Appendix O
Public Health

Appendix O

Health Risk Assessment Support Data

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 WCP 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."[1]

[1] 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 WCP facility.

TABLE O-1 CRITERIA AND AIR TOXIC POLLUTANTS EMITTED FROM WCP 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	

TABLE O-2 HEALTH EFFECTS SIGNIFICANT THRESHOLD LEVELS		
	Significance Thresholds	
Agency	**SCAQMD**	**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	0.5	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 5.2, and from Appendix I.
- 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 WCP (turbine and cooling tower) is expected to be $7.00XE^{-7}$. This risk is well below the one in one million level, and the SCAQMD 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 WCP, and as such, the significant risk threshold for WCP is 10 in a million. The chronic and acute non-cancer hazard indices are 0.0297 and 0.00288, respectively. Both are well below the significant impact level of 1.0. The total cancer burden was calculated to be ~0.0032, which is also well below the state threshold value of 1.0, as well as being below the SCAQMD Rule 1401 significance level of 0.5. Detailed calculations and results for each significant receptor are included in the modeling results, which are being submitted electronically.

TABLE O-3 HEALTH RISK ASSESSMENT SUMMARY (TURBINE AND COOLING TOWER)

Turbine and Cooling Tower		
Risk Category	**Facility Values**	**Applicable Significance Threshold**
Cancer Risk	7.00 E-7	<= 1.0 without T-BACT <= 10.0 with T-BACT

Chronic Hazard Index	0.0297	1.0
Acute Hazard Index	0.00288	1.0
Cancer Burden	~0.0032	0.5
Turbine/Cooling Tower MIR location coordinates: Cancer and chronic MIR – Receptor 9889, 384807mE, 3742718mN Acute MIR – Receptor 1053, 384700mE, 3742700mN		

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 O-4 Census Tract Numbers, Areas, and Population Data
- Table O-5 SCAQMD TAC Summary
- Table O-6 Sensitive Receptor Listing for the Primary Impact Radius
- Table O-7 OEHHA/CARB Risk Assessment Health Values
- Figure O-1 Sensitive Receptor Map
- Figure O-2 Census Tracts in the Immediate Impact Area
- Table O-8 Current RMP OCA Summary
- Table O-9 CEC RMP Level of Concern OCA Summary
- Figure O-3 SLAB-Worst Case CEC LOC Downwind Concentration Plot
- Figure O-4 SLAB-Alternate Case CEC LOC Downwind Concentration Plot
- Table O-10 Risk Assessment Summary for WCP
- Figure O-5 MIR Location Map
- Attachment O-1 RMP Submit Filing for Current Cogen Ammonia System (Excerpts)

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.

APPENDIX O - PUBLIC HEALTH AND SAFETY

Appendix O Health Risk Assessment Support Data

Table O-4 (4 pages)

CENSUS FINDINGS

Map ID	Tract Number	Total Population	Population in Radius	Total Area(sq.mi.)	Area in Radius(sq.mi.)
T1	5410.01	1166	180.8	1.01	0.16
T2	5421.02	7669	766.2	0.60	0.06
T3	2912.10	4961	410.8	0.47	0.04
T4	5424.01	4902	3150.7	0.50	0.32
T5	5425.02	4249	3764.7	0.38	0.34
T6	5425.01	4126	3814.7	0.23	0.21
T7	5429.00	3239	2735.9	0.31	0.26
T8	5430.00	4336	3176.7	0.50	0.37
T9	5538.02	6170	72.5	0.68	0.01
T10	5422.00	6672	6321.3	0.54	0.51
T11	5424.02	3143	3143.0	0.61	0.61
T12	5432.02	4914	4914.0	1.16	1.16
T13	5432.01	3403	3403.0	0.39	0.39
T14	5431.00	6753	6753.0	1.10	1.10
T15	5410.02	3329	3321.7	1.33	1.32
T16	5702.02	6212	5102.6	0.65	0.53
T17	5702.03	4052	154.3	0.49	0.02
T18	6033.02	3678	165.8	0.43	0.02
T19	5704.01	8235	8235.0	0.56	0.56
T20	2912.20	3479	3403.5	0.30	0.30
T21	6031.02	3946	2228.1	0.28	0.16
T22	5703.01	6790	6790.0	0.47	0.47
T23	5704.02	3410	3410.0	0.57	0.57
T24	6502.00	5721	399.3	0.92	0.06
T25	5433.05	2353	2353.0	3.29	3.29
T26	5702.04	3984	137.6	0.21	0.01
T27	5705.02	6338	5998.9	0.77	0.73
T28	5705.01	7282	7282.0	0.58	0.58
T29	5433.21	3928	3928.0	1.90	1.90
T30	6032.00	2310	1998.8	0.54	0.46
T31	6501.01	5542	769.0	0.75	0.10
T32	2913.00	2715	2715.0	0.85	0.85
T33	5701.00	2706	1397.8	0.44	0.23
T34	5434.00	4386	4386.0	1.23	1.23
T35	5703.03	3867	3867.0	0.24	0.24
T36	5717.01	6114	6114.0	0.72	0.72
T37	5706.02	6382	6382.0	0.40	0.40
T38	5706.01	5159	5159.0	0.30	0.30
T39	5435.01	6494	6494.0	1.04	1.04
T40	5708.00	5464	188.0	0.92	0.03
T41	5703.04	4824	4824.0	0.23	0.23
T42	5707.01	6705	5660.6	0.69	0.58
T43	5706.03	4776	4776.0	0.28	0.28
T44	2920.00	6621	6621.0	1.55	1.55
T45	6509.01	5430	4606.1	2.22	1.88
T46	6504.00	3980	182.0	2.06	0.09
T47	5433.22	7033	7033.0	0.74	0.74
T48	5433.04	6551	6551.0	0.61	0.61
T49	5707.02	2306	2306.0	0.26	0.26
T50	5715.01	7882	7882.0	0.94	0.94
T51	5717.02	7626	7626.0	0.35	0.35
T52	5438.01	5232	5232.0	0.83	0.83
T53	5716.00	1988	1988.0	0.11	0.11
T54	5715.02	4630	4630.0	0.53	0.53
T55	5433.03	7140	7140.0	2.92	2.92
T56	5713.00	4268	4268.0	0.81	0.81
T57	5712.00	7778	3038.9	1.02	0.40
T58	5714.00	4649	4649.0	0.82	0.82

CENSUS FINDINGS

Map ID	Tract Number	Total Population	Population in Radius	Total Area(sq.mi.)	Area in Radius(sq. mi.)
T59	5440.00	7698	7698.0	1.35	1.35
T60	5435.02	4147	4147.0	0.43	0.43
T61	5718.00	3118	3118.0	1.07	1.07
T62	5435.03	5643	5643.0	0.63	0.63
T63	5719.00	5299	5299.0	0.76	0.76
T64	5439.03	3786	3786.0	0.50	0.50
T65	2932.01	6540	6540.0	0.42	0.42
T66	5438.02	6952	6952.0	0.52	0.52
T67	5735.00	1	1.0	3.33	3.33
T68	5736.00	5955	1114.8	0.93	0.17
T69	5721.00	1083	1083.0	0.30	0.30
T70	6509.02	5856	5856.0	0.77	0.77
T71	6508.00	5783	2269.2	0.49	0.19
T72	5724.00	1073	1073.0	0.21	0.21
T73	2941.20	2529	2529.0	1.69	1.69
T74	5720.02	4519	4519.0	0.40	0.40
T75	5720.01	5082	5082.0	0.55	0.55
T76	5439.04	4426	4426.0	3.75	3.75
T77	2932.02	6622	6622.0	0.40	0.40
T78	5723.01	3653	3653.0	0.29	0.29
T79	5436.02	7232	7232.0	0.62	0.62
T80	5436.01	3970	3970.0	0.26	0.26
T81	6511.01	5029	2382.0	2.13	1.01
T82	5437.01	3062	3062.0	0.25	0.25
T83	6510.02	4516	4516.0	0.45	0.45
T84	5725.00	3700	3700.0	0.23	0.23
T85	6510.01	5057	5057.0	0.58	0.58
T86	5437.02	6354	6354.0	0.50	0.50
T87	5722.01	6457	6457.0	0.59	0.59
T88	5436.04	5162	5162.0	1.02	1.02
T89	5723.02	3502	3502.0	0.29	0.29
T90	5741.00	4896	1138.5	0.71	0.17
T91	5734.01	1407	1407.0	0.41	0.41
T92	2933.01	2977	2977.0	0.33	0.33
T93	5436.03	4116	4116.0	0.57	0.57
T94	5726.00	5130	5130.0	0.47	0.47
T95	5722.02	3713	3713.0	0.59	0.59
T96	5734.02	6216	6216.0	1.16	1.16
T97	5742.01	3000	1749.1	0.50	0.29
T98	2933.02	4302	4302.0	0.43	0.43
T99	5437.03	3617	3617.0	0.40	0.40
T100	6700.01	3244	3244.0	0.36	0.36
T101	5742.02	2103	2103.0	0.53	0.53
T102	6514.00	8417	1396.8	1.11	0.18
T103	6700.03	6037	6037.0	0.58	0.58
T104	2941.10	4060	4060.0	0.38	0.38
T105	5734.03	1715	1715.0	0.68	0.68
T106	5732.01	5056	5056.0	0.24	0.24
T107	5727.00	5495	5495.0	0.42	0.42
T108	5731.00	7291	7291.0	0.46	0.46
T109	5728.00	263	263.0	0.39	0.39
T110	6700.02	3773	3773.0	0.32	0.32
T111	5733.00	4255	4255.0	0.29	0.29

CENSUS FINDINGS

Map ID	Tract Number	Total Population	Population in Radius	Total Area(sq.mi.)	Area in Radius(sq. mi.)
T112	5750.01	3092	3092.0	0.36	0.36
T113	2942.00	4425	4425.0	0.37	0.37
T114	2943.00	7059	7059.0	0.57	0.57
T115	2944.20	3270	3270.0	0.95	0.95
T116	2944.10	3854	3854.0	0.31	0.31
T117	5730.01	7108	7108.0	0.34	0.34
T118	5729.00	5113	5113.0	0.29	0.29
T119	5732.02	5697	5697.0	0.25	0.25
T120	5730.02	4180	4180.0	0.12	0.12
T121	5749.01	3538	664.3	0.52	0.10
T122	5749.02	4730	4730.0	0.31	0.31
T123	2933.04	4207	4207.0	0.22	0.22
T124	2946.10	3875	3875.0	0.32	0.32
T125	2946.20	3931	3931.0	0.33	0.33
T126	5751.01	5196	5196.0	0.17	0.17
T127	2945.20	3609	3609.0	0.19	0.19
T128	2945.10	4266	4266.0	0.20	0.20
T129	5750.02	4548	4538.8	0.37	0.37
T130	5754.01	5476	5476.0	0.35	0.35
T131	5755.00	252	252.0	0.53	0.53
T132	5753.00	4981	4981.0	0.25	0.25
T133	5754.02	3758	3758.0	0.12	0.12
T134	5752.01	5085	5085.0	0.22	0.22
T135	5751.03	5480	5480.0	0.19	0.19
T136	5752.02	5347	5347.0	0.16	0.16
T137	5748.00	2865	321.2	0.43	0.05
T138	6701.00	6484	6484.0	0.56	0.56
T139	2933.05	4660	4660.0	0.37	0.37
T140	6702.01	3889	1175.3	1.84	0.56
T141	2947.00	3270	3270.0	2.44	2.44
T142	5751.02	4810	4810.0	0.16	0.16
T143	2948.20	3555	3555.0	0.15	0.15
T144	5756.00	46	25.9	18.18	10.22
T145	5758.01	2721	2721.0	0.17	0.17
T146	5763.00	8912	8912.0	0.34	0.34
T147	5769.01	6379	6379.0	0.17	0.17
T148	5769.02	7877	7877.0	0.27	0.27
T149	5764.01	5066	5066.0	0.13	0.13
T150	5764.02	5575	5575.0	0.13	0.13
T151	5764.03	6082	6082.0	0.13	0.13
T152	5770.00	7054	5038.2	0.71	0.51
T153	5758.02	5433	5433.0	0.12	0.12
T154	5758.03	2968	2968.0	0.08	0.08
T155	2948.10	4039	4039.0	0.12	0.12
T156	2951.01	5188	5188.0	2.90	2.90
T157	2949.00	3262	3262.0	1.26	1.26
T158	6707.01	6777	5242.6	1.18	0.91
T159	2948.30	3274	3274.0	0.27	0.27
T160	5759.01	3825	3825.0	0.18	0.18
T161	6707.02	5357	631.8	2.60	0.31
T162	5776.03	7791	581.6	1.15	0.09
T163	5762.00	5652	5652.0	0.27	0.27
T164	5759.02	5108	5108.0	0.14	0.14

CENSUS FINDINGS

Map ID	Tract Number	Total Population	Population in Radius	Total Area(sq.mi.)	Area in Radius(sq. mi.)
T165	5768.01	4682	4682.0	0.20	0.20
T166	5768.02	4162	4162.0	0.18	0.18
T167	5771.00	6521	6519.9	0.47	0.47
T168	5765.03	4723	4723.0	0.12	0.12
T169	5765.01	3669	3669.0	0.11	0.11
T170	5765.02	5092	5092.0	0.12	0.12
T171	5766.01	4395	4395.0	0.19	0.19
T172	5760.00	445	445.0	0.62	0.62
T173	5761.00	2669	2669.0	0.61	0.61
T174	5766.02	3874	3213.3	2.46	2.04
T175	5767.00	3851	1967.8	2.06	1.05
T176	5772.00	5447	769.9	4.34	0.61
T177	2961.00	1434	757.8	8.13	4.30
T178	2963.00	4348	4347.0	0.38	0.38
T179	2962.10	2858	2858.0	0.79	0.79
T180	2965.00	3796	3796.0	0.35	0.35
T181	2964.00	6294	1953.1	0.81	0.25
T182	2966.00	5200	3861.1	0.32	0.24
T183	2962.20	3605	3605.0	0.20	0.20
T184	6099.00	1678	304.6	0.20	0.04
T185	2969.00	8250	2.1	0.43	0.00
T186	2971.10	4547	3448.3	0.19	0.14
T187	2971.20	3358	210.1	2.57	0.16

South Coast Air Basin

Annual Average Concentrations and Health Risks

South Coast Air Basin Toxic Air Contaminants-Annual Average Concentrations and Health Risks																
TAC*	**Conc./Risk**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Acetaldehyde	Annual Avg	2.46	3	2.46	2.67	2.3	0.97	2.08	1.77	1.54	1.63	1.26	1.47	1.41	1.47	1.46
	Health Risk	12	15	12	13	11	5	10	9	7	8	6	7	7	7	7
Benzene	Annual Avg	3.42	2.91	2.61	2.17	2.4	1.89	1.45	1.34	1.25	1.2	0.97	0.86	0.769	0.745	0.589
	Health Risk	317	269	242	201	222	175	134	124	116	111	90	80	71	69	55
1,3-Butadiene	Annual Avg	0.53	0.45	0.50	0.57	0.50	0.46	0.39	0.38	0.35	0.33	0.25	0.25	0.21	0.15	0.14
	Health Risk	200	170	187	212	187	173	146	142	133	123	94	94	79	55	54
Carbon Tetrachloride	Annual Avg	0.14	0.13		0.11		0.10	0.08		0.11		0.10	0.09	0.09	0.09	
	Health Risk	36	35		28		27	21		30		25	23	24	25	
Chromium, Hexavalent	Annual Avg			0.39	0.29	0.29	0.46	0.18	0.17	0.15	0.14	0.18		0.179	0.158	0.177
	Health Risk			59	43	43	69	27	25	22	22	27		27	24	27
para-Dichlorobenzene	Annual Avg		0.17	0.19	0.17	0.13	0.17	0.11	0.13			0.13	0.15	0.16	0.17	0.16
	Health Risk		11	13	11	8	11	7	9			9	10	11	11	11
Formaldehyde	Annual Avg	2.92	3.08	2.22	3.22	3.14	3.57	5.06	4.47	3.79	4.06	3.13	4.13	4.16	3.83	3.76
	Health Risk	22	23	16	24	23	26	37	33	28	30	23	30	31	28	28
Methylene Chloride	Annual Avg	1.86	1.51	0.9	1.23	1.1	1.28	0.95	1.14	0.85	0.92	0.83	0.63	0.57	0.59	0.57
	Health Risk	6	5	3	4	4	4	3	4	3	3	3	2	2	2	2
Perchloroethylene	Annual Avg	0.58	0.55	0.41	0.45	0.39	0.36	0.32	0.27	0.26		0.21	0.18	0.15	0.11	0.08
	Health Risk	23	22	16	18	16	15	13	11	10		8	7	6	4	3
Diesel PM**	*Annual Avg*	*(3.6)*					*(2.7)*					*(2.4)*				
	Health Risk	*(1080)*					*(810)*					*(720)*				
Average Basin Risk* **	Without Diesel PM	616	550	548	554	514	505	398	357	349	297	285	253	258	225	187
	With Diesel PM	*(1696)*					*(1315)*					*(1005)*				

* 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.

