I. INTRODUCTION

The Air Toxics "Hot Spots" Information and Assessment Act of 1987 (Health and Safety Code (HSC) Section 44360 et seq. and as amended by Statutes 1992, Chapter 1162, see Appendix B) established a statewide program for the inventory, assessment, and reduction of air toxics emissions from individual facilities. The HSC requires facilities to report annual emissions of toxic chemicals to the local Air Pollution Control District (district). Districts prioritize facilities based on potency, toxicity, quantity of emissions, proximity to sensitive receptors, and other factors affecting the risk. High priority facilities are required to prepare a risk assessment. The statute requires that the Office of Environmental Health Hazard Assessment (OEHHA) develop guidelines for the preparation of health risk assessments by facilities. The statute also requires OEHHA to review these risk assessments. Operators of facilities posing a significant risk must notify the public and must conduct a risk reduction audit and plan.

The Health and Safety Code defines a health risk assessment as a "comprehensive analysis" of chemical dispersion, potential exposure and health risks. Each chemical listed as part of the Air Toxics "Hot Spots" Program and emitted from a subject facility must be identified, modeled to estimate human exposure, and evaluated for health risks to the population.

As part of the requirement to develop risk assessment guidelines, OEHHA has developed guidelines for acute exposure risk assessment. The purpose of these guidelines is to provide background and a format for evaluating impacts from short-term nonemergency emissions to the air, as required in the Hot Spots Program.

The statute defines a number of potential short-term releases that should be included in a evaluation. These releases include actual and potential spills, leaks, discharges, injections, leaching, dumping, or disposing of a substance into ambient air. The air toxics evaluation is required to focus on all routine releases of a facility, intermittent releases, and predictable process upsets or leaks.

OEHHA recognizes that the preparation of health risk assessments imposes a burden on facilities, and that risk assessments can be required under a variety of programs. OEHHA, therefore, is committed to ensuring that the significant public health benefit of the Air Toxic Hot Spots program be achieved in an efficient and cost-effective manner.

These guidelines have been developed in consultation with other regulatory agencies, and are intended to ensure that risk assessments conducted for the AB 2588 program will be as consistent as possible with other jurisdictions that may require an analysis of air releases. These guidelines have been reviewed by other regulatory agencies. We have tried to come into conformity wherever possible with other programs' risk assessment requirements. By preparing the guidelines in this fashion, Cal/EPA can minimize the need for facilities to perform duplicative work that increases costs but does not further the protection of public health.

Despite our efforts to achieve uniformity, it should be noted that the procedures described here may not adequately address all requirements for other programs and agencies. For example, other programs may require health risk assessments for chemicals that are not covered under the Hot Spots program. In addition, as noted above, the Hot Spots program focuses on "routine" releases. If a facility also must comply with Resource Conservation and Recovery Act(RCRA) and Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) risk assessment requirements, Risk Management and Prevention Program (RMPP) requirements, or additional analyses required by local air pollution control districts, it may need to evaluate a non-routine accident scenario in its risk assessment. Guidelines for evaluation of emergencies resulting from releases of hazardous materials are the subject of Health and Safety Code Section 25534 and are not presented here. The representative from the Office of Emergency Services, Department of Toxic Substances Control Remedial Project Manager or other appropriate agency representative should be consulted on this issue. With regards to compliance with Proposition 65, the levels provided for acute one-hour exposure are not applicable since Proposition 65 focuses on daily exposures.

In conclusion, OEHHA believes in sound science and public participation. We encourage comments on these guidelines and suggestions on improvements in the process.

II. OVERVIEW OF RISK ASSESSMENT PROCEDURE

Exposure to chemicals may be associated with a number of adverse health effects including cancer, chronic noncancer health effects, as well as acute noncancer health effects. Acute noncancer health effects can range from mild discomfort such as eye irritation or headache to serious effects like birth defects. The actual effect depends on the chemical, the exposure, and the individual exposed. When the health impact of an exposure is evaluated it is often explained in terms of a "risk assessment." The National Academy of Sciences has defined risk assessment as the characterization of the probability of potentially adverse health effects from human exposures to environmental hazards. Since many such chemical health evaluations address only cancer risk assessment, an overview is provided on how the potential acute health effects from short-term exposure should be included in a facility risk assessment.

