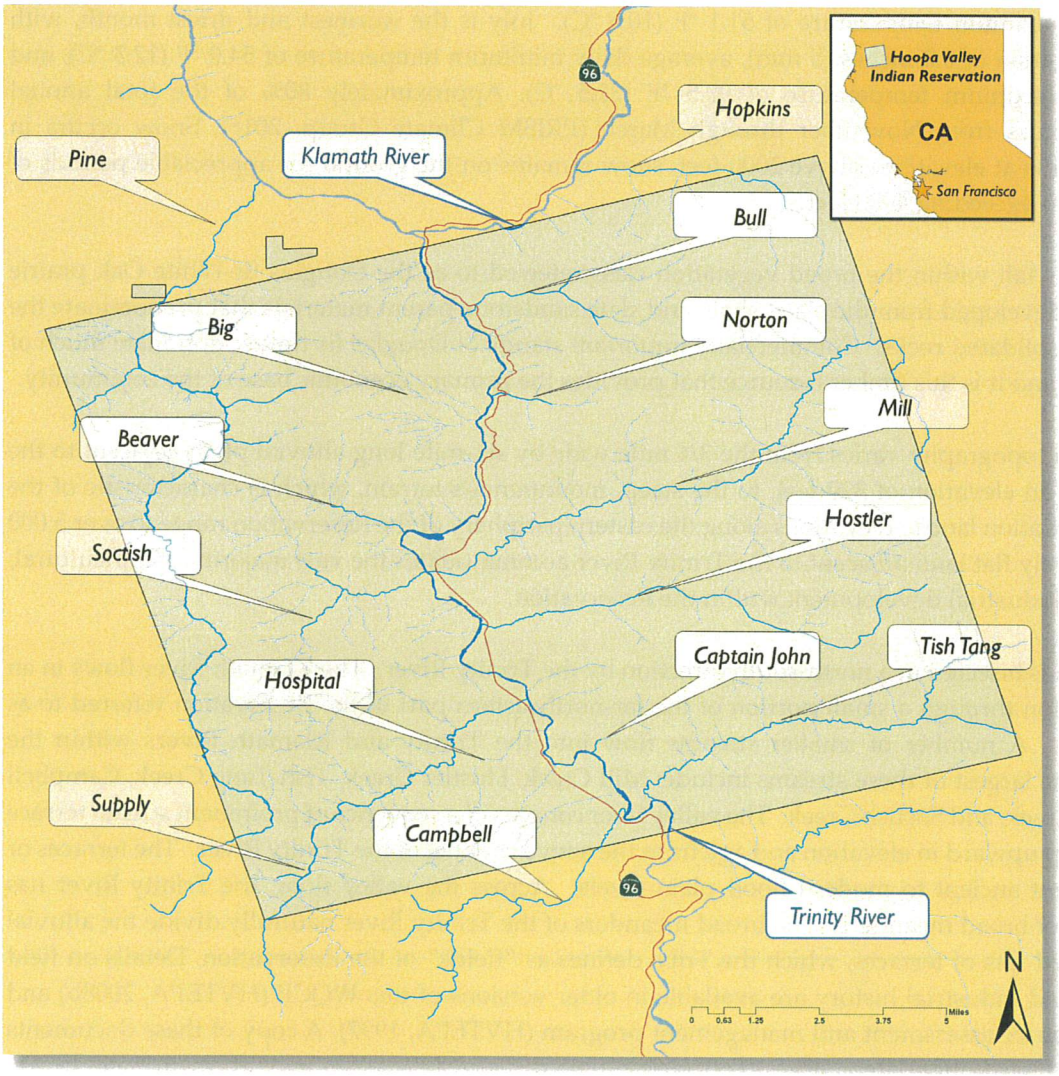
1.2 Legal Basis and Authority

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. 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, and EPA approved the application on July 3, 1990.

Figure 1.1 *- Map showing the regional location and major waterbodies within the Reservation. Most of the Reservation is within the Trinity River watershed, but the Reservation also includes part of the mainstem of the Klamath River (Saints Rest upstream of the confluence with the Trinity River) in addition to portions of some tributaries to the Klamath River.*



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 now encompasses 93,702.73 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 (***Figure 1.1***).

The 2010 U.S. Census indicated that there are 3,494 persons residing on the Reservation. The 2010 census reported 503 non-Indian and 2,991 American Indian people residing on the Reservation.

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. Summary statistics from gridded climate data for the period 1981-2010 (PRISM Climate Group, 2018) for the valley floor show annual precipitation of 56.4 inches (1432 mm) and annual mean temperature of 57.7 °F (14.2 °C). December is the coldest and wettest month, with average precipitation of 12.0 inches (305 mm), average daily minimum temperature of 37.6 °F (3.1 °C), and average daily maximum temperature of 51.1 °F (10.6 °C). July is the warmest and driest month, with average precipitation of 0.2 inches (5 mm), average daily minimum temperature of 54.0 °F (12.3 °C), and average daily maximum temperature of 90.5 °F (32.5 °C). Approximately 80% of the total annual precipitation occurs from November through March (PRISM Climate Group, 2018). 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.

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 referred to as Saints Rest Bar. 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, and Soctish Creek. 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. Details on field hydrogeology and industrial history are available in older versions of this WQCP (HVTEPA, 2008b) and the non-point source assessment and management program (HVTEPA, 1997). A copy of these documents may be viewed at www.hoopatepa.org.

1.4 Water Resources and Water Use

The Reservation hosts a seasonal abundance of surface water for drinking water supply while in contrast, groundwater aquifers are quite limited. The Tribe faces the challenge of meeting increased 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.

Surface Water Inventory

Streams that originate within the Reservation or flow through the Reservation (except the Trinity and Klamath Rivers) are delineated in the watershed inventory (***Table 1.1***). Stream lengths were taken directly from blue lines on USGS topographic maps. Approximately 49 percent of the watershed area drains into the Trinity River from the east side and 24 percent drains into the Trinity River from the west. Twenty-seven percent of the watershed area drains into the Klamath River.

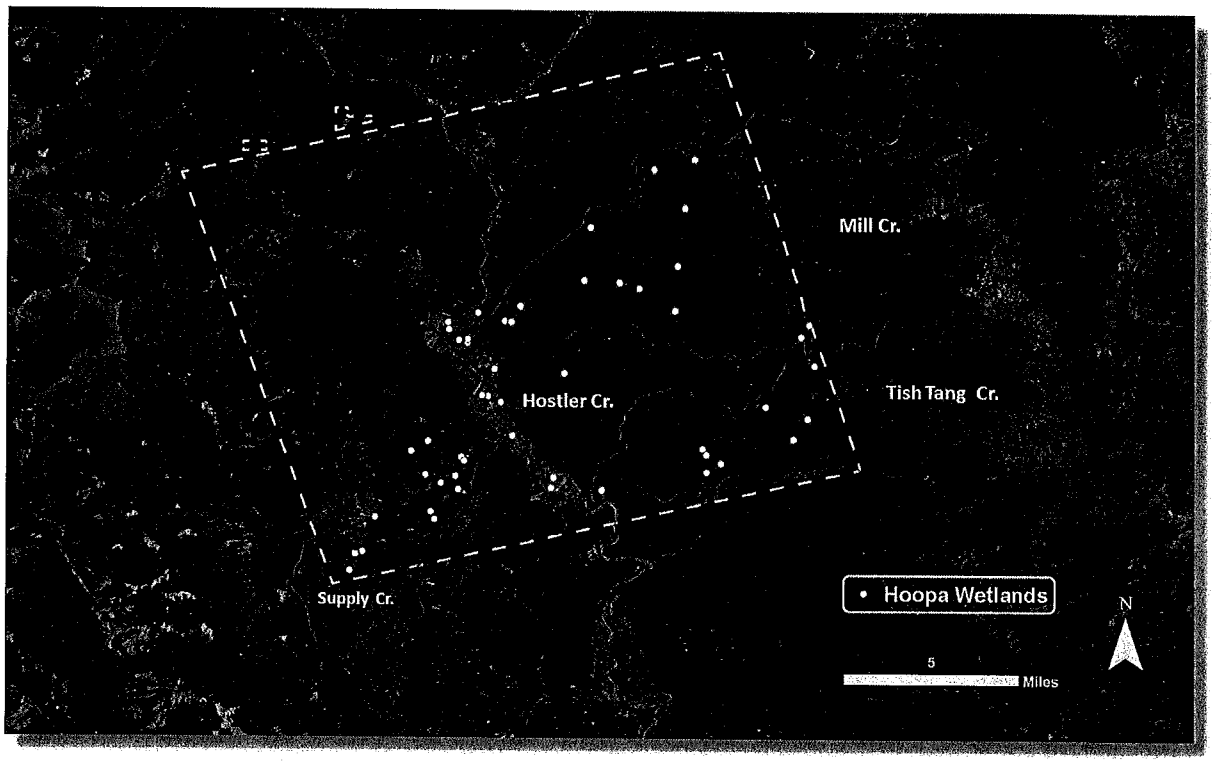
Table. 1.1 - Watershed Inventory (Hoopa Valley 305(b) Water Quality Inventory, 2000)

Watershed Name	Total Watershed Area(ac.)	Reservation Watershed Area (ac.)	Percent Total On-Reservation Watershed Area	Miles of Stream Class I / Class II
	Trinity	**River**	**East Side**	
Tish Tang Creek	19,131	8,367	43	9.67 / 13.59
Hostler Creek	6,657	6,657	100	8.30 / 6.47
Mill Creek	30,806	16,824	55	14.24 / 28.91
Bull Creek	4,198	4,198	100	3.28 / 7.29
Captain John	881	881	100	0.33 / 2.01
Low Order / Direct Facing	9,601	9,458	98	0.98 / 7.74
Total	71,274	46,385	65	36.47 / 64.00
	Trinity	**River**	**West Side**	
Campbell Creek	4,355	423	10	1.18 / 0.00
Hospital Creek	1,617	1,617	100	0.00 / 6.46
Supply Creek	10,254	7,184	70	7.33 / 38.84
Soctish Creek	5,924	5,924	100	3.67 / 23.06
Big Creek	1,157	1,157	100	0.00 / 5.71
Beaver Creek	2,059	2,059	100	1.34 / 8.37
Low Order / Direct Facing	9,601	9,458	98	0.00 / 30.36
Total	34,967	27,822	79	13.52 / 112.80
	Klamath	**River**		
Hopkins Creek	5,762	3,781	66	3.69 / 8.45
Pine Creek	31,412	12,559	40	20.52 / 42.10
Direct Drainage	2,964	1,199	40	0.00 / 2.21
Total	40,138	17,482	44	24.21 / 52.76

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 (***Figure 1.3***). 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. Wetland types described in 1999 inventory include Upland Riparian and Wet Brushfield, Upland Herb Meadows, and Valley Floor Riparian. Details on the 1999 wetland assessment are available in older versions of this WQCP (HVTEPA, 2008b). Delineation of wetlands will normally be conducted when a proposed project is adjacent to it.

Figure 1.3 – Known or potential wetlands on the Reservation, based on surveys from the year 1999.



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, but road construction and logging undoubtedly have caused some wetland losses as well as altering species composition and structure. In contrast, decline in amount or quality of wetlands on the valley floor has probably been significant over the past century due to land use conversions and water diversions. In addition, the Army Corps of Engineers' channelization of many streams following the 1964 flood led to significant loss or decline in quality of valley wetlands.

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.

1.5 Identification of Non-Point Source (NPS) 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. TEPA completed a non-point source pollution assessment and management program in 1997 (HVTEPA 1997). The following potential water quality problems were identified based on the previous detection of contaminants and updated (2018) information from TEPA:

1. Potential for chlorophenols in certain streams.
2. Potential for dioxins and furans in certain streams.
3. Potential for heavy metals and other byproducts of ore processing in certain streams.
4. Potential for unknown chemicals or combinations of chemicals entering Supply Creek from the retired and capped Supply Creek landfill and dump.
5. 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.
6. 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.
7. *Cannabis* cultivation ban within the Reservation is currently appealed. Environmental challenges still remain and require evaluation to water quality and the aquatic environment.

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.

The headwaters of Campbell Creek and the majority of its watershed are located on public lands outside the Reservation boundary. Current and historic land use activities such as timber harvesting, agriculture, and *Cannabis* cultivation create NPS pollution that discharges directly into the watershed. This NPS pollution has the potential to adversely affect water quality and compromise the Tribe's cultural resources. TEPA is currently developing a watershed based plan (WBP) for Campbell Creek to address these issues. The Campbell Creek WBP is a dynamic document that will be amendable to revision and update and incorporate the latest information, address new management strategies, and define new partnerships between watershed shareholders. In the future, TEPA intends to use the Campbell Creek WBP as a template to develop WBPs for additional Reservation watersheds.

1.6 Water Quantity and Quality Issues

The Hoopa Valley Tribe faces difficult management decisions with respect to on-reservation water use

conflicts and water quality issues. 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

Since the 1960s, the U.S. Bureau of Reclamation has regulated flows on the upper Trinity River with Trinity Dam, diverted water from Lewiston Dam into the Central Valley, and anadromous fish cannot reach the river's headwaters. In the early years, up to 90 percent of the river's flow was diverted, driving major declines in salmon and steelhead populations. Diversions have been substantially reduced following the Record of Decision in 2000 and the initiation of the Trinity River Restoration Program (United States Department of the Interior, 2000). Under current management, approximately 50 percent of the river's annual flow is diverted at Lewiston.

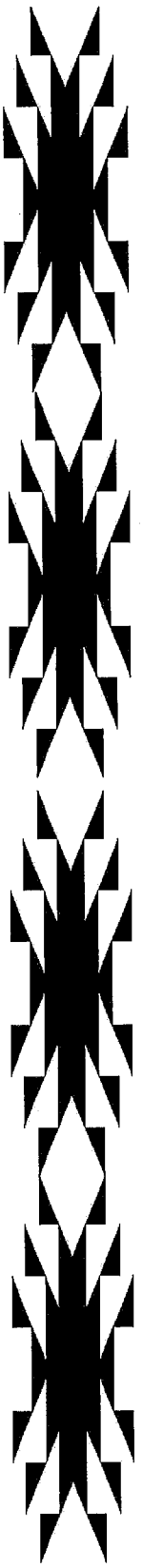
Water Systems

Hoopa PUD developed a valley wide drinking water source drawing upon water from the Trinity River in 2005 under a grant from USEPA. The older system of diversions from Reservation tributaries for drinking water has now been decommissioned except Campbell Creek, but water is still diverted from Mill, Soctish, Supply and Hostler Creeks for irrigation. Backup drinking water supplies are provided by Campbell Creek.

Inorganic Chemicals

The inorganic chemicals most often associated with health and environmental concerns are heavy metals. Past chemical analyses of some Reservation wells have found potentially problematic concentrations of silver, cadmium, mercury, selenium, copper, zinc, manganese, iron, lead, and barium. The concentrations of metals in these wells, as well as seasonal supply constraints, motivated the switch to the cleaner Trinity River as the drinking water source for the Reservation. Detailed results from monitoring of inorganic chemicals are available in older versions of this WQCP (HVTEPA, 2008b) and the NPS plan (HVTEPA, 1997).

BENEFICIAL USES



2.0 BENEFICIAL USES

Designation of beneficial uses for Reservation waters is an essential element of this plan. 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 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 non-consumptive uses over the next several years, including 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.

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 habitats. 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. 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. Swimming and wading along the Trinity River, and in some of the creeks, are popular activities for 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.

(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. 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 2,600 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).

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

Table 2.1 - Designated Beneficial Uses of the Major Drainages on the Reservation

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

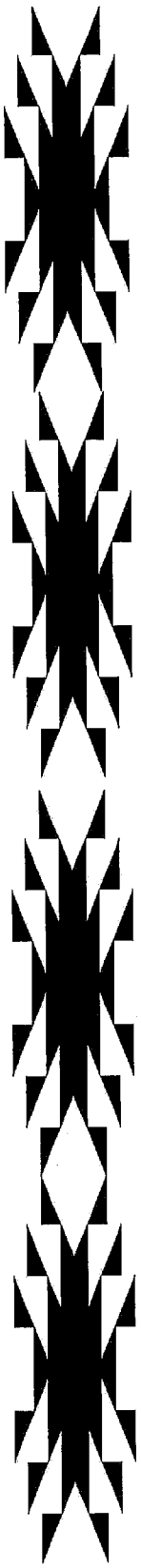
The classification key for the beneficial uses is as follows:

P = Potential Use, E = Existing Use, H = Historical Use, N/A = Not Applicable

X = Waterbodies that extend beyond Reservation boundaries.

(Section 2.2 Beneficial Use Related Activities is available for review in the WQCP 2008 at www.hoopatepa.org)

WATER QUALITY CRITERIA



3.0 WATER QUALITY CRITERIA

3.1 INTRODUCTION

In 1988, the U.S. Congress ratified and confirmed the Hoopa Valley Tribe's 1972 Constitution by Section 8 of Public Law 100-580. The Constitution 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 ("Reservation") establishes pollution control criteria to apply to all individuals within the 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 Reservation. These standards shall provide a mechanism for managing and safeguarding the quality and use of all water bodies within the 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 Reservation; to promote the health, social welfare, and economic well-being of the Hoopa Valley Tribe, its people, and all the residents of the 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 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 C) 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 Reservation as outlined in Appendix D.

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 Reservation. In no cases may controllable water quality factors affect 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 condition of surface waters are of lower quality than the criteria assigned, the Riparian Review Committee may determine that the natural condition 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. Natural condition means the natural condition or circumstance of a water quality parameter affecting the physical, chemical, or biological integrity of a water of the Reservation that are not influences by past or present anthropogenic activities. Disturbances from wildfire, floods, earthquakes, volcanic or geothermal activity, wind, insect infestation, and diseased vegetation are considered natural conditions, except to the extent that they are exacerbated by anthropogenic activities. 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 Reservation 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 since 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 Reservation or flow through the Reservation 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. Hostler Creek
6. Soctish Creek
7. Big Creek
8. Captain John Creek
9. Gibb Gulch
10. Campbell Creek
11. Hospital Creek
12. Klamath River
13. 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 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 D.

(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 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 Trinity River shall be maintained at a level of **5.0 – 9.0** for (MUN) use designations and will be maintained at a level of **7.0 - 8.5** for all other beneficial uses. The pH in the Klamath River shall be maintained within **7.0 - 8.5** at all times.

(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 Table 3.1.

Table 3.1 *- 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 (including Radium-226 but excluding Radon and Uranium)	5
Gross Alpha particle activity	15
Tritium	20,000
Strontium-90	8
Gross Beta particle activity	50

3.5 SPECIFIC USE CRITERIA

3.5.1 Specific Use Criteria: HVT implemented specific use attainability analysis in the development of temperature and turbidity criteria. The rest of 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 for all waters on the Reservation listed with the designated uses from §3.5.1 (A):

	Geometric mean
Enterococci	**33 CFU/100 ml** *
Escherichia coli	**126 CFUs/100 ml** *

* - ***CFUs – Coliform Forming Units***

ii) Water Column Dissolved Oxygen – For the Trinity River and other Reservation Tributaries with the designated uses from §3.5.1 (A), the minimum level of dissolved oxygen shall not drop below **11.0 mg/l** in the water column. Klamath River D.O. criteria based on the designated use COLD (year-round), the 7-day moving average of the daily minimum D.O. in the water column shall not drop below **8.0 mg/L**, whereas SPWN (whenever spawning occurs, has occurred in the past or has potential to occur), the 7-day moving average of daily minimum D.O. in the water column shall not drop below **11.0 mg/L**. If dissolved oxygen standards are not achievable due to natural conditions, then the COLD and SPAWN standard shall instead be dissolved oxygen concentrations equivalent to 90% saturation under natural receiving

water temperatures[1]/. If water quality monitoring indicates that dissolved oxygen levels are below the criteria listed, then an investigation of impact will be conducted.

1/ Corresponding DO concentrations are calculated as daily minima, based on site-specific barometric pressure, site-specific salinity, and natural receiving water temperatures as estimated by the T1BSR run of the Klamath TMDL model and described in Tetra Tech, December 23, 2009, *Modeling Scenarios: Klamath River Model for TMDL Development.* The estimates of natural receiving water temperatures used in these calculations may be updated as new data or method(s) become available. To facilitate interpretation of the standard, the following table contains monthly minimum of daily minimum dissolved oxygen values corresponding to 90% saturation as calculated from monthly minimum water temperatures predicted by the T1BSR model scenario for the Klamath River at Saints Rest Bar on the Reservation:

Month	Monthly Minimum of Daily Minimum Dissolved Oxygen (mg/L)
January	11.0
February	10.6
March	10.0
April	9.5
May	8.5
June	7.6
July	7.4
August	7.3
September	7.8
October	8.3
November	10.1
December	11.0

iii) Inter-gravel Dissolved Oxygen - The inter-gravel dissolved oxygen on the Klamath River, Trinity River, and other Reservation Tributaries with the designated uses from §3.5.1 (A), shall not be decreased below **8.0 mg/l** by any human related activity.

iv) Periphyton - For the Klamath River only (Trinity River standards yet to be developed), the maximum annual periphyton biomass shall not exceed **150 mg chlorophyll *a*/m²** of streambed area.

v) pH - The pH of surface waters within the Trinity River shall be maintained at a level of **5.0 – 9.0** for MUN use designations and will be maintained at a level of **7.0 – 8.5** for all other designated uses from §3.5.1 (A):. The pH in the Klamath River shall be maintained within **7.0 - 8.5** at all times.

vi) Nutrients - For the Klamath River only (Trinity River standards yet to be developed), the mean nutrient concentrations in any 30-day period from May-October shall not exceed the values shown in ***Table 3.2***. There should be at least two samples per 30-day period. If total nitrogen and total phosphorus standards are not achievable due to natural conditions, then the standards shall instead be the natural conditions for total nitrogen and total phosphorus.

Table 3.2 – *Klamath River Nutrient Criteria Standards.* [1]/

Parameter	Standard
Total Nitrogen (TN) (mg/L)	**0.2 mg/L**
Total Phosphorus (TP) (mg/L)	**0.035 mg/L**

[1]/ Through consultation, the ongoing TMDL process for the Klamath River is expected to further define these natural conditions.

vii) Microcystins & Microcystis - For the Klamath River only (Trinity River standards yet to be developed), the Microcystis aeruginosa and microcystin criteria shall not exceed the values shown in ***Table 3.3***.

Table 3.3 - *Microcystis aeruginosa and microcystin criteria for the Klamath River on the Reservation.*

Parameter	Standard	Rational
Microcystis aeruginosa cell density	<5,000 cells/mL for drinking water <40,000 cells/mL for recreational water	Combination of WHO and Oregon guidelines – protective of public health
Microcystin toxin concentration	<1µg/L total microcystins for drinking water <8µg/L total microcystins for recreational water	Combination of WHO and Oregon guidelines – protective of public health
Total potentially toxinogenic blue-green algal species*	<100,000 cells/mL for recreational water	Oregon guidelines – protective of public health
Cyanobacterial scums	There shall be no presence of cyanobacterial scums	Protective of public health, see below

*Includes: *Anabaena, Microcystis, Planktothrix, Nostoc, Coelosphaerium, Anabaenopsis, Aphanizomenon, Gloeotrichia* and *Oscillatoria.*

viii) Turbidity – Turbidity Criteria for all Reservation waters has been withdrawn as they are still being evaluated and will be revised for inclusion in the next triennial review.

ix) 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 Reservation Tributary Temperature standards were derived from a combination of literature review and Hoopa historical temperature data analysis to determine the biological requirements of the various salmonids life stages. We used the following literature resources and review sources to provide the basis of the proposed standards: The US EPA *Region 10 Guidance for Pacific*

Northwest State and Tribal Temperature Water Quality Standards, the California Regional Water Quality Control Board North Coast Region's *Biological Temperature Requirements of Salmonids by Life Stage,* TEPA laboratory temperature studies, and over nine years of Hoopa temperature data. 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 3.4***) 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 the South Boundary CDR 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 3.4 - Trinity River Temperature Criteria for the 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.***

Trinity River temperature standards have been established for the portion of the Trinity River that flows through the 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 for Trinity River and Tributaries

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 Criteria

Water temperature is a critical aspect of the freshwater habitat of anadromous salmonids and overall water quality of Reservation waters. Salmonids listed as threatened or endangered under the ESA and other coldwater salmonids need cold water to survive. Human-caused increases in river water temperatures have been identified as a factor in the decline of SA-listed salmonids in the Pacific Northwest. Adoption of Hoopa Tribal tributary temperature criteria can play an important role in helping to maintain and restore water temperatures to protect anadromous salmonids and to aid in the recovery of water quality on the

Reservation. For these reasons, the Hoopa Valley Tribe is proposing temperature criteria for Reservation tributaries to meet the biological requirements of salmonids during their various life stages.

According to the standards adopted for Trinity River Temperature above, separate criteria were adopted for the water year types, differentiating Dry and Critically Dry Years and Extremely Wet, Wet and Normal Years. ***Table 3.5*** shows the varying criteria for each life stage of salmonids for our Reservation tributaries. The proposed objectives apply when and where the given species and life stage time period exist, and when and where the species and life stage time period existed historically, and have the potential to exist again. Activities that result in an increase to water temperature must comply with the Tribal and Federal anti-degradation policies.

Table 3.5 – Reservation Tributary Temperature Criteria (MWAT) for the Reservation

Salmonid Life Stage	Timeframe	(*C)	(*F)
Dry and Critically Dry Years		**Tributaries**	
Adult Holding/Coho Incubation & Emergence/Spawning/Smoltification	May 23 to June 4	14.0	57.2
Adult Holding/Peak Temperatures Timeframe According to Hoopa Tribal Data	June 5 to July 9	17.0	62.6
Adult Holding	July 10 to September 14	20.0	68.0
Adult Holding/Spawning	September 15 to October 31	16.0	60.8
Adult Incubation & Emergence (Including Coho)/Smoltification/Spawning	November 1 to May 22	12.0	53.6
Extremely Wet, Wet, and Normal Years		**Tributaries**	
Adult Holding/Coho Incubation & Emergence/Spawning/Smoltification	May 23 to June 4	13.0	55.4
Adult Holding/Peak Temperatures Timeframe According to Hoopa Tribal Data	June 5 to July 9	16.0	60.8
Adult Holding	July 10 to September 14	18.0	64.4
Adult Holding/Spawning	September 15 to October 31	14.0	57.2
Adult Incubation & Emergence (Including Coho)/Smoltification/Spawning	November 1 to May 22	10.0	50.0
Adult Migration and Juvenile Rearing are considered All Year Life Stages			

The temperature listed in Table 3.5 are based on the maximum weekly average temperature (MWAT), which is defined as the highest 7-day moving average of equally spaced water temperature measurements for a given time period. In this application, the time period is the duration of the existing salmonid life stage. For the MWAT objective, the water temperatures in the stream may not exceed the numeric objective for every 7-day period during the given life stage.

> *The recommended metric for all of the temperature criteria is the maximum weekly average temperature (MWAT). This metric is recommended because it describes the maximum temperatures in a stream, but is not overly influenced by the maximum temperature of a single day. Thus, it reflects an average of maximum temperatures that fish are exposed to over a week-long period. Since this metric is oriented to daily maximum temperatures, it can be used to protect against acute effects, such as lethality and migration blockage conditions.*

We recognize that in some streams, the numeric objectives may not be achievable due to site specific limitations. In this case, the Hoopa Tribe may consider site specific objectives if the following conditions are met:

- The stream has been restored to its full site potential,
- The salmonid population is at a level consistent with NOAA Fisheries concept of a Viable Salmonid Population

De Minimis Temperature Increase Allowance

The Reservation Tributary Temperature Criteria allows for a de minimis temperature increase above the numeric criteria or the natural background temperature. We choose to include a de minimis increase allowance as a way of accounting for monitoring measurement error and tolerating negligible human impacts.

If a particular tributary exceeds a temperature numeric criterion due to natural conditions (or natural conditions plus a de minimis human impact), then the waterbody need not be listed on the Tribe's 303(d) list. Such waterbodies would not be considered impaired because they would be meeting the narrative natural background provisions of the Hoopa Temperature Criteria. These tributaries should be identified as an attachment to the Tribe's section 303(d) list submission to EPA along with the demonstration that these waters do not exceed the natural background provision.

For situations where waterbodies exceed the applicable numeric criteria due to a combination of apparent natural background conditions and known or suspected human impacts (above a de minimis impact level), it would be appropriate to list those waters on the 303(d) list because the waters would be exceeding the narrative natural background provision because of the human impacts. The TMDL process will provide the opportunity to distinguish the natural sources from the human caused sources.