** Diesel PM concentration estimates are based on receptor modeling techniques, and estimates are available only for selected years.

*** 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.*

Table 5-32

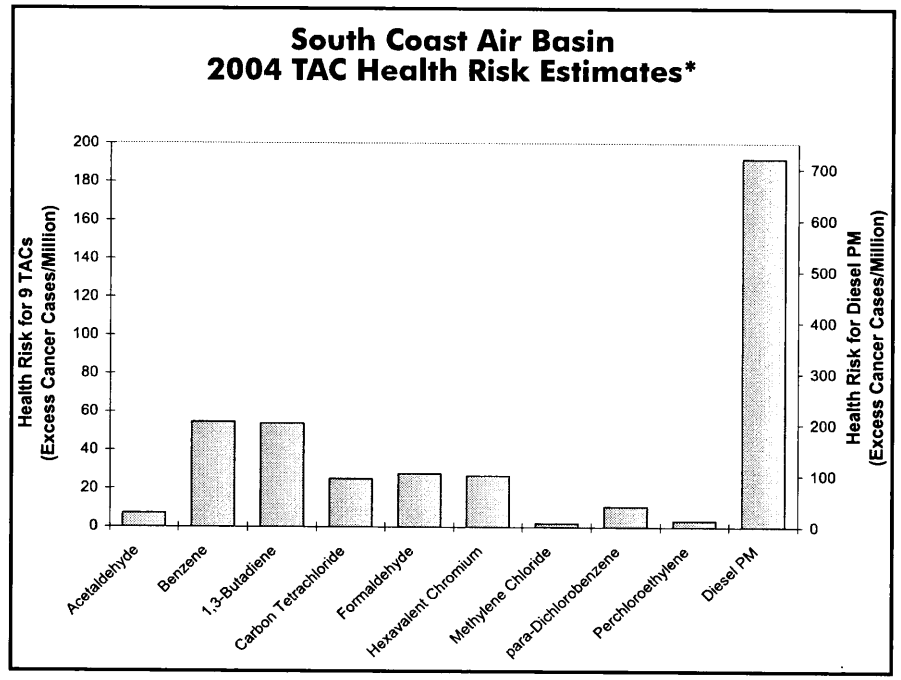
South Coast Air Basin

Air Quality and Health Risk

From 1990 through 2004, the ARB monitored ambient toxics concentrations at seven sites in the South Coast Air Basin. Data are available for most of the years at sites located in Burbank, Los Angeles, North Long Beach, and Riverside. Measurements for 1990 through 1997 are also available from a site at Upland. In addition, there are data for 1998 at a site in Fontana. During December 1999, monitoring activities for most of the TACs at Fontana were relocated to Azusa. Annual average concentration and associated health risk are not available for the year during which the site was moved because neither site had a full year of data.

Annual average concentrations and associated health risks for the top ten TACs individually as well as their cumulative health risk for the South Coast Air Basin, are provided in Table 5-32. Data for individual sites are provided in Appendix C. Although acetaldehyde and formaldehyde data were collected beginning in 1990, concentration and health risk values prior to 1996 were uncertain because the method used to analyze these samples underestimated the actual concentrations. The bias was corrected by a method change in 1996; however, the ARB was unable to develop a correction factor for the earlier data. Therefore, the data for years prior to 1996 are not directly comparable to data collected during the later years, however, these data are included here for completeness.

Figure 5-12 shows 2004 health risks posed by the top ten TACs individually for the South Coast Air Basin. As indicated on the graph, the health risk data reflect the year of 2004, except for diesel PM and carbon tetrachloride. The health risk for diesel PM reflects the year 2000, the most recent year for which estimated data are available. Carbon tetrachloride data are not available for 2004 due to problems with laboratory equipment and associated data reliability, so 2003 data are used instead. It is important to note that health risks shown here are based on an annual average concentration for all sites in the air basin. The health risk at individual locations may be higher or lower than the average for the air basin, depending on the impact of nearby sources.



** Data for Diesel PM reflect 2000; carbon tetrachloride reflect 2003; all other TACs reflect 2004.*

Figure 5-12

Diesel PM poses the greatest health risk among the ten TACs. The estimates for diesel PM was based on receptor modeling techniques. In the South Coast Air Basin, the estimated health risk from diesel PM was 720 excess cancer cases per million people in 2000. Although the health risk is higher than the statewide average, it represents a 33 percent drop between 1990 and 2000.

Trends and health risks for the nine other TACs are based on monitoring data. To examine their trends while minimizing the annual variation due to meteorology and sampling schedule, the air basin average concentration for 1990-1992 time period was compared to that for 2002-2004. The health risks of 1,3-butadiene and benzene have been reduced by 66 percent and 76 percent, respectively. Methylene chloride and perchloroethylene also show substantial reductions of 60 percent and 78 percent, respectively. Overall, in the South Coast Air Basin, all TACs have shown improvement since 1990, but their health risks are still higher than the statewide levels. It is important to note that there may be other compounds that pose a significant health risk but are not monitored. Reductions in ambient TAC concentrations and health risks should continue, as new rules and regulations are implemented to control toxic air contaminants.

In addition to the routine monitoring, a special study was conducted at two sites located in the Boyle Heights and Wilmington areas of Los Angeles between February 2001 and May 2002 (Boyle Heights) and between May 2001 and July 2002 (Wilmington). Monitoring included both TACs and criteria air pollutants. Limited monitoring of a few pollutants was conducted at two satellite sites in Boyle Heights from March 2001 through October 2001, and at one satellite site in Wilmington from November 2001 through May 2002. The Boyle Heights and Wilmington communities are both located near major freeways. The Wilmington community is also located near oil refineries and port facilities. Although not included in this almanac, data from Boyle Heights, Wilmington, and other community monitoring studies are being used in support of the ARB's Community Health Program. Copies of the full reports are available at *www.arb.ca.gov/ch/programs/sb25/sb25.htm*.

South Coast Air Basin

2005 Emission Inventory by Compound

Acetaldehyde

Approximately 92 percent of the emissions of acetaldehyde are from mobile sources.

South Coast - Acetaldehyde			
Emissions Source	**tons/year**	**Percent Air Basin**	**Percent State**
Stationary Sources	51	3%	1%
Area-wide Sources	90	5%	1%
On-Road Mobile	647	37%	8%
Gasoline Vehicles	314	18%	4%
Diesel Vehicles	332	19%	4%
Other Mobile	955	55%	12%
Gasoline Fuel	281	16%	4%
Diesel Fuel	629	36%	8%
Other Fuel	45	3%	1%
Natural Sources	0	0%	0%
Total	1743	100%	23%
Total Statewide	7675		

Table 5-22

Benzene

The primary sources of benzene emissions in the South Coast Air Basin are mobile sources (approximately 92 percent).

South Coast - Benzene			
Emissions Source	**tons/year**	**Percent Air Basin**	**Percent State**
Stationary Sources	248	7%	2%
Area-wide Sources	46	1%	0%
On-Road Mobile	2116	59%	17%
Gasoline Vehicles	2026	56%	16%
Diesel Vehicles	90	3%	1%
Other Mobile	1196	33%	10%
Gasoline Fuel	1007	28%	8%
Diesel Fuel	171	5%	1%
Other Fuel	18	0%	0%
Natural Sources	0	0%	0%
Total	3606	100%	29%
Total Statewide	12293		

Table 5-23

1,3-Butadiene

Approximately 99 percent of the emissions of 1,3-butadiene are from mobile sources.

South Coast - 1,3-Butadiene			
Emissions Source	**tons/year**	**Percent Air Basin**	**Percent State**
Stationary Sources	8	1%	0%
Area-wide Sources	2	0%	0%
On-Road Mobile	429	62%	15%
Gasoline Vehicles	420	60%	15%
Diesel Vehicles	9	1%	0%
Other Mobile	256	37%	9%
Gasoline Fuel	238	34%	9%
Diesel Fuel	16	2%	1%
Other Fuel	1	0%	0%
Natural Sources	0	0%	0%
Total	695	100%	25%
Total Statewide	2778		

Table 5-24

Carbon Tetrachloride

Stationary sources, such as chemical manufacturers and petroleum refineries, account for all of the emissions of carbon tetrachloride.

South Coast - Carbon Tetrachloride			
Emissions Source	**tons/year**	**Percent Air Basin**	**Percent State**
Stationary Sources	0.24	100%	16%
Area-wide Sources	0	0%	0%
On-Road Mobile	0	0%	0%
Gasoline Vehicles	0	0%	0%
Diesel Vehicles	0	0%	0%
Other Mobile	0	0%	0%
Gasoline Fuel	0	0%	0%
Diesel Fuel	0	0%	0%
Other Fuel	0	0%	0%
Natural Sources	0	0%	0%
Total	0.24	100%	16%
Total Statewide	1.48		

Table 5-25

Chromium, Hexavalent

Approximately 35 percent of the hexavalent chromium emissions are from stationary sources such as chrome platers, aircraft and parts manufacturing, and fabricated metal product manufacturing.

South Coast - Chromium, Hexavalent			
Emissions Source	**tons/year**	**Percent Air Basin**	**Percent State**
Stationary Sources	0.06	35%	4%
Area-wide Sources	< .01	1%	0%
On-Road Mobile	0.05	31%	3%
Gasoline Vehicles	0.05	31%	3%
Diesel Vehicles	< .01	1%	0%
Other Mobile	0.05	33%	4%
Gasoline Fuel	0.05	31%	3%
Diesel Fuel	< .01	1%	0%
Other Fuel	< .01	1%	0%
Natural Sources	0	0%	0%
Total	0.16	100%	11%
Total Statewide	1.52		

Table 5-26

para-Dichlorobenzene

Most of the emissions of *para*-dichlorobenzene are from consumer products (non-aerosol insect repellants and solid/gel air fresheners).

South Coast - *para*-Dichlorobenzene			
Emissions Source	**tons/year**	**Percent Air Basin**	**Percent State**
Stationary Sources	< 1	0%	0%
Area-wide Sources	1004	100%	42%
On-Road Mobile	0	0%	0%
Gasoline Vehicles	0	0%	0%
Diesel Vehicles	0	0%	0%
Other Mobile	0	0%	0%
Gasoline Fuel	0	0%	0%
Diesel Fuel	0	0%	0%
Other Fuel	0	0%	0%
Natural Sources	0	0%	0%
Total	1004	100%	42%
Total Statewide	2391		

Table 5-27

Formaldehyde

Approximately 85 percent of the formaldehyde emissions are from mobile sources.

South Coast - Formaldehyde			
Emissions Source	**tons/year**	**Percent Air Basin**	**Percent State**
Stationary Sources	482	10%	3%
Area-wide Sources	188	4%	1%
On-Road Mobile	1734	37%	9%
Gasoline Vehicles	1069	23%	6%
Diesel Vehicles	665	14%	3%
Other Mobile	2220	48%	12%
Gasoline Fuel	861	19%	5%
Diesel Fuel	1259	27%	7%
Other Fuel	100	2%	1%
Natural Sources	0	0%	0%
Total	4623	100%	24%
Total Statewide	19078		

Table 5-28

Methylene Chloride

Approximately 57 percent of the emissions of methylene chloride are from stationary sources such as plastic product manufacturers, manufacturers of synthetics, and aircraft and parts manufacturers.

South Coast - Methylene Chloride			
Emissions Source	**tons/year**	**Percent Air Basin**	**Percent State**
Stationary Sources	2003	57%	31%
Area-wide Sources	1502	43%	23%
On-Road Mobile	0	0%	0%
Gasoline Vehicles	0	0%	0%
Diesel Vehicles	0	0%	0%
Other Mobile	0	0%	0%
Gasoline Fuel	0	0%	0%
Diesel Fuel	0	0%	0%
Other Fuel	0	0%	0%
Natural Sources	0	0%	0%
Total	3505	100%	53%
Total Statewide	6557		

Table 5-29

Perchloroethylene

Approximately 56 percent of the emissions of perchloroethylene are from dry cleaning plants, manufacturers of aircraft parts and fabricated metal parts, and other stationary sources.

South Coast - Perchloroethylene			
Emissions Source	**tons/year**	**Percent Air Basin**	**Percent State**
Stationary Sources	1134	56%	21%
Area-wide Sources	878	44%	16%
On-Road Mobile	0	0%	0%
Gasoline Vehicles	0	0%	0%
Diesel Vehicles	0	0%	0%
Other Mobile	0	0%	0%
Gasoline Fuel	0	0%	0%
Diesel Fuel	0	0%	0%
Other Fuel	0	0%	0%
Natural Sources	0	0%	0%
Total	2012	100%	38%
Total Statewide	5361		

Table 5-30

Diesel Particulate Matter

Approximately 97 percent of emissions of diesel particulate matter are from mobile sources.

South Coast - Diesel PM			
Emissions Source	**tons/year**	**Percent Air Basin**	**Percent State**
Stationary Sources	212	3%	1%
Area-wide Sources	0	0%	0%
On-Road Mobile	2101	27%	7%
Gasoline Vehicles	0	0%	0%
Diesel Vehicles	2101	27%	7%
Other Mobile	5433	70%	18%
Gasoline Fuel	0	0%	0%
Diesel Fuel	5433	70%	18%
Other Fuel	0	0%	0%
Natural Sources	0	0%	0%
Total	7746	100%	25%
Total Statewide	31002		

Table 5-31

County Emissions (tons/year) for Ten Toxic Air Contaminants by Air Basin

South Coast Air Basin

TAC	Los Angeles[1]	Orange	Riverside[1]	San Bernardino[1]
Acetaldehyde	992	325	213	214
Benzene	2141	726	356	383
1,3-Butadiene	410	139	69	78
Carbon Tetrachloride	0.11	0.02	0.09	0.01
Chromium, Hexavalent	0.08	0.04	0.02	0.03
para-DiChlorobenzene	623	197	90	94
Formaldehyde	2664	908	529	522
Methylene Chloride	2137	933	196	239
Perchloroethylene	1224	420	182	185
Diesel PM	4654	1376	966	750

Table C-16

[1] This Air Basin includes only a portion of this county.

South Coast Air Basin

Los Angeles County: North Long Beach

Annual Average Concentrations and Health Risks																
TAC	**Conc.*/Risk****	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Acetaldehyde	Annual Avg	2.49	2.52		2.36	2.18	0.81		1.43			1.16	1.11		1.06	1.19
	Health Risk	12	12		11	11	4		7			6	5		5	6
Benzene	Annual Avg	3.53	2.45	2.6	1.99	2.04	1.69		1.24	1.16	1.11	1		0.705	0.705	0.554
	Health Risk	327	227	241	185	188	157		115	108	103	92		65	65	51
1,3-Butadiene	Annual Avg	0.592	0.439	0.523	0.575	0.447	0.448		0.364	0.339	0.323	0.278		0.198	0.142	0.144
	Health Risk	223	165	197	216	168	169		137	127	121	104		75	53	54
Carbon Tetrachloride	Annual Avg	0.139	0.129				0.099			0.118		0.097		0.092	0.092	
	Health Risk	37	34				26			31		26		24	24	
Chromium, Hexavalent	Annual Avg			0.44	0.34	0.22	0.25		0.15	0.11	0.12	0.12		0.078		0.09
	Health Risk			66	51	33	38		22	16	18	18		12		14
para-Dichlorobenzene	Annual Avg		0.17	0.26	0.19	0.12	0.17		0.16			0.13		0.18	0.2	0.15
	Health Risk		11	17	13	8	11		10			8		12	13	10
Formaldehyde	Annual Avg	2.97	2.76		3.22	3.06	3.29		3.68			2.88	2.96		2.79	2.78
	Health Risk	22	20		24	23	24		27			21	22		21	20
Methylene Chloride	Annual Avg	2.05	0.88	1	1.15	0.84	0.98		0.74	0.6		0.65		0.27	0.31	0.24
	Health Risk	7	3	3	4	3	3		3	2		2		<1	1	<1
Perchloroethylene	Annual Avg	0.477	0.355	0.349	0.433	0.321	0.318		0.227	0.193		0.168		0.095	0.076	0.057
	Health Risk	19	14	14	17	13	13		9	8		7		4	3	2
Diesel PM	Annual Avg	No Monitoring Data Available														
	Health Risk															
Total Health Risk		647	486	538	521	447	445		330	292	242	234	27	192	184	167

* Concentrations for Hexavalent Chromium are expressed as ng/m³, and concentrations for Diesel PM are expressed as µg/m³. Concentrations for all other TACs are expressed as ppb.
** Health Risk represents the number of excess cancer cases per million people based on a lifetime (70-year) exposure to the annual average concentration. Total Health Risk represents only those compounds listed in this table and only those with data for the year. There may be other significant compounds for which monitoring and/or health risk information are not available.

