

APPENDIX 5.1D

## **HRA Support Data**

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## Health Risk Assessment Support Data

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### Health Risk Assessment Process, Goals, Assumptions, and Uses

"In recent years, the public has become increasingly aware of the presence of harmful chemicals in our environment. Many people express concerns about pesticides and other foreign substances in food, contaminants in drinking water, and toxic pollutants in the air. Others believe these concerns are exaggerated or unwarranted. How can we determine which of these potential hazards really deserve attention? How do we, as a society, decide where to focus our efforts and resources to control these hazards? When we hear about toxic threats that affect us personally, such as the discovery of industrial waste buried in our neighborhood or near our children's school, how concerned should we be?"

Health risk assessment is a scientific tool designed to help answer these questions. Government agencies rely on risk assessments to help them determine which potential hazards are the most significant. Risk assessments can also guide regulators in abating environmental hazards. Members of the public who learn the basics of risk assessment can improve their understanding of both real and perceived environmental hazards, and they can work more effectively with decision makers on solutions to environmental problems.

Chemicals can be either beneficial or harmful, depending on a number of factors, such as the amounts to which we are exposed. Low levels of some substances may be necessary for good health, but higher levels may be harmful. Health risk assessments are used to determine if a particular chemical poses a significant risk to human health and, if so, under what circumstances. Could exposure to a specific chemical cause significant health problems? How much of the chemical would someone have to be exposed to before it would be dangerous? How serious could the health risks be? What activities might put people at increased risk?

If it were possible to prevent all human exposure to all hazardous chemicals, there would be no need for risk assessment. However, the total removal of harmful pollutants from the environment is often infeasible or impossible, and many naturally occurring substances also pose health risks. Risk assessment helps scientists and regulators identify serious health hazards and determine realistic goals for reducing exposure to toxics so that there is no significant health threat to the public.

Estimating the hazards posed by toxic chemicals in the environment involves the compilation and evaluation of complex sets of data. Government regulators, therefore, turn to specialists to perform or assist with risk assessments. These specialists include scientists with degrees in toxicology (the study of the toxic effects of chemicals) and epidemiology (the study of disease or illness in populations) as well as physicians, biologists, chemists, and engineers.

The term "health risk assessment" is often misinterpreted. People sometimes think that a risk assessment will tell them whether a current health problem or symptom was caused by exposure

to a chemical. This is not the case. Scientists who are searching for links between chemical exposures and health problems in a community may conduct an epidemiologic study. These studies typically include a survey of health problems in a community and a comparison of health problems in that community with those in other cities, communities, or the population as a whole.

Although they are both important, health risk assessments and epidemiologic studies have different objectives. Most epidemiologic studies evaluate whether *past* chemical exposures may be responsible for documented health problems in a specific group of people. In contrast, health risk assessments are used to estimate whether current or future chemical exposures will pose health risks to a broad population, such as a city or a community. Scientific methods used in health risk assessment cannot be used to link individual illnesses to past chemical exposures, nor can health risk assessments and epidemiologic studies prove that a specific toxic substance caused an individual's illness.

The U.S. Environmental Protection Agency (U.S. EPA) is a leading risk assessment agency at the federal level. In California, the Office of Environmental Health Hazard Assessment (OEHHA) in the California Environmental Protection Agency (Cal/EPA) has the primary responsibility for developing procedures and practices for performing health risk assessments. Other agencies within Cal/EPA, such as the Department of Pesticide Regulation and the Department of Toxic Substances Control, have extensive risk assessment programs of their own but work closely with OEHHA.

The Department of Pesticide Regulation uses risk assessments to make regulatory decisions concerning safe pesticide uses. The Department of Toxic Substances Control uses risk assessments to determine requirements for the management and cleanup of hazardous wastes. OEHHA's health risk assessments are used by the Air Resources Board to develop regulations governing toxic air contaminants, and by the Department of Health Services to develop California's drinking water standards. These agencies' decisions take into account the seriousness of potential health effects along with the economic and technical feasibility of measures that can reduce the health risks.

Health risk assessment requires both sound science and professional judgment and is a constantly developing process. Cal/EPA is nationally recognized for developing new procedures that improve the accuracy of risk assessments. Cal/EPA also works closely with U.S. EPA in all phases of risk assessment.

The risk assessment process is typically described as consisting of four basic steps: hazard identification, exposure assessment, dose-response assessment, and risk characterization. Each of these steps will be explained in the following text.

### **Hazard Identification**

In the first step, hazard identification, scientists determine the types of health problems a chemical could cause by reviewing studies of its effects in humans and laboratory animals. Depending on the chemical, these health effects may include short-term ailments, such as headaches; nausea; and eye, nose, and throat irritation; or chronic diseases, such as cancer. Effects on sensitive populations, such as pregnant women and their developing fetuses, the elderly, or those with health problems

(including those with weakened immune systems), must also be considered. Responses to toxic chemicals will vary depending on the amount and length of exposure. For example, short-term exposure to low concentrations of chemicals may produce no noticeable effect, but continued exposure to the same levels of chemicals over a long period of time may eventually cause harm. An important step in hazard identification is the selection of key research studies that can provide accurate, timely information on the hazards posed to humans by a particular chemical. The selection of a study is based upon factors such as whether the study has been peer reviewed by qualified scientists, whether the study's findings have been verified by other studies, and the species tested (human studies provide the best evidence). Some studies may involve humans that have been exposed to the chemical, while others may involve studies with laboratory animals.

Human data frequently are useful in evaluating human health risks associated with chemical exposures. Human epidemiologic studies typically examine the effects of chemical exposure on a large number of people, such as employees exposed to varying concentrations of chemicals in the workplace. In many cases, these exposures took place prior to the introduction of modern worker-safety measures.

One weakness of occupational studies is that they generally measure the effects of chemicals on healthy workers and do not consider children, the elderly, those with pre-existing medical conditions, or other sensitive groups. Since occupational studies are not controlled experiments, there may be uncertainties about the amount and duration of exposure or the influence of lifestyle choices, such as smoking or alcohol use, on the health of workers in the studies. Exposure of workers to other chemicals at the same time may also influence and complicate the results.

Laboratory studies using human volunteers are better able to gauge some health effects because chemical exposures can then be measured with precision. But these studies usually involve small numbers of people and, in conformance with ethical and legal requirements, use only adults who agree to participate in the studies. Moreover, laboratory studies often use simple measurements that identify immediate responses to the chemical but might miss significant, longer-term health effects. Scientists can also use physicians' case reports of an industrial or transportation accident in which individuals were unintentionally exposed to a chemical. However, these reports may involve very small numbers of people, and the level of exposure to the chemical could be greater than exposures to the same chemical in the environment. Nevertheless, human studies are preferred for risk assessment, so OEHHA makes every effort to use them when they are available.

Because the effects of the vast majority of chemicals have not been studied in humans, scientists must often rely on animal studies to evaluate a chemical's health effects. Animal studies have the advantage of being performed under controlled laboratory conditions that reduce much of the uncertainty related to human studies. If animal studies are used, scientists must determine whether a chemical's health effects in humans are likely to be similar to those in the animals tested. Although effects seen in animals can also occur in humans, there may be subtle or even significant differences in the ways humans and experimental animals react to a chemical. Comparison of human and animal metabolism may be useful in selecting the animal species that should be studied, but it is often not possible to determine which species is most like humans in its response to a chemical exposure. However, if similar effects were found in more than one species, the results would strengthen the evidence that humans may also be at risk.

## Exposure Assessment

In exposure assessment, scientists attempt to determine how long people were exposed to a chemical; how much of the chemical they were exposed to; whether the exposure was continuous or intermittent; and how people were exposed – through eating, drinking water and other liquids, breathing, or skin contact. All of this information is combined with factors such as breathing rates, water consumption, and daily activity patterns to estimate how much of the chemical was taken into the bodies of those exposed.

People can be exposed to toxic chemicals in various ways. These substances can be present in the air we breathe, the food we eat, or the water we drink. Some chemicals, due to their particular characteristics, may be both inhaled and ingested. For example, airborne chemicals can settle on the surface of water, soil, leaves, fruits, vegetables, and forage crops used as animal feed. Cows, chickens, or other livestock can become contaminated when eating, drinking, or breathing the chemicals present in the air, water, feed, and soil. Fish can absorb the chemicals as they swim in contaminated water or ingest contaminated food. Chemicals can be absorbed through the skin, so infants and children can be exposed simply by crawling or playing in contaminated dirt. They can also ingest chemicals if they put their fingers or toys in their mouths after playing in contaminated dirt. Chemicals can also be passed on from nursing mothers to their children through breast milk.

To estimate exposure levels, scientists rely on air, water, and soil monitoring; human blood and urine samples; or computer modeling. Although monitoring of a pollutant provides excellent data, it is time consuming, costly, and typically limited to only a few locations. For those reasons, scientists often rely on computer modeling, which uses mathematical equations to describe how a chemical is released and to estimate the speed and direction of its movement through the surrounding environment. Modeling has the advantage of being relatively inexpensive and less time consuming, provided all necessary information is available and the accuracy of the model can be verified through testing.

Computer modeling is often used to assess chemical releases from industrial facilities. Such models require information on the type of chemicals released, facilities' hours of operation, industrial processes that release the chemicals, smokestack height and temperature, any pollution-control equipment that is used, surrounding land type (urban or rural), local topography and meteorology, and census data regarding the exposed population.

In all health risk assessments, scientists must make assumptions in order to estimate human exposure to a chemical. For example, scientists assessing the effects of air pollution may need to make assumptions about the time people spend outdoors, where they are more directly exposed to pollutants in the ambient air, or the time they spend in an area where the pollution is greatest. An assessment of soil contamination may require scientists to make assumptions about people's consumption of fruits and vegetables that may absorb soil contaminants.

To avoid underestimating actual human exposure to a chemical, scientists often look at the range of possible exposures. For example, people who jog in the afternoon, when urban air pollution levels are highest, would have much higher exposures to air pollutants than people who come home after work and relax indoors. Basing an exposure estimate on a value near the higher end of

a range of exposure levels (closer to the levels experienced by the jogger than by the person remaining indoors) provides a realistic worst-case estimate of exposure. These kinds of conservative assumptions, which presume that people are exposed to the highest amounts of a chemical that can be considered credible, are referred to as "health-protective" assumptions.

The exposure estimates for the project analysis were conducted using HARP. HARP (version 1.4a) is currently the approved model for use in assessing health risks from facilities such as the CCGS Expansion project. HARP-On Ramp was also used to accommodate and process the AERMOD output files for use in HARP.

### **Dose-Response Assessment**

In dose-response assessment, scientists evaluate the information obtained during the hazard identification step to estimate the amount of a chemical that is likely to result in a particular health effect in humans.

An established principle in toxicology is that "the dose makes the poison." For example, a commonplace chemical like table salt is harmless in small quantities, but it can cause illness in large doses. Similarly, hydrochloric acid, a hazardous chemical, is produced naturally in our stomachs but can be quite harmful if taken in large doses.

Scientists perform a dose-response assessment to estimate how different levels of exposure to a chemical can impact the likelihood and severity of health effects. The dose-response relationship is often different for many chemicals that cause cancer than it is for those that cause other kinds of health problems.

The dose-response estimates for the project analysis were conducted using HARP (version 1.4a).

### **Cancer Effects**

For chemicals that cause cancer, the general assumption in risk assessment has been that there are no exposures that have "zero risk" unless there is clear evidence otherwise. In other words, even a very low exposure to a cancer-causing chemical may result in cancer if the chemical happens to alter cellular functions in a way that causes cancer to develop. Thus, even very low exposures to carcinogens might increase the risk of cancer, if only by a very small amount.

Several factors make it difficult to estimate the risk of cancer. Cancer appears to be a progressive disease because a series of cellular transformations is thought to occur before cancer develops. In addition, cancer in humans often develops many years after exposure to a chemical. Also, the best information available on the ability of chemicals to cause cancer often comes from studies in which a limited number of laboratory animals are exposed to levels of chemicals that are much higher than the levels humans would normally be exposed to in the environment. As a result, scientists use mathematical models based on studies of animals exposed to high levels of a chemical to estimate the probability of cancer developing in a diverse population of humans exposed to much lower levels. The uncertainty in these estimates may be rather large. To reduce these uncertainties, risk assessors must stay informed of new scientific research. Data from new studies can be used to improve estimates of cancer risks.