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 ensure 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 antidegradation 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 D. Any

existing point or non-point source causing increased levels of pesticides shall be addressed as a noncompliance condition under the antidegradation 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 antidegradation 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 D.

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 D. 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 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.

3.7. ANTIDEGRADATION 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 (PDPO). 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. 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.

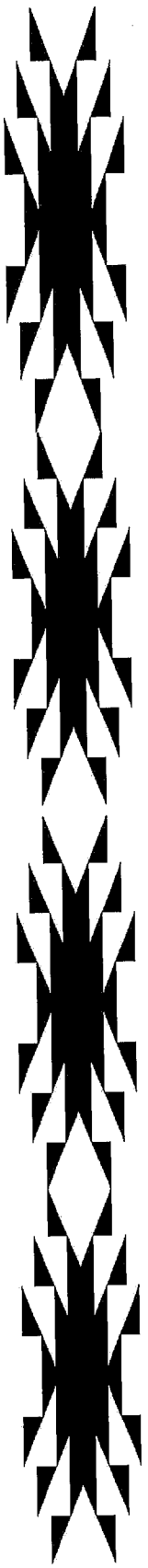
3.7.4 In such cases where water uses justify outstanding resource designations, the designated water quality and uses shall be maintained and protected. Pollutants that will reduce the existing water quality shall not be allowed to enter such waters. To accomplish this, the department may require water 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



4.0 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 non-point 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 in combination or as individual practices as not to 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 Water Quality Assessment Reporting With ATTAINS

The Hoopa Valley Tribe conducted its first 305(b) water quality assessment in 1991 (LACO Associates 1991b), but has recently switched to a new system for water quality assessment reporting. Currently, TEPA conducts water quality assessment reporting using the Assessment Total Maximum Daily Load (TMDL) Tracking and Implementation System (ATTAINS). ATTAINS is a water quality framework developed to streamline water quality assessment and reporting while providing a more complete picture of the Nation's tribal waters. The water quality framework is a new way of thinking about how the EPA's data and information systems can be better integrated to more effectively support water quality managers.

The Clean Water Act requires Tribes to monitor water quality and report to EPA every two years on waters they have evaluated (Assessments). As part of the process, waters that are threatened or too polluted to meet water quality standards are identified. These waters are called impaired (polluted enough to require Actions). The assessment information reported to EPA by the Tribes is managed and maintained in ATTAINS. This system also tracks Total Maximum Daily Loads (TMDLs) and all these data are used in Water Quality Measures calculations. ATTAINS also make the reported water quality information available to the public through EPA's website.

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 non-point 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 to evaluate current conditions, inform adaptive management, and track changes in conditions over time. 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 further refine the monitoring plan as science evolves.

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 2.1). Monitoring conducted at these tributaries includes benthic macroinvertebrates, indicator bacteria, and continuous water temperature during the summer monitoring period. In the Trinity and Klamath Rivers, TEPA operates continuous multi-parameter water quality sondes and collects water samples every two weeks from May through October which are analyzed for nutrients, phytoplankton, and microcystin toxin (TEPA, 2013). In addition, TEPA collects periphyton samples from river cobbles at the Trinity and Klamath River sites (TEPA, 2013).

4.4 Non-Point Source Management Program

4.4.1 Identification of Best Management Practices

Best Management Practices BMPs 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 BMPs 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 (LACO Associates 1991b) and non-point source assessment and management program (HVTEPA, 1997). The Tribal Council is responsible for overseeing forest management activities, such as, surface mining, firewood cutting, fishing, grazing, herbicide use, wellhead protection, and road building. The following non-exhaustive lists of BMPs 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
    - Guidelines for Reservation Wide Fuel Management and Prescribed Fire
- 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

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 Use 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 benthic macroinvertebrates
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 Programs with Tribal 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 Tribal Ordinance, Resolutions, Management Plans, Guidelines, and Best Management Practices described in section 4.4.1 above.

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 provide an opportunity to participate in open processes of governmental decision-making. TEPA 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, TEPA shall hold public hearings for the purpose of reviewing the water quality standards and, as appropriate, modifying standards for Tribal Council approval. TEPA 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 TEPA.

4.4.5 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 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 their 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.

Addition elements relevant to erosion control and prevention include the Tribe's Antidegradation policy (Section 3.7 above) and the Tribe's Forest Management Plan (FMP). The FMP and associated environmental analyses were updated in 2013.

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 one or more acres total land area.

Pollution Prevention Plans for construction projects over one acre 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

2.0 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.

Variances:
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.

Violation Matrix (Penalty per Offense).

Class of Violation	Major	Moderate	Minor
Class I	$5,000	$3,000	$1,000
Class II	$2,000	$1,000	$500
Class III	$500	$250	$100

Each day in violation of this ordinance shall constitute a separate offense and the Land Management Director shall apply a separate penalty for each consecutive day and occurrence of offense.

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 regarding dispute resolution and regulating permitted activities within these wellhead protection areas.

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 4.2.**

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
Seepage Pit	150	100	50	25[3]	50

1. As measured from the line, this 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 evaluations 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 porosity, 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 TEPA 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 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 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 Pre-closure

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.

2. 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.

3. 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.

4. 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.

5. 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.

6. 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.

7. 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).

8. 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.

9. 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.

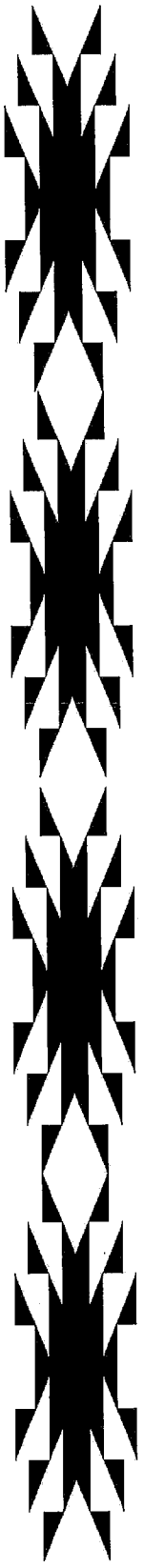
4.13 Inter-Governmental Coordination

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.

TRIENNIAL REVIEW AND AMENDMENT PROCESS



5.0 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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6.0 REFERENCES

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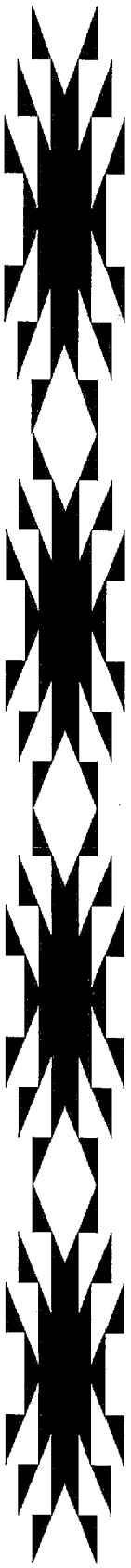
Appendix A
Tribal Legal Capacity



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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.

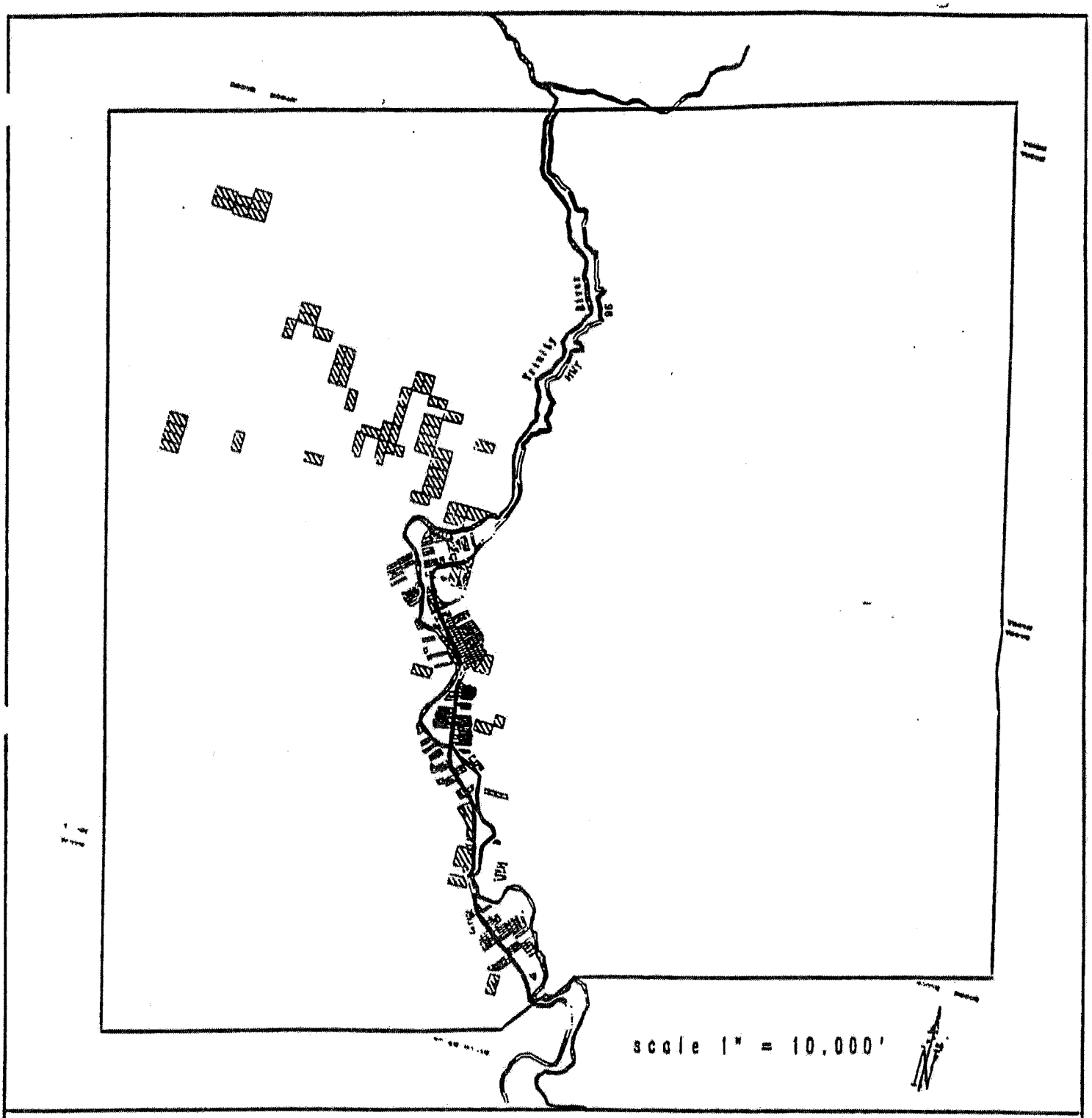
So somewhat less than 1% of the Hoopa Valley Indian reservation is privately owned by non-Indians, at least comparable to the "closed" sector Yakima facts in Brendale; far different than the facts on the Salish and Kootenai Reservation. The Hoopa Valley Tribe, as it happens, and as anticipated in Brendale, 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	=	87948.5 Acres
Total Private (County Fee) Ownership Indian and Non-Indian owners	=	1922.6 Acres
Percent of Reservation Privately Owned	=	2.8 %

source: HVIC, Forestry Div. GIS Database overlay, 7/26/95, jr.

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. See Jessie Short, et al. v. United States, 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 retained 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.

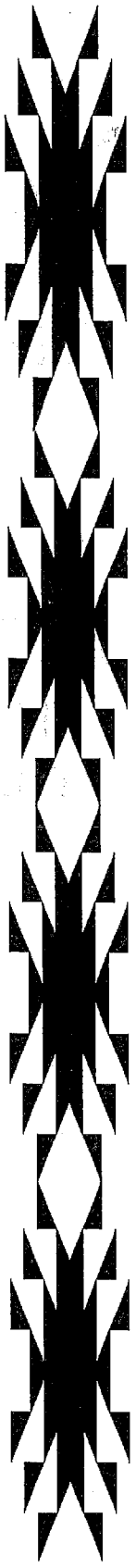
In sum, the Hoopa Valley Tribe clearly possesses the legal authority to comprehensively regulate water quality and use within the Hoopa Valley Reservation. The Tribe also possesses emergency response authority comparable to that of the EPA Administrator under CWA Section 504. Accordingly, EPA is respectfully 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 A. Suagee

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 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 waterbody, 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

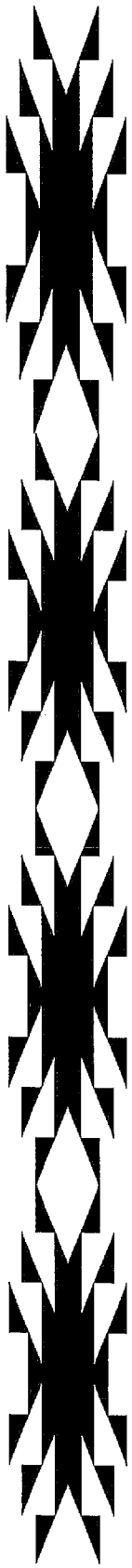
which result from human activities that were not planned, approved and/or permitted from a consortium of staff from Tribal EPA, Fisheries, Forestry and the Tribal cultural committee.

"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
Preliminary Remediation Goals



USERS' GUIDE AND BACKGROUND TECHNICAL DOCUMENT FOR USEPA REGION 9'S PRELIMINARY REMEDIATION GOALS (PRG) TABLE

TABLE OF CONTENTS

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. The PRG Table is specifically not intended as a (1) stand-alone decision-making tool, (2) as a substitute for EPA guidance for preparing baseline risk assessments, (3) a rule to determine if a waste is hazardous under RCRA, or (4) set of final cleanup or action levels to be applied at contaminated sites.

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 human health toxicity values with standard exposure factors to estimate contaminant concentrations in environmental media (soil, air, and water) that are considered by the Agency to be health protective of human exposures (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 risk-based concentrations presented in the Table may be used as screening goals or initial cleanup goals if applicable. Generally a screening goal is intended to provide health protection without knowledge of the specific exposure conditions at a site. PRGs may also be used as initial cleanup goals when the exposure assumptions based on site-specific data match up with the default exposure assumptions in the PRG Table. When considering PRGs as cleanup goals, it is EPA's preference to assume maximum beneficial use of a property (that is, residential use) unless a non-residential number (for example, industrial soil PRG) can be justified.

Before applying PRGs at a particular site, the Table user should consider whether the exposure pathways and exposure scenarios at the site are fully accounted for in the PRG calculations. Region 9 PRG concentrations are based on direct contact 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 printed 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 the rare case where noncancer PRGs are more stringent than cancer PRGs set at one-in-one-million risk, a similar approach has been applied (e.g. "nc**").

In general, PRG concentrations in the printed 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"). At the Region 9 PRG website, the risk-based calculations for these same chemicals are also available in the "InterCalc Tables" if the user wants to view the risk-based concentrations prior to the application of "sat" or "max". For more information on why the "sat" value and not a risk-based value is presented for several volatile chemicals in the PRG Table, please see the discussion in Section 4.6.

With respect to applying a "ceiling limit" for chemicals other than volatiles, it is recognized that

this is not a universally accepted approach. Some within the agency argue that all values should be risk-based to allow for scaling (for example, if the risk-based PRG is set at a hazard quotient = 1.0, and the user would like to set the hazard quotient to 0.1 to take into account multiple chemicals, then this is as simple as multiplying the risk-based PRG by 1/10th). If scaling is necessary, PRG users can do this simply by referring to the "InterCalc Tables" at our website where risk-based soil concentrations are presented for all chemicals (see soil calculations, "combined" pathways column).

In spite of the fact that applying a ceiling limit is not a universally accepted approach, we have opted to continue applying a "max"soil concentration to the PRG Table for the following reasons:

- Risk-based PRGs for some chemicals in soil exceed unity (>1,000,000 mg/kg) which is not possible.
- The ceiling limit of 10^{+5} mg/kg is equivalent to a chemical representing 10% by weight of the soil sample. At this contaminant concentration (and higher), the assumptions for soil contact may be violated (for example, soil adherence and windborne dispersion assumptions) due to the presence of the foreign substance itself.
- PRGs currently do not address short-term exposures (e.g. pica children and construction workers). Although extremely high soil PRGs are likely to represent relatively non-toxic chemicals, such high values may not be justified if in fact more toxicological data were available for evaluating short-term and/or acute exposures.

In addition to Region 9 PRG values, the PRG Table also includes California EPA PRGs ("CAL-Modified PRGs") for specific chemicals where CAL-EPA screening values may deviate significantly from the federal values (see Section 2.4) and EPA OSWER soil screening levels (SSLs) for protection of groundwater (see Section 2.5).

2.2 Toxicity Values

Hierarchy of Toxicity Values

There is a new hierarchy of human health toxicity values that replaces earlier guidance. This is important because human toxicity values known as cancer slope factors (SF) or non-cancer reference doses (RfDs) form the basis of the PRG values listed in the table. As noted in OSWER Directive 9285.7-53 (dated December 5, 2003), the updated EPA hierarchy is as follows: Tier 1 - EPA's Integrated IRIS, Tier 2 - EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs), and Tier 3 - Other Toxicity Values. Tier 3 includes additional EPA sources (e.g. historic HEAST and NCEA provisional values) and non-EPA sources of toxicity information (e.g. California EPA toxicity values).

The PRG Table lists Tier 1 toxicity values from IRIS as "i" and Tier 2 toxicity values known as PPRTVs as "p". Tier 3 toxicity values were obtained from various sources including California EPA databases "c", historic HEAST tables "h" and NCEA provisional values "n".

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:

$$\text{RfDi}\ \frac{\text{mg}}{(\text{kg}\cdot\text{day})} = \text{RfC}\,(\text{mg}/\text{m}^3)\times\frac{20\text{m}^3}{\text{day}}\times\frac{1}{70\text{kg}}$$

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

$$\text{SFi}\ \frac{(\text{kg}\cdot\text{day})}{(\text{mg})} = \text{URF}\,(\text{m}^3/\text{ug})\times\frac{\text{day}}{20\text{m}^3}\times 70\text{kg}\times\frac{10^3\ \text{ug}}{\text{mg}}$$

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. In general, dermal toxicity values are not listed in EPA databases and consequently must be estimated from oral toxicity information. However, a scientifically defensible data base often does not exist for making an adjustment to the oral slope factor/RfD so that the oral toxicity value is often applied without adjustment to estimate a dermal toxicity value. For more information please refer to recent Agency guidance (USEPA 2004) entitled *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment)* available on the web at: http://www.epa.gov/superfund/programs/risk/ragse/index.htm

Please note that whenever route-extrapolated values are used to calculate risk-based PRGs, additional uncertainties are introduced in the calculation.

2.3 PRGs Derived with Special Considerations

Most of the Region 9 PRGs are readily derived by referring to Equations 4-1 thru 4-8 contained in this "User's Guide/Technical Background Document" to the Region 9 PRGs. However, there are some chemicals for which the standard equations do no apply and/or adjustments to the toxicity values are recommended. These special case chemicals are discussed below.

Cadmium The PRGs for Cadmium are based on the oral RfD for water which is slightly more conservative (by a factor of 2) than the RfD for food. Because the PRGs are considered screening values, we elected to use the more conservative RfD for cadmium. However, reasonable arguments could be made for applying an RfD for food (instead of the oral RfD for water) for some media such as soils.

The water RfD for cadmium assumes a 5% oral absorption factor. The assumption of an oral absorption efficiency of 5% for Cadmium leads to an estimated dermal RfD of 2.5E-05. The PRG calculations incorporate these adjustments per recent guidance (USEPA 2004).

Chromium 6 For Chromium 6 (Cr6), IRIS shows an air unit risk of 1.2E-2 per (ug/cu.m) or expressed as an inhalation cancer slope factor (adjusting for inhalation/body weight) of 42 $(mg/kg\text{-}day)^{-1}$. However, the supporting documentation in the IRIS file states that these toxicity values are based on an assumed 1:6 ratio of Cr6:Cr3. Because of this assumption, we in Region 9 prefer to present PRGs based on these cancer toxicity values as "total chromium" numbers.

In the PRG Table, we also include a Cr6 specific value (assuming 100% Cr6) that is derived by multiplying the "total chromium" value by 7, yielding a cancer potency factor of 290 $(mg/kg\text{-}day)^{-1}$. This is considered to be an overly conservative assumption by some within the Agency. However, this calculation is also consistent with the State of California's interpretation of the Mancuso study that forms the basis of Cr6's toxicity values.

If you are working on a project outside of California (and outside of Region 9), you may want to contact the appropriate regulatory officials to determine what their position is on this issue. As mentioned, Region 9 also includes PRGs for "total chromium" which is based on the same ratio (1:6 ratio Cr6:Cr3) that forms the basis of the cancer slope factor of 42 $(mg/kg\text{-}day)^{-1}$ presented in IRIS.

Dioxin Dioxins, furans, and some polychlorinated biphenyls are members of the same family and exhibit similar toxicological properties. Before using the dioxin PRG at an individual site, these dioxin-related compounds must be summed together. However, they differ in the degree of toxicity so that a toxicity equivalence factor (TEF) must first be applied to adjust the measured concentrations to a toxicity equivalent concentration. EPA Region 9 has adopted the 1997 World Health Organization (WHO) TEFs. For more on this, please refer to the following article (in Environmental Health Perspectives, Vol. 6, No. 12, Dec. 1998) online at: http://ehp.niehs.nih.gov/members/1998/106p775-792vandenberg/vandenberg-full.html

Lead Residential PRGs for Lead (Region 9 EPA and California EPA) are derived based on pharmacokinetic models. Both EPA's Integrated Exposure Uptake Biokinetic (IEUBK) Model and California's LeadSpread model are designed to predict the probable blood lead concentrations for children between six months and seven years of age who have been exposed to lead through various sources (air, water, soil, dust, diet and *in utero* contributions from the mother). Run in the reverse, these models also allow the user to calculate lead PRGs that are considered "acceptable" by EPA or the State of California.

EPA uses a second Adult Lead Model to estimate PRGs for an industrial setting. This PRG is intended to protect a fetus that may be carried by a pregnant female worker. It is assumed that a cleanup goal that is protective of a fetus will also afford protection for male or female adult workers. The model equations were developed to calculate cleanup goals such that there would be no more than a 5% probability that fetuses exposed to lead would exceed a blood lead (PbB) of 10 • g/dL. An updated screening level for soil lead at commercial/industrial (i.e., non-residential) sites of 800 ppm is based on a recent analysis of the combined phases of NHANES III that chooses a cleanup goal protective of all subpopulations.

For more information on EPA's lead models and other lead-related topics, please go to:
http://www.epa.gov/oerrpage/superfund/programs/lead/

For more information on California's LeadSpread Model and Cal-Modified PRGs for lead, please go to:
http://www.dtsc.ca.gov/ScienceTechnology/ledspred.html

Manganese The IRIS RfD (0.14 mg/kg-day) includes manganese from all sources, including diet. The author of the IRIS assessment for manganese recommends that the dietary contribution from the normal U.S. diet (an upper limit of 5 mg/day) be subtracted when evaluating non-food (e.g. drinking water or soil) exposures to manganese, leading to a RfD of 0.071 mg/kg-day for non-food items. The explanatory text in IRIS further recommends using a modifying factor of 3 when calculating risks associated with non-food sources due to a number of uncertainties that are discussed in the IRIS file for manganese, leading to a RfD of 0.024 mg/kg-day. This modified RfD is applied in the derivation of the Region 9 PRGs for soil and water. For more information regarding the Manganese RfD, you may want to contact Dr. Bob Benson at (303) 312-7070.

Nitrates/Nitrates Tap water PRGs for Nitrates/Nitrites are based on the MCL as there is no available RfD for these compounds. For more information, please see IRIS at:
http://www.epa.gov/iriswebp/iris/index.html

Thallium IRIS has many values for the different salts of thallium. However, our analytical data packages typically report "thallium". Therefore, as a practical matter it makes more sense to report a PRG for plain thallium. We have done this by making the adjustment contained in the IRIS file for thallium sulfate based on the molecular weight of the thallium in the thallium salt. The adjusted oral RfD for plain thallium is 6.6 E-05 mg/kg-day which we use to calculate a thallium PRG.

Vinyl Chloride In EPA's recent reassessment of vinyl chloride toxicity, IRIS presents two cancer slope factors for vinyl chloride (VC): one that is intended to be applied towards evaluating adult risks and a second more protective slope factor that takes into account the unique susceptibility of developing infants and young children. For residential PRGs, the Region 9 PRG Table applies the more conservative cancer potency factor that addresses exposures to both children and adults whereas for the industrial soils PRG, the adult only cancer slope factor is applied.

Because of the age-dependent vulnerability associated with vinyl chloride exposures, and due to the method that is applied in deriving the cancer slope factor for VC, an assumption of a 70 year exposure over the lifetime is assumed, consistent with the way that the toxicity value for VC was derived. Therefore, instead of the usual exposure assumption of 6 years as a child and 24 years as an adult that is assumed for carcinogenic substances, we have revised the exposure assumption for VC to 6 years as a child and 64 years as adult. Since most of the cancer risk is associated with the first 30 years of exposure to VC, there is actually little difference between a 30 year exposure assumption (typically assumed for Superfund risk assessments) and the 70 year exposure assumption that is assumed in calculating the PRG for VC.

2.4 Cal-Modified PRGs

When EPA Region 9 first came out with a Draft of the PRG Table in 1992, there was concern expressed by California EPA's Department of Toxic Substances and Control (DTSC) that for some chemicals, the risk-based concentrations that are calculated using Cal-EPA toxicity values are "significantly" more protective than the risk-based concentrations that are calculated using EPA toxicity values. Because the risk-based PRGs are order-of-magnitude estimates at best, it was agreed by both Agencies that a difference of approximately 4 or greater would be regarded as a significant difference. For chemicals with California and EPA values that differ by a factor of 4 or more, both the EPA PRGs and the "Cal-Modified PRGs" are listed in the Table.

Please note that in the State of California, Cal-Modified PRGs should be used as screening levels for contaminated sites if they are more stringent than the Federal numbers.

2.5 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 EPA OSWER's *Soil Screening Guidance* series, available on the web at http://www.epa.gov/superfund/resources/soil/index.htm .

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.

It should be noted that in the State of California, the California Regional Water Quality Control Board has derived "California SSLs" for a number of pathways including migration to groundwater. These are not included in the Region 9 PRG Table, but may be accessed at the following website:

http://www.swrcb.ca.gov/rwqcb2/rbsl.htm

Or, for more information on the "California SSLs", please contact Dr Roger Brewer at: (510) 622-2374.

2.6 Miscellaneous

Volatile organic compounds (VOCs) are indicated by "y" 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 4.4).

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 2004). 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 USE OF PRGS AT SITES

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 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 websites for the evaluation of pathways not currently addressed by Region 9 PRG's are presented in Exhibit 3-1.

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

EXPOSURE PATHWAY	WEBSITE
Migration of contaminants to an underlying potable aquifer	EPA Soil Screening Guidance: http://www.epa.gov/superfund/resources/soil/index.htm California Water Board Guidance: http://www.swrcb.ca.gov/rwqcb2/rbsl.htm
Ingestion via plant uptake	EPA Soil Screening Guidance: http://www.epa.gov/superfund/resources/soil/index.htm EPA Fertilizer Risk Assessment: http://www.epa.gov/epaoswer/hazwaste/recycle/fertiliz/risk/
Ingestion via meat, dairy products, human milk	EPA Protocol for Combustion Facilities: http://www.epa.gov/epaoswer/hazwaste/combust/riskvol.htm#volume1 California "Hot Spots" Risk Guidelines: http://www.oehha.ca.gov/air/hot_spots/HRSguide.html
Inhalation of volatiles that have migrated into basements or other enclosed spaces.	EPA's draft Subsurface Vapor Intrusion Guidance: http://www.epa.gov/correctiveaction/eis/vapor.htm EPA's Version of Johnson & Ettinger Model: http://www.epa.gov/oerrpage/superfund/programs/risk/airmodel/johnson_ettinger.htm
Ecological pathways	EPA Ecological Soil Screening Guidance: http://www.epa.gov/superfund/programs/risk/ecorisk/ecossl.htm NOAA Sediment Screening Table: http://response.restoration.noaa.gov/cpr/sediment/squirt/squirt.html

3.2 Background Levels Evaluation

A necessary step in determining the applicability of Region 9 risk-based PRGs is the consideration of background contaminant concentrations. There is new EPA guidance on determining background at sites. *Guidance for Characterizing Background Chemicals in Soil at Superfund Sites* (USEPA 2001b) is available on the web at: http://www.epa.gov/superfund/programs/risk/background.pdf .