Table C-22

Table O-6 Identified Sensitive Receptors and Distances from Site **4 pages**

Watson Cogen Expansion Project

	Google Earth Data			Dist. From	Dist. From	Receptor	**NAD27**	
Receptor ID	UTM Em	UTM Nm	Elev., ft.	Site, m.	Site, ft.	#	**UTM Em**	**UTM Nm**
Site	**384795.6**	**3742527**	23	na	na		384888.6	3742329
Catskill ES	382341	3742012	40	2508.0	8228.9	1	382434	3741814
Delores ES	382253	3742090	37	2579.9	8464.6	2	382346	3741892
Carson HS	381921	3743344	39	2988.4	9805.1	3	382014	3743146
Meyler ES	381128	3743437	44	3778.8	12398.3	4	381221	3743239
Torrance Mont	378234	3742966	78	6576.3	21576.7	5	378327	3742768
Torrance ES	377821	3743352	85	7023.2	23043.2	6	377914	3743154
Shery HS	377456	3743079	85	7360.3	24149.2	7	377549	3742881
Wood ES	377698	3742145	77	7107.9	23320.9	8	377791	3741947
Adams Es	378028	3741674	99	6821.1	22380.2	9	378121	3741476
Hickory ES	376449	3742985	85	8359.2	27426.4	10	376542	3742787
Tutor Time	376375	3743351	89	8460.8	27760.0	11	376468	3743153
YMCA-1	375667	3742806	93	9132.9	29964.9	12	375760	3742608
Torrance Mem	375603	3742204	75	9198.3	30179.5	13	375696	3742006
West Coast Med	375160	3742438	78	9636.0	31615.8	14	375253	3742240
Arnold ES	374457	3743269	77	10365.2	34008.2	15	374550	3743071
Star View Cntr	374535	3743423	79	10299.6	33793.1	16	374628	3743225
Philomena Sch	381795	3743996	37	3340.9	10961.5	17	381888	3743798
Carson ES	381947	3744208	32	3307.6	10852.3	18	382040	3744010
Little SCH Cntr	382301	3744195	31	3000.9	9845.9	19	382394	3743997
Carson Christ.	383067	3743774	26	2131.4	6993.3	20	383160	3743576
Bonita ES	383472	3743898	24	1905.7	6252.5	21	383565	3743700
White MS	381011	3743685	42	3957.8	12985.5	22	381104	3743487
Harbor UCLA Cntr	380425	3744234	39	4692.1	15394.8	23	380518	3744036
Harbor UCLA Phys	380367	3744234	39	4746.2	15572.3	24	380460	3744036
Halldale ES	379547	3744414	47	5577.5	18299.8	25	379640	3744216
Everest Coll	378347	3744709	71	6807.8	22336.3	26	378440	3744511
Del Amo ES	385180	3744654	25	2161.5	7091.7	27	385273	3744456
Broadacres ES	385273	3746698	84	4198.2	13774.4	28	385366	3746500
Curtiss MS	384395	3746388	15	3881.7	12735.9	29	384488	3746190
Annalee ES	384093	3746746	27	4277.1	14033.2	30	384186	3746548
Leapwood ES	383260	3746913	25	4647.0	15247.0	31	383353	3746715
Towne ES	382716	3747205	24	5119.4	16796.8	32	382809	3747007
Long Beach USD	383691	3748123	96	5704.0	18714.7	33	383784	3747925
YMCA-2	385404	3747412	188	4922.7	16151.5	34	385497	3747214
Stairway Serv	385307	3748174	179	5670.1	18603.6	35	385400	3747976

Comm South Bay	385417	3748528	144	6033.1	19794.6	36	385510	3748330
Walton MS	385393	3749601	96	7099.2	23292.4	37	385486	3749403
Drew Head Start	385710	3750327	85	7853.4	25767.1	38	385803	3750129
Longfellow ES	385240	3750232	93	7717.8	25322.1	39	385333	3750034
James Acad	385514	3750286	99	7792.2	25566.2	40	385607	3750088
Caldwell ES	384317	3749899	98	7387.5	24238.5	41	384410	3749701
Bunche ES	383378	3750050	63	7655.4	25117.4	42	383471	3749852
Long Beach USD-2	387766	3743800	44	3231.7	10603.2	43	387859	3743602
Bapt PS	387221	3744134	34	2909.5	9546.0	44	387314	3743936
Dominguez ES	387539	3744604	36	3441.0	11289.8	45	387632	3744406
Toys Grow On	387247	3744984	34	3470.8	11387.6	46	387340	3744786
YMCA-3	390359	3745667	58	6388.4	20960.2	47	390452	3745469
Barton ES	390862	3745756	67	6872.2	22547.8	48	390955	3745558
Carmelitos Cntr	390619	3745866	59	6712.7	22024.5	49	390712	3745668
Plymouth Head Start	390265	3746493	44	6756.0	22166.4	50	390358	3746295
Sea Charter	390276	3746631	46	6846.7	22464.1	51	390369	3746433
Lindbergh Sch	390813	3746599	45	7265.7	23838.7	52	390906	3746401
Harte ES	391543	3747091	50	8146.0	26727.1	53	391636	3746893
LB Mont	392689	3746708	52	8932.3	29307.0	54	392782	3746510
Holmes ES	393714	3746023	52	9579.1	31429.2	55	393807	3745825
Lakewood ES	393749	3746850	51	9942.4	32621.1	56	393842	3746652
Pancratius Sch	393610	3747047	51	9905.8	32500.8	57	393703	3746849
Lakewood Med Cntr	393723	3747247	54	10098.4	33132.7	58	393816	3747049
Webster ES	387453	3742417	26	2659.7	8726.4	59	387546	3742219
Muir ES	387895	3742016	24	3141.2	10306.4	60	387988	3741818
Stephens JR HS	387355	3741631	22	2711.7	8897.1	61	387448	3741433
Long Beach USD-3	388875	3741888	22	4129.1	13547.7	62	388968	3741690
Robinson Acad	389627	3741382	22	4965.2	16290.9	63	389720	3741184
Oakwood Acad	389913	3741809	49	5167.5	16954.6	64	390006	3741611
Pacific Nurs	389368	3742626	43	4573.5	15005.6	65	389461	3742428
Memorial Med	390102	3741778	58	5359.0	17582.9	66	390195	3741580
Jaques Cntr	390317	3741487	50	5618.5	18434.3	67	390410	3741289
LB Day Nurs	390317	3741487	50	5618.5	18434.3	68	390410	3741289
LB Breast Cntr	390412	3741491	55	5711.2	18738.3	69	390505	3741293
Burroughs ES	391191	3742473	82	6395.6	20984.1	70	391284	3742275
Signal Hill ES	391507	3740435	84	7029.9	23065.1	71	391600	3740237
Webster Sch	392892	3741511	60	8159.9	26772.6	72	392985	3741313
LB Adult Sch	393621	3741047	49	8948.6	29360.5	73	393714	3740849
DeVry Inst	393980	3741485	32	9243.3	30327.3	74	394073	3741287
Inter Health Care	393809	3741108	42	9124.4	29937.2	75	393902	3740910

Buffum ES	394369	3740602	33	9765.0	32039.0	76	394462	3740404
Marina Mont	394365	3740517	35	9778.2	32082.3	77	394458	3740319
AR Citizens	394456	3740099	34	9960.8	32681.5	78	394549	3739901
Tucker ES	394820	3740226	24	10285.1	33745.4	79	394913	3740028
Bethany PS	395027	3740275	20	10476.3	34372.8	80	395120	3740077
Bixby ES	395283	3740104	18	10763.7	35315.6	81	395376	3739906
Refuge Sch	395240	3740310	20	10677.1	35031.6	82	395333	3740112
Nazarene Sch	395359	3740428	20	10769.9	35336.1	83	395452	3740230
HudsonSch	387087	3740575	17	3010.1	9876.2	84	387180	3740377
St Lucys Sch	387383	3740549	17	3256.9	10685.8	85	387476	3740351
Garfield Es	387683	3740387	16	3594.0	11791.8	86	387776	3740189
Cabrillo HS	387474	3739914	13	3741.9	12277.1	87	387567	3739716
LB Job Corps	387471	3739708	13	3886.5	12751.5	88	387564	3739510
Japanese Sch	387265	3739474	11	3926.7	12883.4	89	387358	3739276
Bethune Sch	386681	3739887	13	3244.1	10644.0	90	386774	3739689
Lafayette ES	389294	3740789	18	4822.5	15822.5	91	389387	3740591
Holy Innoc	389517	3740884	19	4999.1	16402.1	92	389610	3740686
Burnett ES	390263	3740267	25	5916.1	19410.7	93	390356	3740069
WLB Cal Safe	389498	3739892	14	5390.3	17685.7	94	389591	3739694
LB Day Nurs-2	389242	3739117	16	5603.4	18384.9	95	389335	3738919
Washington MS	389354	3738944	32	5798.0	19023.3	96	389447	3738746
LB Poly HS	390292	3739156	34	6447.8	21155.2	97	390385	3738958
New City Sch	389059	3738604	40	5793.7	19009.0	98	389152	3738406
Rennais HS	389790	3738007	39	6736.1	22101.0	99	389883	3737809
Inter ES	389693	3737871	37	6757.4	22171.1	100	389786	3737673
Chavez ES	388754	3737338	22	6526.5	21413.3	101	388847	3737140
Anthonys HS	390525	3737769	40	7447.5	24435.1	102	390618	3737571
Stevenson ES	390400	3737629	39	7443.1	24420.8	103	390493	3737431
Anthonys ES	390605	3737586	40	7626.4	25022.4	104	390698	3737388
Law Cntr	389277	3737200	28	6961.3	22840.1	105	389370	3737002
CSULB	388820	3736598	21	7165.8	23511.0	106	388913	3736400
Lincoln ES	390965	3738450	36	7394.8	24262.4	107	391058	3738252
Franklin MS	390914	3737640	42	7830.6	25692.1	108	391007	3737442
Burbank ES	392216	3737540	51	8940.5	29333.8	109	392309	3737342
Lutheran PS	392140	3737321	52	9002.4	29536.8	110	392233	3737123
Broadway Hosp	392581	3736778	51	9678.0	31753.5	111	392674	3736580
Holy Fam Sch	384308	3739378	30	3186.5	10455.0	112	384401	3739180
Wilmington EEC	384577	3739195	24	3339.2	10955.8	113	384670	3738997
Wilmington ES	384582	3739094	23	3439.6	11285.5	114	384675	3738896
Broad Ave ES	383145	3740789	46	2396.9	7864.2	115	383238	3740591

Banning Sch	383268	3740002	38	2951.1	9682.7	116	383361	3739804
F Bapt Sch	383200	3739604	42	3330.1	10926.2	117	383293	3739406
Fries ES	382823	3739433	42	3669.3	12039.1	118	382916	3739235
Gulf Ave ES	382177	3739184	32	4246.5	13932.7	119	382270	3738986
St Peter Sch	382383	3738269	25	4894.0	16057.2	120	382476	3738071
Hawaiian ES	381804	3737970	27	5451.2	17885.5	121	381897	3737772
Wilmington JHS	382041	3740394	43	3483.9	11430.7	122	382134	3740196
Pacific ES	381930	3740037	38	3796.3	12455.6	123	382023	3739839
Normont ES	380309	3740129	54	5087.2	16691.2	124	380402	3739931
Harbor City Med Cntr	380229	3739547	24	5452.9	17891.0	125	380322	3739349
Garden PS	379363	3739552	66	6193.8	20322.0	126	379456	3739354
Harbor City ES	379378	3740018	74	5970.4	19588.8	127	379471	3739820
Harbor PS	378910	3740026	77	6394.9	20981.8	128	379003	3739828
Pines Sch	378965	3740278	62	6249.3	20504.0	129	379058	3740080
St Margaret Sch	378307	3739886	94	7005.5	22985.0	130	378400	3739688
Eschelman ES	378308	3739411	119	7197.1	23613.7	131	378401	3739213
Discovery World	377795	3739857	109	7492.5	24582.8	132	377888	3739659
F Stars Acad	377465	3739568	135	7905.3	25937.2	133	377558	3739370
P Coast Mont	377381	3739600	136	7971.4	26154.2	134	377474	3739402
Lomita ES	377797	3740840	71	7199.1	23620.1	135	377890	3740642
BB Learning	377481	3741195	76	7434.9	24393.9	136	377574	3740997
Narbonne HS	378987	3741167	68	5965.7	19573.4	137	379080	3740969
President ES	379428	3741168	59	5537.0	18166.8	138	379521	3740970
Work N	385493	3743599	27	1278.9	4196.0	139	385586	3743401
Work NE	386425	3743553	35	1925.5	6317.6	140	386518	3743355
Work E	387307	3742464	26	2512.2	8242.5	141	387400	3742266
Work SE	386992	3741271	18	2530.2	8301.5	142	387085	3741073
Work S	385107	3740561	37	1990.5	6530.9	143	385200	3740363
Work SW	383781	3741717	35	1298.3	4259.6	144	383874	3741519
Work W	384340	3742515	34	455.8	1495.3	145	384433	3742317
Work NW	384542	3742786	32	362.5	1189.3	146	384635	3742588
Residential N	384899	3743575	30	1053.1	3455.2	147	384992	3743377
Residential NE	386696	3743059	23	1973.5	6474.9	148	386789	3742861
Residential E	386992	3742493	26	2196.7	7207.3	149	387085	3742295
Residential SE	386990	3741684	21	2350.8	7712.8	150	387083	3741486
Residential S	384788	3740029	42	2498.0	8196.0	151	384881	3739831
Residential SW	383765	3741589	38	1393.5	4572.2	152	383858	3741391
Residential W	382996	3742570	38	1800.1	5906.2	153	383089	3742372
Residential NW	383018	3743341	32	1955.1	6414.7	154	383111	3743143

Table O-7 (13 pages)

CONSOLIDATED TABLE OF OEHHA/ARB APPROVED RISK ASSESSMENT HEALTH VALUES°

Substance	Chemical Abstract Number ▼	Noncancer Effects								Cancer Risk					
		Acute Inhalation (µg/m³)	Date ◆ Value Reviewed [Added]	8-Hour Inhalation (µg/m³)	Date ◆ Value Reviewed [Added]	Chronic Inhalation (µg/m³)	Date ◆ Value Reviewed [Added]	Chronic Oral (mg/kg-d)	Date ◆ Value Reviewed [Added]	Inhalation * Unit Risk (µg/m³)⁻¹	Inhalation * Cancer Potency Factor (mg/kg-d)⁻¹	Date ◆ Value Reviewed [Added]	Oral Slope Factor (mg/kg-d)⁻¹	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) TAC	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 TAC	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 TAC ¤	1332-21-4									1.9E-04 TAC ¤	2.2E+02	3/86			333.33
BENZENE TAC	71-43-2	1.3E+03	4/99			6.0E+01	2/00			2.9E-05 TAC	1.0E-01	1/85			1
BENZIDINE (AND ITS SALTS) *values also apply to:*	92-87-5									1.4E-01	5.0E+02	4/99 [1/91]			1
Benzidine based dyes	*1020*									*1.4E-01*	*5.0E+02*	*4/99 [1/91]*			*1*
Direct Black 38	*1937-37-7*									*1.4E-01*	*5.0E+02*	*4/99 [1/91]*			*1*
Direct Blue 6	*2602-46-2*									*1.4E-01*	*5.0E+02*	*4/99 [1/91]*			*1*
Direct Brown 95 (technical grade)	*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 last updated: February 9, 2009

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

Substance	Chemical Abstract Number▼	Noncancer Effects								Cancer Risk					
		Acute Inhalation (µg/m³)	Date◆ Value Reviewed [Added]	8-Hour Inhalation (µg/m³)	Date◆ Value Reviewed [Added]	Chronic Inhalation (µg/m³)	Date◆ Value Reviewed [Added]	Chronic Oral (mg/kg-d)	Date◆ Value Reviewed [Added]	Inhalation Unit Risk (µg/m³)⁻¹*	Inhalation Cancer Potency Factor (mg/kg-d)⁻¹*	Date◆ Value Reviewed [Added]	Oral Slope Factor (mg/kg-d)⁻¹	Date◆ Value Reviewed [Added]	MWAF♣
1,3-BUTADIENE TAC	106-99-0					2.0E+01	1/01			1.7E-04 TAC	6.0E-01	7/92			1
CADMIUM AND COMPOUNDS TAC	7440-43-9 [1045]					2.0E-02	1/01	5.0E-04	10/00	4.2E-03 TAC	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 TAC (Tetrachloromethane)	56-23-5	1.9E+03	4/99			4.0E+01	1/01			4.2E-05 TAC	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 TAC	67-66-3	1.5E+02	4/99			3.0E+02	4/00			5.3E-06 TAC	1.9E-02	12/90			1
Chlorophenols	*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+ TAC *values also apply to:*	18540-29-9					2.0E-01	1/01	2.0E-02	10/00	1.5E-01 TAC	5.1E+02	1/86	Ø		1
Barium chromate	*10294-40-3*					*2.0E-01*	*1/01*	*2.0E-02*	*10/00*	*1.5E-01 TAC*	*5.1E+02*	*1/86*	Ø		*0.2053*
Calcium chromate	*13765-19-0*					*2.0E-01*	*1/01*	*2.0E-02*	*10/00*	*1.5E-01 TAC*	*5.1E+02*	*1/86*	Ø		*0.3332*
Lead chromate	*7758-97-6*					*2.0E-01*	*1/01*	*2.0E-02*	*10/00*	*1.5E-01 TAC*	*5.1E+02*	*1/86*	Ø		*0.1609*
Sodium dichromate	*10588-01-9*					*2.0E-01*	*1/01*	*2.0E-02*	*10/00*	*1.5E-01 TAC*	*5.1E+02*	*1/86*	Ø		*0.397*
Strontium chromate	*7789-06-2*					*2.0E-01*	*1/01*	*2.0E-02*	*10/00*	*1.5E-01 TAC*	*5.1E+02*	*1/86*	Ø		*0.2554*
CHROMIUM TRIOXIDE (as chromic acid mist)	1333-82-0					2.0E-03	1/01	2.0E-02	10/00	1.5E-01 TAC	5.1E+02	1/86	Ø		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 last updated: February 9, 2009