### **Non-cancer Effects**

Non-cancer health effects (such as asthma, nervous system disorders, birth defects, and developmental problems in children) typically become more severe as exposure to a chemical increases. One goal of dose-response assessment is to estimate levels of exposure that pose only a low or negligible risk for non-cancer health effects. Scientists analyze studies of the health effects of a chemical to develop this estimate. They take into account such factors as the quality of the scientific studies, whether humans or laboratory animals were studied, and the degree to which some people may be more sensitive to the chemical than others. The estimated level of exposure that poses no significant health risks can be reduced to reflect these factors.

### **Risk Characterization**

The last step in risk assessment brings together the information developed in the previous three steps to estimate the risk of health effects in an exposed population. In the risk characterization step, scientists analyze the information developed during the exposure and dose-response assessments to describe the resulting health risks that are expected to occur in the exposed population. This information is presented in different ways for cancer and non-cancer health effects, as explained below.

### **Cancer Risk**

Cancer risk is often expressed as the maximum number of new cases of cancer projected to occur in a population of one million people due to exposure to the cancer-causing substance over a 70-year lifetime. For example, a cancer risk of one in one million means that in a population of one million people, not more than one additional person would be expected to develop cancer as the result of the exposure to the substance causing that risk.

An individual's actual risk of contracting cancer from exposure to a chemical is often less than the theoretical risk to the entire population calculated in the risk assessment. For example, the risk estimate for a drinking-water contaminant may be based on the health-protective assumption that the individual drinks two liters of water from a contaminated source daily over a 70-year lifetime. However, an individual's actual exposure to that contaminant would likely be lower due to a shorter time of residence in the area. Moreover, an individual's risk not only depends on the individual's exposure to a specific chemical but also on his or her genetic background (i.e., a family history of certain types of cancer); health; diet; and lifestyle choices, such as smoking or alcohol consumption.

Cancer risks presented in risk assessments are often compared to the overall risk of cancer in the general U.S. population (about 250,000 cases for every one million people) or to the risk posed by all harmful chemicals in a particular medium, such as the air. The cancer risk from breathing current levels of pollutants in California's ambient air over a 70-year lifetime is estimated to be 760 in one million.

### **Non-cancer Risk**

Non-cancer risk is usually determined by comparing the actual level of exposure to a chemical to the level of exposure that is not expected to cause any adverse effects, even in the most susceptible people. Levels of exposure at which no adverse health effects are expected are called "health reference levels," and they generally are based on the results of animal studies. However, scientists usually set health reference levels much lower than the levels of exposure that were

found to have no adverse effects in the animals tested. This approach helps to ensure that real health risks are not underestimated by adjusting for possible differences in a chemical's effects on laboratory animals and humans; the possibility that some humans, such as children and the elderly, may be particularly sensitive to a chemical; and possible deficiencies in data from the animal studies.

Depending on the amount of uncertainty in the data, scientists may set a health reference level 100 to 10,000 times lower than the levels of exposure observed to have no adverse effects in animal studies. Exposures above the health reference level are not necessarily hazardous, but the risk of toxic effects increases as the dose increases. If an assessment determines that human exposure to a chemical exceeds the health reference level, further investigation is warranted.

Risk managers rely on risk assessments when making regulatory decisions, such as setting drinking water standards, or developing plans to clean up hazardous waste sites. Risk managers are responsible for protecting human health, but they must also consider public acceptance, as well as technological, economic, social, and political factors, when arriving at their decisions. For example, they may need to consider how much it would cost to remove a contaminant from drinking water supplies or how seriously the loss of jobs would affect a community if a factory were to close due to the challenge of meeting regulatory requirements that are set at the most stringent level.

Health risk assessments can help risk managers weigh the benefits and costs of various alternatives for reducing exposure to chemicals. For example, a health risk assessment of a hazardous waste site could help determine whether placing a clay cap over the waste to prevent exposure would offer the same health protection as the more costly option of removing the waste from the site.

One of the most difficult questions of risk management is: How much risk is acceptable? While it would be ideal to completely eliminate all exposure to hazardous chemicals, it is usually not possible or feasible to remove all traces of a chemical once it has been released into the environment. The goal of most regulators is to reduce the health risks associated with exposure to hazardous pollutants to a negligibly low level.

Regulators generally presume that a one-in-one million risk of cancer from life-long exposure to a hazardous chemical is an "acceptable risk" level because the risk is extremely low compared to the overall cancer rate. If a drinking water standard for a cancer-causing chemical were set at the level posing a "one-in-one million" risk, it would mean that not more than one additional cancer case (beyond what would normally occur in the population) would potentially occur in a population of one million people drinking water meeting that standard over a 70-year lifetime.

Actual regulatory standards for chemicals or hazardous waste cleanups may be set at less stringent risk levels, such as one in 100,000 (not more than one additional cancer case per 100,000 people) or one in 10,000 (not more than one additional cancer case per 10,000 people). These less stringent risk levels are often due to economic or technological considerations. Regulatory agencies generally view these higher risk levels to be acceptable if there is no feasible way to reduce the risks further."<sup>1</sup>

<sup>1</sup> A Guide to Health Risk Assessment, CalEPA-Office of Environmental Health Hazard Assessment, 1001 I Street, Sacramento, Ca. 95812, (est. 2001).

The following tables summarize the results of the HRA performed by the proposed CCGS facility.

NOx	Propylene Oxide
CO	Toluene
VOC*	Xylene
SOx	Arsenic
PM10/PM2.5	Aluminum
Ammonia	Cadmium
PAHs	Chromium VI
Acetaldehyde	Copper
Acrolein	Iron
Benzene	Lead
1-3 Butadiene	Mercury
Ethylbenzene	Manganese
Formaldehyde	Nickel
Hexane (n-Hexane)	Silver
Naphthalene	Zinc
Propylene	Diesel PM

Agency	Significance Thresholds	
	BAAQMD	State of California
Cancer Risk per million	<= 1.0 without T-BACT <= 10.0 with T-BACT	<= 1.0 without T-BACT <= 10.0 with T-BACT
Acute HI	1.0	1.0
Chronic HI	1.0	1.0
Cancer Burden	n/a	1.0

The other assumptions used in running the HARP program were as follows:

- Emission rates for non-criteria pollutants are taken from AFC Section 5.1, and from Appendix 5.1A.
- Number of residents affected is based upon the updated 2000 population data for those census tracts or portions of census tracts which lie within the maximum impact receptor radius of the proposed facility.
- All receptors were treated as residential receptors, which allows for the assumption that the MIR, if assumed residential, will represent the highest risk and no other receptor will show risks higher than the MIR. This deletes the need for running worker risks. The HARP risk run options as recommended by South Coast AQMD (Chico, 10-20-05) were

utilized (i.e., for cancer - 70-year and derived adjusted method; for chronic - 70-year and derived OEHHA method; for acute - no options).

- Deposition velocity is taken to be 0.02 m/s, as recommended by ARB for controlled emission sources.
- Fraction of residents with gardens is taken to be 0.05 which is likely conservatively high for the urban area near the project site.
- Fraction of produce grown at home is taken to be 0.05, which is also likely to be conservatively high.

The HARP program is a tool that assists with the programmatic requirements of the Air Toxics Hot Spots Program, and it can be used for preparing health risk assessments for other related programs such as air toxic control measure development or facility permitting applications. HARP is a computer based risk assessment program which combines the tools of emission inventory database, facility prioritization, air dispersion modeling, and risk assessment analysis. Use of HARP promotes statewide consistency in the area of risk assessment, increases the efficiency of evaluating potential health impacts, and provides a cost effective tool for developing facility health risk assessments. HARP may be used on single sources, facilities with multiple sources, or multiple facilities in close proximity to each other. The receptor grid used in HARP was a combination of the following:

1. All identified grid receptors as input from the AERMOD analysis,
2. All identified sensitive receptors within the primary impact area as defined by the AERMOD analysis.

The HARP program results for acute and chronic inhalation and chronic non-inhalation exposures, cancer burden and individual cancer risk (workplace and residential) for the combustion source and cooling tower are included in the CD with this Appendix. The results of the HARP calculations are summarized below.

The modeling results show that the maximum modeled cancer risk from CCGS is expected to be  $2.14 \times 10^{-6}$ . This risk is well below the BAAQMD significance value of 10 per million with T-BACT. T-BACT for combined cycle combustion turbines is the use of clean fuels (natural gas) and the operation of a CO catalyst. These T-BACT technologies are proposed for CCGS, and as such, the significant risk threshold for CCGS is 10 in a million. The chronic and acute non-cancer hazard indices are 0.0604 and 0.251, respectively at the cancer MIR. Both are well below the significant impact level of 1.0. Detailed calculations and results for each significant receptor are included in the modeling results, which are being submitted electronically.

<b>Turbines/HRSGs, Aux Boiler, Fire Pump Engine and Cooling Tower</b>		
<b>Risk Category</b>	<b>Facility Values</b>	<b>Applicable Significance Threshold</b>
Cancer Risk	$2.14 \times 10^{-6}$	$\leq 1.0$ without T-BACT $\leq 10.0$ with T-BACT
Chronic Hazard Index	0.0604	1.0
Acute Hazard Index at Cancer MIR	0.251	1.0
Acute Hazard Index at Max Acute Receptor	0.344	1.0

Cancer and chronic MIR – Receptor 12088, 610600mE, 4207100mN  
Max Acute MIR – Receptor 7204, 610460mE, 4207160mN

The calculated health effects as summarized above do not exceed the district significance threshold values, therefore the health effects would be considered “not significant” and may even be “zero”.

The following tables and figures are presented at the end of this appendix:

- Table 5.1D-4                      Census Tract Numbers, Areas, and Population Data
- Table 5.1D-5                      BAAQMD TAC Summary
- Table 5.1D-6                      Sensitive Receptor Listing for the Primary Impact Radius
- Table 5.1D-7                      OEHHA/CARB Risk Assessment Health Values
- Figure 5.1D-1                      Sensitive Receptor Map
- Figure 5.1D-2                      Census Tracts in the Immediate Impact Area
- Figure 5.1D-3                      MIR-1, -2, -3 Location Map

Risk Assessment input and output files are included on the modeling CD. Due to the length of the HRA input and output files, hard copies are not provided in this appendix.