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 concentrations that lie within or even below typical background concentrations for the same element or compound. If natural background concentrations are higher than the risk-based PRG concentrations, then background concentrations should also be considered in determining whether further evaluation and/or remediation is necessary at a particular site. Exhibit 3-2 presents summary statistics for selected elements in soils that have background levels that may exceed risk-based PRGs.

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:

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

- 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 PRG Table. To obtain these values, the user should view or download the InterCalc Tables at the PRG website and display the appropriate sections.]**

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

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

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 Ambient Air and the Vapor Intrusion Pathway

The ambient air PRG is applicable to both indoor and outdoors and is based on a residential exposure scenario using standard Superfund exposure factors (see Exhibit 4-1 below).

The air PRG may also be used as a health-protective indoor air target for determining soil gas and groundwater screening levels for the evaluation of the subsurface vapor intrusion pathway. The "vapor intrusion pathway" refers to the migration of volatile chemicals from the subsurface into overlying buildings. Volatile chemicals in buried wastes and/or contaminated groundwater can emit vapors that may migrate through subsurface soils and into indoor air spaces of overlying buildings in ways similar to that of radon gas seeping into homes.

To derive a soil gas and/or groundwater screening level that targets the air PRG, it is necessary to divide the air PRG by an appropriate attenuation factor. The attenuation factor represents the factor by which subsurface vapor concentrations migrating into indoor air spaces are reduced due to diffusive, advective, and/or other attenuating mechanisms. The attenuation factor can be empirically determined and/or calculated using an appropriate vapor intrusion model such as the Johnson and Ettinger model available at: http://www.epa.gov/oerrpage/superfund/programs/risk/airmodel/johnson_ettinger.htm . Once the appropriate attenuation factor is determined, the following equation can be used to derive a screening level that would be protective of indoor air assuming residential land use.

For Soil Gas, the relationship is as follows:

$C_{soil\text{-}gas}[ug/m^3] = \text{Air PRG } [ug/m^3]/AF$

where

$C_{soil\text{-}gas}$ = soil gas screening level
AF = attenuation factor (ratio of indoor air concentration to soil gas concentration)

For Groundwater, the relationship is as follows:

C_{gw}[ug/L] = Air PRG [ug/m^3] x 10^{-3} m^3/L x 1/H x 1/AF

where

C_{gw} = groundwater screening level
H = dimensionless Henry's Law Constant at 25C [(mg/L - vapor)/(mg/L - water)]
AF = attenuation factor (ratio of indoor air concentration to soil gas concentration)

For more information on EPA's current understanding of this emerging exposure pathway, please refer to EPA's recent draft guidance *Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)* (USEPA 2002) available on the web at:
http://www.epa.gov/correctiveaction/eis/vapor.htm

4.2 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, USEPA 2001a). Briefly, these methods backcalculate a soil concentration level from a target risk (for carcinogens) or hazard quotient (for noncarcinogens).

Residential Soil PRGs

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.

Industrial Soil PRGs

In the *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* (Supplemental SSL Guidance, EPA 2001a), two different soil ingestion rates are assumed for non-construction workers: 100 mg/day is assumed for outdoor workers whereas 50 mg/day is assumed for indoor workers. The default value of 100 mg/day for outdoor workers is also recommended by EPA's Technical Review Workgroup for Lead (TRW), and it reflects increased exposures to soils for outdoor workers relative to their indoor counterparts. For more on this, please see the Supplemental SSL Guidance available at the following website:

http://www.epa.gov/superfund/resources/soil/index.htm

Because the Region 9 PRGs are generic and intended for screening sites early in the investigation process (often before site-specific information is available), we have chosen to use the 100 mg/day soil ingestion (i.e. outdoor worker) assumption to calculate industrial soil PRGs. The appropriateness of this assumption for a particular site may be evaluated when additional information becomes available regarding site conditions or site development.

4.3 Soils - Dermal Contact

Dermal Contact Assumptions

Exposure factors for dermal contact with soil are based on recommendations in *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim Guidance* (USEPA 2004). 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 *Supplemental Guidance for Dermal Risk Assessment* (USEPA 2004) 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 this new guidance. Therefore, the assumption of 1% for inorganics and 10% for volatiles is no longer included in the 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 - 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 based on updates to 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).

It should be noted that the soil-to-air pathway that is evaluated in the PRGs calculations is based on inhalation exposures that result from the volatilization or particulate emissions of chemicals from soil to outdoor air. **The soil PRG calculations do not evaluate potential for volatile contaminants in soil to migrate indoors. For more on the subsurface vapor intrusion pathway please see Section 4.1.**

To address the soil-to-outdoor 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.

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 and other physical-chemical data for VOCs are contained in the InterCalc Tables at the EPA Region 9 PRG 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). When there was a choice between a measured or a modeled value (e.g. Koc), our default was to use modeled values. 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 4.6).

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 listed in the InterCalc Tables. 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.

4.5 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).

4.6 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).

4.7 Tap 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 and 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.

4.8 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]:

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

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

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

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

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

EXHIBIT 4-1
STANDARD DEFAULT FACTORS

Symbol	Definition (units)	Default	Reference
CSFo	Cancer slope factor oral (mg/kg-d)-1	--	IRIS, PPRTV, HEAST, NCEA, or California
CSFi	Cancer slope factor inhaled (mg/kg-d)-1	--	IRIS, PPRTV, HEAST, NCEA, or California
RfDo	Reference dose oral (mg/kg-d)	--	IRIS, PPRTV, HEAST, NCEA, or California
RfDi	Reference dose inhaled (mg/kg-d)	--	IRIS, PPRTV, HEAST, NCEA, or California
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 2004 (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 2004 (EPA/540/R-99/005)
AFa	Adherence factor, soils (mg/cm^2)		Dermal Assessment, EPA 2004 (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 2004 (EPA/540/R-99/005)
ABS	Skin absorption defaults (unitless):		
	– semi-volatile organics	0.1	Dermal Assessment, EPA 2004 (EPA/540/R-99/005)
	– volatile organics	--	Dermal Assessment, EPA 2004 (EPA/540/R-99/005)
	– inorganics	--	Dermal Assessment, EPA 2004 (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)	100	Soil Screening Guidance (EPA 2001a)
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) .

4.9 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 InterCalc Tables available at the EPA Region 9 PRG website also includes pathway-specific concentrations, 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

Soil Equations: 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

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

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

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

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

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

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

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

Tap Water Equations:

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

$$C(ug/L) \bullet\bullet \frac{TR \times AT_c \times 1000 ug/mg}{EF_r \left[\left(IFW_{adj} \times CSF_o\right) \bullet\bullet \left(VF_w \times InhF_{adj} \times CSF_i\right)\right]}$$

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

$$C(ug/L) \bullet\bullet \frac{THQ \times BW_a \times AT_n \times 1000 ug/mg}{EF_r \times ED_r \left[\left(\frac{IRW_a}{RfD_o}\right) \bullet\bullet \left(\frac{VF_w \times IRA_a}{RfD_i}\right)\right]}$$

Air Equations:

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

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

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

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

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)

Equation 4-9: Derivation of the Volatilization Factor

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

where:

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

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 ($g/^{M2}$-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 ($atm\text{-}m^3/mol$)	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%)

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

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

Parameter	Definition (units)	Default
PEF	Particulate emission factor (m^3/kg)	1.316×10^9
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; P = PPRTV; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; J = New Jersey; O = EPA Office of Water; F = See FAQ; E = Environmental Criteria and Assessment Office; S = see user guide Section 5; L = see user guide on lead; M = mutagen; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; n = noncancer; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide); SSL values are based on DAF=1

Toxicity and Chemical-specific Information													Contaminant		Screening Levels												Protection of Ground Water SSLs		
SFO (mg/kg-day)$^{-1}$	Key	IUR (ug/m^3)$^{-1}$	Key	RfD_o (mg/kg-day)	Key	RfC_i (mg/m^3)	Key	Volatile	mutagen	GIABS	ABS	C_{sat} (mg/kg)	Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air (ug/m^3)	key	Industrial Air (ug/m^3)	key	Tapwater (ug/L)	key	MCL (ug/L)	Risk-based SSL (mg/kg)	key	MCL-based SSL (mg/kg)
1.8E-02	C	5.1E-06	C	1.5E-01	I					1	0.1		ALAR	1596-84-5	3.0E+01	c*	1.3E+02	c*	5.5E-01	c	2.4E+00	c	4.3E+00	c*		9.5E-04	c*	
8.7E-03	I			4.0E-03	I					1	0.1		Acephate	30560-19-1	2.5E+01	n	2.6E+02	c**					8.0E+00	n		1.8E-03	n	
		2.2E-06	I			9.0E-03	I	V		1		1.1E+05	Acetaldehyde	75-07-0	8.2E+00	n	3.4E+01	n	9.4E-01	n	3.9E+00	n	1.9E+00	n		3.8E-04	n	
				2.0E-02	I					1	0.1		Acetochlor	34256-82-1	1.3E+02	n	1.6E+03	n					3.5E+01	n		2.8E-02	n	
				9.0E-01	I	3.1E+01	A	V		1		1.1E+05	Acetone	67-64-1	6.1E+03	n	6.7E+04	n	3.2E+03	n	1.4E+04	n	1.4E+03	n		2.9E-01	n	
						2.0E-03	X	V		1		1.1E+05	Acetone Cyanohydrin	75-86-5	5.0E+00	n	2.1E+01	n	2.1E-01	n	8.8E-01	n	4.2E-01	n		8.4E-05	n	
						6.0E-02	I	V		1		1.3E+05	Acetonitrile	75-05-8	8.1E+01	n	3.4E+02	n	6.3E+00	n	2.6E+01	n	1.3E+01	n		2.6E-03	n	
				1.0E-01	I			V		1		2.5E+03	Acetophenone	98-86-2	7.8E+02	n	1.2E+04	ns					1.9E+02	n		5.8E-02	n	
3.8E+00	C	1.3E-03	C							1	0.1		Acetylaminofluorene, 2-	53-96-3	1.4E-01	c	6.0E-01	c	2.2E-03	c	9.4E-03	c	1.6E-02	c		7.2E-05	c	
				5.0E-04	I	2.0E-05	I	V		1		2.3E+04	Acrolein	107-02-8	1.4E-02	n	6.0E-02	n	2.1E-03	n	8.8E-03	n	4.2E-03	n		8.4E-07	n	
5.0E-01	I	1.0E-04	I	2.0E-03	I	6.0E-03	I		M	1	0.1		Acrylamide	79-06-1	2.4E-01	c*	4.6E+00	c*	1.0E-02	c*	1.2E-01	c*	5.0E-02	c*		1.1E-05	c*	
				5.0E-01	I	1.0E-03	I	V		1		1.1E+05	Acrylic Acid	79-10-7	9.9E+00	n	4.2E+01	n	1.0E-01	n	4.4E-01	n	2.1E-01	n		4.2E-05	n	
5.4E-01	I	6.8E-05	I	4.0E-02	A	2.0E-03	I	V		1		1.1E+04	Acrylonitrile	107-13-1	2.5E-01	c**	1.1E+00	c**	4.1E-02	c**	1.8E-01	c**	5.2E-02	c**		1.1E-05	c**	
						6.0E-03	P			1	0.1		Adiponitrile	111-69-3	8.5E+05	nm	3.6E+06	nm	6.3E-01	n	2.6E+00	n						
5.6E-02	C			1.0E-02	I					1	0.1		Alachlor	15972-60-8	9.7E+00	c**	4.1E+01	c*					1.0E+00	c*	2.0E+00	8.6E-04	c*	1.6E-03
				1.0E-03	I					1	0.1		Aldicarb	116-06-3	6.3E+00	n	8.2E+01	n					2.0E+00	n	3.0E+00	4.9E-04	n	7.5E-04
				1.0E-03	I					1	0.1		Aldicarb Sulfone	1646-88-4	6.3E+00	n	8.2E+01	n					2.0E+00	n	2.0E+00	4.4E-04	n	4.4E-04
										1	0.1		Aldicarb sulfoxide	1646-87-3											4.0E+00			8.8E-04
1.7E+01	I	4.9E-03	I	3.0E-05	I			V		1			Aldrin	309-00-2	3.9E-02	c**	1.8E-01	c*	5.7E-04	c	2.5E-03	c	9.2E-04	c*		1.5E-04	c*	
				2.5E-01	I					1	0.1		Ally	74223-64-6	1.6E+03	n	2.1E+04	n					4.9E+02	n		1.9E-01	n	
				5.0E-03	I	1.0E-04	X	V		1		1.1E+05	Allyl Alcohol	107-18-6	3.5E-01	n	1.5E+00	n	1.0E-02	n	4.4E-02	n	2.1E-02	n		4.2E-06	n	
2.1E-02	C	6.0E-06	C			1.0E-03	I	V		1		1.4E+03	Allyl Chloride	107-05-1	1.7E-01	n	6.9E-01	n	1.0E-01	n	4.4E-01	n	2.1E-01	n		6.7E-05	n	
				1.0E+00	P	5.0E-03	P			1			Aluminum	7429-90-5	7.7E+03	n	1.1E+05	nm	5.2E-01	n	2.2E+00	n	2.0E+03	n		3.0E+03	n	
				4.0E-04	I					1			Aluminum Phosphide	20859-73-8	3.1E+00	n	4.7E+01	n					8.0E-01	n			n	
				3.0E-04	I					1	0.1		Amdro	67485-29-4	1.9E+00	n	2.5E+01	n					5.9E-01	n		2.1E+02	n	
				9.0E-03	I					1	0.1		Ametryn	834-12-8	5.7E+01	n	7.4E+02	n					1.5E+01	n		1.6E-02	n	
2.1E+01	C	6.0E-03	C							1	0.1		Aminobiphenyl, 4-	92-67-1	2.6E-02	c	1.1E-01	c	4.7E-04	c	2.0E-03	c	3.0E-03	c		1.5E-05	c	
				8.0E-02	P					1	0.1		Aminophenol, m-	591-27-5	5.1E+02	n	6.6E+03	n					1.6E+02	n		6.1E-02	n	
				2.0E-02	P					1	0.1		Aminophenol, p-	123-30-8	1.3E+02	n	1.6E+03	n					4.0E+01	n		1.5E-02	n	
				2.5E-03	I					1	0.1		Amitraz	33089-61-1	1.6E+01	n	2.1E+02	n					8.2E-01	n		4.2E-01	n	
						1.0E-01	I	V		1			Ammonia	7664-41-7					1.0E+01	n	4.4E+01	n						
				2.0E-01	I					1			Ammonium Sulfamate	7773-06-0	1.6E+03	n	2.3E+04	n					4.0E+02	n			n	
						3.0E-03	X	V		1		1.4E+04	Amyl Alcohol, tert-	75-85-4	8.2E+00	n	3.4E+01	n	3.1E-01	n	1.3E+00	n	6.3E-01	n		1.3E-04	n	
5.7E-03	I	1.6E-06	C	7.0E-03	P	1.0E-03	I			1	0.1		Aniline	62-53-3	4.4E+01	n	4.0E+02	c**	1.0E-01	n	4.4E-01	n	1.3E+01	c**		4.6E-03	c**	
4.0E-02	P			2.0E-03	X					1	0.1		Anthraquinone, 9,10-	84-65-1	1.3E+01	n	5.7E+01	c**					1.4E+00	c**		1.4E-02	c**	
				4.0E-04	I					0.15			Antimony (metallic)	7440-36-0	3.1E+00	n	4.7E+01	n					7.8E-01	n	6.0E+00	3.5E-02	n	2.7E-01
				5.0E-04	H					0.15			Antimony Pentoxide	1314-60-9	3.9E+00	n	5.8E+01	n					9.7E-01	n			n	
				9.0E-04	H					0.15			Antimony Potassium Tartrate	11071-15-1	7.0E+00	n	1.1E+02	n					1.8E+00	n			n	
				4.0E-04	H					0.15			Antimony Tetroxide	1332-81-6	3.1E+00	n	4.7E+01	n					7.8E-01	n			n	
						2.0E-04	I			0.15			Antimony Trioxide	1309-64-4	2.8E+04	n	1.2E+05	nm	2.1E-02	n	8.8E-02	n						
				1.3E-02	I					1	0.1		Apollo	74115-24-5	8.2E+01	n	1.1E+03	n					2.3E+01	n		1.4E+00	n	
2.5E-02	I	7.1E-06	I	5.0E-02	H					1	0.1		Aramite	140-57-8	2.2E+01	c*	9.2E+01	c*	4.0E-01	c	1.7E+00	c	1.3E+00	c*		1.5E-02	c*	
1.5E+00	I	4.3E-03	I	3.0E-04	I	1.5E-05	C			1	0.03		Arsenic, Inorganic	7440-38-2	6.8E-01	c**R	3.0E+00	c*R	6.5E-04	c**	2.9E-03	c**	5.2E-02	c*	1.0E+01	1.5E-03	c*	2.9E-01
				3.5E-06	C	5.0E-05	I			1			Arsine	7784-42-1	2.7E-02	n	4.1E-01	n	5.2E-03	n	2.2E-02	n	7.0E-03	n			n	
				9.0E-03	I					1	0.1		Assure	76578-14-8	5.7E+01	n	7.4E+02	n					1.2E+01	n		1.9E-01	n	
				5.0E-02	I					1	0.1		Asulam	3337-71-1	3.2E+02	n	4.1E+03	n					1.0E+02	n		2.6E-02	n	
2.3E-01	C			3.5E-02	I					1	0.1		Atrazine	1912-24-9	2.4E+00	c*	1.0E+01	c					3.0E-01	c	3.0E+00	1.9E-04	c	1.9E-03
8.8E-01	C	2.5E-04	C							1	0.1		Auramine	492-80-8	6.2E-01	c	2.6E+00	c	1.1E-02	c	4.9E-02	c	6.6E-02	c		6.0E-04	c	
				4.0E-04	I					1	0.1		Avermectin B1	65195-55-3	2.5E+00	n	3.3E+01	n					8.0E-01	n		1.4E+00	n	
1.1E-01	I	3.1E-05	I					V		1			Azobenzene	103-33-3	5.6E+00	c	2.6E+01	c	9.1E-02	c	4.0E-01	c	1.2E-01	c		9.2E-04	c	
				1.0E+00	P	7.0E-06	P			1	0.1		Azodicarbonamide	123-77-3	8.6E+02	n	4.0E+03	n	7.3E-04	n	3.1E-03	n	2.0E+03	n		6.8E-01	n	
				2.0E-01	I	5.0E-04	H			0.07			Barium	7440-39-3	1.5E+03	n	2.2E+04	n	5.2E-02	n	2.2E-01	n	3.8E+02	n	2.0E+03	1.6E+01	n	8.2E+01
5.0E-01	C	1.5E-01	C	2.0E-02	C	2.0E-04	C		M	0.025			Barium Chromate	10294-40-3	3.0E-01	c	6.2E+00	c	6.8E-06	c	8.2E-05	c	4.1E-02	c			c	
				4.0E-03	I					1	0.1		Baygon	114-26-1	2.5E+01	n	3.3E+02	n					7.8E+00	n		2.5E-03	n	
				3.0E-02	I					1	0.1		Bayleton	43121-43-3	1.9E+02	n	2.5E+03	n					5.5E+01	n		4.4E-02	n	
				2.5E-02	I					1	0.1		Baythroid	68359-37-5	1.6E+02	n	2.1E+03	n					1.2E+01	n		3.1E+00	n	
				3.0E-01	I			V		1			Benefin	1861-40-1	2.3E+03	n	3.5E+04	n					1.7E+02	n		5.6E+00	n	
				5.0E-02	I					1	0.1		Benomyl	17804-35-2	3.2E+02	n	4.1E+03	n					9.7E+01	n		8.5E-02	n	
				3.0E-02	I					1	0.1		Bentazon	25057-89-0	1.9E+02	n	2.5E+03	n					5.7E+01	n		1.2E-02	n	
				1.0E-01	I			V		1		1.2E+03	Benzaldehyde	100-52-7	7.8E+02	n	1.2E+04	ns					1.9E+02	n		4.3E-02	n	
5.5E-02	I	7.8E-06	I	4.0E-03	I	3.0E-02	I	V		1		1.8E+03	Benzene	71-43-2	1.2E+00	c**	5.1E+00	c**	3.6E-01	c**	1.6E+00	c**	4.5E-01	c**	5.0E+00	2.3E-04	c**	2.6E-03
1.0E-01	X			3.0E-04	X					1	0.1		Benzenediamine-2-methyl sulfate, 1,4-	6369-59-1	1.9E+00	n	2.3E+01	c**					6.0E-01	n		1.7E-04	n	
				1.0E-03	P			V		1		1.3E+03	Benzenethiol	108-98-5	7.8E+00	n	1.2E+02	n					1.7E+00	n		1.1E-03	n	
2.3E+02	I	6.7E-02	I	3.0E-03	I				M	1	0.1		Benzidine	92-87-5	5.3E-04	c	1.0E-02	c	1.5E-05	c	1.8E-04	c	1.1E-04	c		2.7E-07	c	
				4.0E+00	I					1	0.1		Benzoic Acid	65-85-0	2.5E+04	n	3.3E+05	nm					7.5E+03	n		1.8E+00	n	

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Toxicity and Chemical-specific Information																Contaminant		Screening Levels										Protection of Ground Water SSLs		
SFO (mg/kg-day)$^{-1}$	key	IUR (ug/m^3)$^{-1}$	key	RfD_o (mg/kg-day)	key	RfC_i (mg/m^3)	key	volc	muta-gen	GIABS	ABS	C_{sat} (mg/kg)	Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air (ug/m^3)	key	Industrial Air (ug/m^3)	key	Tapwater (ug/L)	key	MCL (ug/L)	Risk-based SSL (mg/kg)	key	MCL-based SSL (mg/kg)
1.3E+01	I							V		1		3.2E+02	Benzotrichloride	98-07-7	5.3E-02	c	2.5E-01	c					2.9E-03	c		6.5E-06	c		
				1.0E-01	P					1	0.1		Benzyl Alcohol	100-51-6	6.3E+02	n	8.2E+03	n					2.0E+02	n		4.8E-02	n		
1.7E-01	I	4.9E-05	C	2.0E-03	P	1.0E-03	P	V		1		1.5E+03	Benzyl Chloride	100-44-7	1.1E+00	c**	4.8E+00	c**	5.7E-02	c**	2.5E-01	c**	8.9E-02	c**		9.7E-05	c**		
		2.4E-03	I	2.0E-03	I	2.0E-05	I			0.007			Beryllium and compounds	7440-41-7	1.6E+01	n	2.3E+02	n	1.2E-03	c**	5.1E-03	c**	2.5E+00	n	4.0E+00	1.9E+00	n	3.2E+00	
				1.0E-04	I					1	0.1		Bidrin	141-66-2	6.3E-01	n	8.2E+00	n					2.0E-01	n		4.7E-05	n		
				9.0E-03	P					1	0.1		Bifenox	42576-02-3	5.7E+01	n	7.4E+02	n					1.0E+01	n		7.6E-02	n		
				1.5E-02	I					1	0.1		Biphenthrin	82657-04-3	9.5E+01	n	1.2E+03	n					3.0E+01	n		1.4E+02	n		
8.0E-03	I			5.0E-01	I	4.0E-04	X	V		1			Biphenyl, 1,1'-	92-52-4	4.7E+00	n	2.0E+01	n	4.2E-02	n	1.8E-01	n	8.3E-02	n		8.7E-04	n		
7.0E-02	H	1.0E-05	H	4.0E-02	I			V		1		1.0E+03	Bis(2-chloro-1-methylethyl) ether	108-60-1	4.9E+00	c*	2.2E+01	c	2.8E-01	c	1.2E+00	c	3.6E-01	c		1.3E-04	c		
				3.0E-03	P					1	0.1		Bis(2-chloroethoxy)methane	111-91-1	1.9E+01	n	2.5E+02	n					5.9E+00	n		1.3E-03	n		
1.1E+00	I	3.3E-04	I					V		1		5.1E+03	Bis(2-chloroethyl)ether	111-44-4	2.3E-01	c	1.0E+00	c	8.5E-03	c	3.7E-02	c	1.4E-02	c		3.6E-06	c		
2.2E+02	I	6.2E-02	I					V		1		4.2E+03	Bis(chloromethyl)ether	542-88-1	8.3E-05	c	3.6E-04	c	4.5E-05	c	2.0E-04	c	7.2E-05	c		1.7E-08	c		
				5.0E-02	I					1	0.1		Bisphenol A	80-05-7	3.2E+02	n	4.1E+03	n					7.7E+01	n		5.8E+00	n		
				2.0E-01	I	2.0E-02	H			1			Boron And Borates Only	7440-42-8	1.6E+03	n	2.3E+04	n	2.1E+00	n	8.8E+00	n	4.0E+02	n		1.3E+00	n		
				2.0E+00	P	2.0E-02	P	V		1			Boron Trichloride	10294-34-5	1.6E+04	n	2.3E+05	nm	2.1E+00	n	8.8E+00	n	4.2E+00	n			n		
				4.0E-02	C	1.3E-02	C	V		1			Boron Trifluoride	7637-07-2	3.1E+02	n	4.7E+03	n	1.4E+00	n	5.7E+00	n	2.6E+00	n			n		
7.0E-01	I			4.0E-03	I					1			Bromate	15541-45-4	9.9E-01	c*	4.7E+00	c					1.1E-01	c*	1.0E+01	8.5E-04	c*	7.7E-02	
2.0E+00	X	6.0E-04	X					V		1		2.4E+03	Bromo-2-chloroethane, 1-	107-04-0	2.6E-02	c	1.1E-01	c	4.7E-03	c	2.0E-02	c	7.4E-03	c		2.1E-06	c		
				8.0E-03	I	6.0E-02	I	V		1		6.8E+02	Bromobenzene	108-86-1	2.9E+01	n	1.8E+02	n	6.3E+00	n	2.6E+01	n	6.2E+00	n		4.2E-03	n		
						4.0E-02	X	V		1		4.0E+03	Bromochloromethane	74-97-5	1.5E+01	n	6.3E+01	n	4.2E+00	n	1.8E+01	n	8.3E+00	n		2.1E-03	n		
6.2E-02	I	3.7E-05	C	2.0E-02	I			V		1		9.3E+02	Bromodichloromethane	75-27-4	2.9E-01	c	1.3E+00	c	7.6E-02	c	3.3E-01	c	1.3E-01	c	8.0E+01(F)	3.6E-05	c	2.2E-02	
7.9E-03	I	1.1E-06	I	2.0E-02	I			V		1		9.2E+02	Bromoform	75-25-2	1.9E+01	c**	8.6E+01	c*	2.6E+00	c	1.1E+01	c	3.3E+00	c*	8.0E+01(F)	8.7E-04	c*	2.1E-02	
				1.4E-03	I	5.0E-03	I	V		1		3.6E+03	Bromomethane	74-83-9	6.8E-01	n	3.0E+00	n	5.2E-01	n	2.2E+00	n	7.5E-01	n		1.9E-04	n		
				5.0E-03	H			V		1			Bromophos	2104-96-3	3.9E+01	n	5.8E+02	n					3.5E+00	n		1.5E-02	n		
				2.0E-02	I					1	0.1		Bromoxynil	1689-84-5	1.3E+02	n	1.6E+03	n					3.3E+01	n		2.8E-02	n		
				2.0E-02	I			V		1			Bromoxynil Octanoate	1689-99-2	1.6E+02	n	2.3E+03	n					1.4E+01	n		1.2E-01	n		
3.4E+00	C	3.0E-05	I			2.0E-03	I	V		1		6.7E+02	Butadiene, 1,3-	106-99-0	5.8E-02	c**	2.6E-01	c**	9.4E-02	c**	4.1E-01	c**	1.8E-02	c*		9.9E-06	c*		
				1.0E-01	I			V		1		7.6E+03	Butanol, N-	71-36-3	7.8E+02	n	1.2E+04	ns					2.0E+02	n		4.1E-02	n		
1.9E-03	P			2.0E-01	I					1	0.1		Butyl Benzyl Phthlate	85-68-7	2.9E+02	c**	1.2E+03	c*					1.6E+01	c*		2.3E-01	c*		
				2.0E+00	P	3.0E+01	P	V		1		2.1E+04	Butyl alcohol, sec-	78-92-2	1.3E+04	n	1.5E+05	nms	3.1E+03	n	1.3E+04	n	2.4E+03	n		5.0E-01	n		
				5.0E-02	I			V		1			Butylate	2008-41-5	3.9E+02	n	5.8E+03	n					4.6E+01	n		4.5E-02	n		
2.0E-04	C	5.7E-08	C							1	0.1		Butylated hydroxyanisole	25013-16-5	2.7E+03	c	1.1E+04	c	4.9E+01	c	2.2E+02	c	2.4E+02	c		4.5E-01	c		
3.6E-03	P			3.0E-01	P					1	0.1		Butylated hydroxytoluene	128-37-0	1.5E+02	c*	6.4E+02	c*					3.3E+00	c*		9.7E-02	c*		
				5.0E-02	P			V		1		1.1E+02	Butylbenzene, n-	104-51-8	3.9E+02	ns	5.8E+03	ns					1.0E+02	n		3.2E-01	n		
				1.0E-01	X			V		1		1.5E+02	Butylbenzene, sec-	135-98-8	7.8E+02	ns	1.2E+04	ns					2.0E+02	n		5.9E-01	n		
				1.0E-01	X			V		1		1.8E+02	Butylbenzene, tert-	98-06-6	7.8E+02	ns	1.2E+04	ns					6.9E+01	n		1.6E-01	n		
				2.0E-02	A					1	0.1		Cacodylic Acid	75-60-5	1.3E+02	n	1.6E+03	n					4.0E+01	n			n		
		1.8E-03	I	1.0E-03	I	1.0E-05	A			0.025	0.001		Cadmium (Diet)	7440-43-9	7.1E+00	n	9.8E+01	n											
		1.8E-03	I	5.0E-04	I	1.0E-05	A			0.05	0.001		Cadmium (Water)	7440-43-9					1.0E-03	n	4.4E-03	n	9.2E-01	n	5.0E+00	6.9E-02	n	3.8E-01	
5.0E-01	C	1.5E-01	C	2.0E-02	C	2.0E-04	C		M	0.025			Calcium Chromate	13765-19-0	3.0E-01	c	6.2E+00	c	6.8E-06	c	8.2E-05	c	4.1E-02	c			c		
				5.0E-01	I	2.2E-03	C			1	0.1		Caprolactam	105-60-2	3.1E+03	n	4.0E+04	n	2.3E-01	n	9.6E-01	n	9.9E+02	n		2.5E-01	n		
1.5E-01	C	4.3E-05	C	2.0E-03	I					1	0.1		Captafol	2425-06-1	3.6E+00	c**	1.5E+01	c*	6.5E-02	c	2.9E-01	c	4.0E-01	c**		7.1E-04	c**		
2.3E-03	C	6.6E-07	C	1.3E-01	I					1	0.1		Captan	133-06-2	2.4E+02	c**	1.0E+03	c*	4.3E+00	c	1.9E+01	c	3.1E+01	c**		2.2E-02	c**		
				1.0E-01	I					1	0.1		Carbaryl	63-25-2	6.3E+02	n	8.2E+03	n					1.8E+02	n		1.7E-01	n		
				5.0E-03	I					1	0.1		Carbofuran	1563-66-2	3.2E+01	n	4.1E+02	n					9.4E+00	n	4.0E+01	3.7E-03	n	1.6E-02	
				1.0E-01	I	7.0E-01	I	V		1		7.4E+02	Carbon Disulfide	75-15-0	7.7E+01	n	3.5E+02	n	7.3E+01	n	3.1E+02	n	8.1E+01	n		2.4E-02	n		
7.0E-02	I	6.0E-06	I	4.0E-03	I	1.0E-01	I	V		1		4.6E+02	Carbon Tetrachloride	56-23-5	6.5E-01	c*	2.9E+00	c*	4.7E-01	c*	2.0E+00	c*	4.5E-01	c*	5.0E+00	1.8E-04	c*	1.9E-03	
				1.0E-02	I					1	0.1		Carbosulfan	55285-14-8	6.3E+01	n	8.2E+02	n					5.1E+00	n		1.2E-01	n		
				1.0E-01	I					1	0.1		Carboxin	5234-68-4	6.3E+02	n	8.2E+03	n					1.9E+02	n		1.0E-01	n		
						9.0E-04	I			1			Ceric oxide	1306-38-3	1.3E+05	nm	5.4E+05	nm	9.4E-02	n	3.9E-01	n							
				1.0E-01	I			V		1			Chloral Hydrate	302-17-0	7.8E+02	n	1.2E+04	n					2.0E+02	n		4.0E-02	n		
				1.5E-02	I					1	0.1		Chloramben	133-90-4	9.5E+01	n	1.2E+03	n					2.9E+01	n		7.0E-03	n		
4.0E-01	H									1	0.1		Chloranil	118-75-2	1.3E+00	c	5.7E+00	c					1.8E-01	c		1.5E-04	c		
3.5E-01	I	1.0E-04	I	5.0E-04	I	7.0E-04	I	V		1	0.04		Chlordane	12789-03-6	1.7E+00	c**	7.5E+00	c**	2.8E-02	c**	1.2E-01	c**	4.5E-02	c**	2.0E+00	3.0E-03	c**	1.4E-01	
1.0E+01	I	4.6E-03	C	3.0E-04	I					1	0.1		Chlordecone (Kepone)	143-50-0	5.4E-02	c*	2.3E-01	c	6.1E-04	c	2.7E-03	c	3.5E-03	c*		1.2E-04	c*		
				7.0E-04	A					1	0.1		Chlorfenvinphos	470-90-6	4.4E+00	n	5.7E+01	n					1.1E+00	n		3.1E-03	n		
				2.0E-02	I					1	0.1		Chlorimuron, Ethyl-	90982-32-4	1.3E+02	n	1.6E+03	n					3.9E+01	n		1.3E-02	n		
				1.0E-01	I	1.5E-04	A	V		1		2.8E+03	Chlorine	7782-50-5	1.8E-02	n	7.8E-02	n	1.5E-02	n	6.4E-02	n	3.0E-02	n		1.4E-05	n		
				3.0E-02	I	2.0E-04	I	V		1			Chlorine Dioxide	10049-04-4	2.3E+02	n	3.4E+03	n	2.1E-02	n	8.8E-02	n	4.2E-02	n			n		
				3.0E-02	I					1			Chlorite (Sodium Salt)	7758-19-2	2.3E+02	n	3.5E+03	n					6.0E+01	n	1.0E+03		n		
						5.0E+01	I	V		1		1.2E+03	Chloro-1,1-difluoroethane, 1-	75-68-3	5.4E+03	ns	2.3E+04	ns	5.2E+03	n	2.2E+04	n	1.0E+04	n		5.2E+00	n		
		3.0E-04	I	2.0E-02	H	2.0E-02	I	V		1		7.5E+02	Chloro-1,3-butadiene, 2-	126-99-8	1.0E-02	c	4.4E-02	c	9.4E-03	c	4.1E-02	c	1.9E-02	c		9.8E-06	c		
4.6E-01	H									1	0.1		Chloro-2-methylaniline HCl, 4-	3165-93-3	1.2E+00	c	5.0E+00	c					1.7E-01	c		1.5E-04	c		
1.0E-01	P	7.7E-05	C	3.0E-03	X					1	0.1		Chloro-2-methylaniline, 4-	95-69-2	5.4E+00	c**	2.3E+01	c*	3.6E-02	c	1.6E-01	c	6.9E-01	c**		3.9E-04	c**		
2.7E-01	X							V		1		2.8E+04	Chloroacetaldehyde, 2-	107-20-0	2.6E+00	c	1.2E+01	c					2.9E-01	c		5.8E-05	c		