A comprehensive health risk assessment for a facility that evaluates the impact of short-term releases can be divided into four steps: hazard identification, exposure assessment, dose-response assessment, and risk characterization. Hazard identification requires a description of the types of processes associated with short-term exposures, all of the listed chemicals involved, and the health effects associated with each of the chemicals. Exposure assessment involves determining the dispersion of all Hot Spots listed substances that are emitted from the facility into the air and the environment, and determining the concentration of each substance to which individuals and populations are exposed. Dose-response assessment requires determining the concentrations of each substance emitted that may result in health effects. This is often done through the development of toxicity criteria for specific chemicals. For those substances without established toxicity criteria one may have to be derived and subsequently approved by OEHHA. In other cases it may be more appropriate to determine the margin of safety between the levels causing health effects and the exposure concentration determined; this might be conducted in the risk characterization step. Risk characterization comprises the incorporation of information from the first three steps into a final health analysis. This document provides risk assessment guidance in the evaluation of short-term emissions.

III. HAZARD IDENTIFICATION

Hazard identification of potential acute noncancer health impacts requires determining whether continuous or intermittent releases occur, which chemicals are involved, and what health effects are associated with the chemicals. Short-term emissions can occur from many types of industrial processes. The types of short-term releases addressed in the Hot Spots Program are part of the standard operating procedures, not emergency or catastrophic releases.

The facility risk assessment should describe the type of short-term emissions that occurred during the reporting year. Examples include releases from tank cleaning, venting to flares, venting of pressure relief valves, shut downs, and start ups. The description should include the process involved, identify the chemicals released (if known), and include any other notable information that could be of interest to the public, such as any health effects associated with the release or official reports regarding the release. Some of the information of interest would be any "nuisance" violations issued by air districts, or reports required under HSC Section 25359.4 to the Department of Toxic Substances Control (DTSC). This information helps to clarify any potential acute hazard associated with the facility from on-going intermittent releases and could provide a basis to gauge the reliability of the exposure or dose-response methods used to determine the impacts of acute exposures. Furthermore, it may identify chemicals emitted that may not have been noted during standardized source testing.

The risk assessment should identify all Hot Spots chemicals emitted from the facility. The Hot Spots substances are listed in the Air Resources Board (ARB) Emission Inventory Criteria and Guidelines Regulations (California Code of Regulations (CCR), Title 17, Section 93300-93354) (see Appendix A). The risk assessment should list all substances for which emissions must be quantified, and those substances for which production, use or other presence must be reported. To be sure that the substance name has been properly identified, the appropriate Chemical Abstract Services (CAS) number should also be included. If possible, the chemical form of the substance should be indicated. Finally, a complete hazard identification would indicate if any criteria air pollutants are emitted. Criteria air pollutants can interact with the listed substances and result in health effects that would be missed if they were only considered separately.

For those substances for which emissions must be quantified, a description of the potential primary acute health effects associated with the substance should be included. Toxic effects

following an acute exposure may involve the skin, eyes, upper and lower respiratory tract, and/or systemic effects such as birth defects, nerve damage or liver damage. All of these effects may result from absorption of chemicals through the lungs.

In summary, the hazard identification step of facility risk assessment describes how short-term emissions occurred at the facility, lists all substances emitted with their CAS numbers, and identifies key toxic effects potentially associated with the emitted substances.

IV. EXPOSURE ASSESSMENT

The purpose of exposure assessment is to estimate the extent of public exposure to each substance for which acute noncancer effects will be evaluated. This involves emission quantification, modeling of environmental transport, identification of exposure routes, and identification of exposed populations. Exposure assessment will be described in detail in another technical support document.

For the purposes of evaluating impacts from short-term exposures, air dispersion modeling is commonly used to describe the maximum 1-hour ground level concentrations. Each Hot Spots chemical emitted in the reporting year should be modeled for acute exposure. The modeling analysis should contain a network of receptor points with sufficient detail (in number and density) to permit the estimation of the maximum one-hour ground level concentrations for exposed individuals as well as the population. A separate technical support document will describe the air dispersion modeling process.