**Table 5.1D-4**

**CENSUS FINDINGS**

Map ID	Tract Number	Total Population	Population in Radius	Total Area(sq.mi.)	Area in Radius(sq.mi.)
T1	3010.00	3355	933.2	46.58	12.96
T2	3090.00	2496	472.8	7.27	1.38
T3	3020.03	10231	10231.0	6.96	6.96
T4	3050.00	6480	6434.9	3.67	3.64
T5	3060.02	3208	3208.0	3.65	3.65
T6	3120.00	2617	241.6	0.56	0.05
T7	3020.02	8475	7726.8	9.23	8.41
T8	3060.01	8166	8166.0	1.36	1.36
T9	3131.02	3922	187.5	0.76	0.04
T10	3071.02	5018	5018.0	0.62	0.62
T11	3072.01	3029	3023.8	0.58	0.58
T12	3072.02	4493	4493.0	0.27	0.27
T13	3072.05	7162	7162.0	1.18	1.18
T14	3080.01	7552	7552.0	1.44	1.44
T15	3072.04	4443	4443.0	0.58	0.58
T16	3080.02	4206	4206.0	1.54	1.54
T17	3131.03	5912	226.3	5.40	0.21
T18	3020.04	10906	10906.0	4.66	4.66
T19	3071.01	4443	4443.0	0.82	0.82
T20	3551.06	10572	2460.4	39.90	9.29
T21	3551.01	15237	15237.0	2.79	2.79
T22	3040.00	10882	44.9	71.38	0.29
T23	3031.00	8321	3323.2	15.48	6.18
T24	3032.00	21608	13574.1	15.06	9.46
T25	0098.00	1934	861.7	60.25	26.85
T26	2535.00	5733	178.5	235.10	7.32

Table 5.1D-5

**San Francisco Bay Area Air Basin  
Annual Average Concentrations and Health Risks**

		Annual Average Concentrations and Health Risks																	
		1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Acetaldehyde	Annual Avg	1.3	1.4	1.03	1.31	1.17	0.92	0.83	0.73	0.65	0.59	0.58	0.57	0.56	0.54	0.54	0.51	0.56	0.55
	Health Risk	6	7	5	6	6	2	4	4	3	4	3	4	3	4	4	3	3	3
Benzene	Annual Avg	1.18	1.82	1.49	1.49	1.4	1.28	0.71	0.61	0.71	0.52	0.52	0.52	0.399	0.372	0.31	0.31	0.24	0.24
	Health Risk	202	169	138	138	129	116	66	56	66	55	52	39	42	41	34	29	30	25
1,3-Butadiene	Annual Avg	0.359	0.287	0.275	0.26	0.287	0.277	0.218	0.187	0.17	0.17	0.17	0.133	0.13	0.098	0.09	0.09	0.09	0.06
	Health Risk	135	108	103	138	108	104	82	70	82	64	56	50	51	37	34	28	26	23
Carbon Tetrachloride	Annual Avg	0.128	0.125	0.12	0.12	0.12	0.1	0.078	0.07	0.07	0.07	0.064	0.067	0.069	0.06	0.06	0.06	0.06	0.06
	Health Risk	34	33	29	29	29	26	21	21	21	21	25	23	24	25	25	25	25	25
Chromium, Hexavalent	Annual Avg	0.19	0.19	0.19	0.19	0.19	0.25	0.13	0.1	0.1	0.1	0.12	0.12	0.074	0.066	0.06	0.06	0.063	0.053
	Health Risk	34	34	29	29	29	37	19	17	15	15	18	11	14	14	14	12	9	8
o,p'-Dichlorobenzene	Annual Avg	0.12	0.12	0.12	0.12	0.12	0.13	0.13	0.12	0.12	0.12	0.11	0.14	0.15	0.15	0.15	0.15	0.15	0.15
	Health Risk	8	8	8	8	7	8	9	8	8	8	7	9	10	10	11	10	10	10
Formaldehyde	Annual Avg	1.87	1.43	1.43	1.56	1.66	2.06	2.62	1.85	1.76	2.09	1.77	2.32	2.22	2.22	2.22	2.22	2.22	1.45
	Health Risk	14	13	11	11	12	15	19	14	13	15	13	17	19	16	13	10	12	11
Methylene Chloride	Annual Avg	1.04	2.32	0.65	0.62	0.69	0.6	0.58	0.55	0.55	0.55	0.53	0.27	0.22	0.22	0.22	0.22	0.22	0.13
	Health Risk	4	8	2	2	2	2	2	2	2	2	2	<1	<1	<1	<1	<1	<1	<1
Parathion Methyl	Annual Avg	0.204	0.232	0.128	0.128	0.082	0.094	0.05	0.071	0.071	0.071	0.078	0.059	0.05	0.039	0.03	0.029	0.02	0.031
	Health Risk	8	9	7	5	3	4	3	3	3	3	3	2	2	2	1	1	1	1
Diesel PM <sup>3</sup>	Annual Avg	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)	(2.5)
	Health Risk	(750)	(750)	(750)	(750)	(750)	(750)	(750)	(750)	(750)	(750)	(750)	(750)	(750)	(750)	(750)	(750)	(750)	(750)
Average Basin Risk	w/o Diesel PM	355	308	266	25	314	225	174	179	133	133	133	162	149	149	149	149	149	149
	w/ Diesel PM	(1163)	(1163)	(1163)	(1163)	(1163)	(1163)	(1163)	(1163)	(1163)	(1163)	(1163)	(1163)	(1163)	(1163)	(1163)	(1163)	(1163)	(1163)

1 Concentrations for Hexavalent chromium are expressed as ng/m3 and concentrations for diesel PM are expressed as ug/m3. Concentrations for all other TACs are expressed as parts per billion.  
 2 Health Risk represents the number of excess cancer cases per million people based on a lifetime (70-year) exposure to the annual average concentration. It reflects only those compounds listed in this table and only those with data for that year. There may be other significant compounds for which we do not monitor or have health risk information. Additional information about interpreting the toxic air contaminant air quality trends can be found in Chapter 1, *Interpreting the Emission and Air Quality Statistics*.  
 3 Diesel PM estimates are based on receptor modeling techniques, and the estimates are available only for selected years. Currently, the estimates are being reviewed.

Table 5-44

**Table 5.1D-6 Identified Sensitive Receptors and Distances from Site**  
*Contra Costa Generating Station*

Receptor ID	Google Earth Data			Dist. From Site, m.	Dist. From Site, ft.	Receptor #	NAD27		
	UTM Em	UTM Nm	Elev., ft.				UTM Em	UTM Nm	Elev, ft.
<b>Site</b>	<b>609908</b>	<b>4207669</b>	21	na	na		610007	4207486	24
School	612505	4207053	17	2669.1	8757.2	1	612604	4206870	20
School	613136	4205251	42	4033.2	13232.9	2	613235	4205068	45
School	614245	4203981	49	5693.1	18678.9	3	614344	4203798	52
School	611969	4203762	91	4417.3	14493.1	4	612068	4203579	94
School	612787	4203104	88	5397.0	17707.6	5	612886	4202921	91
School	607091	4206999	58	2895.6	9500.4	6	607190	4206816	61
School	608217	4204875	164	3265.9	10715.3	7	608316	4204692	167
School	609587	4202969	159	4710.9	15456.6	8	609686	4202786	162
School	608284	4203071	169	4876.4	15999.4	9	608383	4202888	172
School	607716	4203318	179	4872.0	15984.9	10	607815	4203135	182
School	607389	4203010	238	5296.4	17377.4	11	607488	4202827	241
School	605534	4202978	187	6413.8	21043.8	12	605633	4202795	190
School	604151	4205710	79	6081.2	19952.3	13	604250	4205527	82
School	603855	4207114	36	6078.4	19943.2	14	603954	4206931	39
School	603579	4207607	28	6329.3	20766.4	15	603678	4207424	31
School	604042	4208016	26	5876.3	19280.0	16	604141	4207833	29
School	603860	4208336	11	6084.7	19963.8	17	603959	4208153	14
Hospital	604875	4204531	142	5931.1	19460.0	18	604974	4204348	145
School	617677	4203118	24	9003.8	29541.6	19	617776	4202935	27
Hospital	607320	4201797	205	6417.0	21054.2	20	607419	4201614	208
Res-1	611104	4207838	8	1207.9	3963.1	21	611203	4207655	11
Res-2	610839	4207573	17	935.9	3070.8	22	610938	4207390	20
Worker	610224	4207747	20	325.5	1067.9	23	610323	4207564	23

**Table 1  
CONSOLIDATED TABLE OF OEHA/ARB APPROVED RISK ASSESSMENT HEALTH VALUES\***

Substance	Chemical Abstract Number	Noncancer Effects								Cancer Risk					
		Acute Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	8-Hour Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	Chronic Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	Chronic Oral (mg/kg-d)	Date Value Reviewed [Added]	Inhalation Unit Risk (µg/m <sup>3</sup> ) <sup>-1</sup>	Inhalation Cancer Potency Factor (mg/kg-d) <sup>-1</sup>	Date Value Reviewed [Added]	Oral Slope Factor (mg/kg-d) <sup>-1</sup>	Date Value Reviewed [Added]	M W A F
ACETALDEHYDE	75-07-0	4.7E+02	12/08	3.0E+02	12/08	1.4E+02	12/08			2.7E-06	1.0E-02	4/99 [5/93]			1
ACETAMIDE	60-35-5									2.0E-05	7.0E-02	4/99			1
ACROLEIN	107-02-8	2.5E+00	12/08	7.0E-01	12/08	3.5E-01	12/08								1
ACRYLAMIDE	79-06-1									1.3E-03	4.5E+00	4/99 [7/90]			1
ACRYLIC ACID	79-10-7	6.0E+03	4/99												1
ACRYLONITRILE	107-13-1					5.0E+00	12/01			2.9E-04	1.0E+00	4/99 [1/91]			1
ALLYL CHLORIDE	107-05-1									6.0E-06	2.1E-02	4/99			1
2-AMINOANTHRAQUINONE	117-79-3									9.4E-06	3.3E-02	4/99			1
AMMONIA	7664-41-7	3.2E+03	4/99			2.0E+02	2/00								1
ANILINE	62-53-3									1.6E-06	5.7E-03	4/99			1
ARSENIC AND COMPOUNDS (INORGANIC) <sup>TAC</sup>	7440-38-2 1016 [1015]	2.0E-01	12/08	1.5E-02	12/08	1.5E-02	12/08	3.5E-06	12/08	3.3E-03 <sup>TAC</sup>	1.2E+01	7/90	1.5E+00	10/00	1
ARSINE	7784-42-1	2.0E-01	12/08	1.5E-02	12/08	1.5E-02	12/08								1
ASBESTOS <sup>TAC</sup> ♂	1332-21-4									1.9E-04 <sup>TAC</sup> ♂	2.2E+02	3/86			333.33
BENZENE <sup>TAC</sup>	71-43-2	1.3E+03	4/99			6.0E+01	2/00			2.9E-05 <sup>TAC</sup>	1.0E-01	1/85			1
BENZIDINE (AND ITS SALTS) <i>values also apply to:</i>	92-87-5									1.4E-01	5.0E+02	4/99 [1/91]			1
<i>Benzidine based dyes</i>	1020									1.4E-01	5.0E+02	4/99 [1/91]			1
<i>Direct Black 38</i>	1937-37-7									1.4E-01	5.0E+02	4/99 [1/91]			1
<i>Direct Blue 6</i>	2602-46-2									1.4E-01	5.0E+02	4/99 [1/91]			1
<i>Direct Brown 95 (technical grade)</i>	16071-86-6									1.4E-01	5.0E+02	4/99 [1/91]			1
BENZYL CHLORIDE	100-44-7	2.4E+02	4/99							4.9E-05	1.7E-01	4/99			1
BERYLLIUM AND COMPOUNDS	7440-41-7 [1021]					7.0E-03	12/01	2.0E-03	12/01	2.4E-03	8.4E+00	4/99 [7/90]			1
BIS(2-CHLOROETHYL)ETHER (Dichloroethyl ether)	111-44-4									7.1E-04	2.5E+00	4/99			1
BIS(CHLOROMETHYL)ETHER	542-88-1									1.3E-02	4.6E+01	4/99 [1/91]			1
BROMINE AND COMPOUNDS	7726-95-6 [1040]														1
POTASSIUM BROMATE	7758-01-2									1.4E-04	4.9E-01	4/99 [10/93]			1