Key: I = IRIS; P = PPRTV; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; J = New Jersey; O = EPA Office of Water; F = See FAQ; E = Environmental Criteria and Assessment Office; S = see user guide Section 5; L = see user guide on lead; M = mutagen; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; n = noncancer; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide); SSL values are based on DAF=1

Toxicity and Chemical-specific Information														Contaminant		Screening Levels												Protection of Ground Water SSLs		
SFO (mg/kg-day)$^{-1}$	key	IUR (ug/m^3)$^{-1}$	key	RfD_o (mg/kg-day)	key	RfC_i (mg/m^3)	key	voc	muta-gen	GIABS	ABS	C_{sat} (mg/kg)	Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air (ug/m^3)	key	Industrial Air (ug/m^3)	key	Tapwater (ug/L)	key	MCL (ug/L)	Risk-based SSL (mg/kg)	key	MCL-based SSL (mg/kg)
				2.0E-03	H					1	0.1		Chloroacetic Acid	79-11-8	1.3E+01	n	1.6E+02	n					4.0E+00	n	6.0E+01	8.1E-04	n	1.2E-02
						3.0E-05	I			1	0.1		Chloroacetophenone, 2-	532-27-4	4.3E+03	n	1.8E+04	n	3.1E-03	n	1.3E-02	n						
2.0E-01	P			4.0E-03	I					1	0.1		Chloroaniline, p-	106-47-8	2.7E+00	c**	1.1E+01	c*					3.6E-01	c*		1.6E-04	c*	
				2.0E-02	I	5.0E-02	P	V		1		7.6E+02	Chlorobenzene	108-90-7	2.8E+01	n	1.3E+02	n	5.2E+00	n	2.2E+01	n	7.8E+00	n	1.0E+02	5.3E-03	n	6.8E-02
1.1E-01	C	3.1E-05	C	2.0E-02	I					1	0.1		Chlorobenzilate	510-15-6	4.9E+00	c*	2.1E+01	c*	9.1E-02	c	4.0E-01	c	3.1E-01	c*		1.0E-03	c*	
				3.0E-02	X					1	0.1		Chlorobenzoic Acid, p-	74-11-3	1.9E+02	n	2.5E+03	n					5.1E+01	n		1.3E-02	n	
				3.0E-03	P	3.0E-01	P	V		1		1.2E+02	Chlorobenzotrifluoride, 4-	98-56-6	2.1E+01	n	2.5E+02	ns	3.1E+01	n	1.3E+02	n	3.5E+00	n		1.2E-02	n	
				4.0E-02	P			V		1		7.3E+02	Chlorobutane, 1-	109-69-3	3.1E+02	n	4.7E+03	ns					6.4E+01	n		2.6E-02	n	
						5.0E+01	I	V		1		1.7E+03	Chlorodifluoromethane	75-45-6	4.9E+03	ns	2.1E+04	ns	5.2E+03	n	2.2E+04	n	1.0E+04	n		4.3E+00	n	
				2.0E-02	P			V		1		1.1E+05	Chloroethanol, 2-	107-07-3	1.6E+02	n	2.3E+03	n					4.0E+01	n		8.1E-03	n	
3.1E-02	C	2.3E-05	I	1.0E-02	I	9.8E-02	A	V		1		2.5E+03	Chloroform	67-66-3	3.2E-01	c*	1.4E+00	c*	1.2E-01	c*	5.3E-01	c*	2.2E-01	c*	8.0E+01(F)	6.1E-05	c*	2.2E-02
						9.0E-02	I	V		1		1.3E+03	Chloromethane	74-87-3	1.1E+01	n	4.6E+01	n	9.4E+00	n	3.9E+01	n	1.9E+01	n		4.9E-03	n	
2.4E+00	C	6.9E-04	C					V		1		2.6E+04	Chloromethyl Methyl Ether	107-30-2	2.0E-02	c	8.9E-02	c	4.1E-03	c	1.8E-02	c	6.5E-03	c		1.4E-06	c	
3.0E-01	P			3.0E-03	P	1.0E-05	X			1	0.1		Chloronitrobenzene, o-	88-73-3	1.8E+00	c*	7.7E+00	c*	1.0E-03	n	4.4E-03	n	2.3E-01	c*		2.2E-04	c*	
6.3E-03	P			1.0E-03	P	6.0E-04	P			1	0.1		Chloronitrobenzene, p-	100-00-5	6.3E+00	n	8.2E+01	n	6.3E-02	n	2.6E-01	n	1.8E+00	n		1.7E-03	n	
				5.0E-03	I			V		1		2.2E+04	Chlorophenol, 2-	95-57-8	3.9E+01	n	5.8E+02	n					9.1E+00	n		7.4E-03	n	
						4.0E-04	C	V		1		6.2E+02	Chloropicrin	76-06-2	2.0E-01	n	8.2E-01	n	4.2E-02	n	1.8E-01	n	8.3E-02	n		2.5E-05	n	
3.1E-03	C	8.9E-07	C	1.5E-02	I					1	0.1		Chlorothalonil	1897-45-6	9.5E+01	n	7.4E+02	c**	3.2E+00	c	1.4E+01	c	2.2E+01	c**		4.9E-02	c**	
				2.0E-02	I			V		1		9.1E+02	Chlorotoluene, o-	95-49-8	1.6E+02	n	2.3E+03	ns					2.4E+01	n		2.3E-02	n	
				2.0E-02	X			V		1		2.5E+02	Chlorotoluene, p-	106-43-4	1.6E+02	n	2.3E+03	ns					2.5E+01	n		2.4E-02	n	
2.4E+02	C	6.9E-02	C							1	0.1		Chlorozotocin	54749-90-5	2.3E-03	c	9.6E-03	c	4.1E-05	c	1.8E-04	c	3.2E-04	c		7.1E-08	c	
				2.0E-01	I					1	0.1		Chlorpropham	101-21-3	1.3E+03	n	1.6E+04	n					2.8E+02	n		2.6E-01	n	
				1.0E-03	A					1	0.1		Chlorpyrifos	2921-88-2	6.3E+00	n	8.2E+01	n					8.4E-01	n		1.2E-02	n	
				1.0E-02	H					1	0.1		Chlorpyrifos Methyl	5598-13-0	6.3E+01	n	8.2E+02	n					1.2E+01	n		5.4E-02	n	
				5.0E-02	I					1	0.1		Chlorsulfuron	64902-72-3	3.2E+02	n	4.1E+03	n					9.9E+01	n		8.3E-02	n	
				8.0E-04	H					1	0.1		Chlorthiophos	60238-56-4	5.1E+00	n	6.6E+01	n					2.8E-01	n		7.3E-03	n	
				1.5E+00	I					0.013			Chromium(III), Insoluble Salts	16065-83-1	1.2E+04	n	1.8E+05	nm					2.2E+03	n		4.0E+06	n	
5.0E-01	J	8.4E-02	S	3.0E-03	I	1.0E-04	I		M	0.025			Chromium(VI)	18540-29-9	3.0E-01	c*	6.3E+00	c*	1.2E-05	c	1.5E-04	c	3.5E-02	c		6.7E-04	c	
										0.013			Chromium, Total	7440-47-3											1.0E+02			1.8E+05
		9.0E-03	P	3.0E-04	P	6.0E-06	P			1			Cobalt	7440-48-4	2.3E+00	n	3.5E+01	n	3.1E-04	c**	1.4E-03	c**	6.0E-01	n		2.7E-02	n	
		6.2E-04	I					V	M	1			Coke Oven Emissions	8007-45-2					1.6E-03	c	2.0E-02	c						
				4.0E-02	H					1			Copper	7440-50-8	3.1E+02	n	4.7E+03	n					8.0E+01	n	1.3E+03	2.8E+00	n	4.6E+01
				5.0E-02	I	6.0E-01	C			1	0.1		Cresol, m-	108-39-4	3.2E+02	n	4.1E+03	n	6.3E+01	n	2.6E+02	n	9.3E+01	n		7.4E-02	n	
				5.0E-02	I	6.0E-01	C			1	0.1		Cresol, o-	95-48-7	3.2E+02	n	4.1E+03	n	6.3E+01	n	2.6E+02	n	9.3E+01	n		7.5E-02	n	
				1.0E-01	A	6.0E-01	C			1	0.1		Cresol, p-	106-44-5	6.3E+02	n	8.2E+03	n	6.3E+01	n	2.6E+02	n	1.9E+02	n		1.5E-01	n	
				1.0E-01	A					1	0.1		Cresol, p-chloro-m-	59-50-7	6.3E+02	n	8.2E+03	n					1.4E+02	n		1.7E-01	n	
				1.0E-01	A	6.0E-01	C			1	0.1		Cresols	1319-77-3	6.3E+02	n	8.2E+03	n	6.3E+01	n	2.6E+02	n	1.9E+02	n		1.5E-01	n	
1.9E+00	H			1.0E-03	P			V		1		1.7E+04	Crotonaldehyde, trans-	123-73-9	3.7E-01	c*	1.7E+00	c*					4.0E-02	c*		8.2E-06	c*	
				1.0E-01	I	4.0E-01	I	V		1		2.7E+02	Cumene	98-82-8	1.9E+02	n	9.9E+02	ns	4.2E+01	n	1.8E+02	n	4.5E+01	n		7.4E-02	n	
2.2E-01	C	6.3E-05	C							1	0.1		Cupferron	135-20-6	2.5E+00	c	1.0E+01	c	4.5E-02	c	1.9E-01	c	3.5E-01	c		6.1E-04	c	
8.4E-01	H			2.0E-03	H					1	0.1		Cyanazine	21725-46-2	6.5E-01	c*	2.7E+00	c*					8.7E-02	c*		4.1E-05	c*	
													Cyanides																
				1.0E-03	I					1			~Calcium Cyanide	592-01-8	7.8E+00	n	1.2E+02	n					2.0E+00	n			n	
				5.0E-03	I					1			~Copper Cyanide	544-92-3	3.9E+01	n	5.8E+02	n					1.0E+01	n			n	
				6.0E-04	I	8.0E-04	S	V		1		9.7E+05	~Cyanide (CN-)	57-12-5	2.7E-01	n	1.2E+00	n	8.3E-02	n	3.5E-01	n	1.5E-01	n	2.0E+02	1.5E-03	n	2.0E+00
				1.0E-03	I			V		1			~Cyanogen	460-19-5	7.8E+00	n	1.2E+02	n					2.0E+00	n			n	
				9.0E-02	I			V		1			~Cyanogen Bromide	506-68-3	7.0E+02	n	1.1E+04	n					1.8E+02	n			n	
				5.0E-02	I			V		1			~Cyanogen Chloride	506-77-4	3.9E+02	n	5.8E+03	n					1.0E+02	n			n	
				6.0E-04	I	8.0E-04	I	V		1		1.0E+07	~Hydrogen Cyanide	74-90-8	2.3E+00	n	1.5E+01	n	8.3E-02	n	3.5E-01	n	1.5E-01	n		1.5E-03	n	
				2.0E-03	I					1			~Potassium Cyanide	151-50-8	1.6E+01	n	2.3E+02	n					4.0E+00	n			n	
				5.0E-03	I					0.04			~Potassium Silver Cyanide	506-61-6	3.9E+01	n	5.8E+02	n					8.2E+00	n			n	
				1.0E-01	I					0.04			~Silver Cyanide	506-64-9	7.8E+02	n	1.2E+04	n					1.8E+02	n			n	
				1.0E-03	I					1			~Sodium Cyanide	143-33-9	7.8E+00	n	1.2E+02	n					2.0E+00	n	2.0E+02		n	
				2.0E-04	P					1			~Thiocyanates	NA	1.6E+00	n	2.3E+01	n					4.0E-01	n			n	
				2.0E-04	X			V		1			~Thiocyanic Acid	463-56-9	1.6E+00	n	2.3E+01	n					4.0E-01	n			n	
				5.0E-02	I					1			~Zinc Cyanide	557-21-1	3.9E+02	n	5.8E+03	n					1.0E+02	n			n	
						6.0E+00	I	V		1		1.2E+02	Cyclohexane	110-82-7	6.5E+02	ns	2.7E+03	ns	6.3E+02	n	2.6E+03	n	1.3E+03	n		1.3E+00	n	
2.3E-02	H									1	0.1		Cyclohexane, 1,2,3,4,5-pentabromo-6-chloro-	87-84-3	2.4E+01	c	1.0E+02	c					2.4E+00	c		1.4E-02	c	
				5.0E+00	I	7.0E-01	P	V		1		5.1E+03	Cyclohexanone	108-94-1	2.8E+03	n	1.3E+04	ns	7.3E+01	n	3.1E+02	n	1.4E+02	n		3.4E-02	n	
				5.0E-03	P	1.0E+00	X	V		1		2.8E+02	Cyclohexene	110-83-8	3.1E+01	n	3.1E+02	ns	1.0E+02	n	4.4E+02	n	7.0E+00	n		4.6E-03	n	
				2.0E-01	I			V		1		2.9E+05	Cyclohexylamine	108-91-8	1.6E+03	n	2.3E+04	n					3.8E+02	n		1.0E-01	n	
				5.0E-03	I					1	0.1		Cyhalothrin/karate	68085-85-8	3.2E+01	n	4.1E+02	n					1.0E+01	n		6.8E+00	n	
				1.0E-02	I					1	0.1		Cypermethrin	52315-07-8	6.3E+01	n	8.2E+02	n					2.0E+01	n		3.2E+00	n	
				7.5E-03	I					1	0.1		Cyromazine	66215-27-8	4.7E+01	n	6.2E+02	n					1.5E+01	n		3.8E-03	n	
2.4E-01	I	6.9E-05	C							1	0.1		DDD	72-54-8	2.3E+00	c	9.6E+00	c	4.1E-02	c	1.8E-01	c	3.1E-02	c		7.2E-03	c	

Key: I = IRIS; P = PPRTV; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; J = New Jersey; O = EPA Office of Water; F = See FAQ; E = Environmental Criteria and Assessment Office; S = see user guide Section 5; L = see user guide on lead; M = mutagen; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; n = noncancer; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide); SSL values are based on DAF=1