V. DOSE-RESPONSE ASSESSMENT

A. Derivation of Toxicity Criteria

Dose-response assessment describes the quantitative relationship between the amount of exposure (the "dose") to a chemical and the extent or incidence of toxic disease or injury (the "response"). The process often involves establishing a toxicity value or criterion to compare with exposure concentrations. Dose-response assessment and establishment of toxicity values for the program has been completed by OEHHA for some chemicals. For those chemicals without available toxicity values, but which are currently undergoing a comprehensive dose-response analysis by OEHHA, toxicity criteria will not have to be developed by the facility operator in the risk assessment. However, in these cases, modeling and dispersion information must be submitted to OEHHA so that the health risks associated with the exposure can be assessed and quantified by OEHHA. For those substances not undergoing dose-response analysis, toxicity criteria should be derived by the submitted risk assessment preparers and subsequently approved by OEHHA.

The toxicity values must be derived following the methodology developed by OEHHA. OEHHA will review the toxicity value when the risk assessment is submitted for review; however OEHHA may also be consulted during the toxicity value development. The details for methodology in dose-response assessment are provided in the technical support document entitled The Determination of Acute Toxicity Exposure Levels for Airborne Toxicants. A brief description of the process used and how to use the information produced is provided below.

Data are first evaluated to characterize the short-term exposure and response relationship from accidental or occupational human exposures, controlled human studies, and controlled animal studies. It is assumed that acute health effects from short-term chemical exposure will not occur until a minimum dose or threshold is reached. The concept of a threshold is theoretical and cannot be accurately measured. However, a threshold for a given experimental study can often be bracketed by identifying the lowest dose causing effects and the highest dose not causing any effects. Due to biological variability, experimental design limitations, and statistical uncertainty, a threshold identified in an experimental study usually cannot be considered to be the threshold for an exposed general public. In order to derive a threshold for the public, OEHHA uses procedures originally

developed by the Food and Agriculture Organization/World Health Organization Expert Committee on Food Additives, the U.S. Food and Drug Administration, National Academy of Sciences Safe Drinking Water Committee, and U.S. Environmental Protection Agency.

The first step in these procedures is to determine the dose that results in a no-observed adverse effect level (NOAEL) in each short-term study being evaluated. From a series of studies evaluating the same or a similar plausible human endpoint the best study is chosen for further consideration. The next step is to estimate the NOAEL for exposure to a large and diverse human population. This requires consideration of the wide ranges of sensitivities within the human population such that most members of sensitive populations would be protected from adverse health consequences. For example, individuals with asthma are more sensitive to certain respiratory irritants, and they must be protected as well.

This estimated human population "NOAEL" is called a reference exposure level (REL) in the Air Toxics "Hot Spots" Program risk assessment process. The REL is the toxicity value used in Hot Spots Program for non cancer health effects. RELs are calculated by dividing an experimental study's NOAEL with uncertainty factors. The number of uncertainty factors applied depends on how limited the current scientific knowledge on the substance may be and how well the experimental study can be expected to predict effects in a large diverse human population. If the study is conducted in humans, using a fairly large number of subjects, including sensitive members of the population, then it is likely no uncertainty factors will be used to adjust the experimental NOAEL (as is the case for nitrogen dioxide). If a study is based on only a few human subjects, then an uncertainty factor will be used to be sure that more sensitive members of the public are protected. Similarly, if the study is conducted in a small group of laboratory animals, then usually two uncertainty factors are used to calculate an REL that is protective of the general public. Using the best scientific information and procedures available to calculate the REL, OEHHA does not expect health effects to occur at concentrations at or below the acute REL.