**Table 1  
CONSOLIDATED TABLE OF OEHA/ARB APPROVED RISK ASSESSMENT HEALTH VALUES\***

Substance	Chemical Abstract Number	Noncancer Effects								Cancer Risk					
		Acute Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	8-Hour Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	Chronic Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	Chronic Oral (mg/kg-d)	Date Value Reviewed [Added]	Inhalation Unit Risk (µg/m <sup>3</sup> ) <sup>-1</sup>	Inhalation Cancer Potency Factor (mg/kg-d) <sup>-1</sup>	Date Value Reviewed [Added]	Oral Slope Factor (mg/kg-d) <sup>-1</sup>	Date Value Reviewed [Added]	M W A F
1,3-BUTADIENE <sup>TAC</sup>	106-99-0					2.0E+01	1/01			1.7E-04 <sup>TAC</sup>	6.0E-01	7/92			1
CADMIUM AND COMPOUNDS <sup>TAC</sup>	7440-43-9 [1045]					2.0E-02	1/01	5.0E-04	10/00	4.2E-03 <sup>TAC</sup>	1.5E+01	1/87			1
CARBON DISULFIDE	75-15-0	6.2E+03	4/99			8.0E+02	5/02								1
CARBON MONOXIDE	630-08-0	2.3E+04	4/99												1
CARBON TETRACHLORIDE <sup>TAC</sup> (Tetrachloromethane)	56-23-5	1.9E+03	4/99			4.0E+01	1/01			4.2E-05 <sup>TAC</sup>	1.5E-01	9/87			1
CHLORINATED PARAFFINS	108171-26-2									2.5E-05	8.9E-02	4/99			1
CHLORINE	7782-50-5	2.1E+02	4/99			2.0E-01	2/00								1
CHLORINE DIOXIDE	10049-04-4					6.0E-01	1/01								1
4-CHLORO-O-PHENYLENEDIAMINE	95-83-0									4.6E-06	1.6E-02	4/99			1
CHLOROBENZENE	108-90-7					1.0E+03	1/01								1
CHLORODIFLUOROMETHANE ... (see Fluorocarbons)															
CHLOROFORM <sup>TAC</sup>	67-66-3	1.5E+02	4/99			3.0E+02	4/00			5.3E-06 <sup>TAC</sup>	1.9E-02	12/90			1
<i>Chlorophenols</i>	1060														1
PENTACHLOROPHENOL	87-86-5									5.1E-06	1.8E-02	4/99			1
2,4,6-TRICHLOROPHENOL	88-06-2									2.0E-05	7.0E-02	4/99 [1/91]			1
CHLOROPICRIN	76-06-2	2.9E+01	4/99			4.0E-01	12/01								1
p-CHLORO-o-TOLUIDINE	95-69-2									7.7E-05	2.7E-01	4/99			1
CHROMIUM 6+ <sup>TAC</sup> values also apply to:	18540-29-9					2.0E-01	1/01	2.0E-02	10/00	1.5E-01 <sup>TAC</sup>	5.1E+02	1/86	∅		1
<i>Barium chromate</i>	10294-40-3					2.0E-01	1/01	2.0E-02	10/00	1.5E-01 <sup>TAC</sup>	5.1E+02	1/86	∅		0.2053
<i>Calcium chromate</i>	13765-19-0					2.0E-01	1/01	2.0E-02	10/00	1.5E-01 <sup>TAC</sup>	5.1E+02	1/86	∅		0.3332
<i>Lead chromate</i>	7758-97-6					2.0E-01	1/01	2.0E-02	10/00	1.5E-01 <sup>TAC</sup>	5.1E+02	1/86	∅		0.1609
<i>Sodium dichromate</i>	10588-01-9					2.0E-01	1/01	2.0E-02	10/00	1.5E-01 <sup>TAC</sup>	5.1E+02	1/86	∅		0.397
<i>Strontium chromate</i>	7789-06-2					2.0E-01	1/01	2.0E-02	10/00	1.5E-01 <sup>TAC</sup>	5.1E+02	1/86	∅		0.2554
CHROMIUM TRIOXIDE (as chromic acid mist)	1333-82-0					2.0E-03	1/01	2.0E-02	10/00	1.5E-01 <sup>TAC</sup>	5.1E+02	1/86	∅		0.52
COPPER AND COMPOUNDS	7440-50-8 [1067]	1.0E+02	4/99												1
p-CRESIDINE	120-71-8									4.3E-05	1.5E-01	4/99			1
CRESOLS (mixtures of)	1319-77-3					6.0E+02	1/01								1
m-CRESOL	108-39-4					6.0E+02	1/01								1

**Table 1**  
**CONSOLIDATED TABLE OF OEHA/ARB APPROVED RISK ASSESSMENT HEALTH VALUES\***

Substance	Chemical Abstract Number	Noncancer Effects						Cancer Risk							
		Acute Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	8-Hour Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	Chronic Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	Chronic Oral (mg/kg-d)	Date Value Reviewed [Added]	Inhalation Unit Risk (µg/m <sup>3</sup> ) <sup>-1</sup>	Inhalation Cancer Potency Factor (mg/kg-d) <sup>-1</sup>	Date Value Reviewed [Added]	Oral Slope Factor (mg/kg-d) <sup>-1</sup>	Date Value Reviewed [Added]	M W A F
o-CRESOL	95-48-7					6.0E+02	1/01								1
p-CRESOL	106-44-5					6.0E+02	1/01								1
CUPFERRON	135-20-6									6.3E-05	2.2E-01	4/99			1
Cyanide Compounds (inorganic)	57-12-5 1073	3.4E+02	4/99			9.0E+00	4/00								1
HYDROGEN CYANIDE (Hydrocyanic acid)	74-90-8	3.4E+02	4/99			9.0E+00	4/00								1
2,4-DIAMINOANISOLE	615-05-4									6.6E-06	2.3E-02	4/99			1
2,4-DIAMINOTOLUENE	95-80-7									1.1E-03	4.0E+00	4/99			1
1,2-DIBROMO-3-CHLOROPROPANE (DBCP)	96-12-8									2.0E-03	7.0E+00	4/99 [1/92]			1
p-DICHLOROBENZENE	106-46-7					8.0E+02	1/01			1.1E-05	4.0E-02	4/99 [1/91]			1
3,3-DICHLOROBENZIDINE	91-94-1									3.4E-04	1.2E+00	4/99 [1/91]			1
1,1-DICHLOROETHANE (Ethylidene dichloride)	75-34-3									1.6E-06	5.7E-03	4/99			1
1,1-DICHLOROETHYLENE ... (see Vinylidene Chloride)															
DI(2-ETHYLHEXYL)PHTHALATE (DEHP)	117-81-7									2.4E-06	8.4E-03	4/99 [1/92]	8.4E-03	10/00	1
DIESEL EXHAUST ... (see Particulate Emissions from Diesel-Fueled Engines)															
DIETHANOLAMINE	111-42-2					3.0E+00	12/01								
p-DIMETHYLAMINOAZOBENZENE	60-11-7									1.3E-03	4.6E+00	4/99			1
N,N-DIMETHYL FORMAMIDE	68-12-2					8.0E+01	1/01								1
2,4-DINITROTOLUENE	121-14-2									8.9E-05	3.1E-01	4/99			1
1,4-DIOXANE <sup>+</sup> (1,4-Diethylene dioxide)	123-91-1	3.0E+03	4/99			3.0E+03	4/00			7.7E-06	2.7E-02	4/99 [1/91]			1
EPICHLOROHYDRIN (1-Chloro-2,3-epoxypropane)	106-89-8	1.3E+03	4/99			3.0E+00	1/01			2.3E-05	8.0E-02	4/99 [1/92]			1
1,2-EPOXYBUTANE	106-88-7					2.0E+01	1/01								1
ETHYL BENZENE	100-41-4					2.0E+03	2/00			2.5E-06	8.7E-3	11/07			1
ETHYL CHLORIDE (Chloroethane)	75-00-3					3.0E+04	4/00								1
ETHYLENE DIBROMIDE <sup>TAC</sup> (1,2-Dibromoethane)	106-93-4					8.0E-01	12/01			7.1E-05 <sup>TAC</sup>	2.5E-01	7/85			1
ETHYLENE DICHLORIDE <sup>TAC</sup> (1,2-Dichloroethane)	107-06-2					4.0E+02	1/01			2.1E-05 <sup>TAC</sup>	7.2E-02	9/85			1
ETHYLENE GLYCOL	107-21-1					4.0E+02	4/00								1
ETHYLENE GLYCOL BUTYL ETHER ... (see Glycol ethers)															

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		Acute Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	8-Hour Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	Chronic Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	Chronic Oral (mg/kg-d)	Date Value Reviewed [Added]	Inhalation Unit Risk (µg/m <sup>3</sup> ) <sup>-1</sup>	Inhalation Cancer Potency Factor (mg/kg-d) <sup>-1</sup>	Date Value Reviewed [Added]	Oral Slope Factor (mg/kg-d) <sup>-1</sup>	Date Value Reviewed [Added]	M W A F
ETHYLENE OXIDE <sup>TAC</sup> (1,2-Epoxyethane)	75-21-8					3.0E+01	1/01			8.8E-05 <sup>TAC</sup>	3.1E-01	11/87			1
ETHYLENE THIOUREA	96-45-7									1.3E-05	4.5E-02	4/99			1
Fluorides	1101	2.4E+02	4/99			1.3E+01	8/03	4.0E-02	8/03						1
HYDROGEN FLUORIDE (Hydrofluoric acid)	7664-39-3	2.4E+02	4/99			1.4E+01	8/03	4.0E-02	8/03						1
FORMALDEHYDE <sup>TAC</sup>	50-00-0	5.5E+01	12/08	9.0E+00	12/08	9.0E+00	12/08			6.0E-06 <sup>TAC</sup>	2.1E-02	3/92			1
GLUTARALDEHYDE	111-30-8					8.0E-02	1/01								1
GLYCOL ETHERS	1115														1
ETHYLENE GLYCOL BUTYL ETHER – EGBE	111-76-2	1.4E+04	4/99												1
ETHYLENE GLYCOL ETHYL ETHER – EGEE	110-80-5	3.7E+02	4/99[1/92]			7.0E+01	2/00								1
ETHYLENE GLYCOL ETHYL ETHER ACETATE – EGEEA	111-15-9	1.4E+02	4/99			3.0E+02	2/00								1
ETHYLENE GLYCOL METHYL ETHER – EGME	109-86-4	9.3E+01	4/99			6.0E+01	2/00								1
ETHYLENE GLYCOL METHYL ETHER ACETATE – EGMEA	110-49-6					9.0E+01	2/00								1
HEXACHLOROBENZENE	118-74-1									5.1E-04	1.8E+00	4/99 [1/91]			1
HEXACHLOROCYCLOHEXANES (mixed or technical grade)	608-73-1									1.1E-03	4.0E+00	4/99 [1/91]	4.0E+00	10/00 [1/92]	1
alpha- HEXACHLOROCYCLOHEXANE	319-84-6									1.1E-03	4.0E+00	4/99 [1/91]	4.0E+00	10/00 [1/92]	1
beta- HEXACHLOROCYCLOHEXANE	319-85-7									1.1E-03	4.0E+00	4/99 [1/91]	4.0E+00	10/00 [1/92]	1
gamma- HEXACHLOROCYCLOHEXANE (Lindane)	58-89-9									3.1E-04	1.1E+00	4/99	1.1E+00	10/00	1
n-HEXANE	110-54-3					7.0E+03	4/00								1
HYDRAZINE	302-01-2					2.0E-01	1/01			4.9E-03	1.7E+01	4/99 [7/90]			1
HYDROCHLORIC ACID (Hydrogen chloride)	7647-01-0	2.1E+03	4/99			9.0E+00	2/00								1
HYDROGEN BROMIDE ... (see Bromine & Compounds)															
HYDROGEN CYANIDE ... (see Cyanide & Compounds)															
HYDROGEN FLUORIDE ... (see Fluorides & Compounds)															