Toxicity and Chemical-specific Information														Contaminant		Screening Levels												Protection of Ground Water SSLs		
SFO (mg/kg-day)$^{-1}$	key	IUR (ug/m^3)$^{-1}$	key	RfD_o (mg/kg-day)	key	RfC_i (mg/m^3)	key	volatile	muta-gen	GIABS	ABS	C_{sat} (mg/kg)	Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air (ug/m^3)	key	Industrial Air (ug/m^3)	key	Tapwater (ug/L)	key	MCL (ug/L)	Risk-based SSL (mg/kg)	key	MCL-based SSL (mg/kg)
3.4E-01	I	9.7E-05	C					V		1			DDE, p,p'-	72-55-9	2.0E+00	c	9.3E+00	c	2.9E-02	c	1.3E-01	c	4.6E-02	c		1.1E-02	c		
3.4E-01	I	9.7E-05	I	5.0E-04	I					1	0.03		DDT	50-29-3	1.9E+00	c**	8.5E+00	c**	2.9E-02	c	1.3E-01	c	2.3E-01	c**		7.7E-02	c**		
				1.0E-02	I					1	0.1		Dacthal	1861-32-1	6.3E+01	n	8.2E+02	n					1.2E+01	n		1.5E-02	n		
				3.0E-02	I					1	0.1		Dalapon	75-99-0	1.9E+02	n	2.5E+03	n					6.0E+01	n	2.0E+02	1.2E-02	n	4.1E-02	
7.0E-04	I			7.0E-03	I					1	0.1		Decabromodiphenyl ether, 2,2',3,3',4,4',5,5',6,6'- (BDE-209)	1163-19-5	4.4E+01	n	5.7E+02	n					1.4E+01	n		7.8E+00	n		
				4.0E-05	I					1	0.1		Demeton	8065-48-3	2.5E-01	n	3.3E+00	n					6.7E-02	n			n		
1.2E-03	I			6.0E-01	I					1	0.1		Di(2-ethylhexyl)adipate	103-23-1	4.5E+02	c**	1.9E+03	c*					6.5E+01	c*	4.0E+02	4.7E+00	c*	2.9E+01	
6.1E-02	H									1	0.1		Diallate	2303-16-4	8.9E+00	c	3.8E+01	c					5.2E-01	c		7.8E-04	c		
				7.0E-04	A					1	0.1		Diazinon	333-41-5	4.4E+00	n	5.7E+01	n					1.0E+00	n		6.5E-03	n		
				1.0E-02	X			V		1			Dibenzothiophene	132-65-0	7.8E+01	n	1.2E+03	n					6.5E+00	n		1.2E-01	n		
8.0E-01	P	6.0E-03	P	2.0E-04	P	2.0E-04	I	V	M	1		9.8E+02	Dibromo-3-chloropropane, 1,2-	96-12-8	5.3E-03	c*	6.4E-02	c*	1.7E-04	c	2.0E-03	c*	3.3E-04	c**	2.0E-01	1.4E-07	c**	8.6E-05	
				4.0E-04	X			V		1		1.6E+02	Dibromobenzene, 1,3-	108-36-1	3.1E+00	n	4.7E+01	n					5.3E-01	n		5.1E-04	n		
				1.0E-02	I			V		1			Dibromobenzene, 1,4-	106-37-6	7.8E+01	n	1.2E+03	n					1.3E+01	n		1.2E-02	n		
8.4E-02	I	2.7E-05	C	2.0E-02	I			V		1		8.0E+02	Dibromochloromethane	124-48-1	7.5E-01	c	3.3E+00	c	1.0E-01	c	4.5E-01	c	1.7E-01	c	8.0E+01(F)	4.5E-05	c	2.1E-02	
2.0E+00	I	6.0E-04	I	9.0E-03	I	9.0E-03	I	V		1		1.3E+03	Dibromoethane, 1,2-	106-93-4	3.6E-02	c	1.6E-01	c	4.7E-03	c	2.0E-02	c	7.5E-03	c	5.0E-02	2.1E-06	c	1.4E-05	
				1.0E-02	H	4.0E-03	X	V		1		2.8E+03	Dibromomethane (Methylene Bromide)	74-95-3	2.3E+00	n	9.8E+00	n	4.2E-01	n	1.8E+00	n	8.0E-01	n		2.0E-04	n		
				3.0E-04	P					1	0.1		Dibutyltin Compounds	NA	1.9E+00	n	2.5E+01	n					6.0E-01	n			n		
				3.0E-02	I					1	0.1		Dicamba	1918-00-9	1.9E+02	n	2.5E+03	n					5.7E+01	n		1.5E-02	n		
		4.2E-03	P					V		1		5.2E+02	Dichloro-2-butene, 1,4-	764-41-0	8.3E-03	c	3.6E-02	c	6.7E-04	c	2.9E-03	c	1.3E-03	c		6.2E-07	c		
		4.2E-03	P					V		1		5.2E+02	Dichloro-2-butene, cis-1,4-	1476-11-5	7.4E-03	c	3.2E-02	c	6.7E-04	c	2.9E-03	c	1.3E-03	c		6.2E-07	c		
		4.2E-03	P					V		1		7.6E+02	Dichloro-2-butene, trans-1,4-	110-57-6	7.4E-03	c	3.2E-02	c	6.7E-04	c	2.9E-03	c	1.3E-03	c		6.2E-07	c		
5.0E-02	I			4.0E-03	I					1	0.1		Dichloroacetic Acid	79-43-6	1.1E+01	c**	4.6E+01	c**					1.5E+00	c**	6.0E+01	3.1E-04	c**	1.2E-02	
				9.0E-02	I	2.0E-01	H	V		1		3.8E+02	Dichlorobenzene, 1,2-	95-50-1	1.8E+02	n	9.3E+02	ns	2.1E+01	n	8.8E+01	n	3.0E+01	n	6.0E+02	3.0E-02	n	5.8E-01	
5.4E-03	C	1.1E-05	C	7.0E-02	A	8.0E-01	I	V		1			Dichlorobenzene, 1,4-	106-46-7	2.6E+00	c	1.1E+01	c	2.6E-01	c	1.1E+00	c	4.8E-01	c	7.5E+01	4.6E-04	c	7.2E-02	
4.5E-01	I	3.4E-04	C							1	0.1		Dichlorobenzidine, 3,3'-	91-94-1	1.2E+00	c	5.1E+00	c	8.3E-03	c	3.6E-02	c	1.2E-01	c		8.1E-04	c		
				9.0E-03	X					1	0.1		Dichlorobenzophenone, 4,4'-	90-98-2	5.7E+01	n	7.4E+02	n					7.8E+00	n		4.7E-02	n		
				2.0E-01	I	1.0E-01	X	V		1		8.5E+02	Dichlorodifluoromethane	75-71-8	8.7E+00	n	3.7E+01	n	1.0E+01	n	4.4E+01	n	2.0E+01	n		3.0E-02	n		
5.7E-03	C	1.6E-06	C	2.0E-01	P			V		1		1.7E+03	Dichloroethane, 1,1-	75-34-3	3.6E+00	c	1.6E+01	c	1.8E+00	c	7.7E+00	c	2.7E+00	c		7.8E-04	c		
9.1E-02	I	2.6E-05	I	6.0E-03	X	7.0E-03	P	V		1		3.0E+03	Dichloroethane, 1,2-	107-06-2	4.6E-01	c**	2.0E+00	c**	1.1E-01	c**	4.7E-01	c**	1.7E-01	c**	5.0E+00	4.8E-05	c**	1.4E-03	
				5.0E-02	I	2.0E-01	I	V		1		1.2E+03	Dichloroethylene, 1,1-	75-35-4	2.3E+01	n	1.0E+02	n	2.1E+01	n	8.8E+01	n	2.8E+01	n	7.0E+00	1.0E-02	n	2.5E-03	
				2.0E-03	I			V		1		2.4E+03	Dichloroethylene, 1,2-cis-	156-59-2	1.6E+01	n	2.3E+02	n					3.6E+00	n	7.0E+01	1.1E-03	n	2.1E-02	
				2.0E-02	I			V		1		1.9E+03	Dichloroethylene, 1,2-trans-	156-60-5	1.6E+02	n	2.3E+03	ns					3.6E+01	n	1.0E+02	1.1E-02	n	3.1E-02	
				3.0E-03	I					1	0.1		Dichlorophenol, 2,4-	120-83-2	1.9E+01	n	2.5E+02	n					4.6E+00	n		5.4E-03	n		
				1.0E-02	I					1	0.05		Dichlorophenoxy Acetic Acid, 2,4-	94-75-7	7.0E+01	n	9.6E+02	n					1.7E+01	n	7.0E+01	4.5E-03	n	1.8E-02	
				8.0E-03	I					1	0.1		Dichlorophenoxybutyric Acid, 4-(2,4-	94-82-6	5.1E+01	n	6.6E+02	n					1.2E+01	n		1.1E-02	n		
3.6E-02	C	1.0E-05	C	9.0E-02	A	4.0E-03	I	V		1		1.4E+03	Dichloropropane, 1,2-	78-87-5	1.0E+00	c**	4.4E+00	c**	2.8E-01	c**	1.2E+00	c**	4.4E-01	c**	5.0E+00	1.5E-04	c**	1.7E-03	
				2.0E-02	P			V		1		1.5E+03	Dichloropropene, 1,3-	142-28-9	1.6E+02	n	2.3E+03	ns					3.7E+01	n		1.3E-02	n		
				3.0E-03	I					1	0.1		Dichloropropanol, 2,3-	616-23-9	1.9E+01	n	2.5E+02	n					5.9E+00	n		1.3E-03	n		
1.0E-01	I	4.0E-06	I	3.0E-02	I	2.0E-02	I	V		1		1.6E+03	Dichloropropene, 1,3-	542-75-6	1.8E+00	c**	8.2E+00	c**	7.0E-01	c**	3.1E+00	c**	4.7E-01	c**		1.7E-04	c**		
2.9E-01	I	8.3E-05	C	5.0E-04	I	5.0E-04	I			1	0.1		Dichlorvos	62-73-7	1.9E+00	c**	7.9E+00	c**	3.4E-02	c**	1.5E-01	c**	2.6E-01	c**		8.1E-05	c**		
				8.0E-02	P	3.0E-04	X	V		1			Dicyclopentadiene	77-73-6	1.3E-01	n	5.4E-01	n	3.1E-02	n	1.3E-01	n	6.3E-02	n		2.2E-04	n		
1.6E+01	I	4.6E-03	I	5.0E-05	I					1	0.1		Dieldrin	60-57-1	3.4E-02	c**	1.4E-01	c*	6.1E-04	c	2.7E-03	c	1.7E-03	c*		6.9E-05	c*		
		3.0E-04	C			5.0E-03	I			1	0.1		Diesel Engine Exhaust	NA					9.4E-03	c*	4.1E-02	c*							
				2.0E-03	P	2.0E-04	P			1	0.1		Diethanolamine	111-42-2	1.3E+01	n	1.6E+02	n	2.1E-02	n	8.8E-02	n	4.0E+00	n		8.1E-04	n		
				3.0E-02	P	1.0E-04	P			1	0.1		Diethylene Glycol Monobutyl Ether	112-34-5	1.9E+02	n	2.4E+03	n	1.0E-02	n	4.4E-02	n	6.0E+01	n		1.3E-02	n		
				6.0E-02	P	3.0E-04	P			1	0.1		Diethylene Glycol Monoethyl Ether	111-90-0	3.8E+02	n	4.8E+03	n	3.1E-02	n	1.3E-01	n	1.2E+02	n		2.4E-02	n		
				1.0E-03	P			V		1		1.1E+05	Diethylformamide	617-84-5	7.8E+00	n	1.2E+02	n					2.0E+00	n		4.1E-04	n		
3.5E+02	C	1.0E-01	C							1	0.1		Diethylstilbestrol	56-53-1	1.6E-03	c	6.6E-03	c	2.8E-05	c	1.2E-04	c	4.9E-05	c		2.7E-05	c		
				8.0E-02	I					1	0.1		Difenzoquat	43222-48-6	5.1E+02	n	6.6E+03	n					1.6E+02	n			n		
				2.0E-02	I					1	0.1		Diflubenzuron	35367-38-5	1.3E+02	n	1.6E+03	n					2.9E+01	n		3.3E-02	n		
						4.0E+01	I	V		1		1.4E+03	Difluoroethane, 1,1-	75-37-6	4.8E+03	ns	2.0E+04	ns	4.2E+03	n	1.8E+04	n	8.3E+03	n		2.8E+00	n		
4.4E-02	C	1.3E-05	C					V		1			Dihydrosafrole	94-58-6	3.2E-01	c	1.4E+00	c	2.2E-01	c	9.4E-01	c	3.0E-01	c		3.7E-04	c		
						7.0E-01	P	V		1		2.3E+03	Diisopropyl Ether	108-20-3	2.2E+02	n	9.4E+02	n	7.3E+01	n	3.1E+02	n	1.5E+02	n		3.7E-02	n		
				8.0E-02	I			V		1		5.3E+02	Diisopropyl Methylphosphonate	1445-75-6	6.3E+02	ns	9.3E+03	ns					1.6E+02	n		4.5E-02	n		
				2.0E-02	I					1	0.1		Dimethipin	55290-64-7	1.3E+02	n	1.6E+03	n					4.0E+01	n		8.8E-03	n		
				2.0E-04	I					1	0.1		Dimethoate	60-51-5	1.3E+00	n	1.6E+01	n					4.0E-01	n		9.0E-05	n		
										1	0.1		Dimethoxybenzidine, 3,3'-	119-90-4	3.4E-01	c	1.4E+00	c					4.7E-02	c		5.7E-05	c		
1.6E+00	P									1	0.1		Dimethyl methylphosphonate	756-79-6	3.2E+02	c**	1.4E+03	c**					4.6E+01	c**		9.6E-03	c**		
1.7E-03	P			6.0E-02	P					1	0.1		Dimethylamino azobenzene [p-]	60-11-7	1.2E-01	c	5.0E-01	c	2.2E-03	c	9.4E-03	c	4.9E-03	c		2.1E-05	c		
4.6E+00	C	1.3E-03	C							1	0.1		Dimethylaniline HCl, 2,4-	21436-96-4	9.4E-01	c	4.0E+00	c					1.3E-01	c		1.2E-04	c		
5.8E-01	H									1	0.1		Dimethylaniline, 2,4-	95-68-1	2.7E+00	c**	1.1E+01	c*					3.7E-01	c*		2.1E-04	c*		
2.0E-01	P			2.0E-03	X					1	0.1		Dimethylaniline, N,N-	121-69-7	1.6E+01	n	2.3E+02	n					3.5E+00	n		1.3E-03	n		
				2.0E-03	I			V		1		8.3E+02	Dimethylbenzidine, 3,3'-	119-93-7	4.9E-02	c	2.1E-01	c					6.5E-03	c		4.3E-05	c		
1.1E+01	P									1	0.1		Dimethylformamide	68-12-2	2.6E+02	n	1.5E+03	n	3.1E+00	n	1.3E+01	n	6.1E+00	n		1.2E-03	n		
				1.0E-01	P	3.0E-02	I	V		1		1.1E+05	Dimethylhydrazine, 1,1-	57-14-7	3.2E-02	n	1.4E-01	n	2.1E-04	n	8.8E-04	n	4.2E-04	n		9.3E-08	n		
				1.0E-04	X	2.0E-06	X	V		1		1.7E+05																		

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Toxicity and Chemical-specific Information												Contaminant		Screening Levels												Protection of Ground Water SSLs		
SFO (mg/kg-day)$^{-1}$	key	IUR (ug/m^3)$^{-1}$	key	RfD_o (mg/kg-day)	key	RfC_i (mg/m^3)	key	volc	muta-gen	GIABS	ABS	C_{sat} (mg/kg)	Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air (ug/m^3)	key	Industrial Air (ug/m^3)	key	Tapwater (ug/L)	key	MCL (ug/L)	Risk-based SSL (mg/kg)	key	MCL-based SSL (mg/kg)
5.5E+02	C	1.6E-01	C					V		1		1.9E+05	Dimethylhydrazine, 1,2-	540-73-8	8.8E-04	c	4.1E-03	c	1.8E-05	c	7.7E-05	c	2.8E-05	c		6.5E-09	c	
				2.0E-02	I					1	0.1		Dimethylphenol, 2,4-	105-67-9	1.3E+02	n	1.6E+03	n					3.6E+01	n		4.2E-02	n	
				6.0E-04	I					1	0.1		Dimethylphenol, 2,6-	576-26-1	3.8E+00	n	4.9E+01	n					1.1E+00	n		1.3E-03	n	
				1.0E-03	I					1	0.1		Dimethylphenol, 3,4-	95-65-8	6.3E+00	n	8.2E+01	n					1.8E+00	n		2.1E-03	n	
4.5E-02	C	1.3E-05	C					V		1		1.1E+03	Dimethylvinylchloride	513-37-1	2.1E-01	c	9.4E-01	c	2.2E-01	c	9.4E-01	c	3.3E-01	c		2.0E-04	c	
				8.0E-05	X					1	0.1		Dinitro-o-cresol, 4,6-	534-52-1	5.1E-01	n	6.6E+00	n					1.5E-01	n		2.6E-04	n	
				2.0E-03	I					1	0.1		Dinitro-o-cyclohexyl Phenol, 4,6-	131-89-5	1.3E+01	n	1.6E+02	n					2.3E+00	n		7.7E-02	n	
				1.0E-04	P					1	0.1		Dinitrobenzene, 1,2-	528-29-0	6.3E-01	n	8.2E+00	n					1.9E-01	n		1.8E-04	n	
				1.0E-04	I					1	0.1		Dinitrobenzene, 1,3-	99-65-0	6.3E-01	n	8.2E+00	n					2.0E-01	n		1.8E-04	n	
				1.0E-04	P					1	0.1		Dinitrobenzene, 1,4-	100-25-4	6.3E-01	n	8.2E+00	n					2.0E-01	n		1.8E-04	n	
				2.0E-03	I					1	0.1		Dinitrophenol, 2,4-	51-28-5	1.3E+01	n	1.6E+02	n					3.9E+00	n		4.4E-03	n	
6.8E-01	I									1	0.1		Dinitrotoluene Mixture, 2,4/2,6-	NA	8.0E-01	c	3.4E+00	c					1.1E-01	c		1.5E-04	c	
3.1E-01	C	8.9E-05	C	2.0E-03	I					1	0.102		Dinitrotoluene, 2,4-	121-14-2	1.7E+00	c**	7.4E+00	c*	3.2E-02	c	1.4E-01	c	2.4E-01	c*		3.2E-04	c*	
1.5E+00	P			3.0E-04	X					1	0.099		Dinitrotoluene, 2,6-	606-20-2	3.6E-01	c**	1.5E+00	c*					4.8E-02	c*		6.7E-05	c*	
				2.0E-03	S					1	0.006		Dinitrotoluene, 2-Amino-4,6-	35572-78-2	1.5E+01	n	2.3E+02	n					3.9E+00	n		3.0E-03	n	
				2.0E-03	S					1	0.009		Dinitrotoluene, 4-Amino-2,6-	19406-51-0	1.5E+01	n	2.3E+02	n					3.9E+00	n		3.0E-03	n	
4.5E-01	X			9.0E-04	X					1	0.1		Dinitrotoluene, Technical grade	25321-14-6	1.2E+00	c**	5.1E+00	c*					1.6E-01	c*		2.2E-04	c*	
				1.0E-03	I					1	0.1		Dinoseb	88-85-7	6.3E+00	n	8.2E+01	n					1.5E+00	n	7.0E+00	1.3E-02	n	6.2E-02
1.0E-01	I	5.0E-06	I	3.0E-02	I	3.0E-02	I	V		1		1.2E+05	Dioxane, 1,4-	123-91-1	5.3E+00	c*	2.4E+01	c*	5.6E-01	c**	2.5E+00	c**	4.6E-01	c*		9.4E-05	c*	
													Dioxins															
6.2E+03	I	1.3E+00	I							1	0.03		~Hexachlorodibenzo-p-dioxin, Mixture	NA	1.0E-04	c	4.7E-04	c	2.2E-06	c	9.4E-06	c	1.3E-05	c		1.7E-05	c	
1.3E+05	C	3.8E+01	C	7.0E-10	I	4.0E-08	C	V		1	0.03		~TCDD, 2,3,7,8-	1746-01-6	4.8E-06	c**	2.2E-05	c**	7.4E-08	c*	3.2E-07	c*	1.2E-07	c*	3.0E-05	5.9E-08	c*	1.5E-05
				3.0E-02	I					1	0.1		Diphenamid	957-51-7	1.9E+02	n	2.5E+03	n					5.3E+01	n		5.2E-01	n	
				8.0E-04	X					1	0.1		Diphenyl Sulfone	127-63-9	5.1E+00	n	6.6E+01	n					1.5E+00	n		3.6E-03	n	
				2.5E-02	I					1	0.1		Diphenylamine	122-39-4	1.6E+02	n	2.1E+03	n					3.1E+01	n		5.8E-02	n	
8.0E-01	I	2.2E-04	I							1	0.1		Diphenylhydrazine, 1,2-	122-66-7	6.8E-01	c	2.9E+00	c	1.3E-02	c	5.6E-02	c	7.7E-02	c		2.5E-04	c	
				2.2E-03	I					1	0.1		Diquat	85-00-7	1.4E+01	n	1.8E+02	n					4.4E+00	n	2.0E+01	8.3E-02	n	3.7E-01
7.1E+00	C	1.4E-01	C							1	0.1		Direct Black 38	1937-37-7	7.6E-02	c	3.2E-01	c	2.0E-05	c	8.8E-05	c	1.1E-02	c		5.3E+00	c	
7.4E+00	C	1.4E-01	C							1	0.1		Direct Blue 6	2602-46-2	7.3E-02	c	3.1E-01	c	2.0E-05	c	8.8E-05	c	1.1E-02	c		1.7E+01	c	
6.7E+00	C	1.4E-01	C							1	0.1		Direct Brown 95	16071-86-6	8.1E-02	c	3.4E-01	c	2.0E-05	c	8.8E-05	c	1.2E-02	c			c	
				4.0E-05	I					1	0.1		Disulfoton	298-04-4	2.5E-01	n	3.3E+00	n					5.0E-02	n		9.4E-05	n	
				1.0E-02	I			V		1			Dithiane, 1,4-	505-29-3	7.8E+01	n	1.2E+03	n					2.0E+01	n		9.7E-03	n	
				2.0E-03	I					1	0.1		Diuron	330-54-1	1.3E+01	n	1.6E+02	n					3.6E+00	n		1.5E-03	n	
				4.0E-03	I					1	0.1		Dodine	2439-10-3	2.5E+01	n	3.3E+02	n					8.0E+00	n		4.1E-02	n	
				2.5E-02	I			V		1			EPTC	759-94-4	2.0E+02	n	2.9E+03	n					3.8E+01	n		2.0E-02	n	
				6.0E-03	I			V		1			Endosulfan	115-29-7	4.7E+01	n	7.0E+02	n					1.0E+01	n		1.4E-01	n	
				2.0E-02	I					1	0.1		Endothall	145-73-3	1.3E+02	n	1.6E+03	n					3.8E+01	n	1.0E+02	9.1E-03	n	2.4E-02
				3.0E-04	I					1	0.1		Endrin	72-20-8	1.9E+00	n	2.5E+01	n					2.3E-01	n	2.0E+00	9.2E-03	n	8.1E-02
9.9E-03	I	1.2E-06	I	6.0E-03	P	1.0E-03	I	V		1		1.1E+04	Epichlorohydrin	106-89-8	1.9E+00	n	8.2E+00	n	1.0E-01	n	4.4E-01	n	2.0E-01	n		4.5E-05	n	
						2.0E-02	I	V		1		1.5E+04	Epoxybutane, 1,2-	106-88-7	1.6E+01	n	6.7E+01	n	2.1E+00	n	8.8E+00	n	4.2E+00	n		9.2E-04	n	
				5.0E-03	I					1	0.1		Ethephon	16672-87-0	3.2E+01	n	4.1E+02	n					1.0E+01	n		2.1E-03	n	
				5.0E-04	I					1	0.1		Ethion	563-12-2	3.2E+00	n	4.1E+01	n					4.3E-01	n		8.5E-04	n	
				1.0E-01	P	6.0E-02	P	V		1		3.1E+04	Ethoxyethanol Acetate, 2-	111-15-9	2.6E+02	n	1.4E+03	n	6.3E+00	n	2.6E+01	n	1.2E+01	n		2.5E-03	n	
				9.0E-02	P	2.0E-01	I	V		1		1.1E+05	Ethoxyethanol, 2-	110-80-5	5.2E+02	n	4.7E+03	n	2.1E+01	n	8.8E+01	n	3.4E+01	n		6.8E-03	n	
				9.0E-01	I	7.0E-02	P	V		1		1.1E+04	Ethyl Acetate	141-78-6	6.2E+01	n	2.6E+02	n	7.3E+00	n	3.1E+01	n	1.4E+01	n		3.1E-03	n	
4.8E-02	H			5.0E-03	P	8.0E-03	P	V		1		2.5E+03	Ethyl Acrylate	140-88-5	4.7E+00	n	2.1E+01	n	8.3E-01	n	3.5E+00	n	1.4E+00	n		3.2E-04	n	
						1.0E+01	I	V		1		2.1E+03	Ethyl Chloride (Chloroethane)	75-00-3	1.4E+03	n	5.7E+03	ns	1.0E+03	n	4.4E+03	n	2.1E+03	n		5.9E-01	n	
				2.0E-01	I			V		1		1.0E+04	Ethyl Ether	60-29-7	1.6E+03	n	2.3E+04	ns					3.9E+02	n		8.8E-02	n	
				9.0E-02	H	3.0E-01	P	V		1		1.1E+03	Ethyl Methacrylate	97-63-2	1.4E+02	n	7.1E+02	n	3.1E+01	n	1.3E+02	n	4.6E+01	n		1.1E-02	n	
				1.0E-05	I					1	0.1		Ethyl-p-nitrophenyl Phosphonate	2104-64-5	6.3E-02	n	8.2E-01	n					8.9E-03	n		2.8E-04	n	
1.1E-02	C	2.5E-06	C	1.0E-01	I	1.0E+00	I	V		1		4.8E+02	Ethylbenzene	100-41-4	5.8E+00	c*	2.5E+01	c*	1.1E+00	c*	4.9E+00	c*	1.5E+00	c*	7.0E+02	1.7E-03	c*	7.8E-01
				7.0E-02	P					1	0.1		Ethylene Cyanohydrin	109-78-4	4.4E+02	n	5.7E+03	n					1.4E+02	n		2.8E-02	n	
				9.0E-02	P			V		1		1.9E+05	Ethylene Diamine	107-15-3	7.0E+02	n	1.1E+04	n					1.8E+02	n		4.1E-02	n	
				2.0E+00	I	4.0E-01	C			1	0.1		Ethylene Glycol	107-21-1	1.3E+04	n	1.6E+05	nm	4.2E+01	n	1.8E+02	n	4.0E+03	n		8.1E-01	n	
				1.0E-01	I	1.6E+00	I			1	0.1		Ethylene Glycol Monobutyl Ether	111-76-2	6.3E+02	n	8.2E+03	n	1.7E+02	n	7.0E+02	n	2.0E+02	n		4.1E-02	n	
3.1E-01	C	8.8E-05	C			3.0E-02	C	V		1		1.2E+05	Ethylene Oxide	75-21-8	1.8E-01	c	7.9E-01	c	3.2E-02	c*	1.4E-01	c*	5.1E-02	c		1.1E-05	c	
4.5E-02	C	1.3E-05	C	8.0E-05	I					1	0.1		Ethylene Thiourea	96-45-7	5.1E-01	n	6.6E+00	n	2.2E-01	c	9.4E-01	c	1.6E-01	n		3.6E-05	n	
6.5E+01	C	1.9E-02	C					V		1		1.5E+05	Ethyleneimine	151-56-4	2.7E-03	c	1.2E-02	c	1.5E-04	c	6.5E-04	c	2.4E-04	c		5.2E-08	c	
				3.0E+00	I					1	0.1		Ethylphthalyl Ethyl Glycolate	84-72-0	1.9E+04	n	2.5E+05	nm					5.8E+03	n		1.3E+01	n	
				8.0E-03	I					1	0.1		Express	101200-48-0	5.1E+01	n	6.6E+02	n					1.6E+01	n		6.1E-03	n	
				2.5E-04	I					1	0.1		Fenamiphos	22224-92-6	1.6E+00	n	2.1E+01	n					4.4E-01	n		4.3E-04	n	
				2.5E-02	I					1	0.1		Fenpropathrin	39515-41-8	1.6E+02	n	2.1E+03	n					6.4E+00	n		2.9E-01	n	
				1.3E-02	I					1	0.1		Fluometuron	2164-17-2	8.2E+01	n	1.1E+03	n					2.4E+01	n		1.9E-02	n	
				4.0E-02	C	1.3E-02	C			1			Fluoride	16984-48-8	3.1E+02	n	4.7E+03	n	1.4E+00	n	5.7E+00	n	8.0E+01	n		1.2E+01	n	
				6.0E-02	I	1.3E-02	C			1			Fluorine (Soluble Fluoride)	7782-41-4	4.7E+02	n	7.0E+03	n	1.4E+00	n	5.7E+00	n	1.2E+02	n	4.0E+03	1.8E+01	n	6.0E+02