B. Description of Acute RELs in Risk Assessment

While RELs are based on the most sensitive endpoint, the severity of the endpoint can vary dramatically. Acute RELs are thus categorized in this program into one of two severity categories: Level I (mild toxicity or discomforting effects) or Level II (severe or disabling effects). Ideally it would be desirable to base all acute RELs on Level I effects; however, due to the

nature of biological responses and data gaps that exist, that is ot possible in all cases. For this reason, for many chemicals, .Ls based on Level 1 effects are not available, and Level 2 effects must be used. However, it is important to note that each acute REL is associated with only one level and a Level II is only used when a Level I is not available for a compound. Complete information regarding the health effects associated with specific chemicals, the severity of the effects, and the derivation of the REL is presented in the technical support document entitled The Determination of Acute Toxicity Exposure Levels for Airborne Toxicants. The general definition for Level I and Level II effects is provided below:

Level I is termed the discomfort or mild effect level and refers to the concentration of an airborne substance at or below which exposure for one hour may result in some odors, tastes, visual cues, and sensations but which will cause no adverse health effects in essentially all of the population. Exposure to concentrations above this level, depending on the chemical, may result in minor health effects, such as mild eye and respiratory irritation, skin irritation, minor histologic effects, and headaches. The effects are expected to be of short duration and to cease soon after removal from exposure.

Level II is termed the disability or serious effect level and exposure for one hour to an airborne substance above this level may lead individuals to seek assistance. Exposures above this level, depending on the chemical, may result in serious health effects such as severe eye irritation, severe respiratory irritation, bronchospasm, shortness of breath, disorientation, blurred vision, vomiting, cardiac arrhythmias, and adverse outcomes of an existing or subsequent pregnancy. Many of the effects are expected to be of short duration, others may result in long-term effects, but such effects may not necessarily imply prolonged injury following cessation of exposure.

The acute noncancer RELs currently available for use in the assessment of acute health effects are listed in Table 1. In addition to using the RELs, the endpoint of toxicity and level of severity (Level I or II) needs to be included. Furthermore each risk assessment should include the definitions of Level I or II effects to clarify the toxic endpoints described.

VI. RISK CHARACTERIZATION

The fourth step of risk assessment, risk characterization, is an integration of the health effects and public exposure information developed for emitted pollutants. Under the Air Toxics "Hot Spots" Act, comprehensive risk assessments are to quantify both individual and populationwide health risks (HSC 44306). The risk assessments need to consider impacts from individual substances and from the combination of pollutants emitted by a single facility. The risk assessments are facility specific, but at some level it may be prudent to consider the impacts of multiple facilities, or to compare facilities with background levels in the same area.

In order to characterize the risk for a single substance, the modeled exposure is divided by the REL listed for that substance in Table 1 to calculate a hazard quotient. This approach is described in detail below. In general, if the exposure is less than the REL, health effects are not expected to occur, i.e., there is no risk from exposure. As the exposure increases beyond the REL, there is an increasing chance that the identified health effect may result. This type of comparison may be all that is necessary for facilities that emit a very limited number of substances, i.e., dry-cleaning facilities.

For many facilities a large number of chemicals may be emitted or may be present in the air at the location of the receptor. To assess the cumulative impact of several chemicals present at the same time, it is important to consider the interaction of effects of the toxicants. Chemical interactions can occur in numerous ways such as alterations in absorption or metabolism, binding to proteins, or changes in the toxicological responses at the site of action. When there is simultaneous exposure to two or more chemicals that produce similar toxic effects, the response may be additive, greater than additive (synergistic), or less than additive (antagonistic). When two chemicals that impact the same toxic endpoint are given together the most common observation is that their effects are additive. For this reason, unless specific information is available to the contrary, the interaction of two or more chemicals is assumed to be additive. The actions of some respiratory irritants have been shown to be synergistic, thus, in some cases additivity may underestimate the health impact.

An underlying issue in chemical interactions and additivity is the concept of a threshold. Exposure to a single chemical in the air may not result in a toxic response because it is below the threshold (i.e., the REL) necessary to elicit a response. However, simultaneous exposure to two similar chemicals, at

subthreshold levels may result in a toxic response. This is accounted for by adding the hazard quotients for chemicals that impact the same toxic endpoint. While interactions may occur from exposure to facility emissions and other chemicals present in our air, food, water, medications, etc., such interactions are not considered in this evaluation, but may be considered as part of the reason for the wide range of responses that occur in our population and part of the uncertainty in the analysis.