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		Acute Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	8-Hour Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	Chronic Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	Chronic Oral (mg/kg-d)	Date Value Reviewed [Added]	Inhalation Unit Risk (µg/m <sup>3</sup> ) <sup>-1</sup>	Inhalation Cancer Potency Factor (mg/kg-d) <sup>-1</sup>	Date Value Reviewed [Added]	Oral Slope Factor (mg/kg-d) <sup>-1</sup>	Date Value Reviewed [Added]	M W A F
HYDROGEN SELENIDE ... (see Selenium & Compounds)															
HYDROGEN SULFIDE	7783-06-4	4.2E+01	4/99[7/90]			1.0E+01	4/00								1
ISOPHORONE	78-59-1					2.0E+03	12/01								
ISOPROPYL ALCOHOL (Isopropanol)	67-63-0	3.2E+03	4/99			7.0E+03	2/00								1
LEAD AND COMPOUNDS <sup>TAC JJ*</sup> (inorganic) values also apply to:	7439-92-1 1128 [1130]									1.2E-05 TAC	4.2E-02	4/97	8.5E-03	10/00	1
<i>Lead acetate</i>	301-04-2									1.2E-05 TAC	4.2E-02	4/97	8.5E-03	10/00	0.637
<i>Lead phosphate</i>	7446-27-7									1.2E-05 TAC	4.2E-02	4/97	8.5E-03	10/00	0.7659
<i>Lead subacetate</i>	1335-32-6									1.2E-05 TAC	4.2E-02	4/97	8.5E-03	10/00	0.7696
LINDANE ... (see gamma-Hexachlorocyclohexane)															
MALEIC ANHYDRIDE	108-31-6					7.0E-01	12/01								1
MANGANESE AND COMPOUNDS	7439-96-5 [1132]			1.7E-01	12/08	9.0E-02	12/08								1
MERCURY AND COMPOUNDS (INORGANIC)	7439-97-6 [1133]	6.0E-01	12/08	6.0E-02	12/08	3.0E-02	12/08	1.6E-04	12/08						1
<i>Mercuric chloride</i>	7487-94-7	6.0E-01	12/08	6.0E-02	12/08	3.0E-02	12/08	1.6E-04	12/08						1
METHANOL	67-56-1	2.8E+04	4/99			4.0E+03	4/00								1
METHYL BROMIDE (Bromomethane)	74-83-9	3.9E+03	4/99			5.0E+00	2/00								1
METHYL tertiary-BUTYL ETHER	1634-04-4					8.0E+03	2/00			2.6E-07	1.8E-03	11/99			1
METHYL CHLOROFORM (1,1,1-Trichloroethane)	71-55-6	6.8E+04	4/99			1.0E+03	2/00								1
METHYL ETHYL KETONE (2-Butanone)	78-93-3	1.3E+04	4/99												1
METHYL ISOCYANATE	624-83-9					1.0E+00	12/01								1
METHYL MERCURY ... (see Mercury & Compounds)															
4,4'-METHYLENE BIS (2-CHLOROANILINE) (MOCA)	101-14-4									4.3E-04	1.5E+00	4/99			1
METHYLENE CHLORIDE <sup>TAC</sup> (Dichloromethane)	75-09-2	1.4E+04	4/99			4.0E+02	2/00			1.0E-06 TAC	3.5E-03	7/89			1
4,4'-METHYLENE DIANILINE (AND ITS DICHLORIDE)	101-77-9					2.0E+01	12/01			4.6E-04	1.6E+00	4/99	1.6E+00	10/00	1
METHYLENE DIPHENYL ISOCYANATE	101-68-8					7.0E-01	1/01								1
MICHLER'S KETONE (4,4'-Bis(dimethylamino)benzophenone)	90-94-8									2.5E-04	8.6E-01	4/99			1
N-NITROSODI-n-BUTYLAMINE	924-16-3									3.1E-03	1.1E+01	4/99 [1/92]			1

**Table 1  
CONSOLIDATED TABLE OF OEHA/ARB APPROVED RISK ASSESSMENT HEALTH VALUES\***

Substance	Chemical Abstract Number	Noncancer Effects								Cancer Risk					
		Acute Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	8-Hour Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	Chronic Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	Chronic Oral (mg/kg-d)	Date Value Reviewed [Added]	Inhalation Unit Risk (µg/m <sup>3</sup> ) <sup>-1</sup>	Inhalation Cancer Potency Factor (mg/kg-d) <sup>-1</sup>	Date Value Reviewed [Added]	Oral Slope Factor (mg/kg-d) <sup>-1</sup>	Date Value Reviewed [Added]	M W A F
N-NITROSODI-n-PROPYLAMINE	621-64-7									2.0E-03	7.0E+00	4/99 [1/91]			1
N-NITROSODIETHYLAMINE	55-18-5									1.0E-02	3.6E+01	4/99 [1/91]			1
N-NITROSODIMETHYLAMINE	62-75-9									4.6E-03	1.6E+01	4/99 [1/91]			1
N-NITROSODIPHENYLAMINE	86-30-6									2.6E-06	9.0E-03	4/99 [1/91]			1
N-NITROSO-N-METHYLETHYLAMINE	10595-95-6									6.3E-03	2.2E+01	4/99 [7/90]			1
N-NITROSOMORPHOLINE	59-89-2									1.9E-03	6.7E+00	4/99 [7/92]			1
N-NITROSOPIPERIDINE	100-75-4									2.7E-03	9.4E+00	4/99 [7/92]			1
N-NITROSPYRROLIDINE	930-55-2									6.0E-04	2.1E+00	4/99 [7/90]			1
NAPHTHALENE ... (see Polycyclic aromatic hydrocarbons)															
NICKEL AND COMPOUNDS <sup>TAC</sup> values also apply to:	7440-02-0 [1145]	6.0E+00	4/99			5.0E-02	2/00	5.0E-02	10/00	2.6E-04 <sup>TAC</sup>	9.1E-01	8/91			1
<i>Nickel acetate</i>	373-02-4	6.0E+00	4/99			5.0E-02	2/00	5.0E-02	10/00	2.6E-04 <sup>TAC</sup>	9.1E-01	8/91			0.3321
<i>Nickel carbonate</i>	3333-67-3	6.0E+00	4/99			5.0E-02	2/00	5.0E-02	10/00	2.6E-04 <sup>TAC</sup>	9.1E-01	8/91			0.4945
<i>Nickel carbonyl</i>	13463-39-3	6.0E+00	4/99			5.0E-02	2/00	5.0E-02	10/00	2.6E-04 <sup>TAC</sup>	9.1E-01	8/91			0.3438
<i>Nickel hydroxide</i>	12054-48-7	6.0E+00	4/99			5.0E-02	2/00	5.0E-02	10/00	2.6E-04 <sup>TAC</sup>	9.1E-01	8/91			0.6332
<i>Nickelocene</i>	1271-28-9	6.0E+00	4/99			5.0E-02	2/00	5.0E-02	10/00	2.6E-04 <sup>TAC</sup>	9.1E-01	8/91			0.4937
NICKEL OXIDE	1313-99-1	6.0E+00	4/99			1.0E-01	2/00	5.0E-02	10/00	2.6E-04 <sup>TAC</sup>	9.1E-01	8/91			0.7859
<i>Nickel refinery dust from the pyrometallurgical process</i>	1146	6.0E+00	4/99			5.0E-02	2/00	5.0E-02	10/00	2.6E-04 <sup>TAC</sup>	9.1E-01	8/91			1
<i>Nickel subsulfide</i>	12035-72-2	6.0E+00	4/99			5.0E-02	2/00	5.0E-02	10/00	2.6E-04 <sup>TAC</sup>	9.1E-01	8/91			0.2443
NITRIC ACID	7697-37-2	8.6E+01	4/99												1
NITROGEN DIOXIDE	10102-44-0	4.7E+02	4/99[1/92]												1
p-NITROSODIPHENYLAMINE	156-10-5									6.3E-06	2.2E-02	4/99			1
OZONE	10028-15-6	1.8E+02	4/99[1/92]												1
PARTICULATE EMISSIONS FROM DIESEL-FUELED ENGINES <sup>TAC</sup> ■■	9901					5.0E+00 <sup>TAC</sup>	8/98			3.0E-04 <sup>TAC</sup>	1.1E+00	8/98			1
PENTACHLOROPHENOL ... (see Chlorophenols)															

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Substance	Chemical Abstract Number	Noncancer Effects								Cancer Risk					
		Acute Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	8-Hour Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	Chronic Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	Chronic Oral (mg/kg-d)	Date Value Reviewed [Added]	Inhalation Unit Risk (µg/m <sup>3</sup> ) <sup>-1</sup>	Inhalation Cancer Potency Factor (mg/kg-d) <sup>-1</sup>	Date Value Reviewed [Added]	Oral Slope Factor (mg/kg-d) <sup>-1</sup>	Date Value Reviewed [Added]	M W A F
PERCHLOROETHYLENE <sup>TAC</sup> (Tetrachloroethylene)	127-18-4	2.0E+04	4/99			3.5E+01 TAC	10/91			5.9E-06 TAC	2.1E-02	10/91			1
PHENOL	108-95-2	5.8E+03	4/99			2.0E+02	4/00								1
PHOSGENE	75-44-5	4.0E+00	4/99												1
PHOSPHINE	7803-51-2					8.0E-01	9/02								1
PHOSPHORIC ACID	7664-38-2					7.0E+00	2/00								1
PHTHALIC ANHYDRIDE	85-44-9					2.0E+01	1/01								1
PCB (POLYCHLORINATED BIPHENYLS) (unspeciated mixture) [lowest risk] ⚠*	1336-36-3									2.0E-05	7.0E-02	4/99	7.0E-02	10/00	1
PCB (POLYCHLORINATED BIPHENYLS) (unspeciated mixture) [low risk] ⚠*	1336-36-3									1.1E-04	4.0E-01*		4.0E-01*		1
PCB (POLYCHLORINATED BIPHENYLS) (unspeciated mixture) [high risk] ⚠*	1336-36-3									5.7E-04	2.0E+00	4/99	2.0E+00	10/00	1
PCB (POLYCHLORINATED BIPHENYLS) (speciated) <sup>Ⓜ</sup>															
3,3',4,4'- TETRACHLOROBIPHENYL (PCB 77)	32598-13-3					4.0E-01	8/03	1.0E-04	8/03	3.8E-03	1.3E+01	8/03	1.3E+01	8/03	1
3,4,4',5'- TETRACHLOROBIPHENYL (PCB 81)	70362-50-4					4.0E-01	8/03	1.0E-04	8/03	3.8E-03	1.3E+01	8/03	1.3E+01	8/03	1
2,3,3',4,4'- PENTACHLOROBIPHENYL (PCB 105)	32598-14-4					4.0E-01	8/03	1.0E-04	8/03	3.8E-03	1.3E+01	8/03	1.3E+01	8/03	1
2,3,4,4',5'- PENTACHLOROBIPHENYL (PCB 114)	74472-37-0					8.0E-02	8/03	2.0E-05	8/03	1.9E-02	6.5E+01	8/03	6.5E+01	8/03	1
2,3',4,4',5'- PENTACHLOROBIPHENYL (PCB 118)	31508-00-6					4.0E-01	8/03	1.0E-04	8/03	3.8E-03	1.3E+01	8/03	1.3E+01	8/03	1
2,3',4,4',5'- PENTACHLOROBIPHENYL (PCB 123)	65510-44-3					4.0E-01	8/03	1.0E-04	8/03	3.8E-03	1.3E+01	8/03	1.3E+01	8/03	1
3,3',4,4',5'- PENTACHLOROBIPHENYL (PCB 126)	57465-28-8					4.0E-04	8/03	1.0E-07	8/03	3.8E+00	1.3E+04	8/03	1.3E+04	8/03	1
2,3,3',4,4',5'- HEXACHLOROBIPHENYL (PCB 156)	38380-08-4					8.0E-02	8/03	2.0E-05	8/03	1.9E-02	6.5E+01	8/03	6.5E+01	8/03	1
2,3,3',4,4',5'- HEXACHLOROBIPHENYL (PCB 157)	69782-90-7					8.0E-02	8/03	2.0E-05	8/03	1.9E-02	6.5E+01	8/03	6.5E+01	8/03	1