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Toxicity and Chemical-specific Information														Contaminant		Screening Levels												Protection of Ground Water SSLs		
SFO (mg/kg-day)$^{-1}$	Key	IUR (ug/m^3)$^{-1}$	Key	RfD_o (mg/kg-day)	Key	RfC_i (mg/m^3)	Key	Volatile	mutagen	GIABS	ABS	C_{sat} (mg/kg)	Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air (ug/m^3)	key	Industrial Air (ug/m^3)	key	Tapwater (ug/L)	key	MCL (ug/L)	Risk-based SSL (mg/kg)	key	MCL-based SSL (mg/kg)
				8.0E-02	I					1	0.1		Fluridone	59756-60-4	5.1E+02	n	6.6E+03	n					1.4E+02	n		1.6E+01	n		
				2.0E-02	I					1	0.1		Flurprimidol	56425-91-3	1.3E+02	n	1.6E+03	n					3.4E+01	n		1.6E-01	n		
				6.0E-02	I					1	0.1		Flutolanil	66332-96-5	3.8E+02	n	4.9E+03	n					9.5E+01	n		5.0E-01	n		
				1.0E-02	I					1	0.1		Fluvalinate	69409-94-5	6.3E+01	n	8.2E+02	n					2.0E+01	n		2.9E+01	n		
3.5E-03	I			1.0E-01	I					1	0.1		Folpet	133-07-3	1.6E+02	c**	6.6E+02	c*					2.0E+01	c**		4.7E-03	c**		
1.9E-01	I									1	0.1		Fomesafen	72178-02-0	2.9E+00	c	1.2E+01	c					3.9E-01	c		1.3E-03	c		
				2.0E-03	I					1	0.1		Fonofos	944-22-9	1.3E+01	n	1.6E+02	n					2.4E+00	n		4.7E-03	n		
		1.3E-05	I	2.0E-01	I	9.8E-03	A	V		1		4.2E+04	Formaldehyde	50-00-0	1.7E+01	c**	7.3E+01	c**	2.2E-01	c**	9.4E-01	c**	4.3E-01	c**		8.7E-05	c**		
				9.0E-01	P	3.0E-04	X	V		1		1.1E+05	Formic Acid	64-18-6	2.9E+00	n	1.2E+01	n	3.1E-02	n	1.3E-01	n	6.3E-02	n		1.3E-05	n		
				3.0E+00	I					1	0.1		Fosetyl-AL	39148-24-8	1.9E+04	n	2.5E+05	nm					6.0E+03	n			n		
													Furans																	
				1.0E-03	X			V		1	0.03		~Dibenzofuran	132-64-9	7.3E+00	n	1.0E+02	n					7.9E-01	n		1.5E-02	n		
				1.0E-03	I			V		1	0.03	6.2E+03	~Furan	110-00-9	7.3E+00	n	1.0E+02	n					1.9E+00	n		7.3E-04	n		
				9.0E-01	I	2.0E+00	I	V		1	0.03	1.7E+05	~Tetrahydrofuran	109-99-9	1.8E+03	n	9.6E+03	n	2.1E+02	n	8.8E+02	n	3.4E+02	n		7.5E-02	n		
3.8E+00	H									1	0.1		Furazolidone	67-45-8	1.4E-01	c	6.0E-01	c					2.0E-02	c		3.9E-05	c		
				3.0E-03	I	5.0E-02	H	V		1		1.0E+04	Furfural	98-01-1	2.1E+01	n	2.6E+02	n	5.2E+00	n	2.2E+01	n	3.8E+00	n		8.1E-04	n		
1.5E+00	C	4.3E-04	C							1	0.1		Furium	531-82-8	3.6E-01	c	1.5E+00	c	6.5E-03	c	2.9E-02	c	5.0E-02	c		6.8E-05	c		
3.0E-02	I	8.6E-06	C							1	0.1		Furmecyclox	60568-05-0	1.8E+01	c	7.7E+01	c	3.3E-01	c	1.4E+00	c	1.1E+00	c		1.2E-03	c		
				4.0E-04	I					1	0.1		Glufosinate, Ammonium	77182-82-2	2.5E+00	n	3.3E+01	n					8.0E-01	n		1.8E-04	n		
						8.0E-05	C			1	0.1		Glutaraldehyde	111-30-8	1.1E+04	n	4.8E+04	n	8.3E-03	n	3.5E-02	n							
				4.0E-04	I	1.0E-03	H	V		1		1.1E+05	Glycidyl	765-34-4	2.2E+00	n	1.9E+01	n	1.0E-01	n	4.4E-01	n	1.7E-01	n		3.3E-05	n		
				1.0E-01	I					1	0.1		Glyphosate	1071-83-6	6.3E+02	n	8.2E+03	n					2.0E+02	n	7.0E+02	8.8E-01	n	3.1E+00	
				3.0E-03	I					1	0.1		Goal	42874-03-3	1.9E+0	n	2.5E+02	n					3.2E+00	n		2.5E-01	n		
				1.0E-02	X			V		1			Guanidine	113-00-8	7.8E+0	n	1.2E+03	n					2.0E+01	n		4.5E-03	n		
				2.0E-02	P					1	0.1		Guanidine Chloride	50-01-1	1.3E+02	n	1.6E+03	n					4.0E+01	n			n		
				3.0E-03	A	1.0E-02	A			1	0.1		Guthion	86-50-0	1.9E+0	n	2.5E+02	n	1.0E+00	n	4.4E+00	n	5.6E+00	n		1.7E-03	n		
				5.0E-05	I					1	0.1		Haloxyfop, Methyl	69806-40-2	3.2E-01	n	4.1E+00	n					7.6E-02	n		8.4E-04	n		
				1.3E-02	I					1	0.1		Harmony	79277-27-3	8.2E+0	n	1.1E+03	n					2.6E+01	n		7.8E-03	n		
4.5E+00	I	1.3E-03	I	5.0E-04	I			V		1			Heptachlor	76-44-8	1.3E-01	c*	6.3E-01	c*	2.2E-03	c	9.4E-03	c	1.4E-03	c*	4.0E-01	1.1E-04	c*	3.3E-02	
													Heptachlor Epoxide	1024-57-3	7.0E-02	c**	3.3E-01	c**	1.1E-03	c	4.7E-03	c	1.4E-03	c**	2.0E-01	2.8E-05	c**	4.1E-03	
9.1E+00	I	2.6E-03	I	1.3E-05	I			V		1			Hexabromobenzene	87-82-1	1.6E+0	n	2.3E+02	n					4.0E+00	n		2.3E-02	n		
				2.0E-03	I			V		1			Hexabromodiphenyl ether, 2,2',4,4',5,5'- (BDE-153)	68631-49-2	1.3E+00	n	1.6E+01	n					4.0E-01	n			n		
				2.0E-04	I					1	0.1		Hexachlorobenzene	118-74-1	2.1E-01	c*	9.6E-01	c*	6.1E-03	c	2.7E-02	c	9.8E-03	c	1.0E+00	1.2E-04	c	1.3E-02	
1.6E+00	I	4.6E-04	I	8.0E-04	I			V		1			Hexachlorobutadiene	87-68-3	1.2E+00	c**	5.3E+00	c*	1.3E-01	c	5.6E-01	c	1.4E-01	c**		2.6E-04	c**		
7.8E-02	I	2.2E-05	I	1.0E-03	P			V		1		1.7E+01	Hexachlorocyclohexane, Alpha-	319-84-6	8.8E-02	c	3.6E-01	c	1.6E-03	c	6.8E-03	c	7.1E-03	c		4.1E-05	c		
6.3E+00	I	1.8E-03	I	8.0E-03	A					1	0.1		Hexachlorocyclohexane, Beta-	319-85-7	3.0E-01	c	1.3E+00	c	5.3E-03	c	2.3E-02	c	2.5E-02	c		1.4E-04	c		
1.8E+00	I	5.3E-04	I							1	0.1		Hexachlorocyclohexane, Gamma- (Lindane)	58-89-9	5.7E-01	c**	2.5E+00	c*	9.1E-03	c	4.0E-02	c	4.1E-02	c**	2.0E-01	2.4E-04	c**	1.2E-03	
1.1E+00	C	3.1E-04	C	3.0E-04	I					1	0.04		Hexachlorocyclohexane, Technical	608-73-1	3.0E-01	c	1.3E+00	c	5.5E-03	c	2.4E-02	c	2.5E-02	c		1.4E-04	c		
1.8E+00	I	5.1E-04	I							1	0.1		Hexachlorocyclopentadiene	77-47-4	1.8E-01	n	7.5E-01	n	2.1E-02	n	8.8E-02	n	4.1E-02	n	5.0E+01	1.3E-04	n	1.6E-01	
				6.0E-03	I	2.0E-04	I	V		1		1.6E+01	Hexachloroethane	67-72-1	1.8E+00	c**	8.0E+00	c**	2.6E-01	c*	1.1E+00	c*	3.3E-01	c**		2.0E-04	c**		
4.0E-02	I	1.1E-05	C	7.0E-04	I	3.0E-02	I	V		1			Hexachlorophene	70-30-4	1.9E+00	n	2.5E+01	n					6.0E-01	n		8.0E-01	n		
				3.0E-04	I					1	0.1		Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX)	121-82-4	6.1E+00	c**	2.8E+01	c*					7.0E-01	c**		2.7E-04	c**		
1.1E-01	I			3.0E-03	I					1	0.015		Hexamethylene Diisocyanate, 1,6-	822-06-0	3.1E-01	n	1.3E+00	n	1.0E-03	n	4.4E-03	n	2.1E-03	n		2.1E-05	n		
						1.0E-05	I	V		1		5.2E+03	Hexamethylphosphoramide	680-31-9	2.5E+00	n	3.3E+01	n					8.0E-01	n		1.8E-04	n		
				4.0E-04	P					1	0.1		Hexane, N-	110-54-3	5.4E+0	n	2.5E+02	ns	7.3E+01	n	3.1E+02	n	3.2E+01	n		2.3E-01	n		
				6.0E-02	H	7.0E-01	I	V		1		1.4E+02	Hexanedioic Acid	124-04-9	1.3E+04	n	1.6E+05	nm					4.0E+03	n		9.9E-01	n		
				2.0E+00	P					1	0.1		Hexanone, 2-	591-78-6	2.0E+01	n	1.3E+02	n	3.1E+00	n	1.3E+01	n	3.8E+00	n		8.8E-04	n		
				5.0E-03	I	3.0E-02	I	V		1		3.3E+03	Hexazinone	51235-04-2	2.1E+02	n	2.7E+03	n					6.4E+01	n		3.0E-02	n		
				3.3E-02	I					1	0.1		Hydrazine	302-01-2	2.3E-01	c	1.1E+00	c	5.7E-04	c**	2.5E-03	c**	1.1E-03	c**			c**		
3.0E+00	I	4.9E-03	I			3.0E-05	P	V		1			Hydrazine Sulfate	10034-93-2	2.3E-01	c	1.1E+00	c	5.7E-04	c	2.5E-03	c	2.6E-02	c			c		
3.0E+00	I	4.9E-03	I							1			Hydrogen Chloride	7647-01-0	2.8E+06	nm	1.2E+07	nm	2.1E+00	n	8.8E+00	n	4.2E+00	n			n		
						2.0E-02	I	V		1			Hydrogen Fluoride	7664-39-3	3.1E+02	n	4.7E+03	n	1.5E+00	n	6.1E+00	n	2.8E+00	n			n		
				4.0E-02	C	1.4E-02	C	V		1			Hydrogen Sulfide	7783-06-4	2.8E+05	nm	1.2E+06	nm	2.1E-01	n	8.8E-01	n	4.2E-01	n			n		
						2.0E-03	I	V		1			Hydroquinone	123-31-9	9.0E+00	c*	3.8E+01	c*					1.3E+00	c*		8.7E-04	c*		
6.0E-02	P			4.0E-02	P					1	0.1		Imazalil	35554-44-0	8.2E+01	n	1.1E+03	n					1.9E+01	n		3.2E-01	n		
				1.3E-02	I					1	0.1		Imazaquin	81335-37-7	1.6E+03	n	2.1E+04	n					4.9E+02	n		2.4E+00	n		
				2.5E-01	I					1	0.1		Iodine	7553-56-2	7.8E+01	n	1.2E+03	n					2.0E+01	n		1.2E+00	n		
				1.0E-02	A					1			Iprodione	36734-19-7	2.5E+02	n	3.3E+03	n					7.4E+01	n		2.2E-02	n		
				4.0E-02	I					1	0.1		Iron	7439-89-6	5.5E+03	n	8.2E+04	n					1.4E+03	n		3.5E+01	n		
				7.0E-01	P					1			Isobutyl Alcohol	78-83-1	2.3E+03	n	3.5E+04	ns					5.9E+02	n		1.2E-01	n		
				3.0E-01	I			V		1		1.0E+04	Isophorone	78-59-1	5.7E+02	c**	2.4E+03	c**	2.1E+02	n	8.8E+02	n	7.8E+01	c**		2.6E-02	c**		
9.5E-04	I			2.0E-01	I	2.0E+00	C			1	0.1		Isopropalin	33820-53-0	1.2E+02	n	1.8E+03	n					4.0E+00	n		9.2E-02	n		
				1.5E-02	I			V		1			Isopropanol	67-63-0	5.6E+02	n	2.4E+03	n	2.1E+01	n	8.8E+01	n	4.1E+01	n		8.4E-03	n		
				2.0E+00	P	2.0E-01	P	V		1		1.1E+05	Isopropyl Methyl Phosphonic Acid	1832-54-8	6.3E+02	n	8.2E+03	n					2.0E+02	n		4.3E-02	n		
				1.0E-01	I					1	0.1		Isoxaben	82558-50-7	3.2E+02	n	4.1E+03	n					7.3E+01	n		2.0E-01	n		
				5.0E-02	I					1	0.1																			

Key: I = IRIS; P = PPRTV; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; J = New Jersey; O = EPA Office of Water; F = See FAQ; E = Environmental Criteria and Assessment Office; S = see user guide Section 5; L = see user guide on lead; M = mutagen; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; n = noncancer; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide); SSL values are based on DAF=1

Toxicity and Chemical-specific Information														Contaminant		Screening Levels												Protection of Ground Water SSLs		
SFO (mg/kg-day)$^{-1}$	key	IUR (ug/m^3)$^{-1}$	key	RfD_o (mg/kg-day)	key	RfC_i (mg/m^3)	key	vol	muta-gen	GIABS	ABS	C_{sat} (mg/kg)	Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air (ug/m^3)	key	Industrial Air (ug/m^3)	key	Tapwater (ug/L)	key	MCL (ug/L)	Risk-based SSL (mg/kg)	key	MCL-based SSL (mg/kg)
						3.0E-01	A	V		1			JP-7	NA	4.3E+07	nm	1.8E+08	nm	3.1E+01	n	1.3E+02	n	6.3E+01	n			n	
				7.5E-02	I					1	0.1		Kerb	23950-58-5	4.7E+02	n	6.2E+03	n					1.2E+02	n		1.2E-01	n	
				2.0E-03	I					1	0.1		Lactofen	77501-63-4	1.3E+01	n	1.6E+02	n					2.5E+00	n		1.2E-01	n	
													Lead Compounds																
5.0E-01	C	1.5E-01	C	2.0E-02	C	2.0E-04	C		M	0.025			~Lead Chromate	7758-97-6	3.0E-01	c	6.2E+00	c	6.8E-06	c	8.2E-05	c	4.1E-02	c			c	
8.5E-03	C	1.2E-05	C							1			~Lead Phosphate	7446-27-7	8.2E+01	c	3.8E+02	c	2.3E-01	c	1.0E+00	c	9.1E+00	c			c	
2.8E-01	C	8.0E-05	C							1	0.1		~Lead acetate	301-04-2	1.9E+00	c	8.2E+00	c	3.5E-02	c	1.5E-01	c	2.8E-01	c			c	
										1			~Lead and Compounds	7439-92-1	4.0E+02		8.0E+02	L	1.5E-01	L			1.5E+01	L	1.5E+01		L	1.4E+01
8.5E-03	C	1.2E-05	C							1	0.1		~Lead subacetate	1335-32-6	6.4E+01	c	2.7E+02	c	2.3E-01	c	1.0E+00	c	9.2E+00	c			c	
				1.0E-07	I			V		1		2.4E+00	~Tetraethyl Lead	78-00-2	7.8E-04	n	1.2E-02	n					1.3E-04	n		4.7E-07	n	
				2.0E-03	I					1	0.1		Linuron	330-55-2	1.3E+01	n	1.6E+02	n					3.3E+00	n		2.9E-03	n	
				2.0E-03	P					1			Lithium	7439-93-2	1.6E+01	n	2.3E+02	n					4.0E+00	n		1.2E+00	n	
				2.0E-01	I					1	0.1		Londax	83055-99-6	1.3E+03	n	1.6E+04	n					3.9E+02	n		1.0E-01	n	
				5.0E-04	I					1	0.1		MCPA	94-74-6	3.2E+00	n	4.1E+01	n					7.5E-01	n		2.0E-04	n	
				1.0E-02	I					1	0.1		MCPB	94-81-5	6.3E+01	n	8.2E+02	n					1.5E+01	n		5.8E-03	n	
				1.0E-03	I					1	0.1		MCPP	93-65-2	6.3E+00	n	8.2E+01	n					1.6E+00	n		4.6E-04	n	
				2.0E-02	I					1	0.1		Malathion	121-75-5	1.3E+02	n	1.6E+03	n					3.9E+01	n		1.0E-02	n	
				1.0E-01	I	7.0E-04	C			1	0.1		Maleic Anhydride	108-31-6	6.3E+02	n	8.0E+03	n	7.3E-02	n	3.1E-01	n	1.9E+02	n		3.8E-02	n	
				5.0E-01	I					1	0.1		Maleic Hydrazide	123-33-1	3.2E+03	n	4.1E+04	n					1.0E+03	n		2.1E-01	n	
				1.0E-04	P					1	0.1		Malononitrile	109-77-3	6.3E-01	n	8.2E+00	n					2.0E-01	n		4.1E-05	n	
				3.0E-02	H					1	0.1		Mancozeb	8018-01-7	1.9E+02	n	2.5E+03	n					5.4E+01	n			n	
				5.0E-03	I					1	0.1		Maneb	12427-38-2	3.2E+01	n	4.1E+02	n					9.8E+00	n		1.4E-02	n	
				1.4E-01	I	5.0E-05	I			1			Manganese (Diet)	7439-96-5														
				2.4E-02	S	5.0E-05	I			0.04			Manganese (Non-diet)	7439-96-5	1.8E+02	n	2.6E+03	n	5.2E-03	n	2.2E-02	n	4.3E+01	n		2.8E+00	n	
				9.0E-05	H					1	0.1		Mephosfolan	950-10-7	5.7E-01	n	7.4E+00	n					1.8E-01	n		2.6E-04	n	
				3.0E-02	I					1	0.1		Mepiquat Chloride	24307-26-4	1.9E+02	n	2.5E+03	n					6.0E+01	n		2.0E-02	n	
													Mercury Compounds																
				3.0E-04	I	3.0E-04	S			0.07			~Mercuric Chloride (and other Mercury salts)	7487-94-7	2.3E+00	n	3.5E+01	n	3.1E-02	n	1.3E-01	n	5.7E-01	n	2.0E+00		n	
						3.0E-04	I	V		1		3.1E+00	~Mercury (elemental)	7439-97-6	9.4E-01	n	4.0E+00	ns	3.1E-02	n	1.3E-01	n	6.3E-02	n	2.0E+00	3.3E-03	n	1.0E-01
				1.0E-04	I					1			~Methyl Mercury	22967-92-6	7.8E-01	n	1.2E+01	n					2.0E-01	n			n	
				8.0E-05	I					1	0.1		~Phenylmercuric Acetate	62-38-4	5.1E-01	n	6.6E+00	n					1.6E-01	n		5.0E-05	n	
				3.0E-05	I			V		1			Merphos	150-50-5	2.3E-01	n	3.5E+00	n					6.0E-02	n		5.9E-03	n	
				3.0E-05	I					1	0.1		Merphos Oxide	78-48-8	1.9E-01	n	2.5E+00	n					8.5E-03	n		4.2E-05	n	
				6.0E-02	I					1	0.1		Metalaxyl	57837-19-1	3.8E+02	n	4.9E+03	n					1.2E+02	n		3.3E-02	n	
				1.0E-04	I	3.0E-02	P	V		1		4.6E+03	Methacrylonitrile	126-98-7	7.5E-01	n	1.0E+01	n	3.1E+00	n	1.3E+01	n	1.9E-01	n		4.3E-05	n	
				5.0E-05	I					1	0.1		Methamidophos	10265-92-6	3.2E-01	n	4.1E+00	n					1.0E-01	n		2.1E-05	n	
				2.0E+00	I	2.0E+01	I	V		1		1.1E+05	Methanol	67-56-1	1.2E+04	n	1.2E+05	nms	2.1E+03	n	8.8E+03	n	2.0E+03	n		4.1E-01	n	
				1.0E-03	I					1	0.1		Methidathion	950-37-8	6.3E+00	n	8.2E+01	n					1.9E+00	n		4.7E-04	n	
				2.5E-02	I					1	0.1		Methomyl	16752-77-5	1.6E+02	n	2.1E+03	n					5.0E+01	n		1.1E-02	n	
4.9E-02	C	1.4E-05	C							1	0.1		Methoxy-5-nitroaniline, 2-	99-59-2	1.1E+01	c	4.7E+01	c	2.0E-01	c	8.8E-01	c	1.5E+00	c		5.3E-04	c	
				5.0E-03	I					1	0.1		Methoxychlor	72-43-5	3.2E+01	n	4.1E+02	n					3.7E+00	n	4.0E+01	2.0E-01	n	2.2E+00
				8.0E-03	P	1.0E-03	P	V		1		1.2E+05	Methoxyethanol Acetate, 2-	110-49-6	1.1E+01	n	5.1E+01	n	1.0E-01	n	4.4E-01	n	2.1E-01	n		4.2E-05	n	
				5.0E-03	P	2.0E-02	I	V		1		1.1E+05	Methoxyethanol, 2-	109-86-4	3.3E+01	n	3.5E+02	n	2.1E+00	n	8.8E+00	n	2.9E+00	n		5.9E-04	n	
				1.0E+00	X			V		1		2.9E+04	Methyl Acetate	79-20-9	7.8E+03	n	1.2E+05	nms					2.0E+03	n		4.1E-01	n	
				3.0E-02	H	2.0E-02	P	V		1		6.8E+03	Methyl Acrylate	96-33-3	1.4E+01	n	6.0E+01	n	2.1E+00	n	8.8E+00	n	3.9E+00	n		8.3E-04	n	
				6.0E-01	I	5.0E+00	I	V		1		2.8E+04	Methyl Ethyl Ketone (2-Butanone)	78-93-3	2.7E+03	n	1.9E+04	n	5.2E+02	n	2.2E+03	n	5.6E+02	n		1.2E-01	n	
		1.0E-03	X	1.0E-03	P	2.0E-05	X	V		1		1.8E+05	Methyl Hydrazine	60-34-4	3.1E-01	n	1.4E+00	n	2.1E-03	n	8.8E-03	n	4.2E-03	n		9.4E-07	n	
				8.0E-02	H	3.0E+00	I	V		1		3.4E+03	Methyl Isobutyl Ketone (4-methyl-2-pentanone)	108-10-1	5.3E+02	n	5.6E+03	ns	3.1E+02	n	1.3E+03	n	1.2E+02	n		2.8E-02	n	
						1.0E-03	C	V		1		1.7E+04	Methyl Isocyanate	624-83-9	4.6E-01	n	1.9E+00	n	1.0E-01	n	4.4E-01	n	2.1E-01	n		5.9E-05	n	
				1.4E+00	I	7.0E-01	I	V		1		2.4E+03	Methyl Methacrylate	80-62-6	4.4E+02	n	1.9E+03	n	7.3E+01	n	3.1E+02	n	1.4E+02	n		3.0E-02	n	
				2.5E-04	I					1	0.1		Methyl Parathion	298-00-0	1.6E+00	n	2.1E+01	n					4.5E-01	n		7.4E-04	n	
				6.0E-02	X					1	0.1		Methyl Phosphonic Acid	993-13-5	3.8E+02	n	4.9E+03	n					1.2E+02	n		2.4E-02	n	
				6.0E-03	H	4.0E-02	H	V		1		3.9E+02	Methyl Styrene (Mixed Isomers)	25013-15-4	2.4E+01	n	1.6E+02	n	4.2E+00	n	1.8E+01	n	3.8E+00	n		6.2E-03	n	
9.9E-02	C	2.8E-05	C							1	0.1		Methyl methanesulfonate	66-27-3	5.5E+00	c	2.3E+01	c	1.0E-01	c	4.4E-01	c	7.9E-01	c		1.6E-04	c	
1.8E-03	C	2.6E-07	C			3.0E+00	I	V		1		8.9E+03	Methyl tert-Butyl Ether (MTBE)	1634-04-4	4.7E+01	c*	2.1E+02	c*	1.1E+01	c*	4.7E+01	c*	1.4E+01	c*		3.2E-03	c*	
				3.0E-04	X					1	0.1		Methyl-1,4-benzenediamine dihydrochloride, 2-	615-45-2	1.9E+00	n	2.5E+01	n					6.0E-01	n		3.6E-04	n	
9.0E-03	P			2.0E-02	X					1	0.1		Methyl-5-Nitroaniline, 2-	99-55-8	6.0E+01	c**	2.6E+02	c**					8.1E+00	c**		4.5E-03	c**	
8.3E+00	C	2.4E-03	C							1	0.1		Methyl-N-nitro-N-nitrosoguanidine, N-	70-25-7	6.5E-02	c	2.8E-01	c	1.2E-03	c	5.1E-03	c	9.4E-03	c		3.2E-06	c	
1.3E-01	C	3.7E-05	C							1	0.1		Methylaniline Hydrochloride, 2-	636-21-5	4.2E+00	c	1.8E+01	c	7.6E-02	c	3.3E-01	c	6.0E-01	c		2.6E-04	c	
				1.0E-02	A					1	0.1		Methylarsonic acid	124-58-3	6.3E+01	n	8.2E+02	n					2.0E+01	n			n	
				2.0E-04	X					1	0.1		Methylbenzene,1-4-diamine monohydrochloride, 2-	74612-12-7	1.3E+00	n	1.6E+01	n					4.0E-01	n			n	
1.0E-01	X			3.0E-04	X					1	0.1		Methylbenzene-1,4-diamine sulfate, 2-	615-50-9	1.9E+00	n	2.3E+01	c**					6.0E-01	n			n	
2.2E+01	C	6.3E-03	C						M	1	0.1		Methylcholanthrene, 3-	56-49-5	5.5E-03	c	1.0E-01	c	1.6E-04	c	1.9E-03	c	1.1E-03	c		2.2E-03	c	
2.0E-03	I	1.0E-08	I	6.0E-03	I	6.0E-01	I	V	M	1		3.3E+03	Methylene Chloride	75-09-2	3.5E+01	n	3.2E+02	n	6.3E+01	n	2.6E+02	n	1.1E+01	n	5.0E+00	2.7E-03	n	1.3E-03
1.0E-01	P	4.3E-04	C	2.0E-03	P				M	1	0.1		Methylene-bis(2-chloroaniline), 4,4'-	101-14-4	1.2E+00	c*	2.3E+01	c**	2.4E-03	c	2.9E-02	c	1.6E-01	c*		1.8E-03	c*	

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Contaminant		Screening Levels												Protection of Ground Water SSLs		
Toxicity and Chemical-specific Information																
Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air (ug/m^3)	key	Industrial Air (ug/m^3)	key	Tapwater (ug/L)	key	MCL (ug/L)	Risk-based SSL (mg/kg)	key	MCL-based SSL (mg/kg)
Methylene-bis(N,N-dimethyl) Aniline, 4,4'-	101-61-1	1.2E+01	c	5.0E+01	c	2.2E-01	c	9.4E-01	c	4.6E-01	c		2.6E-03	c	
Methylenebisbenzenamine, 4,4'-	101-77-9	3.4E-01	c	1.4E+00	c	6.1E-03	c	2.7E-02	c	4.7E-02	c		2.1E-04	c	
Methylenediphenyl Diisocyanate	101-68-8	8.5E+04	n	3.6E+05	nm	6.3E-02	n	2.6E-01	n						
Methylstyrene, Alpha-	98-83-9	5.5E+02	ns	8.2E+03	ns					7.8E+01	n		1.2E-01	n	
Metolachlor	51218-45-2	9.5E+02	n	1.2E+04	n					2.7E+02	n		3.2E-01	n	
Metribuzin	21087-64-9	1.6E+02	n	2.1E+03	n					4.9E+01	n		1.5E-02	n	
Mineral oils	8012-95-1	2.3E+04	ns	3.5E+05	nms					6.0E+03	n		2.4E+02	n	
Mirex	2385-85-5	3.6E-02	c*	1.7E-01	c	5.5E-04	c	2.4E-03	c	8.8E-04	c		6.3E-04	c	
Molinate	2212-67-1	1.3E+01	n	1.6E+02	n					3.0E+00	n		1.7E-03	n	
Molybdenum	7439-98-7	3.9E+01	n	5.8E+02	n					1.0E+01	n		2.0E-01	n	
Monochloramine	10599-90-3	7.8E+02	n	1.2E+04	n					2.0E+02	n	4.0E+03		n	
Monomethylaniline	100-61-8	1.3E+01	n	1.6E+02	n					3.8E+00	n		1.4E-03	n	
N,N'-Diphenyl-1,4-benzenediamine	74-31-7	1.9E+00	n	2.5E+01	n					3.6E-01	n		3.7E-02	n	
Naled	300-76-5	1.6E+01	n	2.3E+02	n					4.0E+00	n		1.8E-03	n	
Naphtha, High Flash Aromatic (HFAN)	64742-95-6	2.3E+02	n	3.5E+03	n	1.0E+01	n	4.4E+01	n	1.5E+01	n			n	
Naphthylamine, 2-	91-59-8	3.0E-01	c	1.3E+00	c					3.9E-02	c		2.0E-04	c	
Napropamide	15299-99-7	6.3E+02	n	8.2E+03	n					1.6E+02	n		1.1E+00	n	
Nickel Acetate	373-02-4	6.7E+01	n	8.1E+02	n	1.5E-03	n	6.1E-03	n	2.2E+01	n			n	
Nickel Carbonate	3333-67-3	6.7E+01	n	8.1E+02	n	1.5E-03	n	6.1E-03	n	2.2E+01	n			n	
Nickel Carbonyl	13463-39-3	8.2E+01	n	1.1E+03	n	1.5E-03	n	6.1E-03	n	2.9E-03	n			n	
Nickel Hydroxide	12054-48-7	8.2E+01	n	1.1E+03	n	1.5E-03	n	6.1E-03	n	2.0E+01	n			n	
Nickel Oxide	1313-99-1	8.4E+01	n	1.2E+03	n	2.1E-03	n	8.8E-03	n	2.0E+01	n			n	
Nickel Refinery Dust	NA	8.2E+01	n	1.1E+03	n	1.5E-03	n	6.1E-03	n	2.2E+01	n		3.2E+00	n	
Nickel Soluble Salts	7440-02-0	1.5E+02	n	2.2E+03	n	9.4E-03	n	3.9E-02	n	3.9E+01	n		2.6E+00	n	
Nickel Subsulfide	12035-72-2	4.1E-01	c	1.9E+00	c	1.5E-03	n	6.1E-03	n	4.5E-02	c			c	
Nickelocene	1271-28-9	6.7E+01	n	8.1E+02	n	1.5E-03	n	6.1E-03	n	2.2E+01	n			n	
Nitrate	14797-55-8	1.3E+04	n	1.9E+05	nm					3.2E+03	n	1.0E+04		n	
Nitrate + Nitrite (as N)	NA											1.0E+04			
Nitrite	14797-65-0	7.8E+02	n	1.2E+04	n					2.0E+02	n	1.0E+03		n	
Nitroaniline, 2-	88-74-4	6.3E+01	n	8.0E+02	n	5.2E-03	n	2.2E-02	n	1.9E+01	n		8.0E-03	n	
Nitroaniline, 4-	100-01-6	2.5E+01	n	1.1E+02	c**	6.3E-01	n	2.6E+00	n	3.8E+00	c**		1.6E-03	c**	
Nitrobenzene	98-95-3	5.1E+00	c**	2.2E+01	c**	7.0E-02	c*	3.1E-01	c*	1.4E-01	c**		9.2E-05	c**	
Nitrocellulose	9004-70-0	1.9E+07	nm	2.5E+08	nm					6.0E+06	n		1.3E+03	n	
Nitrofurantoin	67-20-9	4.4E+02	n	5.7E+03	n					1.4E+02	n		6.1E-02	n	
Nitrofurazone	59-87-0	4.2E-01	c	1.8E+00	c	7.6E-03	c	3.3E-02	c	6.0E-02	c		5.4E-05	c	
Nitroglycerin	55-63-0	6.3E-01	n	8.2E+00	n					2.0E-01	n		8.5E-05	n	
Nitroguanidine	556-88-7	6.3E+02	n	8.2E+03	n					2.0E+02	n		4.8E-02	n	
Nitromethane	75-52-5	5.4E+00	c**	2.4E+01	c**	3.2E-01	c**	1.4E+00	c**	6.4E-01	c**		1.4E-04	c**	
Nitropropane, 2-	79-46-9	1.4E-02	c	6.0E-02	c	1.0E-03	c	4.5E-03	c	2.1E-03	c		5.4E-07	c	
Nitroso-N-ethylurea, N-	759-73-9	4.5E-03	c	8.5E-02	c	1.3E-04	c	1.6E-03	c	9.2E-04	c		2.2E-07	c	
Nitroso-N-methylurea, N-	684-93-5	1.0E-03	c	1.9E-02	c	3.0E-05	c	3.6E-04	c	2.1E-04	c		4.6E-08	c	
Nitroso-di-N-butylamine, N-	924-16-3	9.9E-02	c	4.6E-01	c	1.8E-03	c	7.7E-03	c	2.7E-03	c		5.5E-06	c	
Nitroso-di-N-propylamine, N-	621-64-7	7.8E-02	c	3.3E-01	c	1.4E-03	c	6.1E-03	c	1.1E-02	c		8.1E-06	c	
Nitrosodiethanolamine, N-	1116-54-7	1.9E-01	c	8.2E-01	c	3.5E-03	c	1.5E-02	c	2.8E-02	c		5.6E-06	c	
Nitrosodiethylamine, N-	55-18-5	8.1E-04	c	1.5E-02	c	2.4E-05	c	2.9E-04	c	1.7E-04	c		6.0E-08	c	
Nitrosodimethylamine, N-	62-75-9	2.0E-03	c*	3.4E-02	c*	7.2E-05	c*	8.8E-04	c*	1.1E-04	c*		2.8E-08	c*	
Nitrosodiphenylamine, N-	86-30-6	1.1E+02	c	4.7E+02	c	1.1E+00	c	4.7E+00	c	1.2E+01	c		6.6E-02	c	
Nitrosomethylethylamine, N-	10595-95-6	2.0E-02	c	9.1E-02	c	4.5E-04	c	1.9E-03	c	7.1E-04	c		2.0E-07	c	
Nitrosomorpholine [N-]	59-89-2	8.1E-02	c	3.4E-01	c	1.5E-03	c	6.5E-03	c	1.2E-02	c		2.8E-06	c	
Nitrosopiperidine [N-]	100-75-4	5.8E-02	c	2.4E-01	c	1.0E-03	c	4.5E-03	c	8.2E-03	c		4.4E-06	c	
Nitrosopyrrolidine, N-	930-55-2	2.6E-01	c	1.1E+00	c	4.6E-03	c	2.0E-02	c	3.7E-02	c		1.4E-05	c	
Nitrotoluene, m-	99-08-1	6.3E-01	n	8.2E+00	n					1.7E-01	n		1.6E-04	n	
Nitrotoluene, o-	88-72-2	3.2E+00	c**	1.5E+01	c**					3.1E-01	c**		2.9E-04	c**	
Nitrotoluene, p-	99-99-0	2.5E+01	n	1.4E+02	c**					4.2E+00	c**		3.9E-03	c**	
Nonane, n-	111-84-2	1.1E+00	n	7.2E+00	ns	2.1E+00	n	8.8E+00	n	5.3E-01	n		7.5E-03	n	
Norflurazon	27314-13-2	2.5E+02	n	3.3E+03	n					7.7E+01	n		5.0E-01	n	
Nustar	85509-19-9	4.4E+00	n	5.7E+01	n					1.1E+00	n		1.8E-01	n	
Octabromodiphenyl Ether	32536-52-0	1.9E+01	n	2.5E+02	n					6.0E+00	n		1.2E+00	n	
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX)	2691-41-0	3.9E+02	n	5.7E+03	n					1.0E+02	n		1.3E-01	n	
Octamethylpyrophosphoramide	152-16-9	1.3E+01	n	1.6E+02	n					4.0E+00	n		9.6E-04	n	
Oryzalin	19044-88-3	3.2E+02	n	4.1E+03	n					8.1E+01	n		1.5E-01	n	
Oxadiazon	19666-30-9	3.2E+01	n	4.1E+02	n					4.7E+00	n		4.8E-02	n	
Oxamyl	23135-22-0	1.6E+02	n	2.1E+03	n					5.0E+01	n	2.0E+02	1.1E-02	n	4.4E-02
Paclobutrazol	76738-62-0	8.2E+01	n	1.1E+03	n					2.3E+01	n		4.6E-02	n	
Paraquat Dichloride	1910-42-5	2.8E+01	n	3.7E+02	n					9.0E+00	n		1.2E-01	n	