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

Substance	Chemical Abstract Number▼	Noncancer Effects								Cancer Risk					
		Acute Inhalation (µg/m³)	Date Value Reviewed [Added]◆	8-Hour Inhalation (µg/m³)	Date Value Reviewed [Added]◆	Chronic Inhalation (µg/m³)	Date Value Reviewed [Added]◆	Chronic Oral (mg/kg-d)	Date Value Reviewed [Added]◆	Inhalation Unit Risk (µg/m³)⁻¹*	Inhalation Cancer Potency Factor (mg/kg-d)⁻¹*	Date Value Reviewed [Added]◆	Oral Slope Factor (mg/kg-d)⁻¹	Date Value Reviewed [Added]◆	MWAF♣
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+ (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 TAC (1,2-Dibromoethane)	106-93-4					8.0E-01	12/01			7.1E-05 TAC	2.5E-01	7/85			1
ETHYLENE DICHLORIDE TAC (1,2-Dichloroethane)	107-06-2					4.0E+02	1/01			2.1E-05 TAC	7.2E-02	9/85			1
ETHYLENE GLYCOL	107-21-1					4.0E+02	4/00								1
ETHYLENE GLYCOL BUTYL ETHER ... (see Glycol ethers)															

Table last updated: February 9, 2009

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

Substance	Chemical Abstract Number▼	Noncancer Effects								Cancer Risk					
		Acute Inhalation (µg/m³)	Date◆ Value Reviewed [Added]	8-Hour Inhalation (µg/m³)	Date◆ Value Reviewed [Added]	Chronic Inhalation (µg/m³)	Date◆ Value Reviewed [Added]	Chronic Oral (mg/kg-d)	Date◆ Value Reviewed [Added]	Inhalation* Unit Risk (µg/m³)⁻¹	Inhalation* Cancer Potency Factor (mg/kg-d)⁻¹	Date◆ Value Reviewed [Added]	Oral Slope Factor (mg/kg-d)⁻¹	Date◆ Value Reviewed [Added]	M♣ W A F
ETHYLENE OXIDE TAC (1,2-Epoxyethane)	75-21-8					3.0E+01	1/01			8.8E-05 TAC	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 TAC	50-00-0	5.5E+01	12/08	9.0E+00	12/08	9.0E+00	12/08			6.0E-06 TAC	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)															

Table last updated: February 9, 2009

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

Substance	Chemical Abstract Number▼	Noncancer Effects								Cancer Risk					
		Acute Inhalation (µg/m³)	Date◆ Value Reviewed [Added]	8-Hour Inhalation (µg/m³)	Date◆ Value Reviewed [Added]	Chronic Inhalation (µg/m³)	Date◆ Value Reviewed [Added]	Chronic Oral (mg/kg-d)	Date◆ Value Reviewed [Added]	Inhalation Unit Risk (µg/m³)⁻¹*	Inhalation Cancer Potency Factor (mg/kg-d)⁻¹*	Date◆ Value Reviewed [Added]	Oral Slope Factor (mg/kg-d)⁻¹	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 TAC ♫* (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
Lead acetate	*301-04-2*									*1.2E-05 TAC*	*4.2E-02*	*4/97*	*8.5E-03*	*10/00*	*0.637*
Lead phosphate	*7446-27-7*									*1.2E-05 TAC*	*4.2E-02*	*4/97*	*8.5E-03*	*10/00*	*0.7659*
Lead subacetate	*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
Mercuric chloride	*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 TAC (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 last updated: February 9, 2009

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

Substance	Chemical Abstract Number▼	Noncancer Effects								Cancer Risk					
		Acute Inhalation (µg/m³)	Date◆ Value Reviewed [Added]	8-Hour Inhalation (µg/m³)	Date◆ Value Reviewed [Added]	Chronic Inhalation (µg/m³)	Date◆ Value Reviewed [Added]	Chronic Oral (mg/kg-d)	Date◆ Value Reviewed [Added]	Inhalation* Unit Risk (µg/m³)⁻¹	Inhalation* Cancer Potency Factor (mg/kg-d)⁻¹	Date◆ Value Reviewed [Added]	Oral Slope Factor (mg/kg-d)⁻¹	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
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-NITROSOPYRROLIDINE	930-55-2									6.0E-04	2.1E+00	4/99 [7/90]			1
NAPHTHALENE ... (see Polycyclic aromatic hydrocarbons)															
NICKEL AND COMPOUNDS TAC *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 TAC	9.1E-01	8/91			1
Nickel acetate	*373-02-4*	*6.0E+00*	*4/99*			*5.0E-02*	*2/00*	*5.0E-02*	*10/00*	*2.6E-04 TAC*	*9.1E-01*	*8/91*			*0.3321*
Nickel carbonate	*3333-67-3*	*6.0E+00*	*4/99*			*5.0E-02*	*2/00*	*5.0E-02*	*10/00*	*2.6E-04 TAC*	*9.1E-01*	*8/91*			*0.4945*
Nickel carbonyl	*13463-39-3*	*6.0E+00*	*4/99*			*5.0E-02*	*2/00*	*5.0E-02*	*10/00*	*2.6E-04 TAC*	*9.1E-01*	*8/91*			*0.3438*
Nickel hydroxide	*12054-48-7*	*6.0E+00*	*4/99*			*5.0E-02*	*2/00*	*5.0E-02*	*10/00*	*2.6E-04 TAC*	*9.1E-01*	*8/91*			*0.6332*
Nickelocene	*1271-28-9*	*6.0E+00*	*4/99*			*5.0E-02*	*2/00*	*5.0E-02*	*10/00*	*2.6E-04 TAC*	*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 TAC	9.1E-01	8/91			0.7859
Nickel refinery dust from the pyrometallurgical process	*1146*	*6.0E+00*	*4/99*			*5.0E-02*	*2/00*	*5.0E-02*	*10/00*	*2.6E-04 TAC*	*9.1E-01*	*8/91*			*1*
Nickel subsulfide	*12035-72-2*	*6.0E+00*	*4/99*			*5.0E-02*	*2/00*	*5.0E-02*	*10/00*	*2.6E-04 TAC*	*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 TAC ■¶	9901					5.0E+00 TAC	8/98			3.0E-04 TAC	1.1E+00	8/98			1
PENTACHLOROPHENOL ... (see Chlorophenols)															

Table last updated: February 9, 2009

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

Substance	Chemical Abstract Number▼	Noncancer Effects								Cancer Risk					
		Acute Inhalation (µg/m³)	Date◆ Value Reviewed [Added]	8-Hour Inhalation (µg/m³)	Date◆ Value Reviewed [Added]	Chronic Inhalation (µg/m³)	Date◆ Value Reviewed [Added]	Chronic Oral (mg/kg-d)	Date◆ Value Reviewed [Added]	Inhalation* Unit Risk (µg/m³)⁻¹	Inhalation* Cancer Potency Factor (mg/kg-d)⁻¹	Date◆ Value Reviewed [Added]	Oral Slope Factor (mg/kg-d)⁻¹	Date◆ Value Reviewed [Added]	M◆ W A F
PERCHLOROETHYLENE TAC (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) ϖ															
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

Table last updated: February 9, 2009

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

Substance	Chemical Abstract Number▼	Noncancer Effects								Cancer Risk					
		Acute Inhalation (µg/m³)	Date ◆ Value Reviewed [Added]	8-Hour Inhalation (µg/m³)	Date ◆ Value Reviewed [Added]	Chronic Inhalation (µg/m³)	Date ◆ Value Reviewed [Added]	Chronic Oral (mg/kg-d)	Date ◆ Value Reviewed [Added]	Inhalation Unit Risk (µg/m³)⁻¹ *	Inhalation Cancer Potency Factor (mg/kg-d)⁻¹ *	Date ◆ Value Reviewed [Added]	Oral Slope Factor (mg/kg-d)⁻¹	Date ◆ Value Reviewed [Added]	MWAF ♣
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)[TAC] ●	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[TAC]	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)[TAC] ● (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

Table last updated: February 9, 2009

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

Substance	Chemical Abstract Number▼	Noncancer Effects								Cancer Risk					
		Acute Inhalation (µg/m³)	Date Value Reviewed [Added]◆	8-Hour Inhalation (µg/m³)	Date Value Reviewed [Added]◆	Chronic Inhalation (µg/m³)	Date Value Reviewed [Added]◆	Chronic Oral (mg/kg-d)	Date Value Reviewed [Added]◆	Inhalation Unit Risk (µg/m³)⁻¹*	Inhalation Cancer Potency Factor (mg/kg-d)⁻¹*	Date Value Reviewed [Added]◆	Oral Slope Factor (mg/kg-d)⁻¹	Date Value Reviewed [Added]◆	MWAF♣
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

Table last updated: February 9, 2009

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

Substance	Chemical Abstract Number▼	Noncancer Effects								Cancer Risk					
		Acute Inhalation (µg/m³)	Date◆ Value Reviewed [Added]	8-Hour Inhalation (µg/m³)	Date◆ Value Reviewed [Added]	Chronic Inhalation (µg/m³)	Date◆ Value Reviewed [Added]	Chronic Oral (mg/kg-d)	Date◆ Value Reviewed [Added]	Inhalation* Unit Risk (µg/m³)⁻¹	Inhalation* Cancer Potency Factor (mg/kg-d)⁻¹	Date◆ Value Reviewed [Added]	Oral Slope Factor (mg/kg-d)⁻¹	Date◆ Value Reviewed [Added]	MWAF◆
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 SULTONE	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	7783-07-5	5.0E+00	4/99												1
Selenium sulfide	*7446-34-6*					*2.0E+01*	*12/01*								*1*

Table last updated: February 9, 2009

Table 1
CONSOLIDATED TABLE OF OEHHA/ARB APPROVED RISK ASSESSMENT HEALTH VALUES[o]

Substance	Chemical Abstract Number[▼]	Noncancer Effects								Cancer Risk					
		Acute Inhalation ($\mu g/m^3$)	Date[◆] Value Reviewed [Added]	8-Hour Inhalation ($\mu g/m^3$)	Date[◆] Value Reviewed [Added]	Chronic Inhalation ($\mu g/m^3$)	Date[◆] Value Reviewed [Added]	Chronic Oral (mg/kg-d)	Date[◆] Value Reviewed [Added]	Inhalation[*] Unit Risk $(\mu g/m^3)^{-1}$	Inhalation[*] Cancer Potency Factor $(mg/kg\text{-}d)^{-1}$	Date[◆] Value Reviewed [Added]	Oral Slope Factor $(mg/kg\text{-}d)^{-1}$	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 diisocyantates	*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[TAC]	79-01-6					6.0E+02	4/00			2.0E-06 TAC	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[TAC] (Chloroethylene)	75-01-4	1.8E+05	4/99							7.8E-05 TAC	2.7E-01	12/90			1
VINYLIDENE CHLORIDE (1,1-Dichloroethylene)	75-35-4					7.0E+01	1/01								1

Table last updated: February 9, 2009

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

Substance	Chemical Abstract Number ▼	Noncancer Effects								Cancer Risk					
		Acute Inhalation ($\mu g/m^3$)	Date ◆ Value Reviewed [Added]	8-Hour Inhalation ($\mu g/m^3$)	Date ◆ Value Reviewed [Added]	Chronic Inhalation ($\mu g/m^3$)	Date ◆ Value Reviewed [Added]	Chronic Oral (mg/kg-d)	Date ◆ Value Reviewed [Added]	Inhalation * Unit Risk $(\mu g/m^3)^{-1}$	Inhalation * Cancer Potency Factor $(mg/kg\text{-}d)^{-1}$	Date ◆ Value Reviewed [Added]	Oral Slope Factor $(mg/kg\text{-}d)^{-1}$	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[●]

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) *Air Toxics "Hot Spots" Program Revised 1992 Risk Assessment Guidelines, October 1993.* The OEHHA has adopted four technical support documents for these guidelines, which can be found on their website (http://www.oehha.ca.gov/air/hot_spots/index.html). 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 (www.oehha.ca.gov) for any updates to the health values.

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-I *(Substances For Which Emissions Must Be Quantified)* and Appendix F (*Criteria For Inputs For Risk Assessment Using Screening Air Dispersion Modeling*) of the ARB's *Air Toxics "Hot Spots" Emission Inventory Criteria and Guidelines (EICG) (July 1997)* have been removed from this table.

● Substances written in *italics* do not have explicit OEHHA approved health values, but are included in this table to clarify applicability of OEHHA adopted heath effects values to individual or grouped substances listed in the *Air Toxics "Hot Spots" Emission Inventory Criteria and Guidelines*, Appendix A-I list of *"Substances For Which Emissions Must Be Quantified"*.

▼ Chemical Abstract Service Number (CAS): For chemical groupings and mixtures where a CAS number is not applicable, the 4-digit code used in the *Air Toxics "Hot Spots" Emission Inventory Criteria and Guidelines (EICG) Report* 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.

◆ 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 [ ].

- 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.
- 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.
- October 2000 is listed for the oral chronic RELs and oral cancer slope factors.
- Cancer potency value adopted for naphthalene in August 2004. The inhalation and oral cancer potency values for ethyl benzene were adopted in November 2007.
- 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.
- 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: http://www.oehha.ca.gov/air/allrels.html. 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).

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 & inorganic arsenic compounds, benzene, carbon disulfide, 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.

* 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., $(mg/kg\text{-}day)^{-1}$]. They were derived from unit risk factors [units = $(ug/m^3)^{-1}$] 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, *Air Toxics Hot Spots Program; Part IV; Technical Support Document for Exposure Assessment and Stochastic Analysis (September 2000).*

♣ Molecular Weight Adjustment Factor: Molecular weight adjustment factors (MWAF) 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_2NiO_2). 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 (MWAF) to be used along with the OEHHA cancer potency factors for Hot Spots metals can be found in the MWAF column of this table.

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 MWAF (0.6332) for Nickel hydroxide:

- 100 pounds x 0.6332 = 63.32 pounds of Nickel atom equivalent

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. (For more information see Chapter 8 of OEHHA's document, *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments.*)

Note: The value listed in the MWAF 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 *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments* for more information on Asbestos, or see the EICG report for reporting guidance. Also see the Asbestos footnote (designated by the symbol ¤)

Table last updated: February 9, 2009

Table 1
CONSOLIDATED TABLE OF OEHHA/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^3)$^{-1}$. A conversion factor of 100 fibers/0.003 µg can be multiplied by a receptor concentration of asbestos expressed in µg/m^3. Unless other information necessary to estimate the concentration (fibers/m^3) of asbestos at receptors of interest is available. A unit risk factor of 1.9 E 10^{-4} (µg/m^3)$^{-1}$ and an inhalation cancer potency factor of 2.2 E 10^{+2} (mg/kg BW * day)$^{-1}$ are available. For more information on asbestos quantity conversion factors, see Appendix C of OEHHA's *The Air Toxics Hot Spots Program Risk Assessment Guidelines; Part II; Technical Support Document for Describing Available Cancer Potency Factors*, and Appendix C of OEHHA's document *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments.*
∅	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, *Risk Management Guidelines for New, Modified, and Existing Sources of Lead, March 2001*, has been developed by ARB and OEHHA staff for assessing noncancer health impacts from sources of lead. See Appendix F of OEHHA's document *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments* for an overview of how to evaluate noncancer impacts from exposure to lead using these risk management guidelines.
Φ	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 *Benzo[a]pyrene as a Toxic Air Contaminant*). PAH inhalation slope factors listed here have been adjusted by the PEFs. See Appendix G of OEHHA's document *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments* for more information. See section 8.2.3 of OEHHA's *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments* for conducting health risks when total (unspeciated) PAHs are reported.
☼	Polychlorinated Biphenyls: (unspeciated 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.
ϖ	Polychlorinated Biphenyls (speciated): Values calculated using WHO_{97} TEF procedure. See OEHHA memo dated August 29, 2003.
•	Polychlorinated Dibenzo-*p*-dioxins and Polychlorinated Dibenzofurans (also referred to as chlorinated dioxins and dibenzofurans): The OEHHA has adopted the World Health Organization 1997 (WHO_{-97}) Toxicity Equivalency Factor scheme for evaluating the cancer risk due to exposure to samples containing mixtures of polychlorinated dibenzo-*p*-dioxins (PCDD) and polychlorinated dibenzofurans (PCDF) and determining cancer risks for a number of specific PCB congeners. See Appendix A of OEHHA's *Technical Support Document For Describing Available Cancer Potency Factors* for more information about the scheme. See Appendix E of OEHHA's *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments* 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 *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments* for conducting health risks when total (unspeciated) 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 *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments* for more information.