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		Acute Inhalation ( $\mu\text{g}/\text{m}^3$ )	Date Value Reviewed [Added]	8-Hour Inhalation ( $\mu\text{g}/\text{m}^3$ )	Date Value Reviewed [Added]	Chronic Inhalation ( $\mu\text{g}/\text{m}^3$ )	Date Value Reviewed [Added]	Chronic Oral (mg/kg-d)	Date Value Reviewed [Added]	Inhalation Unit Risk ( $\mu\text{g}/\text{m}^3\text{-}1$ )	Inhalation Cancer Potency Factor (mg/kg-d) <sup>-1</sup>	Date Value Reviewed [Added]	Oral Slope Factor (mg/kg-d) <sup>-1</sup>	Date Value Reviewed [Added]	M W A F
2,3',4,4',5,5'-HEXACHLOROBIPHENYL (PCB 167)	52663-72-6					4.0E+00	8/03	1.0E-03	8/03	3.8E-04	1.3E+00	8/03	1.3E+00	8/03	1
3,3',4,4',5,5'-HEXACHLOROBIPHENYL (PCB 169)	32774-16-6					4.0E-03	8/03	1.0E-06	8/03	3.8E-01	1.3E+03	8/03	1.3E+03	8/03	1
2,3,3',4,4',5,5'-HEPTACHLOROBIPHENYL (PCB 189)	39635-31-9					4.0E-01	8/03	1.0E-04	8/03	3.8E-03	1.3E+01	8/03	1.3E+01	8/03	1
POLYCHLORINATED DIBENZO-P-DIOXINS (PCDD) (Treated as 2,3,7,8-TCDD for HRA) <sup>TAC</sup> ●	1085 1086					4.0E-05	2/00	1.0E-08	10/00	3.8E+01 TAC	1.3E+05	8/86	1.3E+05 TAC	8/86	1
2,3,7,8-TETRACHLORODIBENZO-P-DIOXIN <sup>TAC</sup>	1746-01-6					4.0E-05	2/00	1.0E-08	10/00	3.8E+01 TAC	1.3E+05	8/86	1.3E+05 TAC	8/86	1
1,2,3,7,8-PENTACHLORODIBENZO-P-DIOXIN	40321-76-4					4.0E-05	8/03	1.0E-08	8/03	3.8E+01	1.3E+05	8/03	1.3E+05	8/03	1
1,2,3,4,7,8-HEXACHLORODIBENZO-P-DIOXIN	39227-28-6					4.0E-04	2/00	1.0E-07	10/00	3.8E+00	1.3E+04	4/99	1.3E+04	10/00	1
1,2,3,6,7,8-HEXACHLORODIBENZO-P-DIOXIN	57653-85-7					4.0E-04	2/00	1.0E-07	10/00	3.8E+00	1.3E+04	4/99	1.3E+04	10/00	1
1,2,3,7,8,9-HEXACHLORODIBENZO-P-DIOXIN	19408-74-3					4.0E-04	2/00	1.0E-07	10/00	3.8E+00	1.3E+04	4/99	1.3E+04	10/00	1
1,2,3,4,6,7,8-HEPTACHLORODIBENZO-P-DIOXIN	35822-46-9					4.0E-03	2/00	1.0E-06	10/00	3.8E-01	1.3E+03	4/99	1.3E+03	10/00	1
1,2,3,4,6,7,8,9-OCTACHLORODIBENZO-P-DIOXIN	3268-87-9					4.0E-01	8/03	1.0E-04	8/03	3.8E-03	1.3E+01	8/03	1.3E+01	8/03	1
POLYCHLORINATED DIBENZOFURANS (PCDF) <sup>TAC</sup> ● (Treated as 2,3,7,8-TCDD for HRA)	1080					4.0E-05	2/00	1.0E-08	10/00	3.8E+01 TAC	1.3E+05	8/86	1.3E+05 TAC	8/86	1
2,3,7,8-TETRACHLORODIBENZOFURAN	5120-73-19					4.0E-04	2/00	1.0E-07	10/00	3.8E+00	1.3E+04	4/99	1.3E+04	10/00	1
1,2,3,7,8-PENTACHLORODIBENZOFURAN	57117-41-6					8.0E-04	2/00	2.0E-07	10/00	1.9E+00	6.5E+03	4/99	6.5E+03	10/00	1
2,3,4,7,8-PENTACHLORODIBENZOFURAN	57117-31-4					8.0E-05	2/00	2.0E-08	10/00	1.9E+01	6.5E+04	4/99	6.5E+04	10/00	1
1,2,3,4,7,8-HEXACHLORODIBENZOFURAN	70648-26-9					4.0E-04	2/00	1.0E-07	10/00	3.8E+00	1.3E+04	4/99	1.3E+04	10/00	1

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Substance	Chemical Abstract Number	Noncancer Effects								Cancer Risk					
		Acute Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	8-Hour Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	Chronic Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	Chronic Oral (mg/kg-d)	Date Value Reviewed [Added]	Inhalation Unit Risk (µg/m <sup>3</sup> ) <sup>-1</sup>	Inhalation Cancer Potency Factor (mg/kg-d) <sup>-1</sup>	Date Value Reviewed [Added]	Oral Slope Factor (mg/kg-d) <sup>-1</sup>	Date Value Reviewed [Added]	M W A F
1,2,3,6,7,8-HEXACHLORODIBENZOFURAN	57117-44-9					4.0E-04	2/00	1.0E-07	10/00	3.8E+00	1.3E+04	4/99	1.3E+04	10/00	1
1,2,3,7,8,9-HEXACHLORODIBENZOFURAN	72918-21-9					4.0E-04	2/00	1.0E-07	10/00	3.8E+00	1.3E+04	4/99	1.3E+04	10/00	1
2,3,4,6,7,8-HEXACHLORODIBENZOFURAN	60851-34-5					4.0E-04	2/00	1.0E-07	10/00	3.8E+00	1.3E+04	4/99	1.3E+04	10/00	1
1,2,3,4,6,7,8-HEPTACHLORODIBENZOFURAN	67562-39-4					4.0E-03	2/00	1.0E-06	10/00	3.8E-01	1.3E+03	4/99	1.3E+03	10/00	1
1,2,3,4,7,8,9-HEPTACHLORODIBENZOFURAN	55673-89-7					4.0E-03	2/00	1.0E-06	10/00	3.8E-01	1.3E+03	4/99	1.3E+03	10/00	1
1,2,3,4,6,7,8,9-OCTACHLORODIBENZOFURAN	39001-02-0					4.0E-01	8/03	1.0E-04	8/03	3.8E-03	1.3E+01	8/03	1.3E+01	8/03	1
POLYCYCLIC AROMATIC HYDROCARBON (PAH) Φ [Treated as B(a)P for HRA]	1150 1151									1.1E-03	3.9E+00	4/99 [4/94]	1.2E+01	10/00 [4/94]	1
BENZ(A)ANTHRACENE	56-55-3									1.1E-04	3.9E-01	4/99 [4/94]	1.2E+00	10/00 [4/94]	1
BENZO(A)PYRENE	50-32-8									1.1E-03	3.9E+00	4/99 [4/94]	1.2E+01	10/00 [4/94]	1
BENZO(B)FLUORANTHENE	205-99-2									1.1E-04	3.9E-01	4/99 [4/94]	1.2E+00	10/00 [4/94]	1
BENZO(J)FLUORANTHENE	205-82-3									1.1E-04	3.9E-01	4/99 [4/94]	1.2E+00	10/00 [4/94]	1
BENZO(K)FLUORANTHENE	207-08-9									1.1E-04	3.9E-01	4/99 [4/94]	1.2E+00	10/00 [4/94]	1
CHRYSENE	218-01-9									1.1E-05	3.9E-02	4/99 [4/94]	1.2E-01	10/00 [4/94]	1
DIBENZ(A,H)ACRIDINE	226-36-8									1.1E-04	3.9E-01	4/99 [4/94]	1.2E+00	10/00 [4/94]	1
DIBENZ(A,H)ANTHRACENE	53-70-3									1.2E-03	4.1E+00	4/99 [4/94]	4.1E+00	10/00 [4/94]	1
DIBENZ(A,J)ACRIDINE	224-42-0									1.1E-04	3.9E-01	4/99 [4/94]	1.2E+00	10/00 [4/94]	1
DIBENZO(A,E)PYRENE	192-65-4									1.1E-03	3.9E+00	4/99 [4/94]	1.2E+01	10/00 [4/94]	1
DIBENZO(A,H)PYRENE	189-64-0									1.1E-02	3.9E+01	4/99 [4/94]	1.2E+02	10/00 [4/94]	1

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DIBENZO(A,I)PYRENE*	189-55-9									1.1E-02	3.9E+01	4/99 [4/94]	1.2E+02	10/00 [4/94]	1
DIBENZO(A,L)PYRENE*	191-30-0									1.1E-02	3.9E+01	4/99 [4/94]	1.2E+02	10/00 [4/94]	1
7H-DIBENZO(C,G)CARBAZOLE*	194-59-2									1.1E-03	3.9E+00	4/99 [4/94]	1.2E+01	10/00 [4/94]	1
7,12-DIMETHYLBENZ(A)ANTHRACENE*	57-97-6									7.1E-02	2.5E+02	4/99 [4/94]	2.5E+02	10/00 [4/94]	1
1,6-DINITROPYRENE*	42397-64-8									1.1E-02	3.9E+01	4/99 [4/94]	1.2E+02	10/00 [4/94]	1
1,8-DINITROPYRENE*	42397-65-9									1.1E-03	3.9E+00	4/99 [4/94]	1.2E+01	10/00 [4/94]	1
INDENO(1,2,3-C,D)PYRENE*	193-39-5									1.1E-04	3.9E-01	4/99 [4/94]	1.2E+00	10/00 [4/94]	1
3-METHYLCHOLANTHRENE*	56-49-5									6.3E-03	2.2E+01	4/99 [4/94]	2.2E+01	10/00 [4/94]	1
5-METHYLCHRYSENE*	3697-24-3									1.1E-03	3.9E+00	4/99 [4/94]	1.2E+01	10/00 [4/94]	1
NAPHTHALENE	91-20-3					9.0E+00	4/00			3.4E-05	1.2E-01	8/04			1
5-NITROACENAPHTHENE*	602-87-9									3.7E-05	1.3E-01	4/99 [4/94]	1.3E-01	10/00 [4/94]	1
6-NITROCHRYSENE*	7496-02-8									1.1E-02	3.9E+01	4/99 [4/94]	1.2E+02	10/00 [4/94]	1
2-NITROFLUORENE*	607-57-8									1.1E-05	3.9E-02	4/99 [4/94]	1.2E-01	10/00 [4/94]	1
1-NITROPYRENE*	5522-43-0									1.1E-04	3.9E-01	4/99 [4/94]	1.2E+00	10/00 [4/94]	1
4-NITROPYRENE*	57835-92-4									1.1E-04	3.9E-01	4/99 [4/94]	1.2E+00	10/00 [4/94]	1
POTASSIUM BROMATE.... ... (see Bromine & Compounds)															
1,3-PROPANE SULFONE	1120-71-4									6.9E-04	2.4E+00	4/99			1
PROPYLENE (PROPENE)	115-07-1					3.0E+03	4/00								1
PROPYLENE GLYCOL MONOMETHYL ETHER	107-98-2					7.0E+03	2/00								1
PROPYLENE OXIDE	75-56-9	3.1E+03	4/99			3.0E+01	2/00			3.7E-06	1.3E-02	4/99 [7/90]			1
SELENIUM AND COMPOUNDS	7782-49-2 [1170]					2.0E+01	12/01								1
HYDROGEN SELENIDE <i>Selenium sulfide</i>	7783-07-5 7446-34-6	5.0E+00	4/99			2.0E+01	12/01								1 1