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Toxicity and Chemical-specific Information												Contaminant		Screening Levels												Protection of Ground Water SSLs		
SFO (mg/kg-day)$^{-1}$	key	IUR (ug/m^3)$^{-1}$	key	RfD_o (mg/kg-day)	key	RfC_i (mg/m^3)	key	voc	muta-gen	GIABS	ABS	C_{sat} (mg/kg)	Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air (ug/m^3)	key	Industrial Air (ug/m^3)	key	Tapwater (ug/L)	key	MCL (ug/L)	Risk-based SSL (mg/kg)	key	MCL-based SSL (mg/kg)
				6.0E-03	H					1	0.1		Parathion	56-38-2	3.8E+01	n	4.9E+02	n					8.6E+00	n		4.3E-02	n	
				5.0E-02	H			V		1			Pebulate	1114-71-2	3.9E+02	n	5.8E+03	n					5.6E+01	n		4.5E-02	n	
				4.0E-02	I					1	0.1		Pendimethalin	40487-42-1	2.5E+02	n	3.3E+03	n					1.8E+01	n		2.1E-01	n	
				2.0E-03	I					1	0.1		Pentabromodiphenyl Ether	32534-81-9	1.3E+01	n	1.6E+02	n					4.0E+00	n		1.7E-01	n	
				1.0E-04	I					1	0.1		Pentabromodiphenyl ether, 2,2',4,4',5- (BDE-99)	60348-60-9	6.3E-01	n	8.2E+00	n					2.0E-01	n		8.7E-03	n	
				8.0E-04	I			V		1			Pentachlorobenzene	608-93-5	6.3E+00	n	9.3E+01	n					3.2E-01	n		2.4E-03	n	
9.0E-02	P							V		1		4.5E+02	Pentachloroethane	76-01-7	7.7E+00	c	3.6E+01	c					6.4E-01	c		3.1E-04	c	
2.6E-01	H			3.0E-03	I			V		1			Pentachloronitrobenzene	82-68-8	2.7E+00	c**	1.3E+01	c*					1.2E-01	c*		1.4E-03	c*	
4.0E-01	I	5.1E-06	C	5.0E-03	I					1	0.25		Pentachlorophenol	87-86-5	1.0E+00	c*	4.0E+00	c*	5.5E-01	c	2.4E+00	c	4.0E-02	c*	1.0E+00	4.0E-04	c*	1.0E-02
4.0E-03	X			2.0E-03	P					1	0.1		Pentaerythritol tetranitrate (PETN)	78-11-5	1.3E+01	n	1.6E+02	n					3.9E+00	n		5.8E-03	n	
						1.0E+00	P	V		1		3.9E+02	Pentane, n-	109-66-0	8.1E+01	n	3.4E+02	n	1.0E+02	n	4.4E+02	n	2.1E+02	n		1.0E+00	n	
													Perchlorates															
				7.0E-04	I					1			~Ammonium Perchlorate	7790-98-9	5.5E+00	n	8.2E+01	n					1.4E+00	n			n	
				7.0E-04	I					1			~Lithium Perchlorate	7791-03-9	5.5E+00	n	8.2E+01	n					1.4E+00	n			n	
				7.0E-04	I					1			~Perchlorate and Perchlorate Salts	14797-73-0	5.5E+00	n	8.2E+01	n					1.4E+00	n	1.5E+01(F)		n	
				7.0E-04	I					1			~Potassium Perchlorate	7778-74-7	5.5E+00	n	8.2E+01	n					1.4E+00	n			n	
				7.0E-04	I					1			~Sodium Perchlorate	7601-89-0	5.5E+00	n	8.2E+01	n					1.4E+00	n			n	
				2.0E-02	P			V		1			Perfluorobutane Sulfonate	375-73-5	1.6E+02	n	2.3E+03	n					3.8E+01	n		2.1E-02	n	
				5.0E-02	I					1	0.1		Permethrin	52645-53-1	3.2E+02	n	4.1E+03	n					1.0E+02	n		2.4E+01	n	
2.2E-03	C	6.3E-07	C							1	0.1		Phenacetin	62-44-2	2.5E+02	c	1.0E+03	c	4.5E+00	c	1.9E+01	c	3.4E+01	c		9.7E-03	c	
				2.5E-01	I					1	0.1		Phenmedipham	13684-63-4	1.6E+03	n	2.1E+04	n					4.0E+02	n		2.1E+00	n	
				3.0E-01	I	2.0E-01	C			1	0.1		Phenol	108-95-2	1.9E+03	n	2.5E+04	n	2.1E+01	n	8.8E+01	n	5.8E+02	n		3.3E-01	n	
				5.0E-04	X					1	0.1		Phenothiazine	92-84-2	3.2E+00	n	4.1E+01	n					4.3E-01	n		1.4E-03	n	
				6.0E-03	I					1	0.1		Phenylenediamine, m-	108-45-2	3.8E+01	n	4.9E+02	n					1.2E+01	n		3.2E-03	n	
4.7E-02	H									1	0.1		Phenylenediamine, o-	95-54-5	1.2E+01	c	4.9E+01	c					1.6E+00	c		4.4E-04	c	
				1.9E-01	H					1	0.1		Phenylenediamine, p-	106-50-3	1.2E+03	n	1.6E+04	n					3.8E+02	n		1.0E-01	n	
1.9E-03	H									1	0.1		Phenylphenol, 2-	90-43-7	2.8E+02	c	1.2E+03	c					3.0E+01	c		4.0E-01	c	
				2.0E-04	H					1	0.1		Phorate	298-02-2	1.3E+00	n	1.6E+01	n					3.0E-01	n		3.4E-04	n	
						3.0E-04	I	V		1		1.6E+03	Phosgene	75-44-5	3.1E-02	n	1.3E-01	n	3.1E-02	n	1.3E-01	n						
				2.0E-02	I					1	0.1		Phosmet	732-11-6	1.3E+02	n	1.6E+03	n					3.7E+01	n		8.2E-03	n	
													Phosphates, inorganic															
				4.9E+01	P					1			~Aluminum metaphosphate	13776-88-0	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Ammonium polyphosphate	68333-79-9	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Calcium pyrophosphate	7790-76-3	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Diammonium phosphate	7783-28-0	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Dicalcium phosphate	7757-93-9	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Dimagnesium phosphate	7782-75-4	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Dipotassium phosphate	7758-11-4	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Disodium phosphate	7558-79-4	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Monoaluminum phosphate	13530-50-2	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Monoammonium phosphate	7722-76-1	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Monocalcium phosphate	7758-23-8	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Monomagnesium phosphate	7757-86-0	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Monopotassium phosphate	7778-77-0	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Monosodium phosphate	7558-80-7	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Polyphosphoric acid	8017-16-1	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Potassium tripolyphosphate	13845-36-8	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Sodium acid pyrophosphate	7758-16-9	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Sodium aluminum phosphate (acidic)	7785-88-8	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Sodium aluminum phosphate (anhydrous)	10279-59-1	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Sodium aluminum phosphate (tetrahydrate)	10305-76-7	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Sodium hexametaphosphate	10124-56-8	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Sodium polyphosphate	68915-31-1	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Sodium trimetaphosphate	7785-84-4	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Sodium tripolyphosphate	7758-29-4	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Tetrapotassium phosphate	7320-34-5	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Tetrasodium pyrophosphate	7722-88-5	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Trialuminum sodium tetra decahydrogenoctaorthophosphate (dihydrate)	15136-87-5	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Tricalcium phosphate	7758-87-4	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Trimagnesium phosphate	7757-87-1	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Tripotassium phosphate	7778-53-2	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				4.9E+01	P					1			~Trisodium phosphate	7601-54-9	3.8E+05	nm	5.7E+06	nm					9.7E+04	n			n	
				3.0E-04	I	3.0E-04	I	V		1			Phosphine	7803-51-2	2.3E+00	n	3.5E+01	n	3.1E-02	n	1.3E-01	n	5.7E-02	n			n	
				4.9E+01	P	1.0E-02	I			1			Phosphoric Acid	7664-38-2	3.0E+05	nm	2.9E+06	nm	1.0E+00	n	4.4E+00	n	9.7E+04	n			n	
				2.0E-05	I			V		1			Phosphorus, White	7723-14-0	1.6E-01	n	2.3E+00	n					4.0E-02	n		1.5E-04	n	

Key: I = IRIS; P = PPRTV; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; J = New Jersey; O = EPA Office of Water; F = See FAQ; E = Environmental Criteria and Assessment Office; S = see user guide Section 5; L = see user guide on lead; M = mutagen; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; n = noncancer; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide); SSL values are based on DAF=1

Contaminant		Screening Levels														Protection of Ground Water SSLs			
Toxicity and Chemical-specific Information																			
Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air (ug/m^3)	key	Industrial Air (ug/m^3)	key	Tapwater (ug/L)	key	MCL (ug/L)		Risk-based SSL (mg/kg)	key	MCL-based SSL (mg/kg)
SFO (mg/kg-day)$^{-1}$	key	IUR (ug/m^3)$^{-1}$	key	RfD$_o$ (mg/kg-day)	key	RfC$_i$ (mg/m^3)	key	VOC	muta-gen	GIABS	ABS	C$_{sat}$ (mg/kg)							
Phthalates																			
~Bis(2-ethylhexyl)phthalate	117-81-7	3.9E+01	c**	1.6E+02	c*	1.2E+00	c	5.1E+00	c	5.6E+00	c**	6.0E+00		1.3E+00	c**	1.4E+00		1.4E-02	I
~Butylphthalyl Butylglycolate	85-70-1	6.3E+03	n	8.2E+04	n					1.3E+03	n			3.0E+01	n				
~Dibutyl Phthalate	84-74-2	6.3E+02	n	8.2E+03	n					9.0E+01	n			2.3E-01	n				
~Diethyl Phthalate	84-66-2	5.1E+03	n	6.6E+04	n					1.5E+03	n			6.1E-01	n				
~Dimethylterephthalate	120-61-6	7.8E+02	n	1.2E+04	n					1.9E+02	n			4.9E-02	n				
~Octyl Phthalate, di-N-	117-84-0	6.3E+01	n	8.2E+02	n					2.0E+01	n			5.7E+00	n				
~Phthalic Acid, P-	100-21-0	6.3E+03	n	8.2E+04	n					1.9E+03	n			6.8E-01	n				
~Phthalic Anhydride	85-44-9	1.3E+04	n	1.6E+05	nm	2.1E+00	n	8.8E+00	n	3.9E+03	n			8.5E-01	n				
Picloram	1918-02-1	4.4E+02	n	5.7E+03	n					1.4E+02	n	5.0E+02		3.8E-02	n	1.4E-01			
Picramic Acid (2-Amino-4,6-dinitrophenol)	96-91-3	6.3E-01	n	8.2E+00	n					2.0E-01	n			1.3E-04	n				
Pirimiphos, Methyl	29232-93-7	6.3E+01	n	8.2E+02	n					1.2E+01	n			1.2E-02	n				
Polybrominated Biphenyls	59536-65-1	1.8E-02	c**	7.7E-02	c**	3.3E-04	c	1.4E-03	c	2.6E-03	c**				c**			3.0E+01	I
Polychlorinated Biphenyls (PCBs)																			
~Aroclor 1016	12674-11-2	4.1E-01	n	5.1E+00	n	1.4E-01	c	6.1E-01	c	1.4E-01	n			1.3E-02	n			7.0E-02	S
~Aroclor 1221	11104-28-2	1.7E-01	c	7.2E-01	c	4.9E-03	c	2.1E-02	c	4.6E-03	c			7.9E-05	c			2.0E+00	S
~Aroclor 1232	11141-16-5	1.7E-01	c	7.2E-01	c	4.9E-03	c	2.1E-02	c	4.6E-03	c			7.9E-05	c			2.0E+00	S
~Aroclor 1242	53469-21-9	2.3E-01	c	9.7E-01	c	4.9E-03	c	2.1E-02	c	7.8E-03	c			1.2E-03	c			2.0E+00	S
~Aroclor 1248	12672-29-6	2.3E-01	c	9.4E-01	c	4.9E-03	c	2.1E-02	c	7.8E-03	c			1.2E-03	c			2.0E+00	S
~Aroclor 1254	11097-69-1	1.2E-01	n	9.7E-01	c**	4.9E-03	c	2.1E-02	c	7.8E-03	c**			2.0E-03	c**			2.0E+00	S
~Aroclor 1260	11096-82-5	2.4E-01	c	9.9E-01	c	4.9E-03	c	2.1E-02	c	7.8E-03	c			5.5E-03	c			2.0E+00	S
~Aroclor 5460	11126-42-4	3.5E+00	n	4.4E+01	n					1.2E+00	n			2.0E-01	n			6.0E-04	X
~Heptachlorobiphenyl, 2,3,3',4,4',5,5'- (PCB 189)	39635-31-9	1.2E-01	c**	5.1E-01	c**	2.5E-03	c*	1.1E-02	c*	4.0E-03	c*			2.8E-03	c*			3.9E+00	E
~Hexachlorobiphenyl, 2,3',4,4',5,5'- (PCB 167)	52663-72-6	1.2E-01	c**	5.1E-01	c**	2.5E-03	c*	1.1E-02	c*	4.0E-03	c*			1.7E-03	c*			3.9E+00	E
~Hexachlorobiphenyl, 2,3,3',4,4',5'- (PCB 157)	69782-90-7	1.2E-01	c**	5.1E-01	c**	2.5E-03	c*	1.1E-02	c*	4.0E-03	c*			1.7E-03	c*			3.9E+00	E
~Hexachlorobiphenyl, 2,3,3',4,4',5- (PCB 156)	38380-08-4	1.2E-01	c**	5.1E-01	c**	2.5E-03	c*	1.1E-02	c*	4.0E-03	c*			1.7E-03	c*			3.9E+00	E
~Hexachlorobiphenyl, 3,3',4,4',5,5'- (PCB 169)	32774-16-6	1.2E-04	c**	5.1E-04	c**	2.5E-06	c*	1.1E-05	c*	4.0E-06	c*			1.7E-06	c*			3.9E+03	E
~Pentachlorobiphenyl, 2',3,4,4',5- (PCB 123)	65510-44-3	1.2E-01	c**	5.0E-01	c**	2.5E-03	c*	1.1E-02	c*	4.0E-03	c*			1.0E-03	c*			3.9E+00	E
~Pentachlorobiphenyl, 2,3',4,4',5- (PCB 118)	31508-00-6	1.2E-01	c**	5.0E-01	c**	2.5E-03	c*	1.1E-02	c*	4.0E-03	c*			1.0E-03	c*			3.9E+00	E
~Pentachlorobiphenyl, 2,3,3',4,4'- (PCB 105)	32598-14-4	1.2E-01	c**	5.0E-01	c**	2.5E-03	c*	1.1E-02	c*	4.0E-03	c*			1.0E-03	c*			3.9E+00	E
~Pentachlorobiphenyl, 2,3,4,4',5- (PCB 114)	74472-37-0	1.2E-01	c**	5.0E-01	c**	2.5E-03	c*	1.1E-02	c*	4.0E-03	c*			1.0E-03	c*			3.9E+00	E
~Pentachlorobiphenyl, 3,3',4,4',5- (PCB 126)	57465-28-8	3.7E-05	c**	1.5E-04	c**	7.4E-07	c*	3.2E-06	c*	1.2E-06	c*			3.0E-07	c*			1.3E+04	E
~Polychlorinated Biphenyls (high risk)	1336-36-3	2.3E-01	c	9.7E-01	c	4.9E-03	c	2.1E-02	c									2.0E+00	I
~Polychlorinated Biphenyls (low risk)	1336-36-3					2.8E-02	c	1.2E-01	c	4.4E-02	c	5.0E-01		6.8E-03	c	7.8E-02		4.0E-01	I
~Polychlorinated Biphenyls (lowest risk)	1336-36-3					1.4E-01	c	6.1E-01	c									7.0E-02	I
~Tetrachlorobiphenyl, 3,3',4,4'- (PCB 77)	32598-13-3	3.8E-02	c**	1.6E-01	c**	7.4E-04	c*	3.2E-03	c*	6.0E-03	c**			9.4E-04	c**			1.3E+01	E
~Tetrachlorobiphenyl, 3,4,4',5- (PCB 81)	70362-50-4	1.2E-02	c**	4.9E-02	c**	2.5E-04	c*	1.1E-03	c*	4.0E-04	c*			6.2E-05	c*			3.9E+01	E
Polymeric Methylene Diphenyl Diisocyanate (PMDI)	9016-87-9	8.5E+04	n	3.6E+05	nm	6.3E-02	n	2.6E-01	n									6.0E-03	M
Polynuclear Aromatic Hydrocarbons (PAHs)																			
~Acenaphthene	83-32-9	3.6E+02	n	4.5E+03	n					5.3E+01	n			5.5E-01	n			6.0E-02	I
~Anthracene	120-12-7	1.8E+03	n	2.3E+04	n					1.8E+02	n			5.8E+00	n			3.0E-01	I
~Benz[a]anthracene	56-55-3	1.6E-01	c	2.9E+00	c	9.2E-03	c	1.1E-01	c	1.2E-02	c			4.3E-03	c			7.3E-01	E
~Benzo(j)fluoranthene	205-82-3	4.2E-01	c	1.8E+00	c	2.6E-02	c	1.1E-01	c	6.5E-02	c			7.8E-02	c			1.2E+00	C
~Benzo[a]pyrene	50-32-8	1.6E-02	c	2.9E-01	c	9.2E-04	c	1.1E-02	c	3.4E-03	c	2.0E-01		4.0E-03	c	2.4E-01		7.3E+00	I
~Benzo[b]fluoranthene	205-99-2	1.6E-01	c	2.9E+00	c	9.2E-03	c	1.1E-01	c	3.4E-02	c			4.1E-02	c			7.3E-01	E
~Benzo[k]fluoranthene	207-08-9	1.6E+00	c	2.9E+01	c	9.2E-03	c	1.1E-01	c	3.4E-01	c			4.0E-01	c			7.3E-02	E
~Chloronaphthalene, Beta-	91-58-7	4.8E+02	n	6.0E+03	n					7.5E+01	n			3.8E-01	n			8.0E-02	I
~Chrysene	218-01-9	1.6E+01	c	2.9E+02	c	9.2E-02	c	1.1E+00	c	3.4E+00	c			1.2E+00	c			7.3E-03	E
~Dibenz[a,h]anthracene	53-70-3	1.6E-02	c	2.9E-01	c	8.4E-04	c	1.0E-02	c	3.4E-03	c			1.3E-02	c			7.3E+00	E
~Dibenzo(a,e)pyrene	192-65-4	4.2E-02	c	1.8E-01	c	2.6E-03	c	1.1E-02	c	6.5E-03	c			8.4E-02	c			1.2E+01	C
~Dimethylbenz(a)anthracene, 7,12-	57-97-6	4.6E-04	c	8.4E-03	c	1.4E-05	c	1.7E-04	c	1.0E-04	c			9.9E-05	c			2.5E+02	C
~Fluoranthene	206-44-0	2.4E+02	n	3.0E+03	n					8.0E+01	n			8.9E+00	n			4.0E-02	I
~Fluorene	86-73-7	2.4E+02	n	3.0E+03	n					2.9E+01	n			5.4E-01	n			4.0E-02	I
~Indeno[1,2,3-cd]pyrene	193-39-5	1.6E-01	c	2.9E+00	c	9.2E-03	c	1.1E-01	c	3.4E-02	c			1.3E-01	c			7.3E-01	E
~Methylnaphthalene, 1-	90-12-0	1.8E+01	c*	7.3E+01	c*					1.1E+00	c*			5.8E-03	c*			2.9E-02	P
~Methylnaphthalene, 2-	91-57-6	2.4E+01	n	3.0E+02	n					3.6E+00	n			1.9E-02	n			4.0E-03	I
~Naphthalene	91-20-3	3.8E+00	c**	1.7E+01	c**	8.3E-02	c**	3.6E-01	c**	1.7E-01	c**			5.4E-04	c**			2.0E-02	I
~Nitropyrene, 4-	57835-92-4	4.2E-01	c	1.8E+00	c	2.6E-02	c	1.1E-01	c	1.9E-02	c			3.2E-03	c			3.4E-05	C
~Pyrene	129-00-0	1.8E+02	n	2.3E+03	n					1.2E+01	n			1.3E+00	n			1.2E+00	C
Potassium Perfluorobutane Sulfonate	29420-49-3	1.3E+02	n	1.6E+03	n					4.0E+01	n				n			1.1E-04	C
Prochloraz	67747-09-5	3.6E+00	c*	1.5E+01	c*					3.7E-01	c*			1.9E-03	c*			1.5E-01	I
Profluralin	26399-36-0	4.7E+01	n	7.0E+02	n					2.6E+00	n			1.6E-01	n			6.0E-03	H
Prometon	1610-18-0	9.5E+01	n	1.2E+03	n					2.5E+01	n			1.2E-02	n			1.5E-02	I
Prometryn	7287-19-6	2.5E+01	n	3.3E+02	n					6.0E+00	n			9.0E-03	n			4.0E-03	I
Propachlor	1918-16-7	8.2E+01	n	1.1E+03	n					2.5E+01	n			1.5E-02	n			1.3E-02	I