Figure O-1 Sensitive Receptor Map

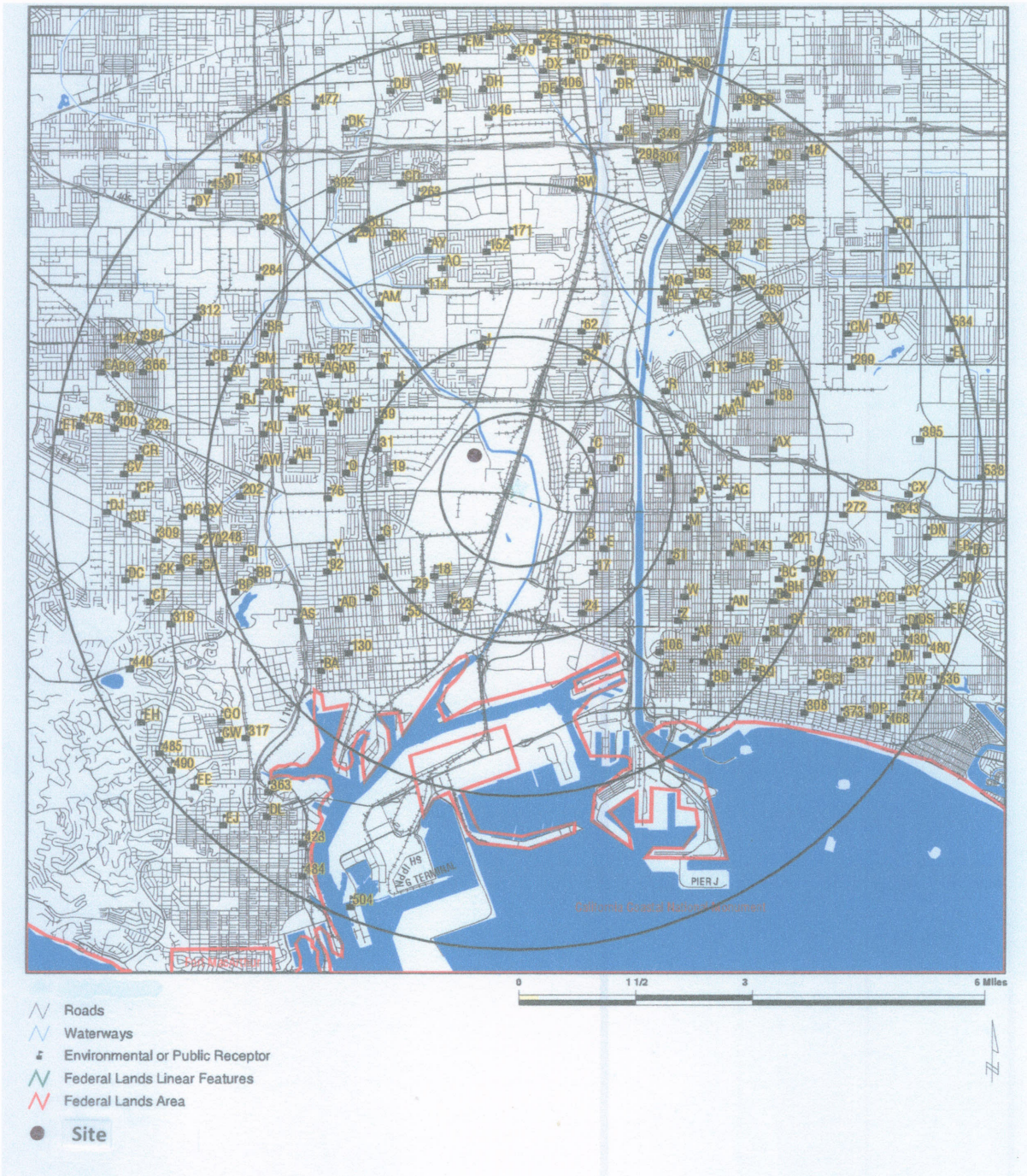
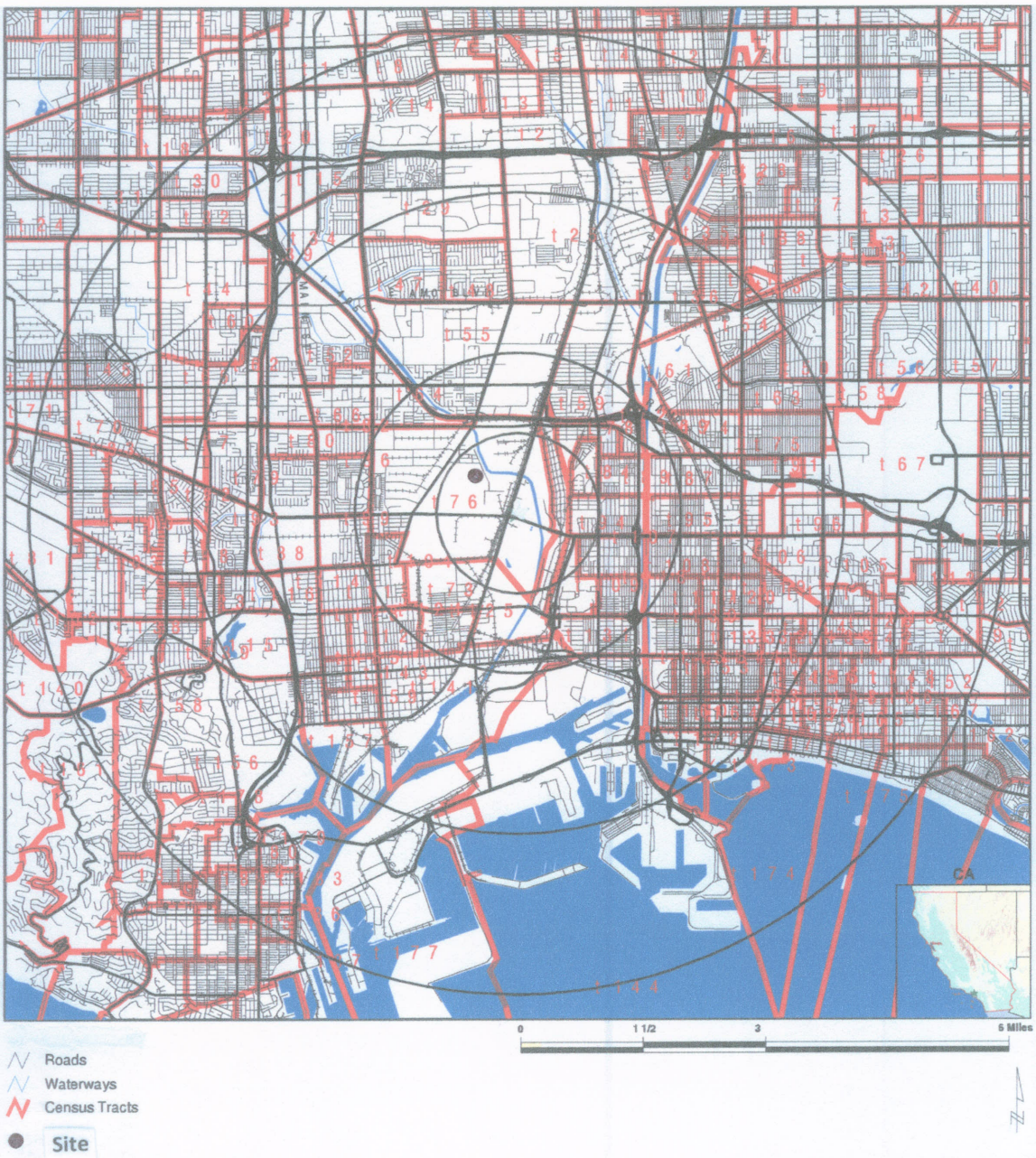


Figure O-2 Census Tracts in the Immediate Impact Area



Ammonia Offsite Consequence Analysis

The cogeneration facility currently uses a single anhydrous ammonia tank to supply reagent to the turbine SCR systems. The facility is NOT proposing to install or use another tank, i.e., the current tank will continue to be used for anhydrous ammonia storage for the existing and new turbine SCR systems. The facility ammonia tank is presently covered by an approved Risk Management Plan. The present RMP contains an offsite consequence analysis based upon the federal and CalARP ammonia toxic endpoint of 201 ppm (1 hr).

Data on the storage tank is as follows:

- Dimensions = 12 ft. ID X 32 ft. length
- 300 PSIG at 650 F
- Full vacuum at 60 F
- MAWP = 312 PSIG at 650 F
- Operating pressure = 100 PSIG at 60 F
- Maximum capacity = 74.2 tons
- Maximum administrative level = 85% of volume
- Secondary containment dimensions =

The following table summarizes the data and results of the current OCA as presented in the RMP.

Table O-8 RMP OCA Summary

Parameter	Worst Case Release	Alternate Case Release
Release Rate, lbs/min	11,720	24,750
Release Type	Gas (tank rupture)	Gas (hose failure)
Wind Speed, m/sec	1.5	1.5
Stability Class	F	D
Release Duration, min	10	10
Setting	Urban	Urban
Distance to Endpoint, miles	3.6	0.5
Population Affected	259,270	0
Model Used	EPA RMP Comp.	EPA RMP Comp.

As noted above, the RMP Te value for ammonia is 201 ppm (1 hr). The level of concern (LOC) considered by CEC staff to be without serious adverse effects on the public for a one-time exposure is 75 ppm (30 min).

The RMP Comp program will not evaluate source releases for Te values of 75 ppm for ammonia. As such, the SLAB model was used to evaluate the downwind impacts of the ammonia plume for the 75 ppm (30 minute exposure period) scenario. Results of the SLAB analysis are as follows:

Table O-9 SLAB Modeling Summary		
Parameter	**Worst Case Release**	**Alternate Case Release**
Release Rate, lbs/min (gals)	11,720 (2276)	2,475 (481)
Release Type	Gas (tank rupture)	Gas (hose failure)
Te, ppm	75	75
Tav, mins	30	30
Wind Speed, m/sec	1.5	3.0
Stability Class	F	D
Release Duration, min	10	10
Setting	Urban	Urban
Z_0, m	1.0	1.0
RH, %	50	50
Fenceline Distance, m	~300 (west)	~300 (west)
Spill surface Area, m^2	45.52	182
Ambient Temp, F	91	74
Spill Depth, cm	na	1.0
Secondary Containment	Yes	No
Distance to Endpoint, miles	8.9	1.3

Figure O-3
SLAB-CEC LOC Downwind Concentration Plot
Worst Case

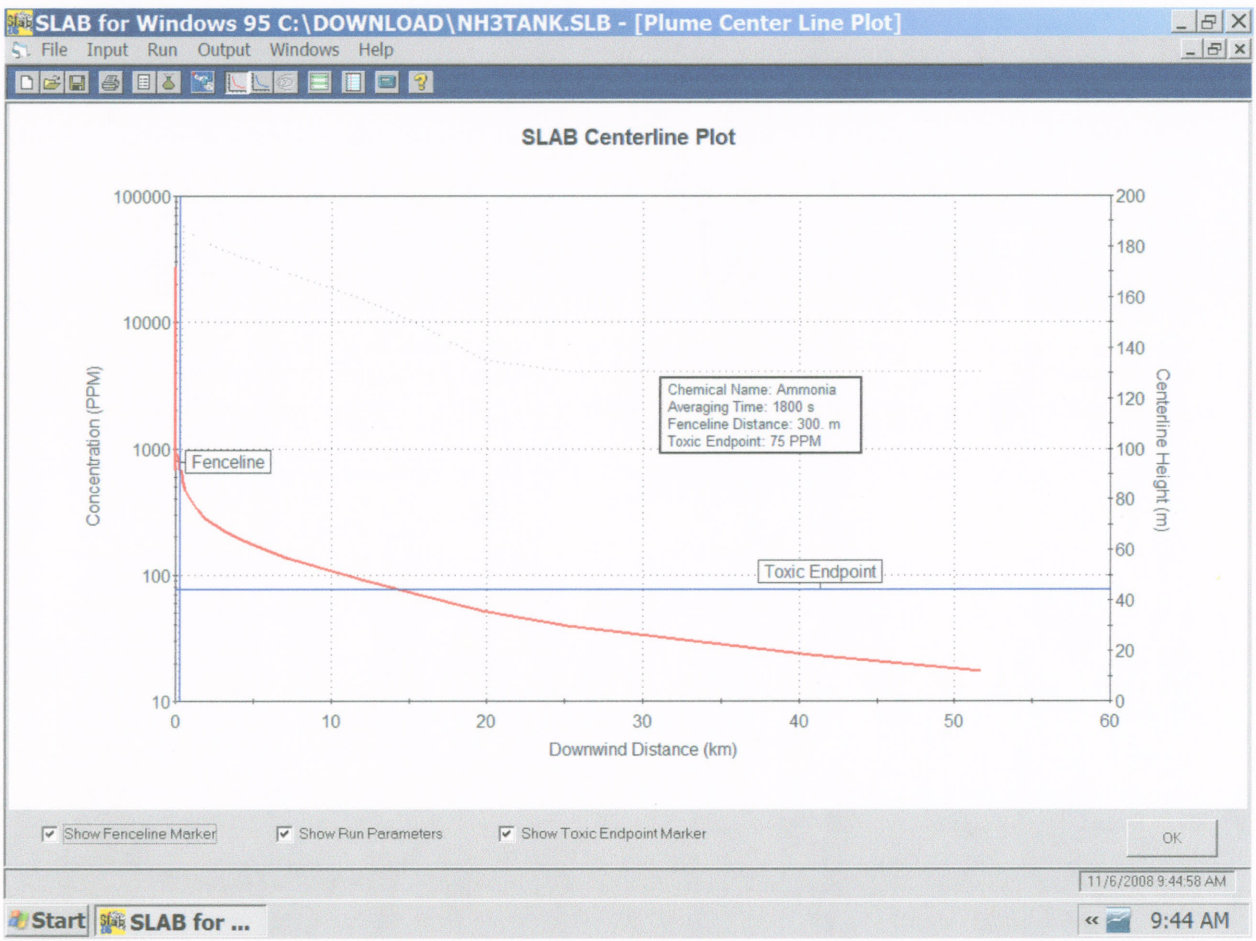


Figure O-4
SLAB-CEC LOC Downwind Concentration Plot
Alternate Case

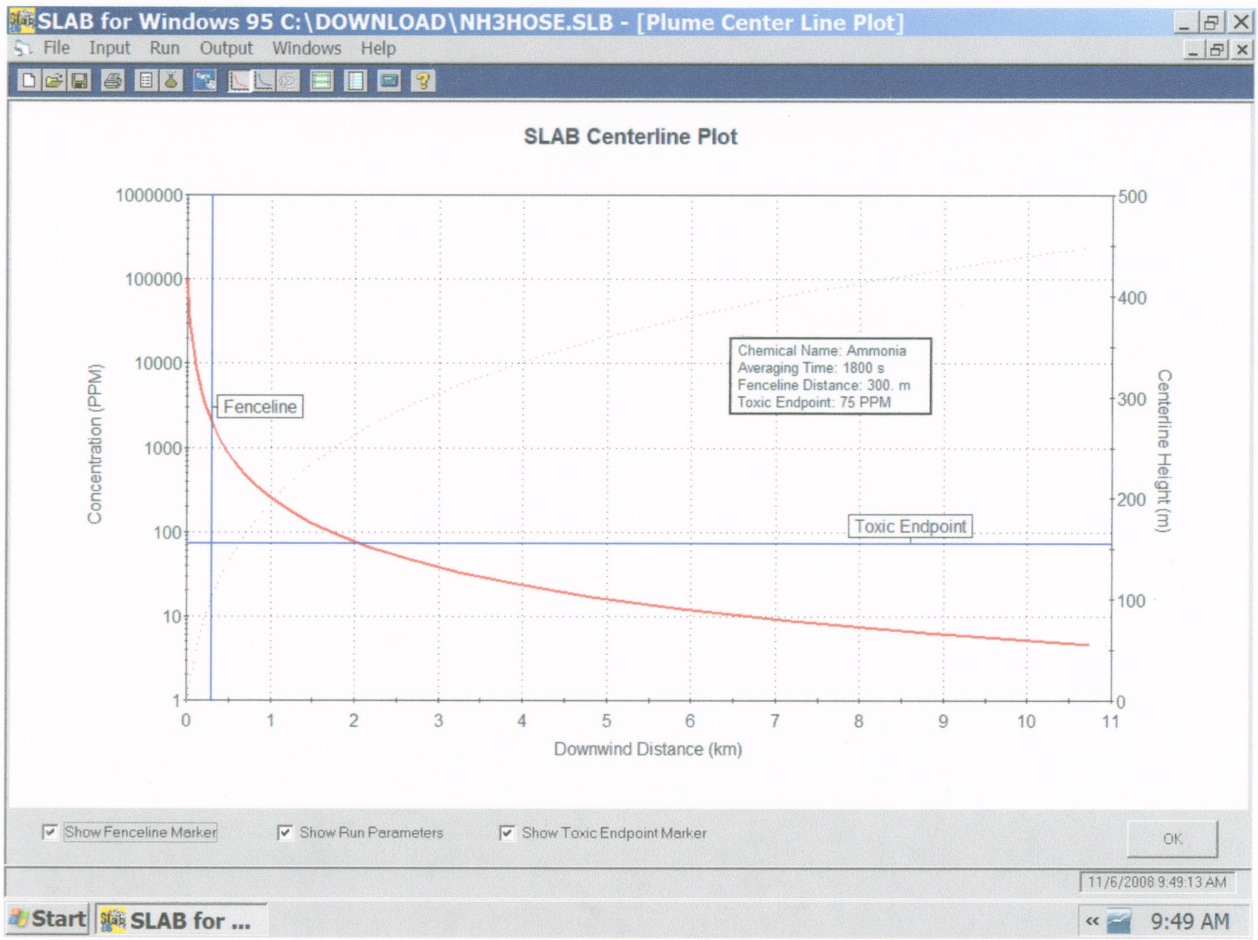


Table O-10
Risk Assessment Summary for Watson Cogen Expansion Project
(Turbine and Cooling Tower)