**Table 1  
CONSOLIDATED TABLE OF OEHA/ARB APPROVED RISK ASSESSMENT HEALTH VALUES\***

Substance	Chemical Abstract Number	Noncancer Effects								Cancer Risk					
		Acute Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	8-Hour Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	Chronic Inhalation (µg/m <sup>3</sup> )	Date Value Reviewed [Added]	Chronic Oral (mg/kg-d)	Date Value Reviewed [Added]	Inhalation Unit Risk (µg/m <sup>3</sup> ) <sup>-1</sup>	Inhalation Cancer Potency Factor (mg/kg-d) <sup>-1</sup>	Date Value Reviewed [Added]	Oral Slope Factor (mg/kg-d) <sup>-1</sup>	Date Value Reviewed [Added]	M W A F
SILICA [CRYSTALLINE, RESPIRABLE]	1175					3.0E+00	2/05								1
SODIUM HYDROXIDE	1310-73-2	8.0E+00	4/99												1
STYRENE	100-42-5	2.1E+04	4/99			9.0E+02	4/00								1
SULFATES	9960	1.2E+02	4/99												1
SULFUR DIOXIDE	7446-09-5	6.6E+02	4/99[1/92]												1
SULFURIC ACID AND OLEUM	9961	1.2E+02	4/99			1.0E+00	12/01								1
SULFURIC ACID	7664-93-9	1.2E+02	4/99			1.0E+00	12/01								1
SULFUR TRIOXIDE	7446-71-9	1.2E+02	4/99			1.0E+00	12/01								1
OLEUM	8014-95-7	1.2E+02	4/99			1.0E+00	12/01								1
1,1,2,2-TETRACHLOROETHANE	79-34-5									5.8E-05	2.0E-01	4/99			1
TETRACHLOROPHENOLS															
... (see Chlorophenols)															
2,4,5-TRICHLOROPHENOL															
... (see Chlorophenols)															
2,4,6-TRICHLOROPHENOL															
... (see Chlorophenols)															
THIOACETAMIDE	62-55-5									1.7E-03	6.1E+00	4/99			1
TOLUENE	108-88-3	3.7E+04	4/99			3.0E+02	4/00								1
Toluene diisocyanates	26471-62-5					7.0E-02	1/01			1.1E-05	3.9E-02	4/99			1
TOLUENE-2,4-DIISOCYANATE	584-84-9					7.0E-02	1/01			1.1E-05	3.9E-02	4/99			1
TOLUENE-2,6-DIISOCYANATE	91-08-7					7.0E-02	1/01			1.1E-05	3.9E-02	4/99			1
1,1,2-TRICHLOROETHANE (Vinyl trichloride)	79-00-5									1.6E-05	5.7E-02	4/99			1
TRICHLOROETHYLENE <sup>TAC</sup>	79-01-6					6.0E+02	4/00			2.0E-06 <sup>TAC</sup>	7.0E-03	10/90			1
TRIETHYLAMINE	121-44-8	2.8E+03	4/99			2.0E+02	9/02								1
URETHANE (Ethyl carbamate)	51-79-6									2.9E-04	1.0E+00	4/99 [7/90]			1
Vanadium Compounds	N/A														1
Vanadium (fume or dust)	7440-62-2	3.0E+01	4/99												1
VANADIUM PENTOXIDE	1314-62-1	3.0E+01	4/99												1
VINYL ACETATE	108-05-4					2.0E+02	12/01								1
VINYL CHLORIDE <sup>TAC</sup> (Chloroethylene)	75-01-4	1.8E+05	4/99							7.8E-05 <sup>TAC</sup>	2.7E-01	12/90			1
VINYLDENE CHLORIDE (1,1-Dichloroethylene)	75-35-4					7.0E+01	1/01								1

**Table 1  
CONSOLIDATED TABLE OF OEHH/ARB APPROVED RISK ASSESSMENT HEALTH VALUES\***

Substance	Chemical Abstract Number	Noncancer Effects								Cancer Risk					
		Acute Inhalation ( $\mu\text{g}/\text{m}^3$ )	Date Value Reviewed [Added]	8-Hour Inhalation ( $\mu\text{g}/\text{m}^3$ )	Date Value Reviewed [Added]	Chronic Inhalation ( $\mu\text{g}/\text{m}^3$ )	Date Value Reviewed [Added]	Chronic Oral (mg/kg-d)	Date Value Reviewed [Added]	Inhalation Unit Risk ( $\mu\text{g}/\text{m}^3$ ) <sup>-1</sup>	Inhalation Cancer Potency Factor (mg/kg-d) <sup>-1</sup>	Date Value Reviewed [Added]	Oral Slope Factor (mg/kg-d) <sup>-1</sup>	Date Value Reviewed [Added]	M W A F
XYLENES (mixed isomers)	1330-20-7	2.2E+04	4/99			7.0E+02	4/00								1
m-XYLENE	108-38-3	2.2E+04	4/99			7.0E+02	4/00								1
o-XYLENE	95-47-6	2.2E+04	4/99			7.0E+02	4/00								1
p-XYLENE	106-42-3	2.2E+04	4/99			7.0E+02	4/00								1

**Table 1  
CONSOLIDATED TABLE OF OEHHA/ARB APPROVED RISK ASSESSMENT HEALTH VALUES\***

<p>Purpose: The purpose of this reference table is to provide a quick list of all health values that have been approved by the Office of Environmental Health Hazard Assessment (OEHHA) and the Air Resources Board (ARB) for use in facility health risk assessments conducted for the AB 2588 Air Toxics Hot Spots Program. The OEHHA has developed and adopted new risk assessment guidelines that update and replace the California Air Pollution Control Officers Association's (CAPCOA) <i>Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines, October 1993</i>. The OEHHA has adopted four technical support documents for these guidelines, which can be found on their website (<a href="http://www.oehha.ca.gov/air/hot_spots/index.html">http://www.oehha.ca.gov/air/hot_spots/index.html</a>). This table lists the OEHHA adopted inhalation and oral cancer slope factors, noncancer acute Reference Exposure Levels (RELs), and inhalation and oral noncancer chronic RELs. OEHHA is still in the process of adopting new health values. Therefore, new health values will periodically be added to, or deleted from, this table. Users of this table are advised to monitor the OEHHA website (<a href="http://www.oehha.ca.gov">www.oehha.ca.gov</a>) for any updates to the health values.</p> <p>May 2008 update: The Air Resources Board adopted amendments to the AB 2588 Air Toxics "Hot Spots" Emission Inventory Criteria and Guidelines Regulation (Title 17, California Code of Regulations, Section 93300.5) on November 16, 2006. The amendments became effective on September 26, 2007, after approval from the Office of Administrative Law. Under the new amendments, the substances previously listed in Appendix A-1 (<i>Substances For Which Emissions Must Be Quantified</i>) and Appendix F (<i>Criteria For Inputs For Risk Assessment Using Screening Air Dispersion Modeling</i>) of the ARB's <i>Air Toxics "Hot Spots" Emission Inventory Criteria and Guidelines (EICG) (July 1997)</i> have been removed from this table.</p>
<p>* Substances written in <i>italics</i> do not have explicit OEHHA approved health values, but are included in this table to clarify applicability of OEHHA adopted health effects values to individual or grouped substances listed in the <i>Air Toxics "Hot Spots" Emission Inventory Criteria and Guidelines, Appendix A-1 list of "Substances For Which Emissions Must Be Quantified"</i>.</p>
<p>▼ Chemical Abstract Service Number (CAS): For chemical groupings and mixtures where a CAS number is not applicable, the 4-digit code used in the <i>Air Toxics "Hot Spots" Emission Inventory Criteria and Guidelines (EICG) Report</i> is listed. The 4-digit codes enclosed in brackets [ ] are codes that have been phased out, but may still appear on previously reported Hot Spots emissions. For information on the origin and use of the 4-digit code, see the EICG report.</p>
<p>◆ Date Value Reviewed [Added]: These columns list the date that the health value was last reviewed by OEHHA and the Scientific Review Panel, and/or approved for use in the AB 2588 Air Toxics Hot Spots Program. If the health value is unchanged since it was first approved for use in the Hot Spots Program, then the date that the value was first approved for use by CAPCOA is listed within the brackets [ ].</p> <ul style="list-style-type: none"> <li>• April 1999 is listed for the cancer potency values and noncancer acute RELs, which have been adopted by the OEHHA as part of the AB 2588 Hot Spot Risk Assessment Guidelines.</li> <li>• February 2000, April 2000, January 2001, and December 2001 are listed for the first set of 22, the second set of 16, the third set of 22, and the fourth set of 12 noncancer chronic RELs, respectively. The chronic REL for carbon disulfide was adopted in May 2002. Chronic RELs for phosphine and triethylamine were adopted in September 2002. Chronic RELs for fluorides including hydrogen fluoride were adopted August 2003. Chronic REL for silica [crystalline respirable] was adopted February 2005.</li> <li>• October 2000 is listed for the oral chronic RELs and oral cancer slope factors.</li> <li>• Cancer potency value adopted for naphthalene in August 2004. The inhalation and oral cancer potency values for ethyl benzene were adopted in November 2007.</li> <li>• For the substances identified as Toxic Air Contaminants, the Air Resources Board hearing date is listed. The dates for acetaldehyde, benzo[a]pyrene, and methyl tertiary-butyl ether represent the dates the values were approved by the Scientific Review Panel.</li> <li>• On December 19, 2008, OEHHA adopted new acute, 8-hour, and chronic RELs for acetaldehyde, acrolein, arsenic, formaldehyde, manganese, and mercury. The most current health values can be found at: <a href="http://www.oehha.ca.gov/air/allrels.html">http://www.oehha.ca.gov/air/allrels.html</a>. Note that the 8-hour RELs are not included in the HARP program. These health factors will be added after OEHHA approves the Guidelines Manual (Part V).</li> </ul> <p>Note: 1. OEHHA presents the new oral RELs in micrograms (µg/kg-d) and we converted them to milligrams (mg/kg-d) for consistency.  2. Acute RELs with longer averaging periods (i.e., 4-hour, 6-hour, and 7-hour) will now use the 1-hour averaging period. The affected chemicals are: arsenic &amp; inorganic arsenic compounds, benzene, carbon tetrachloride, chloroform, ethylene glycol monoethyl ether, ethylene glycol monoethyl ether acetate, and ethylene glycol monomethyl ether.  3. At OEHHA's direction, the chronic oral REL for arsenic does not apply to arsine because arsine is a gas and not particle associated.</p>
<p>* Inhalation cancer potency factor: The "unit risk factor" has been replaced in the new risk assessment algorithms by a factor called the "inhalation cancer potency factor". Inhalation cancer potency factors are expressed as units of inverse dose [i.e., (mg/kg-day)<sup>-1</sup>]. They were derived from unit risk factors [units = (ug/m<sup>3</sup>)<sup>-1</sup>] by assuming that a receptor weighs 70 kilograms and breathes 20 cubic meters of air per day. The inhalation potency factor is used to calculate a potential inhalation cancer risk using the new risk assessment algorithms defined in the OEHHA, <i>Air Toxics Hot Spots Program; Part IV; Technical Support Document for Exposure Assessment and Stochastic Analysis (September 2000)</i>.</p>
<p>♣ Molecular Weight Adjustment Factor: Molecular weight adjustment factors (MWF) are only to be used when a toxic metal has a cancer potency factor. For most of the Hot Spots toxic metals, the OEHHA cancer potency factor applies to the weight of the toxic metal atom contained in the overall compound. Some of the Hot Spots compounds contain various elements along with the toxic metal atom (e.g., "Nickel hydroxide", CAS number 12054-48-7, has a formula of H<sub>2</sub>NiO<sub>2</sub>). Therefore, an adjustment to the reported pounds of the overall compound is needed before applying the OEHHA cancer potency factor for "Nickel and compounds" to such a compound. This ensures that the cancer potency factor is applied only to the fraction of the overall weight of the emissions that are associated with health effects of the metal. In other cases, the Hot Spots metals are already reported as the metal atom equivalent (e.g., CAS 7440-02-0, "Nickel"), and these cases do not use any further molecular weight adjustment. (Refer to Note [7] in Appendix A, List of Substances in the EICG Report for further information on how the emissions of various Hot Spots metal compounds are reported.) The appropriate molecular weight adjustment factors (MWF) to be used along with the OEHHA cancer potency factors for Hot Spots metals can be found in the MWF column of this table.</p> <p>So, for example, assume 100 pounds of "Nickel hydroxide" emissions are reported under CAS number 12054-48-7. To get the Nickel atom equivalent of these emissions, multiply by the listed MWF (0.6332) for Nickel hydroxide:</p> <ul style="list-style-type: none"> <li>• 100 pounds x 0.6332 = 63.32 pounds of Nickel atom equivalent</li> </ul> <p><i>This step should be completed prior to applying the OEHHA cancer potency factor for "Nickel and compounds" in a calculation for a prioritization score or risk assessment calculation.</i> (For more information see Chapter 8 of OEHHA's document, <i>The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments</i>.)</p> <p>Note: The value listed in the MWF column for Asbestos is not a molecular weight adjustment. This is a conversion factor for adjusting mass to fibers or structures. See Appendix C of OEHHA's document <i>The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments</i> for more information on Asbestos, or see the EICG report for reporting guidance. Also see the Asbestos footnote (designated by the symbol ⚡)</p>