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Toxicity and Chemical-specific Information												Contaminant		Screening Levels													Protection of Ground Water SSLs		
SFO (mg/kg-day)$^{-1}$	key	IUR (ug/m^3)$^{-1}$	key	RfD_o (mg/kg-day)	key	RfC_i (mg/m^3)	key	vo c	muta-gen	GIABS	ABS	C_{sat} (mg/kg)	Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air (ug/m^3)	key	Industrial Air (ug/m^3)	key	Tapwater (ug/L)	key	MCL (ug/L)	Risk-based SSL (mg/kg)	key	MCL-based SSL (mg/kg)
				5.0E-03	I					1	0.1		Propanil	709-98-8	3.2E+01	n	4.1E+02	n					8.2E+00	n		4.5E-03	n	
				2.0E-02	I					1	0.1		Propargite	2312-35-8	1.3E+02	n	1.6E+03	n					1.6E+01	n		1.2E+00	n	
				2.0E-03	I			V		1		1.1E+05	Propargyl Alcohol	107-19-7	1.6E+01	n	2.3E+02	n					4.0E+00	n		8.1E-04	n	
				2.0E-02	I					1	0.1		Propazine	139-40-2	1.3E+02	n	1.6E+03	n					3.4E+01	n		3.0E-02	n	
				2.0E-02	I					1	0.1		Propham	122-42-9	1.3E+02	n	1.6E+03	n					3.5E+01	n		2.2E-02	n	
				1.3E-02	I					1	0.1		Propiconazole	60207-90-1	8.2E+01	n	1.1E+03	n					2.1E+01	n		6.9E-02	n	
						8.0E-03	I	V		1		3.3E+04	Propionaldehyde	123-38-6	7.5E+00	n	3.1E+01	n	8.3E-01	n	3.5E+00	n	1.7E+00	n		3.4E-04	n	
				1.0E-01	X	1.0E+00	X	V		1		2.6E+02	Propyl benzene	103-65-1	3.8E+02	ns	2.4E+03	ns	1.0E+02	n	4.4E+02	n	6.6E+01	n		1.2E-01	n	
						3.0E+00	C	V		1		3.5E+02	Propylene	115-07-1	2.2E+02	n	9.3E+02	ns	3.1E+02	n	1.3E+03	n	6.3E+02	n		6.0E-01	n	
				2.0E+01	P					1	0.1		Propylene Glycol	57-55-6	1.3E+05	nm	1.6E+06	nm					4.0E+04	n		8.1E+00	n	
						2.7E-04	A			1	0.1		Propylene Glycol Dinitrate	6423-43-4	3.9E+04	n	1.6E+05	nm	2.8E-02	n	1.2E-01	n							
				7.0E-01	H			V		1		8.5E+04	Propylene Glycol Monoethyl Ether	1569-02-4	5.5E+03	n	8.2E+04	n					1.4E+03	n		2.8E-01	n	
				7.0E-01	H	2.0E+00	I	V		1		1.1E+05	Propylene Glycol Monomethyl Ether	107-98-2	4.1E+03	n	3.7E+04	n	2.1E+02	n	8.8E+02	n	3.2E+02	n		6.5E-02	n	
2.4E-01	I	3.7E-06	I			3.0E-02	I	V		1		7.8E+04	Propylene Oxide	75-56-9	2.1E+00	c*	9.7E+00	c*	7.6E-01	c**	3.3E+00	c**	2.7E-01	c*		5.6E-05	c*	
				2.5E-01	I					1	0.1		Pursuit	81335-77-5	1.6E+03	n	2.1E+04	n					4.7E+02	n		4.1E-01	n	
				2.5E-02	I					1	0.1		Pydrin	51630-58-1	1.6E+02	n	2.1E+03	n					5.0E+01	n		3.2E+01	n	
				1.0E-03	I			V		1		5.3E+05	Pyridine	110-86-1	7.8E+00	n	1.2E+02	n					2.0E+00	n		6.8E-04	n	
				5.0E-04	I					1	0.1		Quinalphos	13593-03-8	3.2E+00	n	4.1E+01	n					5.1E-01	n		4.3E-03	n	
3.0E+00	I									1	0.1		Quinoline	91-22-5	1.8E-01	c	7.7E-01	c					2.4E-02	c		7.8E-05	c	
						3.0E-02	A			1			Refractory Ceramic Fibers	NA	4.3E+06	nm	1.8E+07	nm	3.1E+00	n	1.3E+01	n							
				3.0E-02	I					1	0.1		Resmethrin	10453-86-8	1.9E+02	n	2.5E+03	n					6.7E+00	n		4.2E+00	n	
				5.0E-02	H			V		1			Ronnel	299-84-3	3.9E+02	n	5.8E+03	n					4.1E+01	n		3.7E-01	n	
				4.0E-03	I					1	0.1		Rotenone	83-79-4	2.5E+01	n	3.3E+02	n					6.1E+00	n		3.2E+00	n	
2.2E-01	C	6.3E-05	C						M	1	0.1		Safrole	94-59-7	5.5E-01	c	1.0E+01	c	1.6E-02	c	1.9E-01	c	9.5E-02	c		5.9E-05	c	
				2.5E-02	I					1	0.1		Savey	78587-05-0	1.6E+02	n	2.1E+03	n					1.1E+01	n		5.0E-02	n	
				5.0E-03	I					1			Selenious Acid	7783-00-8	3.9E+01	n	5.8E+02	n					1.0E+01	n			n	
				5.0E-03	I	2.0E-02	C			1			Selenium	7782-49-2	3.9E+01	n	5.8E+02	n	2.1E+00	n	8.8E+00	n	1.0E+01	n	5.0E+01	5.2E-02	n	2.6E-01
				5.0E-03	C	2.0E-02	C			1			Selenium Sulfide	7446-34-6	3.9E+01	n	5.8E+02	n	2.1E+00	n	8.8E+00	n	1.0E+01	n			n	
				9.0E-02	I					1	0.1		Sethoxydim	74051-80-2	5.7E+02	n	7.4E+03	n					1.0E+02	n		9.3E-01	n	
						3.0E-03	C			1			Silica (crystalline, respirable)	7631-86-9	4.3E+05	nm	1.8E+06	nm	3.1E-01	n	1.3E+00	n						
				5.0E-03	I					0.04			Silver	7440-22-4	3.9E+01	n	5.8E+02	n					9.4E+00	n		8.0E-02	n	
1.2E-01	H			5.0E-03	I					1	0.1		Simazine	122-34-9	4.5E+00	c**	1.9E+01	c*					6.1E-01	c*	4.0E+00	3.0E-04	c*	2.0E-03
				1.3E-02	I					1	0.1		Sodium Acifluorfen	62476-59-9	8.2E+01	n	1.1E+03	n					2.6E+01	n		2.1E-01	n	
				4.0E-03	I					1			Sodium Azide	26628-22-8	3.1E+01	n	4.7E+02	n					8.0E+00	n			n	
5.0E-01	C	1.5E-01	C	2.0E-02	C	2.0E-04	C		M	0.025			Sodium Dichromate	10588-01-9	3.0E-01	c	6.2E+00	c	6.8E-06	c	8.2E-05	c	4.1E-02	c			c	
2.7E-01	H			3.0E-02	I					1	0.1		Sodium Diethyldithiocarbamate	148-18-5	2.0E+00	c*	8.5E+00	c					2.9E-01	c			c	
				5.0E-02	A	1.3E-02	C			1			Sodium Fluoride	7681-49-4	3.9E+02	n	5.8E+03	n	1.4E+00	n	5.7E+00	n	1.0E+02	n			n	
				2.0E-05	I					1	0.1		Sodium Fluoroacetate	62-74-8	1.3E-01	n	1.6E+00	n					4.0E-02	n		8.1E-06	n	
				1.0E-03	H					1			Sodium Metavanadate	13718-26-8	7.8E+00	n	1.2E+02	n					2.0E+00	n			n	
2.4E-02	H			3.0E-02	I					1	0.1		Strirofos (Tetrachlorovinphos)	961-11-5	2.3E+01	c**	9.6E+01	c*					2.8E+00	c*		8.1E-03	c*	
5.0E-01	C	1.5E-01	C	2.0E-02	C	2.0E-04	C		M	0.025			Strontium Chromate	7789-06-2	3.0E-01	c	6.2E+00	c	6.8E-06	c	8.2E-05	c	4.1E-02	c			c	
				6.0E-01	I					1			Strontium, Stable	7440-24-6	4.7E+03	n	7.0E+04	n					1.2E+03	n		4.2E+01	n	
				3.0E-04	I					1	0.1		Strychnine	57-24-9	1.9E+00	n	2.5E+01	n					5.9E-01	n		6.5E-03	n	
				2.0E-01	I	1.0E+00	I	V		1		8.7E+02	Styrene	100-42-5	6.0E+02	n	3.5E+03	ns	1.0E+02	n	4.4E+02	n	1.2E+02	n	1.0E+02	1.3E-01	n	1.1E-01
				3.0E-03	P					1	0.1		Styrene-Acrylonitrile (SAN) Trimer	NA	1.9E+01	n	2.5E+02	n					4.8E+00	n			n	
				1.0E-03	P	2.0E-03	X			1	0.1		Sulfolane	126-33-0	6.3E+00	n	8.2E+01	n	2.1E-01	n	8.8E-01	n	2.0E+00	n		4.4E-04	n	
				8.0E-04	P					1	0.1		Sulfonylbis(4-chlorobenzene), 1,1'-	80-07-9	5.1E+00	n	6.6E+01	n					1.1E+00	n		6.5E-03	n	
						1.0E-03	C	V		1			Sulfur Trioxide	7446-11-9	1.4E+05	nm	6.0E+05	nm	1.0E-01	n	4.4E-01	n	2.1E-01	n			n	
						1.0E-03	C			1			Sulfuric Acid	7664-93-9	1.4E+05	nm	6.0E+05	nm	1.0E-01	n	4.4E-01	n						
				2.5E-02	I					1	0.1		Systhane	88671-89-0	1.6E+02	n	2.1E+03	n					4.5E+01	n		5.6E-01	n	
				3.0E-02	H					1	0.1		TCMTB	21564-17-0	1.9E+02	n	2.5E+03	n					4.8E+01	n		3.3E-01	n	
				7.0E-02	I					1	0.1		Tebuthiuron	34014-18-1	4.4E+02	n	5.7E+03	n					1.4E+02	n		3.9E-02	n	
				2.0E-02	H					1	0.1		Temephos	3383-96-8	1.3E+02	n	1.6E+03	n					4.0E+01	n		7.6E+00	n	
				1.3E-02	I					1	0.1		Terbacil	5902-51-2	8.2E+01	n	1.1E+03	n					2.5E+01	n		7.5E-03	n	
				2.5E-05	H			V		1		3.1E+01	Terbufos	13071-79-9	2.0E-01	n	2.9E+00	n					2.4E-02	n		5.2E-05	n	
				1.0E-03	I					1	0.1		Terbutryn	886-50-0	6.3E+00	n	8.2E+01	n					1.3E+00	n		1.9E-03	n	
				1.0E-04	I					1	0.1		Tetrabromodiphenyl ether, 2,2',4,4'- (BDE-47)	5436-43-1	6.3E-01	n	8.2E+00	n					2.0E-01	n		5.3E-03	n	
				3.0E-04	I			V		1			Tetrachlorobenzene, 1,2,4,5-	95-94-3	2.3E+00	n	3.5E+01	n					1.7E-01	n		7.9E-04	n	
2.6E-02	I	7.4E-06	I	3.0E-02	I			V		1		6.8E+02	Tetrachloroethane, 1,1,1,2-	630-20-6	2.0E+00	c	8.8E+00	c	3.8E-01	c	1.7E+00	c	5.7E-01	c*		2.2E-04	c*	
2.0E-01	I	5.8E-05	C	2.0E-02	I			V		1		1.9E+03	Tetrachloroethane, 1,1,2,2-	79-34-5	6.0E-01	c	2.7E+00	c	4.8E-02	c	2.1E-01	c	7.6E-02	c		3.0E-05	c	
2.1E-03	I	2.6E-07	I	6.0E-03	I	4.0E-02	I	V		1		1.7E+02	Tetrachloroethylene	127-18-4	8.1E+00	n	3.9E+01	n	4.2E+00	n	1.8E+01	n	4.1E+00	n	5.0E+00	1.8E-03	n	2.3E-03
				3.0E-02	I					1	0.1		Tetrachlorophenol, 2,3,4,6-	58-90-2	1.9E+02	n	2.5E+03	n					2.4E+01	n		1.5E-01	n	
2.0E+01	H							V		1			Tetrachlorotoluene, p- alpha, alpha, alpha-	5216-25-1	3.5E-02	c	1.6E-01	c					1.3E-03	c		4.4E-06	c	
				5.0E-04	I					1	0.1		Tetraethyl Dithiopyrophosphate	3689-24-5	3.2E+00	n	4.1E+01	n					7.1E-01	n		5.2E-04	n	
						8.0E+01	I	V		1		1.1E+03	Tetrafluoroethane, 1,1,1,2-	811-97-2	1.0E+04	ns	4.3E+04	ns	8.3E+03	n	3.5E+04	n	1.7E+04	n		9.3E+00	n	

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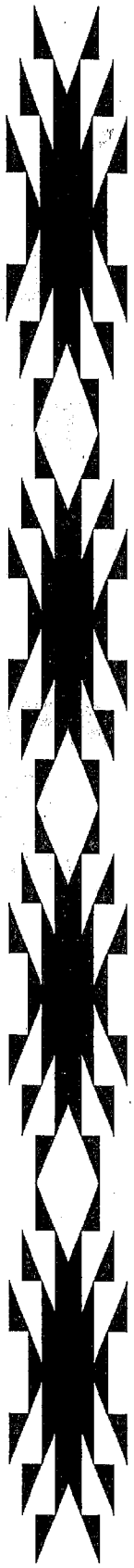
Contaminant		Screening Levels												Protection of Ground Water SSLs			
Toxicity and Chemical-specific Information																	
SFO (mg/kg-day)$^{-1}$	key	IUR ($\mu g/m^3$)$^{-1}$	key	RfD_o (mg/kg-day)	key	RfC_i (mg/m^3)	key	voc	muta-gen	GIABS	ABS	C_{sat} (mg/kg)	Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air (ug/m^3)	key	Industrial Air (ug/m^3)	key	Tapwater (ug/L)	key	MCL (ug/L)	Risk-based SSL (mg/kg)	key	MCL-based SSL (mg/kg)
				2.0E-03	P					1	0.0007		Tetryl (Trinitrophenylmethylnitramine)	479-45-8	1.6E+01	n	2.3E+02	n					3.9E+00	n		3.7E-02	n	
				7.0E-06	X					1			Thallium (I) Nitrate	10102-45-1	5.5E-02	n	8.2E-01	n					1.4E-02	n			n	
				1.0E-05	X					1			Thallium (Soluble Salts)	7440-28-0	7.8E-02	n	1.2E+00	n					2.0E-02	n	2.0E+00	1.4E-03	n	1.4E-01
				6.0E-06	X			V		1	0.1		Thallium Acetate	563-68-8	3.8E-02	n	4.9E-01	n					1.2E-02	n			n	
				2.0E-05	X					1	0.1		Thallium Carbonate	6533-73-9	1.3E-01	n	1.6E+00	n					4.0E-02	n			n	
				6.0E-06	X					1			Thallium Chloride	7791-12-0	4.7E-02	n	7.0E-01	n					1.2E-02	n			n	
				2.0E-05	X					1			Thallium Sulfate	7446-18-6	1.6E-01	n	2.3E+00	n					4.0E-02	n			n	
				1.0E-02	I					1	0.1		Thiobencarb	28249-77-6	6.3E+01	n	8.2E+02	n					1.6E+01	n		5.5E-02	n	
				7.0E-02	X					1	0.0075		Thiodiglycol	111-48-8	5.4E+02	n	7.9E+03	n					1.4E+02	n		2.8E-02	n	
				3.0E-04	H					1	0.1		Thiofanox	39196-18-4	1.9E+00	n	2.5E+01	n					5.3E-01	n		1.8E-04	n	
				8.0E-02	I					1	0.1		Thiophanate, Methyl	23564-05-8	5.1E+02	n	6.6E+03	n					1.6E+02	n		1.4E-01	n	
				5.0E-03	I					1	0.1		Thiram	137-26-8	3.2E+01	n	4.1E+02	n					9.8E+00	n		1.4E-02	n	
				6.0E-01	H					1			Tin	7440-31-5	4.7E+03	n	7.0E+04	n					1.2E+03	n		3.0E+02	n	
						1.0E-04	A	V		1			Titanium Tetrachloride	7550-45-0	1.4E+04	n	6.0E+04	n	1.0E-02	n	4.4E-02	n	2.1E-02	n			n	
				8.0E-02	I	5.0E+00	I	V		1		8.2E+02	Toluene	108-88-3	4.9E+02	n	4.7E+03	ns	5.2E+02	n	2.2E+03	n	1.1E+02	n	1.0E+03	7.6E-02	n	6.9E-01
1.8E-01	X			2.0E-04	X					1	0.1		Toluene-2,5-diamine	95-70-5	1.3E+00	n	1.3E+01	c**					4.0E-01	n		1.2E-04	n	
3.0E-02	P			4.0E-03	X					1	0.1		Toluidine, p-	106-49-0	1.8E+01	c**	7.7E+01	c**					2.5E+00	c**		1.1E-03	c**	
				3.0E+00	P			V		1		3.4E-01	Total Petroleum Hydrocarbons (Aliphatic High)	NA	2.3E+04	ns	3.5E+05	nms					6.0E+03	n		2.4E+02	n	
						6.0E-01	P	V		1		1.4E+02	Total Petroleum Hydrocarbons (Aliphatic Low)	NA	5.2E+01	n	2.2E+02	ns	6.3E+01	n	2.6E+02	n	1.3E+02	n		8.8E-01	n	
				1.0E-02	X	1.0E-01	P	V		1		6.9E+00	Total Petroleum Hydrocarbons (Aliphatic Medium)	NA	9.6E+00	ns	4.4E+01	ns	1.0E+01	n	4.4E+01	n	1.0E+01	n		1.5E-01	n	
				4.0E-02	P					1	0.1		Total Petroleum Hydrocarbons (Aromatic High)	NA	2.5E+02	n	3.3E+03	n					8.0E+01	n		8.9E+00	n	
				4.0E-03	P	3.0E-02	P	V		1		1.8E+03	Total Petroleum Hydrocarbons (Aromatic Low)	NA	8.2E+00	n	4.2E+01	n	3.1E+00	n	1.3E+01	n	3.3E+00	n		1.7E-03	n	
				4.0E-03	P	3.0E-03	P	V		1			Total Petroleum Hydrocarbons (Aromatic Medium)	NA	1.1E+01	n	6.0E+01	n	3.1E-01	n	1.3E+00	n	5.5E-01	n		2.3E-03	n	
1.1E+00	I	3.2E-04	I							1	0.1		Toxaphene	8001-35-2	4.9E-01	c	2.1E+00	c	8.8E-03	c	3.8E-02	c	1.5E-02	c	3.0E+00	2.4E-03	c	4.6E-01
				7.5E-03	I					1	0.1		Tralomethrin	66841-25-6	4.7E+01	n	6.2E+02	n					1.5E+01	n		5.8E+00	n	
				3.0E-04	A			V		1			Tri-n-butyltin	688-73-3	2.3E+00	n	3.5E+01	n					3.7E-01	n		8.2E-03	n	
				8.0E+01	X					1	0.1		Triacetin	102-76-1	5.1E+05	nm	6.6E+06	nm					1.6E+05	n		4.5E+01	n	
				1.3E-02	I			V		1			Triallate	2303-17-5	1.0E+02	n	1.5E+03	n					1.2E+01	n		2.6E-02	n	
				1.0E-02	I					1	0.1		Triasulfuron	82097-50-5	6.3E+01	n	8.2E+02	n					2.0E+01	n		2.1E-02	n	
				5.0E-03	I			V		1			Tribromobenzene, 1,2,4-	615-54-3	3.9E+01	n	5.8E+02	n					4.5E+00	n		6.4E-03	n	
				1.0E-02	P					1	0.1		Tributyl Phosphate	126-73-8	6.0E+01	c**	2.6E+02	c**					5.1E+00	c**		2.5E-02	c**	
9.0E-03	P			3.0E-04	P					1	0.1		Tributyltin Compounds	NA	1.9E+00	n	2.5E+01	n					6.0E-01	n			n	
				3.0E-04	I					1	0.1		Tributyltin Oxide	56-35-9	1.9E+00	n	2.5E+01	n					5.7E-01	n		2.9E+01	n	
				3.0E+01	I	3.0E+01	H	V		1		9.1E+02	Trichloro-1,2,2-trifluoroethane, 1,1,2-	76-13-1	4.0E+03	ns	1.7E+04	ns	3.1E+03	n	1.3E+04	n	5.5E+03	n		1.4E+01	n	
7.0E-02	I			2.0E-02	I					1	0.1		Trichloroacetic Acid	76-03-9	7.8E+00	c*	3.3E+01	c*					1.1E+00	c*	6.0E+01	2.2E-04	c*	1.2E-02
2.9E-02	H									1	0.1		Trichloroaniline HCl, 2,4,6-	33663-50-2	1.9E+01	c	7.9E+01	c					2.7E+00	c		7.4E-03	c	
7.0E-03	X			3.0E-05	X					1	0.1		Trichloroaniline,2,4,6-	634-93-5	1.9E-01	n	2.5E+00	n					4.0E-02	n		3.6E-04	n	
				8.0E-04	X			V		1			Trichlorobenzene, 1,2,3-	87-61-6	6.3E+00	n	9.3E+01	n					7.0E-01	n		2.1E-03	n	
2.9E-02	P			1.0E-02	I	2.0E-03	P	V		1		4.0E+02	Trichlorobenzene, 1,2,4-	120-82-1	5.8E+00	n	2.6E+01	n	2.1E-01	n	8.8E-01	n	4.0E-01	n	7.0E+01	1.2E-03	n	2.0E-01
				2.0E+00	I	5.0E+00	I	V		1		6.4E+02	Trichloroethane, 1,1,1-	71-55-6	8.1E+02	ns	3.6E+03	ns	5.2E+02	n	2.2E+03	n	8.0E+02	n	2.0E+02	2.8E-01	n	7.0E-02
5.7E-02	I	1.6E-05	I	4.0E-03	I	2.0E-04	X	V		1		2.2E+03	Trichloroethane, 1,1,2-	79-00-5	1.5E-01	n	6.3E-01	n	2.1E-02	n	8.8E-02	n	4.1E-02	n	5.0E+00	1.3E-05	n	1.6E-03
4.6E-02	I	4.1E-06	I	5.0E-04	I	2.0E-03	I	V	M	1		6.9E+02	Trichloroethylene	79-01-6	4.1E-01	n	1.9E+00	n	2.1E-01	n	8.8E-01	n	2.8E-01	n	5.0E+00	1.0E-04	n	1.8E-03
				3.0E-01	I	7.0E-01	H	V		1		1.2E+03	Trichlorofluoromethane	75-69-4	7.3E+01	n	3.1E+02	n	7.3E+01	n	3.1E+02	n	1.1E+02	n		7.3E-02	n	
				1.0E-01	I					1	0.1		Trichlorophenol, 2,4,5-	95-95-4	6.3E+02	n	8.2E+03	n					1.2E+02	n		4.4E-01	n	
1.1E-02	I	3.1E-06	I	1.0E-03	P					1	0.1		Trichlorophenol, 2,4,6-	88-06-2	6.3E+00	n	8.2E+01	n	9.1E-01	c	4.0E+00	c	1.2E+00	n		4.5E-03	n	
				1.0E-02	I					1	0.1		Trichlorophenoxyacetic Acid, 2,4,5-	93-76-5	6.3E+01	n	8.2E+02	n					1.6E+01	n		6.7E-03	n	
				8.0E-03	I					1	0.1		Trichlorophenoxypropionic acid, -2,4,5	93-72-1	5.1E+01	n	6.6E+02	n					1.1E+01	n	5.0E+01	6.1E-03	n	2.8E-02
				5.0E-03	I			V		1		1.3E+03	Trichloropropane, 1,1,2-	598-77-6	3.9E+01	n	5.8E+02	n					8.8E+00	n		3.5E-03	n	
3.0E+01	I			4.0E-03	I	3.0E-04	I	V	M	1		1.4E+03	Trichloropropane, 1,2,3-	96-18-4	5.1E-03	c*	1.1E-01	c*	3.1E-02	n	1.3E-01	n	7.5E-04	c*		3.2E-07	c*	
				3.0E-03	X	3.0E-04	P	V		1		4.5E+02	Trichloropropene, 1,2,3-	96-19-5	7.3E-02	n	3.1E-01	n	3.1E-02	n	1.3E-01	n	6.2E-02	n		3.1E-05	n	
				2.0E-02	A					1	0.1		Tricresyl Phosphate (TCP)	1330-78-5	1.3E+02	n	1.6E+03	n					1.6E+01	n		1.5E+00	n	
				3.0E-03	I					1	0.1		Tridiphane	58138-08-2	1.9E+01	n	2.5E+02	n					1.8E+00	n		1.3E-02	n	
						7.0E-03	I	V		1		2.8E+04	Triethylamine	121-44-8	1.2E+01	n	4.8E+01	n	7.3E-01	n	3.1E+00	n	1.5E+00	n		4.4E-04	n	
				2.0E+00	P					1	0.1		Triethylene Glycol	112-27-6	1.3E+04	n	1.6E+05	nm					4.0E+03	n		8.8E-01	n	
7.7E-03	I			7.5E-03	I			V		1			Trifluralin	1582-09-8	5.9E+01	n	4.2E+02	c**					2.5E+00	c**		8.2E-02	c**	
2.0E-02	P			1.0E-02	P					1	0.1		Trimethyl Phosphate	512-56-1	2.7E+01	c**	1.1E+02	c**					3.9E+00	c**		8.6E-04	c**	
						5.0E-03	P	V		1		2.9E+02	Trimethylbenzene, 1,2,3-	526-73-8	4.9E+00	n	2.1E+01	n	5.2E-01	n	2.2E+00	n	1.0E+00	n		1.5E-03	n	
						7.0E-03	P	V		1		2.2E+02	Trimethylbenzene, 1,2,4-	95-63-6	5.8E+00	n	2.4E+01	n	7.3E-01	n	3.1E+00	n	1.5E+00	n		2.1E-03	n	
				1.0E-02	X			V		1		1.8E+02	Trimethylbenzene, 1,3,5-	108-67-8	7.8E+01	n	1.2E+03	ns					1.2E+01	n		1.7E-02	n	
				3.0E-02	I					1	0.019		Trinitrobenzene, 1,3,5-	99-35-4	2.2E+02	n	3.2E+03	n					5.9E+01	n		2.1E-01	n	
3.0E-02	I			5.0E-04	I					1	0.032		Trinitrotoluene, 2,4,6-	118-96-7	3.6E+00	n	5.1E+01	n					9.8E-01	n		5.7E-03	n	
				2.0E-02	P					1	0.1		Triphenylphosphine Oxide	791-28-6	1.3E+02	n	1.6E+03	n					3.6E+01	n		1.5E-01	n	
				2.0E-02	A					1	0.1		Tris(1,3-Dichloro-2-propyl) Phosphate	13674-87-8	1.3E+02	n	1.6E+03	n					3.6E+01	n		8.0E-01	n	
				1.0E-02	X					1	0.1		Tris(1-chloro-2-propyl)phosphate	13674-84-5	6.3E+01	n	8.2E+02	n					1.9E+01	n		6.5E-02	n	
2.3E+00	C	6.6E-04	C					V		1		4.7E+02	Tris(2,3-dibromopropyl)phosphate	126-72-7	2.8E-01	c	1.3E+00	c	4.3E-03	c	1.9E-02	c	6.8E-03	c		1.3E-04	c	

Key: I = IRIS; P = PPRTV; A = ATSDR; C = Cal EPA; X = APPENDIX PPRTV SCREEN (See FAQ #27); H = HEAST; J = New Jersey; O = EPA Office of Water; F = See FAQ; E = Environmental Criteria and Assessment Office; S = see user guide Section 5; L = see user guide on lead; M = mutagen; V = volatile; R = RBA applied (See User Guide for Arsenic notice) ; c = cancer; * = where: n SL < 100X c SL; ** = where n SL < 10X c SL; n = noncancer; m = Concentration may exceed ceiling limit (See User Guide); s = Concentration may exceed Csat (See User Guide); SSL values are based on DAF=1

Toxicity and Chemical-specific Information												Contaminant		Screening Levels										Protection of Ground Water SSLs		
SFO (mg/kg-day)$^{-1}$	key	IUR (ug/m^3)$^{-1}$	key	RfD_o (mg/kg-day)	key	RfC_i (mg/m^3)	key	VOC	muta-gen	GIABS	ABS	C_{sat} (mg/kg)	Analyte	CAS No.	Resident Soil (mg/kg)	key	Industrial Soil (mg/kg)	key	Resident Air (ug/m^3)	key	Industrial Air (ug/m^3)	key	Tapwater (ug/L)	key	MCL (ug/L)	Risk-based SSL (mg/kg)	key	MCL-based SSL (mg/kg)
2.0E-02	P			7.0E-03	P					1	0.1		Tris(2-chloroethyl)phosphate	115-96-8	2.7E+01	c**	1.1E+02	c**					3.8E+00	c**		3.8E-03	c**	
3.2E-03	P			1.0E-01	P					1	0.1		Tris(2-ethylhexyl)phosphate	78-42-2	1.7E+02	c**	7.2E+02	c*					2.4E+01	c**		1.2E+02	c**	
				3.0E-03	I	4.0E-05	A			1			Uranium (Soluble Salts)	NA	2.3E+01	n	3.5E+02	n	4.2E-03	n	1.8E-02	n	6.0E+00	n	3.0E+01	2.7E+00	n	1.4E+01
1.0E+00	C	2.9E-04	C						M	1	0.1		Urethane	51-79-6	1.2E-01	c	2.3E+00	c	3.5E-03	c	4.2E-02	c	2.5E-02	c		5.6E-06	c	
		8.3E-03	P	9.0E-03	I	7.0E-06	P			0.026			Vanadium Pentoxide	1314-62-1	6.6E+01	n	8.4E+02	n	3.4E-04	c**	1.5E-03	c**	1.5E+01	n			n	
				5.0E-03	S	1.0E-04	A			0.026			Vanadium and Compounds	7440-62-2	3.9E+01	n	5.8E+02	n	1.0E-02	n	4.4E-02	n	8.6E+00	n		8.6E+00	n	
				1.0E-03	I			V		1			Vernolate	1929-77-7	7.8E+00	n	1.2E+02	n					1.1E+00	n		8.9E-04	n	
				2.5E-02	I					1	0.1		Vinclozolin	50471-44-8	1.6E+02	n	2.1E+03	n					4.4E+01	n		3.4E-02	n	
				1.0E+00	H	2.0E-01	I	V		1		2.8E+03	Vinyl Acetate	108-05-4	9.1E+01	n	3.8E+02	n	2.1E+01	n	8.8E+01	n	4.1E+01	n		8.7E-03	n	
		3.2E-05	H			3.0E-03	I	V		1		3.4E+03	Vinyl Bromide	593-60-2	1.2E-01	c**	5.2E-01	c**	8.8E-02	c**	3.8E-01	c**	1.8E-01	c**		5.1E-05	c**	
7.2E-01	I	4.4E-06	I	3.0E-03	I	1.0E-01	I	V	M	1		3.9E+03	Vinyl Chloride	75-01-4	5.9E-02	c	1.7E+00	c*	1.7E-01	c*	2.8E+00	c*	1.9E-02	c	2.0E+00	6.5E-06	c	6.9E-04
				3.0E-04	I					1	0.1		Warfarin	81-81-2	1.9E+00	n	2.5E+01	n					5.6E-01	n		5.9E-04	n	
				2.0E-01	S	1.0E-01	S	V		1		3.9E+02	Xylene, p-	106-42-3	5.6E+01	n	2.4E+02	n	1.0E+01	n	4.4E+01	n	1.9E+01	n		1.9E-02	n	
				2.0E-01	S	1.0E-01	S	V		1		3.9E+02	Xylene, m-	108-38-3	5.5E+01	n	2.4E+02	n	1.0E+01	n	4.4E+01	n	1.9E+01	n		1.9E-02	n	
				2.0E-01	S	1.0E-01	S	V		1		4.3E+02	Xylene, o-	95-47-6	6.5E+01	n	2.8E+02	n	1.0E+01	n	4.4E+01	n	1.9E+01	n		1.9E-02	n	
				2.0E-01	I	1.0E-01	I	V		1		2.6E+02	Xylenes	1330-20-7	6.5E+01	n	2.8E+02	ns	1.0E+01	n	4.4E+01	n	1.9E+01	n	1.0E+04	1.9E-02	n	9.8E+00
				3.0E-04	I					1			Zinc Phosphide	1314-84-7	2.3E+00	n	3.5E+01	n					6.0E-01	n			n	
				3.0E-01	I					1			Zinc and Compounds	7440-66-6	2.3E+03	n	3.5E+04	n					6.0E+02	n		3.7E+01	n	
				5.0E-02	I					1	0.1		Zineb	12122-67-7	3.2E+02	n	4.1E+03	n					9.9E+01	n		2.9E-01	n	
				8.0E-05	X					1			Zirconium	7440-67-7	6.3E-01	n	9.3E+00	n					1.6E-01	n		4.8E-01	n	

Appendix D
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 $e^{(1.0166[\ln(\text{hardness})]-3.924)}$	0.15 e,i,m,w $e^{(.7409[\ln(\text{hardness})]-4.719}$	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)

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

(ii)

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

(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 Administrant 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.