Grid Receptor Results:

RECEPTORS WITH HIGHEST CANCER RISK

REC	TYPE	CANCER	CHRONIC	ACUTE	UTME	UTMN	ZONE
9889	GRID	7.00E-07	2.97E-02	2.88E-03	384807	3742718	11
9890	GRID	6.98E-07	2.97E-02	2.88E-03	384793	3742698	11
9888	GRID	6.98E-07	2.96E-02	2.90E-03	384821	3742738	11

RECEPTORS WITH HIGHEST ACUTE HI

REC	TYPE	CANCER	CHRONIC	ACUTE	UTME	UTMN	ZONE
1053	GRID	5.63E-07	2.39E-02	3.00E-03	384700	3742700	11
9842	GRID	1.96E-07	6.92E-03	2.99E-03	385329	3742381	11
1054	GRID	5.63E-07	2.40E-02	2.97E-03	384700	3742800	11

Sensitive Receptor Results:

RECEPTORS WITH HIGHEST CANCER RISK

REC	TYPE	CANCER	CHRONIC	ACUTE	UTME	UTMN	ZONE
148	SENS	4.14E-07	1.77E-02	1.58E-03	384992	3743377	11
147	SENS	3.42E-07	1.38E-02	2.73E-03	384635	3742588	11
86	SENS	2.98E-07	1.25E-02	1.83E-03	387476	3740351	11

RECEPTORS WITH HIGHEST ACUTE HI

REC	TYPE	CANCER	CHRONIC	ACUTE	UTME	UTMN	ZONE
147	SENS	3.42E-07	1.38E-02	2.73E-03	384635	3742588	11
146	SENS	7.00E-08	2.34E-03	2.15E-03	384433	3742317	11
154	SENS	6.33E-08	2.62E-03	2.12E-03	383089	3742372	11

Worker Impacts:

1. Applying the maximum worker adjustment factor (0.1516) from Table 8.2 (OEHHA, Worker-Continuous-High End) to the 1st High MIR from the Grid receptor analysis results in an estimated worker cancer risk of 1.06×10^{-7}.
2. Applying the maximum worker adjustment factor (0.1516) from Table 8.2 (OEHHA, Worker-Continuous-High End) to the 1st High MIR from the Sensitive receptor analysis results in an estimated worker cancer risk of 6.28×10^{-8}.

Worker related cancer risks are well below the applicable significance thresholds.

Ref: OEHHA, Air Toxics Hot Spots Program Risk Assessment Guidelines, August 2003, CalEPA.

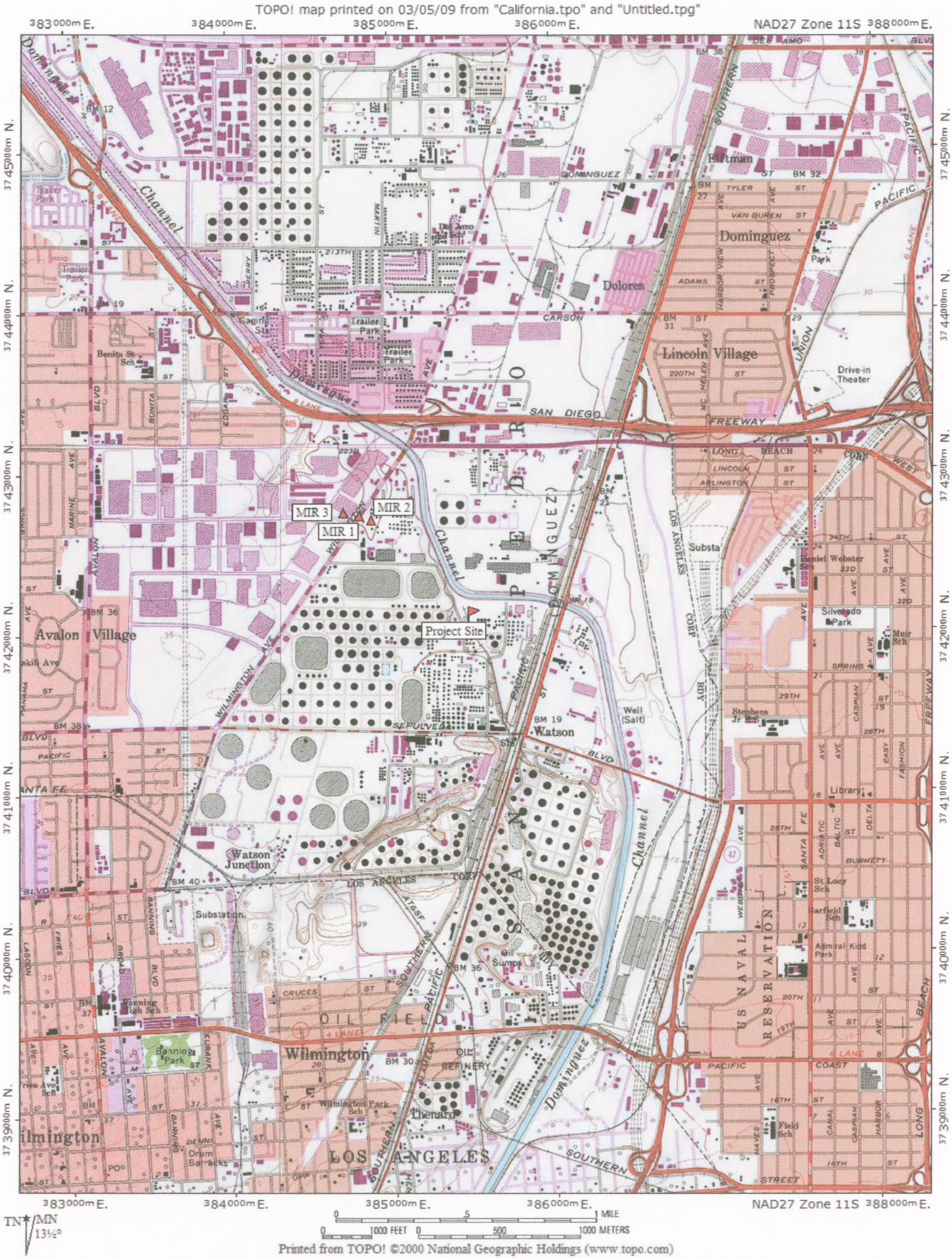


Figure O-5 MIR Location Map

RMP Report for BP Carson Refinery

Section 1. Registration Information

1.1 Source Identification: **Facility ID: 3**

a. Facility Name: BP Carson Refinery

b. Parent Company #1 Name: BP West Coast Products LLC

c. Parent Company #2 Name:

1.2 EPA Facility Identifier: 1000 0007 3476

1.3 Other EPA Systems Facility ID: CAD077227049

1.4 Dun and Bradstreet Numbers (DUNS):

a. Facility DUNS: 129313149

b. Parent Company #1 DUNS:

c. Parent Company #2 DUNS:

1.5 Facility Location Address:

a. Street 1: 1801 East Sepulveda Blvd.

b. Street 2:

c. City: Carson **d. State:** CA **e. Zip:** 90749 - 6210

f. County: Los Angeles

Facility Latitude and Longitude:

g. Lat. (dd.dddddd): 33.813611 **h. Long. (ddd.dddddd):** -118.241389

i. Lat/Long Method: I2 Interpolation - Photo

j. Lat/Long Description: CE Center of Facility

k. Horizontal accuracy measure (m): 25

l. Horizontal Reference Datum Code: 002 North American Datum of 1983

m. Source Map Scale Number: 24000

1.6 Owner or Operator:

a. Name: BP West Coast Products

b. Phone: (310) 816-8100

Mailing address:

c. Street 1: 1801 East Sepulveda Blvd. **d. Street 2:**

e. City: Carson **f. State:** CA **g. Zip:** 90749 - 6210

1.7 Name and title of person or position responsible for part 68 (RMP) implementation:

a. Name of person: Mark Bennett

b. Title of person or position: Safety Engineer

c. Email address:

1.8 Emergency contact:

a. Name: Shift Superintendent

b. Title: Shift Superintendent

c. Phone: (310) 816-8180

d. 24-hour phone: (310) 816-8888

e. Ext. or PIN:

f. Email address: N/A

1.9 Other points of contact:

a. Facility or Parent Company E-Mail Address:

b. Facility Public Contact Phone:

c. Facility or Parent Company WWW Homepage Address:

1.10 LEPC: California Region 1 LEPC

1.11 Number of full time employees on site: 1,021

1.12 Covered by:

a. OSHA PSM: Yes

b. EPCRA 302: Yes

c. CAA Title V: Yes **Air operating permit ID:** 800012

1.13 OSHA Star or Merit Ranking: No

1.14 Last Safety Inspection (by an External Agency) Date: 10/21/2003

1.15 Last Safety Inspection Performed by an External Agency: State occupational safety agency

1.16 Will this RMP involve predictive filing?: No

1.18 RMP Preparer Information:

a. Name:

b. Telephone:

c. Street1:

d. Street2:

e. City:

f. State: **g. ZIP:** -

Section 1.17 Process(es)

a. Process ID: 14 **Program Level** 3 Coker

b. NAICS Code

32411 Petroleum Refineries

c. Process Chemicals

c.1 Process Chemical (ID / Name)	c.2 CAS Nr.	c.3 Qty (lbs.)
36 Flammable Mixture	00-11-11	36,650
Butane	106-97-8	
Propane	74-98-6	
Hydrogen	1333-74-0	
Ethylene [Ethene]	74-85-1	
Methane	74-82-8	
Pentane	109-66-0	
Ethane	74-84-0	
Isobutane [Propane, 2-methyl]	75-28-5	
Isopentane [Butane, 2-methyl-]	78-78-4	
Propylene [1-Propene]	115-07-1	
37 Hydrogen sulfide	7783-06-4	3,323

a. Process ID: 15 **Program Level** 3 Hydrocracker

b. NAICS Code

32411 Petroleum Refineries

c. Process Chemicals

c.1 Process Chemical (ID / Name)	c.2 CAS Nr.	c.3 Qty (lbs.)
38 Flammable Mixture	00-11-11	90,431
Butane	106-97-8	
Propane	74-98-6	
Pentane	109-66-0	
Hydrogen	1333-74-0	
Propylene [1-Propene]	115-07-1	
Methane	74-82-8	
Ethane	74-84-0	
Isobutane [Propane, 2-methyl]	75-28-5	
Ethylene [Ethene]	74-85-1	
Isopentane [Butane, 2-methyl-]	78-78-4	
39 Ammonia (anhydrous)	7664-41-7	68,036
40 Hydrogen sulfide	7783-06-4	1,544

a. Process ID: 16 **Program Level** 3 Cogen

b. NAICS Code

221112 Fossil Fuel Electric Power Generation

c. Process Chemicals

c.1 Process Chemical (ID / Name)	c.2 CAS Nr.	c.3 Qty (lbs.)
41 Ammonia (anhydrous)	7664-41-7	147,917
42 Butane	106-97-8	1,015,544
43 Hydrogen	1333-74-0	10,000
44 Methane	74-82-8	3,400,000
45 Flammable Mixture	00-11-11	4,575
Propane	74-98-6	
Isobutane [Propane, 2-methyl]	75-28-5	
Methane	74-82-8	
Isopentane [Butane, 2-methyl-]	78-78-4	
Hydrogen	1333-74-0	
Ethane	74-84-0	
Propylene [1-Propene]	115-07-1	
Ethylene [Ethene]	74-85-1	

COGEN

a. Process ID: 17 **Program Level 3** #1 Reformer/HDS

b. NAICS Code

32411 Petroleum Refineries

c. Process Chemicals

c.1 Process Chemical (ID / Name)	c.2 CAS Nr.	c.3 Qty (lbs.)
46 Flammable Mixture	00-11-11	336,572
Propylene [1-Propene]	115-07-1	
Pentane	109-66-0	
Propane	74-98-6	
Methane	74-82-8	
Isobutane [Propane, 2-methyl]	75-28-5	
Hydrogen	1333-74-0	
Ethane	74-84-0	
Ethylene [Ethene]	74-85-1	
Isopentane [Butane, 2-methyl-]	78-78-4	
Butane	106-97-8	
47 Hydrogen sulfide	7783-06-4	1,592

a. Process ID: 18 **Program Level 3** #2, 3 Reformer

b. NAICS Code

32411 Petroleum Refineries

c. Process Chemicals

c.1 Process Chemical (ID / Name)	c.2 CAS Nr.	c.3 Qty (lbs.)
48 Flammable Mixture	00-11-11	963,754
Propylene [1-Propene]	115-07-1	
Pentane	109-66-0	
Propane	74-98-6	
Methane	74-82-8	
Isobutane [Propane, 2-methyl]	75-28-5	
Isopentane [Butane, 2-methyl-]	78-78-4	
Hydrogen	1333-74-0	
Ethylene [Ethene]	74-85-1	

a. Process ID: 24 **Program Level** 3 SFIA

b. NAICS Code

32411 Petroleum Refineries

c. Process Chemicals

c.1 Process Chemical (ID / Name)	c.2 CAS Nr.	c.3 Qty (lbs.)
67 Flammable Mixture	00-11-11	443,474
Butane	106-97-8	
Propane	74-98-6	
Pentane	109-66-0	
Hydrogen	1333-74-0	
Propylene [1-Propene]	115-07-1	
Methane	74-82-8	
Ethane	74-84-0	
Isobutane [Propane, 2-methyl]	75-28-5	
Ethylene [Ethene]	74-85-1	
Isopentane [Butane, 2-methyl-]	78-78-4	
68 Hydrogen sulfide	7783-06-4	356

a. Process ID: 25 **Program Level** 3 ISOM

b. NAICS Code

32411 Petroleum Refineries

c. Process Chemicals

c.1 Process Chemical (ID / Name)	c.2 CAS Nr.	c.3 Qty (lbs.)
69 Flammable Mixture	00-11-11	25,700
Butane	106-97-8	
Propane	74-98-6	
Pentane	109-66-0	
Hydrogen	1333-74-0	
Propylene [1-Propene]	115-07-1	
Methane	74-82-8	
Ethane	74-84-0	
Isobutane [Propane, 2-methyl]	75-28-5	
Ethylene [Ethene]	74-85-1	
Isopentane [Butane, 2-methyl-]	78-78-4	

Section 2. Toxics: Worst Case

Toxics: Worst Case ID 3

2.1 a. Chemical Name: Ammonia (anhydrous)

b. Percent Weight of Chemical (if in a mixture):

2.2 Physical State: Gas Liquified by Pressure

2.3 Model used: EPA's RMP*Comp(TM)

2.4 Scenario: Gas Release

2.5 Quantity released: 117,200 **lbs**

2.6 Release rate: 11,720.0 **lbs/min**

2.7 Release duration: 10.0 **mins**

2.8 Wind speed: 1.5 **m/sec**

2.9 Atmospheric Stability Class: F

2.10 Topography: Urban

2.11 Distance to Endpoint: 3.60 **mi**

2.12 Estimated Residential population within distance to endpoint: 259,270

2.13 Public receptors within distance to endpoint:

a. Schools:	Yes	**d. Prisons/Correction facilities:**	No
b. Residences:	Yes	**e. Recreation areas:**	Yes
c. Hospitals:	Yes	**f. Major commercial, office or, industrial areas:**	Yes

g. Other (Specify): Day Care, Nursing Homes

2.14 Environmental receptors within distance to endpoint:

a. National or state parks, forests, or monuments:	No
b. Officially designated wildlife sanctuaries, preserves, or refuges:	No
c. Federal wilderness areas:	No

d. Other (Specify):

2.15 Passive mitigation considered:

a. Dikes:	No	**d. Drains:**	No
b. Enclosures:	No	**e. Sumps:**	No
c. Berms:	No	**f. Other (Specify):**	