**Table 1**  
**CONSOLIDATED TABLE OF OEHH/ARB APPROVED RISK ASSESSMENT HEALTH VALUES\***

N/A	Not Applicable
TAC	Toxic Air Contaminant: The Air Resources Board has identified this substance as a Toxic Air Contaminant.
☒	Asbestos: The units for the Inhalation Cancer Potency factor for asbestos are (100 PCM fibers/m <sup>3</sup> ) <sup>-1</sup> . A conversion factor of 100 fibers/0.003 µg can be multiplied by a receptor concentration of asbestos expressed in µg/m <sup>3</sup> . Unless other information necessary to estimate the concentration (fibers/m <sup>3</sup> ) of asbestos at receptors of interest is available. A unit risk factor of 1.9 E 10 <sup>-4</sup> (µg/m <sup>3</sup> ) <sup>-1</sup> and an inhalation cancer potency factor of 2.2 E 10 <sup>-2</sup> (mg/kg BW * day) <sup>-1</sup> are available. For more information on asbestos quantity conversion factors, see Appendix C of OEHHA's <i>The Air Toxics Hot Spots Program Risk Assessment Guidelines; Part II; Technical Support Document for Describing Available Cancer Potency Factors</i> , and Appendix C of OEHHA's document <i>The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments</i> .
☒	Hexavalent Chromium: The oral cancer slope factor for chromium 6+ and compounds has been withdrawn by the Office of Environmental Health Hazard Assessment.
🎵	Inorganic Lead: Inorganic Lead was identified by the Air Resources Board as a Toxic Air Contaminant in April 1997. Since information on noncancer health effects show no identified threshold, no Reference Exposure Level has been developed. The document, <i>Risk Management Guidelines for New, Modified, and Existing Sources of Lead, March 2001</i> , has been developed by ARB and OEHHA staff for assessing noncancer health impacts from sources of lead. See Appendix F of OEHHA's document <i>The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments</i> for an overview of how to evaluate noncancer impacts from exposure to lead using these risk management guidelines.
Ⓢ	Polycyclic Aromatic Hydrocarbons (PAHs): These substances are PAH or PAH-derivatives that have OEHHA-developed Potency Equivalency Factors (PEFs) which were approved by the Scientific Review Panel in April 1994 (see ARB document entitled <i>Benzo[a]pyrene as a Toxic Air Contaminant</i> ). PAH inhalation slope factors listed here have been adjusted by the PEFs. See Appendix G of OEHHA's document <i>The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments</i> for more information.  See section 8.2.3 of OEHHA's <i>The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments</i> for conducting health risks when total (unspicated) PAHs are reported.
☼	Polychlorinated Biphenyls: (unspicated mixtures) Lowest Risk: For use in cases where congeners with more than four chlorines comprise less than one-half percent of total polychlorinated biphenyls. High Risk: For use in cases where congeners with more than four chlorines do not comprise less than one-half percent of total polychlorinated biphenyls. Low Risk: This number would not ordinarily be used in the Hot Spots program. Chronic Oral: The chronic oral value is U.S. EPA's 1996 oral Reference Dose for Aroclor-1254.
Ⓢ	Polychlorinated Biphenyls (spicated): Values calculated using WHO <sub>97</sub> TEF procedure. See OEHHA memo dated August 29, 2003.
•	Polychlorinated Dibenzo- <i>p</i> -dioxins and Polychlorinated Dibenzofurans (also referred to as chlorinated dioxins and dibenzofurans): The OEHHA has adopted the World Health Organization 1997 (WHO <sub>97</sub> ) Toxicity Equivalency Factor scheme for evaluating the cancer risk due to exposure to samples containing mixtures of polychlorinated dibenzo- <i>p</i> -dioxins (PCDD) and polychlorinated dibenzofurans (PCDF) and determining cancer risks for a number of specific PCB congeners. See Appendix A of OEHHA's <i>Technical Support Document For Describing Available Cancer Potency Factors</i> for more information about the scheme. See Appendix E of OEHHA's <i>The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments</i> for the methodology for calculating 2,3,7,8-equivalents for PCDD, PCDFs and a number of specific PCB congeners. See section 8.2.3 of OEHHA's <i>The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments</i> for conducting health risks when total (unspicated) chlorinated dioxins and furans are reported.
🔊	Particulate Emissions from Diesel-Fueled Engines: The inhalation cancer potency factor and chronic REL were derived from whole diesel exhaust and should be used only for impacts from the inhalation pathway. The inhalation impacts from speciated emissions from diesel-fueled engines are already accounted for in the inhalation cancer potency factor and REL. However, at the discretion of the risk assessor, speciated emissions from diesel-fueled engines may be used to estimate acute noncancer health impacts or the contribution to cancer risk or chronic noncancer health impacts for the non-inhalation exposure pathway. See Appendix D of OEHHA's document <i>The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments</i> for more information.

Figure 5.1D-1 Sensitive Receptor Map

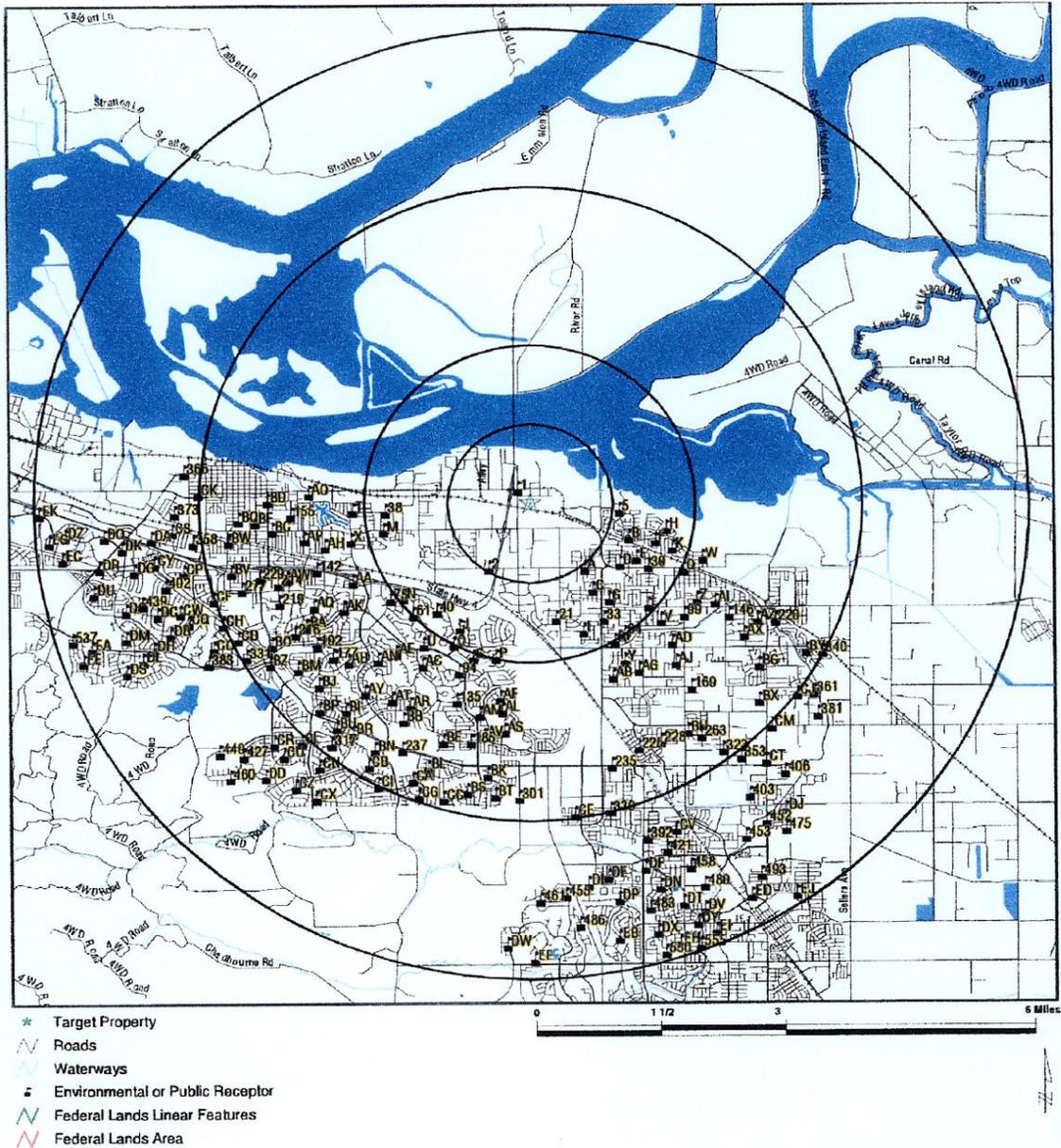


Figure 5.1D-2 Census Tracts in the Immediate Impact Area

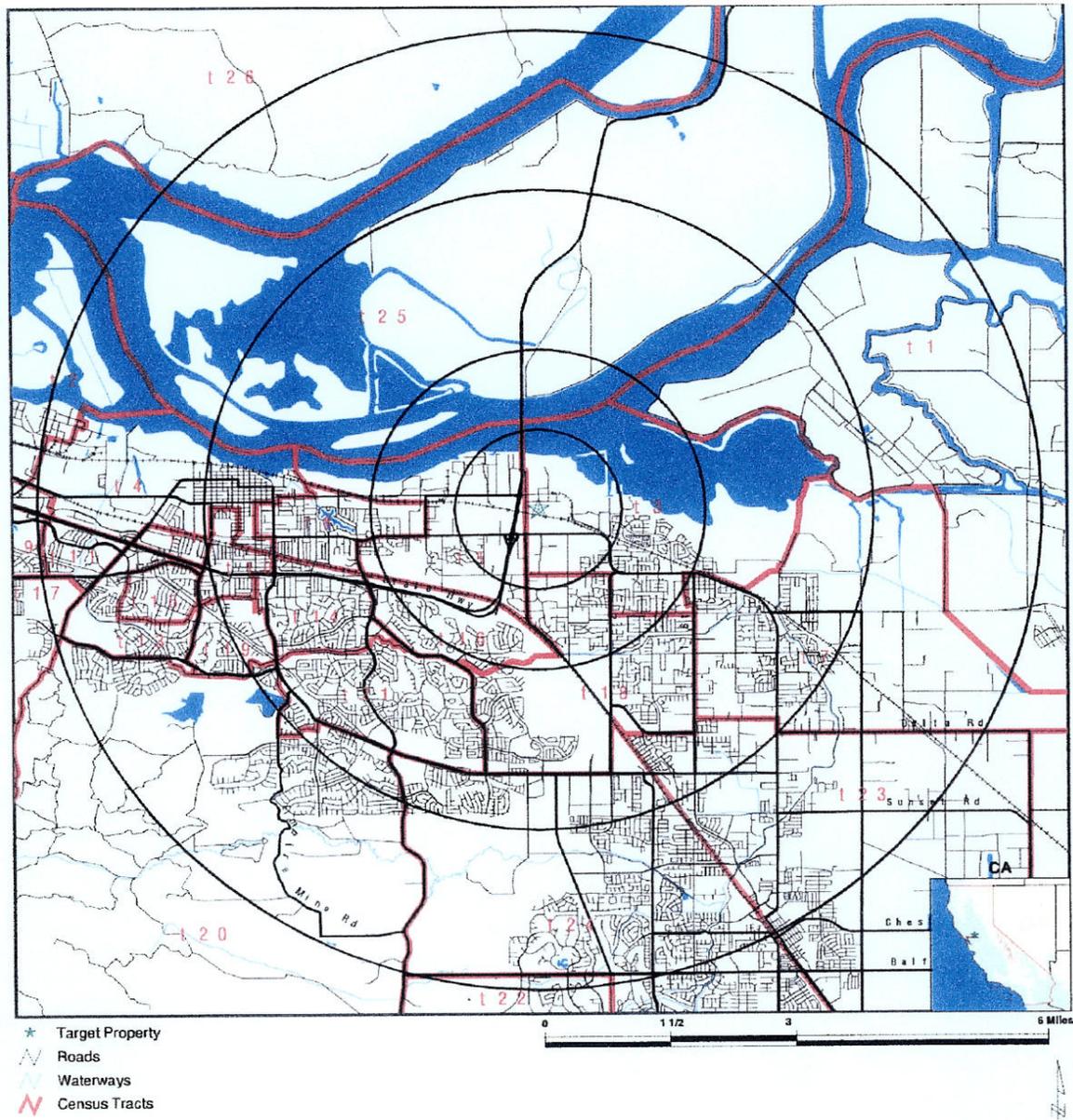


Figure 5.1D-3 MIR 1, 2, and 3 Location Map