2.16 Graphic file name:

Toxics: Worst Case ID 4

2.1 a. Chemical Name: Hydrogen sulfide

b. Percent Weight of Chemical (if in a mixture): 92.0

2.2 Physical State: Gas

2.3 Model used: EPA's RMP*Comp(TM)

2.4 Scenario: Gas Release

2.5 Quantity released: 615 **lbs**

2.6 Release rate: 61.5 **lbs/min**

2.7 Release duration: 10.0 **mins**

2.8 Wind speed: 1.5 **m/sec**

2.9 Atmospheric Stability Class: F

2.10 Topography: Urban

2.11 Distance to Endpoint: 1.10 **mi**

2.12 Estimated Residential population within distance to endpoint: 2,920

2.13 Public receptors within distance to endpoint:

a. Schools:	Yes	**d. Prisons/Correction facilities:**	No
b. Residences:	Yes	**e. Recreation areas:**	Yes
c. Hospitals:	No	**f. Major commercial, office or, industrial areas:**	Yes

g. Other (Specify): Child Day Care

2.14 Environmental receptors within distance to endpoint:

a. National or state parks, forests, or monuments:	No
b. Officially designated wildlife sanctuaries, preserves, or refuges:	No
c. Federal wilderness areas:	No

d. Other (Specify):

2.15 Passive mitigation considered:

a. Dikes:	No	**d. Drains:**	No
b. Enclosures:	No	**e. Sumps:**	No
c. Berms:	No	**f. Other (Specify):**	

2.16 Graphic file name:

Section 3. Toxics: Alternative Release

Toxics: Alternative Release ID: 4

3.1 a. Chemical Name: Ammonia (anhydrous)

b. Percent Weight of Chemical (if in a mixture):

3.2 Physical State: Gas Liquified by Pressure

3.3 Model: EPA's RMP*Comp(TM)

3.4 Scenario: Transfer hose failure

3.5 Quantity released: 24,750 **lbs**

3.6 Release rate: 7620.0 **lbs/min**

3.7 Release duration: 10.0 **mins**

3.8 Wind speed: 1.5 **m/sec**

3.9 Atmospheric Stability Class: D

3.10 Topography: Urban

3.11 Distance to Endpoint: 0.50 **mi**

3.12 Estimated Residential population within distance to endpoint: 0

3.13 Public receptors within distance to endpoint:

a. Schools:	No	**d. Prisons/Correction facilities:**	No
b. Residences:	No	**e. Recreation areas:**	No
c. Hospitals:	No	**f. Major commercial, office, or industrial areas:**	Yes
g. Other (Specify):			

3.14 Environmental receptors within distance to endpoint:

a. National or state parks, forests, or monuments:	No
b. Officially designated wildlife sanctuaries, preserves, or refuges:	No
c. Federal wilderness areas:	No
d. Other (Specify):	

3.15 Passive mitigation considered:

a. Dikes:	No	**d. Drains:**	No
b. Enclosures:	No	**e. Sumps:**	No
c. Berms:	No	**f. Other (Specify):**	

3.16 Active mitigation considered:

a. Sprinkler systems:	No	**f. Flares:**	No
b. Deluge system:	No	**g. Scrubbers:**	No
c. Water curtain:	No	**h. Emergency shutdown systems:**	No
d. Neutralization:	No	**i. Other (Specify):**	
e. Excess flow valve:	No		

3.17 Graphic file name:

5.6 Distance to Endpoint: 0.20 mi

5.7 Estimated Residential population within distance to endpoint: 0

5.8 Public receptors within distance to endpoint:

a. Schools:	No	**d. Prisons/Correction facilities:**	No
b. Residences:	No	**e. Recreation areas:**	No
c. Hospitals:	No	**f. Major commercial, office, or industrial areas:**	Yes

g. Other (Specify):

5.9 Environmental receptors within distance to endpoint:

a. National or state parks, forests, or monuments:	No
b. Officially designated wildlife sanctuaries, preserves, or refuges:	No
c. Federal wilderness areas:	No

d. Other (Specify):

5.10 Passive mitigation considered:

a. Dikes:	No
b. Fire walls:	No
c. Blast walls:	No
d. Enclosures:	No

e. Other (Specify):

5.11 Active mitigation considered:

a. Sprinkler system:	No
b. Deluge systems:	No
c. Water curtain:	No
d. Excess flow valve:	No

e. Other (Specify):

5.12 Graphic file name:

Section 6. Accident History

Accident History ID: 2

6.1 Date of accident: 03/21/2003 **6.2 Time accident began(HHMM):** 0745 ◉ AM ○ PM

6.3 NAICS Code of process involved: 32411

6.4 Release duration: 000 **Hours (HHH)** 15 **Minutes (MM)**

6.5 Chemical(s):

a. Chemical Name	CAS Number	b. Quantity Released (lbs)	c. % Weight
Hydrogen sulfide	7783-06-4	510	

6.6 Release event: **6.7 Release source:**

a. Gas release:	Yes	**a. Storage vessel:**	Yes	**e. Valve:**	No
b. Liquid spill/evaporation:	No	**b. Piping:**	No	**f. Pump:**	No
c. Fire:	No	**c. Process vessel:**	No	**g. Joint:**	No
d. Explosion:	No	**d. Transfer hose:**	No	**h. Other (Specify):**	
e. Uncontrolled/Runaway reaction	No				

6.8 Weather conditions at time of event (if known):

a. Wind speed: 1.5 **Units:** mile/h **Direction:** SW

b. Temperature: 51 Degrees Fahrenheit

c. Atmospheric Stability Class: B

d. Precipitation present: No

e. Unknown weather conditions: No

6.9 On-site impacts:

	Employees or contractors:	Public responders:	Public:
a. Deaths	0	0	0
b. Injuries	1	0	0

c. Property damage ($): 0

6.10 Known Off-site impacts:

a. Deaths:	0	**d. Evacuated:**	0
b. Hospitalization:	0	**e. Sheltered-in-place:**	0
c. Other medical treatments:	0	**f. Property Damage ($):**	0

g. Environmental damage:

1. Fish or Animal Kills:	No
2. Tree, lawn, shrub, or crop damage:	No
3. Water contamination:	No
4. Soil contamination:	No
5. Other (specify):	

6.11 Initiating event: a Equipment Failure

6.12 Contributing factors:

a. Equipment failure:	Yes	**g. Maintenance activity/inactivity:**	No
b. Human error:	No	**h. Process design failure:**	Yes
c. Improper procedures:	No	**i. Unsuitable equipment:**	No
d. Overpressurization:	No	**j. Unusual weather condition:**	No

e. Upset condition:	Yes	**k. Management error:**	No
f. By-pass condition:	No	**l. Other (Specify):**	

6.13 Offsite responders notified: Notified Only

6.14 Changes introduced as a result of the accident:

a. Improved or upgraded equipment:	Yes	**g. Revised emergency response plan:**	No
b. Revised maintenance:	No	**h. Changed process:**	No
c. Revised training:	Yes	**i. Reduced inventory:**	No
d. Revised operating procedures:	Yes	**j. None:**	No
e. New process controls:	No	**k. Other(Specify):**	
f. New mitigation systems:	Yes		

Section 7. Prevention Program 3

Process ID: 14 Coker

Prevention Program ID: 14

Prevention Program Description: For 7.7 a, b, and c, maintenance procedures are reviewed on an ongoing basis and whenever manufacturer instructions are revised. Equipment inspection is conducted daily at the refinery and the frequency is based on engineering data. The "most recent" inspection date changes each day. The database is not designed to query for the most recent inspections at each unit. Therefore the date provided in this report is for a specific unit at the time this report was completed. For 7.9, date of PSSR is not required to be documented (not required by OSHA) but is performed in accordance with OSHA and BP standards. For new or modified facilities, PSSRs are conducted as part of normal project work flow.

7.1 NAICS Code 32411

7.2 Chemicals

Chemical Name
Flammable Mixture

7.3 Date on which the safety information was last reviewed or revised: 11/03/2003

7.4 Process Hazard Analysis (PHA):

a. Date of last PHA or PHA update: 11/03/2003

b. The technique used:

What If:	No	**Failure Mode and Effects Analysis:**	No
Checklist:	No	**Fault Tree Analysis:**	No
What If/Checklist:	No	**Other (Specify):**	
HAZOP:	Yes		

c. Expected or actual date of completion of all changes from last PHA or PHA update: 02/05/2007

d. Major hazards identified:

7.8 Management of change:

a. The date of the most recent change that triggered management of change procedures: 12/14/2006

b. The date of the most recent review or revision of management of change procedures: 11/01/2004

7.9 The date of the most recent pre-startup review:

7.10 Compliance audits:

a. The date of the most recent compliance audit: 08/18/2005

b. Expected date of completion of all changes resulting from the compliance audit: 06/03/2006

7.11 Incident investigation:

a. The date of the most recent incident investigation (if any): 10/25/2006

b. Expected or actual date of completion of all changes resulting from the investigation: 10/27/2006

7.12 The date of the most recent review or revision of employee participation plans: 06/16/2004

7.13 The date of the most recent review or revision of hot work permit procedures: 07/01/2005

7.14 The date of the most recent review or revision of contractor safety procedures: 11/30/2006

7.15 The date of the most recent evaluation of contractor safety performance: 12/12/2006

Process ID: 16 Cogen

Prevention Program ID: 16

Prevention Program Description: For 7.7 a, b, c, maintenance procedures are reviewed on an ongoing basis and whenever manufacturer instructions are revised. Equipment inspection is conducted daily at the refinery and the frequency is based on engineering data. The "most recent" inspection date changes each day. The database is not designed to query the most recent inspections at each unit. Therefore the date provided in this report is for a specific unit at the time this report was completed. For 7.9, date of PSSR is not required to be documented (not required by OSHA) but is performed in accordance with OSHA and BP standards. For new or modified facilities, PSSRs are conducted as part of normal project work flow.

7.1 NAICS Code 221112

7.2 Chemicals

Chemical Name
Ammonia (anhydrous)
Butane
Hydrogen
Methane

7.3 Date on which the safety information was last reviewed or revised: 06/16/2004

7.4 Process Hazard Analysis (PHA):

a. Date of last PHA or PHA update: 06/16/2004

b. The technique used:

What If:	No	**Failure Mode and Effects Analysis:**	No
Checklist:	No	**Fault Tree Analysis:**	No

What If/Checklist:	No	**Other (Specify):**	
HAZOP:	Yes		

c. Expected or actual date of completion of all changes from last PHA or PHA update: 06/01/2007

d. Major hazards identified:

Toxic release:	Yes	**Contamination:**	Yes
Fire:	Yes	**Equipment failure:**	Yes
Explosion:	Yes	**Loss of cooling, heating, electricity, instrument air:**	Yes
Runaway reaction:	No	**Earthquake:**	Yes
Polymerization:	No	**Floods (flood plain):**	Yes
Overpressurization:	Yes	**Tornado:**	No
Corrosion:	Yes	**Hurricanes:**	No
Overfilling:	Yes	**Other (Specify):**	

e. Process controls in use:

Vents:	Yes	**Emergency air supply:**	Yes
Relief valves:	Yes	**Emergency power:**	Yes
Check valves:	Yes	**Backup pump:**	Yes
Scrubbers:	Yes	**Grounding equipment:**	Yes
Flares:	Yes	**Inhibitor addition:**	No
Manual shutoffs:	Yes	**Rupture disks:**	Yes
Automatic shutoffs:	Yes	**Excess flow device:**	Yes
Interlocks:	Yes	**Quench system:**	Yes
Alarms and procedures:	Yes	**Purge system:**	Yes
Keyed bypass:	Yes	**None:**	No
		Other (Specify):	

f. Mitigation systems in use:

Sprinkler system:	No	**Water curtain:**	No
Dikes:	Yes	**Enclosure:**	No
Fire walls:	No	**Neutralization:**	Yes
Blast walls:	No	**None:**	No
Deluge system:	Yes	**Other (Specify):**	Fixed Monitors

g. Monitoring/detection systems in use:

Process area detectors:	No	**None:**	No
Perimeter monitors:	Yes	**Other (Specify):**	

h. Changes since last PHA or PHA update:

Reduction in chemical inventory:	No	**Installation of perimeter monitoring systems:**	No
Increase in chemical inventory:	No	**Installation of mitigation systems:**	No
Change process parameters:	No	**None recommended:**	No
Installation of process controls:	No	**None:**	Yes
Installation of process detection systems:	No	**Other (Specify):**	

7.5 Date of most recent review or revision of operating procedures: 12/16/2006

7.6 Training:

a. The date of the most recent review or revision of training programs: 05/29/2006

b. The type of training provided:

Classroom: Yes **On the job:** Yes **Other (Specify):**

c. The type of competency testing used:

Written test:	Yes	**Observation:**	Yes
Oral test:	Yes	**Other (Specify):**	
Demonstration:	Yes		

7.7 Maintenance:

a. The date of the most recent review or revision of maintenance procedures: 11/05/2006

b. The date of the most recent equipment inspection or test: 12/18/2006

c. Equipment most recently inspected or tested : Jet Desulfurizer Heater

7.8 Management of change:

a. The date of the most recent change that triggered management of change procedures: 10/26/2006

b. The date of the most recent review or revision of management of change procedures: 11/01/2004

7.9 The date of the most recent pre-startup review:

7.10 Compliance audits:

a. The date of the most recent compliance audit: 08/18/2005

b. Expected date of completion of all changes resulting from the compliance audit: 06/03/2006

7.11 Incident investigation:

a. The date of the most recent incident investigation (if any): 06/11/2006

b. Expected or actual date of completion of all changes resulting from the investigation: 10/19/2006

7.12 The date of the most recent review or revision of employee participation plans: 06/16/2004

7.13 The date of the most recent review or revision of hot work permit procedures: 07/01/2005

7.14 The date of the most recent review or revision of contractor safety procedures: 11/30/2006

COGEN

END

7.15 The date of the most recent evaluation of contractor safety performance: 12/12/2006

Process ID: 17 #1 Reformer/HDS

Prevention Program ID: 17

Prevention Program Description: For 7.7 a, b, c, maintenance procedures are reviewed on an ongoing basis and whenever manufacturer instructions are revised. Equipment inspection is conducted daily at the refinery and the frequency is based on engineering data. The "most recent" inspection date changes each day. The database is not designed to query the most recent inspections at each unit. Therefore the date provided in this report is for a specific unit at the time this report was completed. For 7.9, date of PSSR is not required to be documented (not required by OSHA) but is performed in accordance with OSHA and BP standards. For new or modified facilities, PSSRs are conducted as part of normal project work flow.

7.1 NAICS Code 32411

7.2 Chemicals

Chemical Name
Flammable Mixture

7.3 Date on which the safety information was last reviewed or revised: 05/30/2006

7.4 Process Hazard Analysis (PHA):

a. Date of last PHA or PHA update: 05/30/2006

b. The technique used:

What If:	No	**Failure Mode and Effects Analysis:**	No
Checklist:	No	**Fault Tree Analysis:**	No
What If/Checklist:	No	**Other (Specify):**	
HAZOP:	Yes		

c. Expected or actual date of completion of all changes from last PHA or PHA update: 12/31/2007

d. Major hazards identified:

Toxic release:	Yes	**Contamination:**	Yes
Fire:	Yes	**Equipment failure:**	Yes
Explosion:	Yes	**Loss of cooling, heating, electricity, instrument air:**	Yes
Runaway reaction:	Yes	**Earthquake:**	Yes
Polymerization:	No	**Floods (flood plain):**	Yes
Overpressurization:	Yes	**Tornado:**	No
Corrosion:	Yes	**Hurricanes:**	No
Overfilling:	Yes	**Other (Specify):**	

e. Process controls in use:

Vents:	Yes	**Emergency air supply:**	Yes
Relief valves:	Yes	**Emergency power:**	Yes
Check valves:	Yes	**Backup pump:**	Yes

a. The date of the most recent review or revision of training programs: 11/15/2006

b. The type of training provided:

Classroom: Yes **On the job:** Yes **Other (Specify):** Computer Based Training

c. The type of competency testing used:

Written test: Yes **Observation:** Yes

Oral test: Yes **Other (Specify):**

Demonstration: Yes

7.7 Maintenance:

a. The date of the most recent review or revision of maintenance procedures: 11/05/2006

b. The date of the most recent equipment inspection or test: 12/18/2006

c. Equipment most recently inspected or tested : Jet Desulfurizer Heater

7.8 Management of change:

a. The date of the most recent change that triggered management of change procedures: 12/05/2006

b. The date of the most recent review or revision of management of change procedures: 11/01/2004

7.9 The date of the most recent pre-startup review:

7.10 Compliance audits:

a. The date of the most recent compliance audit: 08/18/2005

b. Expected date of completion of all changes resulting from the compliance audit: 06/03/2006

7.11 Incident investigation:

a. The date of the most recent incident investigation (if any): 06/19/2006

b. Expected or actual date of completion of all changes resulting from the investigation: 06/19/2006

7.12 The date of the most recent review or revision of employee participation plans: 06/16/2004

7.13 The date of the most recent review or revision of hot work permit procedures: 07/01/2005

7.14 The date of the most recent review or revision of contractor safety procedures: 11/30/2006

7.15 The date of the most recent evaluation of contractor safety performance: 12/12/2006

Section 8. Prevention Program 2 --- No Data To Report

Section 9. Emergency Response

9.1 Written Emergency Response (ER) Plan:

a. Is facility included in written community emergency response plan? Yes

b. Does facility have its own written emergency response plan?	Yes
9.2 Does facility's ER plan include specific actions to be taken in response to accidental releases of regulated substance(s)?	Yes
9.3 Does facility's ER plan include procedures for informing the public and local agencies responding to accidental releases?	Yes
9.4 Does facility's ER plan include information on emergency heath care?	Yes
9.5 Date of most recent review or update of facility's ER plan:	03/16/2006
9.6 Date of most recent ER training for facility's employees:	08/15/2006

9.7 Local agency with which facility's ER plan or response activities are coordinated:

a. Name of agency: LA County Fire Department

b. Telephone number: (213) 830-3170

9.8 Subject to:

a. OSHA Regulations at 29 CFR 1910.38:	Yes
b. OSHA Regulations at 29 CFR 1910.120:	Yes
c. Clean Water Act Regulations at 40 CFR 112:	Yes
d. RCRA Regulations at 40 CFR 264, 265, and 279.52:	Yes
e. OPA-90 Regulations at 40 CFR 112, 33 CFR 154, 49 CFR 194, or 30 CFR 254:	Yes
f. State EPCRA Rules/Law:	Yes
g. Other (Specify):	

Executive Summary

BP CARSON REFINERY

RISK MANAGEMENT PLAN

EXECUTIVE SUMMARY

This summary provides an overview of the BP Carson Refinery's Program to comply with the U.S. EPA's Risk Management Plan (RMP) and the California Accidental Release Prevention Plan (Cal ARP).

ACCIDENTAL RELEASE PREVENTION AND RESPONSE POLICIES

The BP Carson Refinery is committed to protecting the health and safety of its employees, contractors, customers, and the general public. Conducting business in a manner that wins public confidence and meets the environmental and economic needs of the communities we serve is critical to our long-term success.

This commitment is demonstrated by the resources invested in accident prevention, including the design, construction, operation and maintenance of our facilities, as well as in the training or our employees. Our policy is to implement the necessary controls to prevent foreseeable releases of regulated substances. If a release does occur, we have trained personnel who will respond to control and contain the release, thereby reducing potential impact on our surrounding community.

DESCRIPTION OF THE STATIONARY SOURCE AND REGULATED SUBSTANCES HANDLED

The BP Carson Refinery is located in the city of Carson, California. The site occupies 630 acres and employs more than 1000 people. The refinery has to capacity to process approximately 265,000 barrels of crude oil per day to produce a variety of petroleum products, including gasoline, jet fuel, diesel fuel, and petroleum coke, as well as products such as propylene, natural gas liquids and other petrochemicals. The facility also includes the Watson Cogeneration Unit. The Watson Cogeneration Unit is a joint venture between BP West Coast Products LLC and Southern California Edison. The Cogeneration Unit burns natural gas to produce electricity, which is sold to the Edison grid. Waste heat from the process is then used to supply steam to the refinery for process use.

The refinery has several regulated flammable substances, such as propane, butane, pentane, etc. In addition, the facility uses ammonia, which is a regulated toxic chemical, in the Cogeneration facility and in the refinery. The primary use of ammonia is in the air pollution control system for the reduction of emissions of nitrogen oxides. It is also used for process corrosion control.

GENERAL ACCIDENTAL RELEASE PREVENTION PROGRAM

The following is a summary of the general accident prevention program in place at the BP Carson Refinery. Because processes at the refinery that are regulated by the EPA RMP regulation are also subject to the OSHA PSM standard, this summary addresses each of the OSHA PSM elements and describes the management systems in place to implement the accident prevention program.

Employee Participation

The BP Carson Refinery provides for and encourages employees to participate in all facets of process safety management and accident prevention. Examples of employee participation range from updating and compiling technical documents and operating procedures to participating as a member of process hazard analysis (PHA) and incident investigation teams. Employees have access to all information created as part of the refinery accident prevention program. In addition, the refinery has a number of programs underway that address employee safety issues, including a comprehensive program for behavioral safety. This program provides training for each employee to enable them to observe fellow employees in order to identify and correct behaviors that may lead to accident or injury. Developed and managed by our employees, this peer review program is a well supported by our employees and is a fundamental part of our safety program. Other ways that employees are involved in the accident prevention program are documented in written programs maintained at the facility.

Process Safety Information

The BP Carson Refinery maintains extensive documentation that is used to help maintain safe operation of the processes. This documentation addresses chemical properties and associated hazards, limits for key process parameters and specific chemical inventories, and equipment design basis/configuration information. Specific departments within the refinery are assigned responsibility for maintaining up-to-date process safety information.

Chemical specific information, including exposure hazards and emergency response information is provided in material safety data sheets (MSDS). This information is supplemented by documents that specifically address known corrosion concerns and any known hazards associated with the inadvertent mixing of chemicals. For specific process areas, the refinery has documented safety-related limits for specific process parameters (e.g., temperature, level, composition) contained in Operating Manuals and Design Process Books. The refinery ensures that the process is maintained within these limits using process controls and monitoring instruments, highly trained personnel, and protective instrument systems (e.g. automated shutdown systems).

The refinery also maintains documentation that provides information about the design and construction of process equipment. This information includes materials of construction, design pressure and temperature ratings, electrical rating of equipment, etc. This information, in combination with written procedures and trained personnel, provides a basis for establishing inspection and maintenance activities, as well as for evaluating proposed process and facility changes to ensure that safety features in the process are not compromised.

Process Hazard Analysis

The BP Carson Refinery has a comprehensive program to help ensure that hazards associated with the various processes are identified and controlled. Within this program, each process is systematically examined to identify hazards and ensure that adequate controls are in place to manage these hazards.

The refinery uses the HAZOP (hazard and operability) analysis method and other approved Process Hazard Analysis methods to perform these evaluations.

The analyses are conducted using a team of people who have operating and maintenance experience as well as engineering expertise. The hazards of the process, identification of previous incidents involving accidental release or potential for such, engineering and administrative controls and failure of such, and human factors will be addressed by the team performing the hazard analysis. The findings and recommendations of the team are submitted to area management to assess the likelihood of the potential hazards, assess the severity of the consequences from potential releases, and assign priority for implementation of recommendations. The recommendations and progress towards implementation is followed using a computerized tracking system. The final resolution of findings are documented and retained.

To help ensure that the process controls and/or process hazards do not eventually deviate significantly from the original design safety features, the Carson Refinery periodically updates and revalidates the hazard analysis results. These periodic reviews are conducted at least every 5 years and will be conducted at this frequency until the process is no longer in operation. The results and findings from these updates are documented and retained.

Operating Procedures

The BP Carson Refinery maintains written procedures that address various modes of process operations, such as 1) unit startup, 2) normal operations, 3) temporary operations, 4) unit emergencies and emergency shutdown, 5) normal shutdown, and 6) initial startup of a new process.

The operating procedures are currently available to anyone working in or near a process area at the appropriate process unit control rooms or through area supervisors. The operating procedures are also maintained on-line on the BP Carson Refinery computer network.

The operating procedures are reviewed by supervision before scheduled activities (e.g. scheduled start-ups and shutdowns, scheduled on-line maintenance) and when supervision believes that the current procedure should be modified to better execute the planned activities. Critical procedures such as unit emergency procedures are reviewed annually during annual training sessions.

Training

To complement the written procedures for process operations, the BP Carson Refinery has implemented a comprehensive training program for all employees involved in operating or maintaining a process. Initial training for operating and maintenance personnel who are new to a process includes health and safety training, fundamentals of refining, process overview and process fundamentals. Job specific training is given to operators assigned to an operating unit. This training includes specific safety and health hazards, emergency operations including shutdown, and safe work practices applicable to the operator's job tasks. Job specific training includes on-the-job training, a written manual, written tests, observations, and written sign-off. The Carson Refinery also has ongoing refresher and supplemental training for all personnel. Testing is conducted for all job specific training and craft qualification for each level of progression. Once an operator is qualified in a position, they are required to recertify for the job every three years by comprehensive testing. Testing is also conducted on all OSHA-required safety and health training. Employee training and certification records are documented, both in hard copy and computerized training records.

Contractors

The BP Carson Refinery uses contractors to supplement its work force during periods of increased maintenance or construction activities, or to perform tasks requiring skills that are needed on a non-routine basis. Because some contractors work on or near process equipment, the refinery has procedures in place to ensure that contractors 1) perform their work in a safe manner, 2) have the appropriate knowledge and skills, 3) are aware of the hazards in their workplace, 4) understand what they should do in the event of an emergency, 5) understand and follow site safety rules, and 6) inform refinery personnel of any hazards that they find during their work. This is accomplished by providing contractors with a process overview, information about refinery safety and health hazards, emergency response plan requirements, and safe work practices prior to their beginning work. Additionally, all contractors that work at the Carson Refinery must have completed an 8-hour training program (Refinery Safety Orders) that provides a standardized baseline of safety and health training for

all contractors that perform work at local area refineries. Recertification to demonstrate knowledge of the required subject areas is required every two years. In addition, the BP Carson Refinery evaluates contractor safety programs and performance as one of the key criteria for selection of a contractor to perform work in the refinery. Refinery personnel periodically monitor contractor performance to ensure that contractors are fulfilling their safety obligations.

Pre-Startup Safety Reviews

A pre-startup safety review is conducted at the Carson Refinery for any new/modified facilities where modification necessitates a change in the process safety information. The pre-startup review is used to confirm that prior to the introduction of hazardous materials to a process, that the following takes place: 1) construction and modification are in accordance with design specifications and applicable codes; 2) safety, operating, maintenance, and emergency procedures are in place and adequate; 3) training of each operating employee and maintenance worker has been completed; and 4) process hazard analysis recommendations have been resolved or actions necessary for startup have been completed. The review uses checklists to verify all aspects of readiness, and involves field verification of construction where necessary.

Mechanical Integrity

The BP Carson Refinery has well-established practices and procedures to maintain pressure vessels, piping systems, relief and vent systems, controls, pumps and compressors, and emergency shutdown systems in a safe operating condition. The basic aspects of this program include: 1) written procedures to maintain ongoing integrity of process equipment, including methods to allow employee identification and reporting of mechanical integrity problems; 2) inspection and testing, including correction of deficiencies; 3) employee training; and 4) quality assurance.

Carson Refinery employees report potentially faulty or unsafe equipment via one or more of the following: Operator Daily Logs, a Maintenance Job Order System, direct notification of supervision, EH&S audit programs, or focused audits (platforms, electrical, etc.).

The Carson Refinery has an extensive inspection and testing program. The frequency of inspections is based on historical corrosion rate. The Carson Refinery has a comprehensive database program, which assimilates and analyzes corrosion data from equipment at the refinery and determines their corrosion rates. These rates, together with industry standards or codes are used to determine frequency of inspections. All inspectors at the Carson Refinery have certification in the appropriate performance area. Written documentation is maintained for both the administrative and technical procedures. Inspection deficiencies are documented. The status of each inspection and repair completion is tracked until the issue is resolved, implemented, and closed.

Another integral part of the mechanical integrity program is quality assurance. The BP Carson Refinery incorporates quality assurance measures into equipment purchases and repairs. Procedures are in place to ensure that new pressure vessels, piping systems, rotating equipment, storage tanks, instrumentation and control equipment, including spare parts are: 1) modified, repaired or fabricated to meet applicable codes; 2) meet design specifications and applicable codes; and 3) are inspected and checked for proper installation and consistency with specifications and manufacturer' instructions. As part of this program, Positive Material Identification (PMI) is conducted, which involves physical testing to ensure that the correct metallurgy is received and installed as specified for both existing equipment, repair work, and new construction.

Safe Work Permits

The BP Carson Refinery has long-standing safe work practices in place to help ensure worker and process safety. Examples include 1) a lockout/tagout procedure to ensure isolation of energy sources for equipment undergoing maintenance; 2) a permit and procedure to control spark-producing activities (hot work permit); 3) a permit and procedure to ensure that adequate precautions are in place before entry into a confined space; and 4) a procedure for safe removal of hazardous materials before process piping or equipment is opened. These and other safety procedures, along with training of affected personnel, form a system to help ensure that operations and maintenance activities are performed safely.

Management of Change

The BP Carson Refinery has a comprehensive system to manage changes to processes. This system requires that changes to items such as process equipment, chemicals, technology (including process operating conditions), procedures and other facility changes be properly reviewed and authorized before being implemented. Changes are reviewed to ensure that adequate controls are in place to manage any new hazards

and to verify that existing controls have not been compromised by the change. Affected chemical hazard information, process operating limits, and equipment information, as well as procedures are updated to incorporate these changes. In addition, operating and maintenance personnel are provided any necessary training on the change.

Incident Investigation

The BP Carson Refinery promptly investigates all incidents that resulted in, or reasonably could have resulted in personal injury, spills, fire/explosion, release of a toxic or flammable material, major property damage, or environmental damage. The goal of each investigation is to determine the facts and develop corrective actions to prevent a recurrence of the incident or a similar incident. The investigation team documents its findings, develops recommendations to prevent a recurrence, and forwards these results to refinery management for resolution. Corrective actions taken in response to the investigation team's findings and recommendations are documented and tracked to completion. The investigation results are reviewed with all employees (including contractors) who could be affected by the findings. Incident investigation reports are retained for at least 5 years so that the reports can be reviewed during future PHA's and PHA revalidations.

Compliance Audits

To help ensure that the accident prevention program is functioning properly, BP West Coast Products LLC periodically conducts audits of its operating facilities, including the Carson Refinery, to determine whether the procedures and practices required by the accident prevention program are being implemented. Compliance audits are conducted every 3 years. The audit team develops findings that are forwarded to refinery management for resolution. Corrective actions taken in response to the audit team's findings are tracked until they are complete. The final resolution of each finding is documented, and audit reports are maintained for review in subsequent audits.

CHEMICAL-SPECIFIC PREVENTION STEPS

The accident prevention program summarized previously is applied to all EPA RMP and Cal-ARP covered processes at the BP Carson Refinery. Collectively, these prevention program activities help prevent potential accident scenarios that could be caused by equipment failures or human error.

In addition to these prevention program activities, the Carson Refinery has safety features on many units to help 1) contain/control a release, 2) quickly detect a release, and 3) reduce the consequences of a release. The following types of safety features are used in various processes:

Release Detection
·Hydrocarbon detectors with alarms

Release Containment/Control
·Process relief valves that discharge to a flare to capture and incinerate episodic releases
·Valves to permit isolation of the process (manual and automatic)
·Automated shutdown systems for specific process parameters (e.g., high level, high temperature
·Diking to contain liquid releases
·Redundant equipment and instrumentation
·Atmospheric pressure relief devices

Release Mitigation
·Fire suppression and extinguishing systems
·Trained emergency response personnel
·Personal protective equipment (protective clothing, self-contained breathing apparatus)

FIVE YEAR ACCIDENT HISTORY

The BP Carson Refinery has an excellent record of accident prevention over the past 5 years. Due to proactive efforts to prevent accidents and a strong safety program, there have been no incidents in the past 5 years with onsite or offsite effects involving a release of ammonia or flammables that meet the reporting criteria of the EPA RMP or Cal-ARP Rules.

There is one recorded accidental release which resulted in exposing one contract employee to Hydrogen Sulfide in sufficient quantity to require medical attention. The accident was the result of equipment failure. We

conducted an investigation and developed corrective actions to prevent similar incidents from happening in the future.

EMERGENCY RESPONSE PROGRAM

The BP Carson Refinery has a comprehensive Emergency Response Plan in place to protect worker and public safety as well as the environment. The program consists of procedures for responding to a release of a regulated substance, including the possibility of a fire or explosion if a flammable substance is accidentally released. The procedures address all aspects of emergency response, including notification of emergency response agencies if a release occurs that could endanger the public or the environment and post-incident clean-up and decontamination procedures. The plan includes or utilizes the following: 1) pre-emergency planning, including training, drills and reviews; 2) responsibilities for all employees involved in response, control, containment, notification, evacuation, etc.; 3) plans for evacuation to safe areas; 4) emergency traffic control and security; 5) weather monitoring through an on-site weather station (wind direction, wind speed) and visible wind socks; 6) emergency first aid and treatment. In addition, the refinery has procedures that address maintenance, inspection and testing of emergency response equipment. Employees receive training in these procedures as necessary to perform their specific emergency response duties. The emergency response plan is updated when necessary, based on modifications made to refinery processes or facilities.

The overall emergency response plan for the BP Carson Refinery is coordinated with the Los Angeles County Fire Department. This coordination includes periodic meeting and program review as well as joint training opportunities during on-site training exercises and off-site fire and hazardous materials training schools. The Carson Refinery has around the clock communications capability with appropriate emergency response organizations, which provides a quick means of notifying the public of an incident, if necessary, as well as facilitating a quick response to an incident. Periodic emergency drills are conducted that involve the local emergency response organizations, and training is provided to local emergency responders regarding the hazards of regulated substances and other hazardous substances at the refinery.

PLANNED CHANGES TO IMPROVE SAFETY

The BP Carson Refinery is committed to operating excellence in the way we conduct our business and the way we relate to the environment. The company has implemented a system that provides a mechanism for self-assessment and a direction for continuous improvement within our operations. As a result of this self-assessment, we are in the process of evaluating and strengthening our training programs for refinery supervision, and further strengthening our procedures for Management of Change.

RMP Validation Errors/Warnings --- No Data To Report