In order to identify the health impact of a facility, it is essential to include all substances that can cause an adverse effect. A particular emission needs to be considered in the context of total facility emissions.

A. Calculation of the Hazard Quotient and Hazard Index

The potential for acute health effects should be evaluated by dividing the estimated one-hour maximum concentrations (Cs) by the acute RELs provided in Table 1 for those RELs that have been developed by OEHHA. This simple ratio method is called the hazard index (HI) approach. For a single substance, this ratio is called the acute hazard quotient (HQ), see Equation 1. The individual acute HQ for each substance affecting each toxic endpoint (listed in Table 1) is then summed, as shown below in Equation 2 to arrive at an acute HI for the toxicological endpoint, at a particular receptor location. See Table 2 and Appendix D for more information and an expanded example for calculating the HQ and the HI for a target endpoint.

$$HQ = C / REL \qquad \text{(Equation 1)}$$

where for a specific toxicant,

C is the 1-hour maximum concentration in $\mu g/m^3$

and REL is the acute reference exposure level in $\mu g/m^3$.

$$HI = C_1/REL_1 + C_2/REL_2 + \ldots + C_i/REL_i \qquad \text{(Equation 2)}$$

where C_i = 1-hour maximum concentration for the i^{th} toxicant

and REL_i = acute REL for the i^{th} toxicant.

For those chemicals without RELs, but which are currently undergoing a comprehensive dose-response analysis by OEHHA, modeling and dispersion information must be submitted to OEHHA so that the health risks associated with the exposure can be assessed and quantified by OEHHA. In those instances where the

REL is not undergoing development by OEHHA, in addition to submitting modeling and dispersion information to OEHHA, the interim REL derived in the submitted risk assessment should be used in the HQ and HI calculation. OEHHA will review the interim REL and HQ/HI calculations when the risk assessment is submitted for review. The acute HI should be calculated for specific receptors in a grid surrounding the facility to determine any location of receptors where the HI exceeds one.

The HI reflects potential cumulative impacts from all evaluated substances for a particular toxicological endpoint. Addition of individual chemical HQs for dissimilar toxicological endpoints does not have scientific meaning.

The HI is a numerical indication of the nearness to RELs or the degree to which RELs are exceeded but provides only a rough measure of likely toxicity. Exposure to a combination of substances at or below the acute HI is not expected to result in adverse health effects. As this index approaches or exceeds one, concern for the potential hazard of the mixture increases.

B. Presentation of Results

The risk assessment should include a list of all Hot Spot chemicals emitted from the facility. There must be a summary table with the one-hour maximum concentration and acute hazard quotients calculated for each chemical and hazard indices for each toxicological endpoint. A sample summary Table 2 is provided. The HI for the offsite point of maximum impact (PMI) should be presented in a table. The PMI is defined as the offsite location with the highest one-hour maximum ground level concentration of the substance under evaluation when only one substance is evaluated. Otherwise it is the maximum HI found when more than one substance is in the HI calculation. Similar tables should also be provided for the maximum impacted offsite location where there is currently a residential receptor designated maximum exposed individual resident (MEIR) and for the maximum impacted offsite location where there is an existing business designated maximum exposed individual worker (MEIW). Detailed instructions on the determination of receptors will be presented in the guideline document describing exposure assessment. In addition to the receptors mentioned, the acute HI at other receptors may need to be presented. The risk assessment should also provide a list of the acute RELs used to calculate the acute hazard indices. In addition, an acute HI isopleth map should be presented in the risk assessment when the HI is greater than 0.5.

Currently, each chemical has an REL for the most sensitive endpoint but may have the potential to affect other target organs as well at higher concentrations. Therefore, a hazard index does not necessarily include all chemicals which may impact that endpoint. If an HI equals or exceeds 0.5, the risk assessor should provide information on emitted chemicals which can impact that endpoint but which have not been included in the HI calculations. This information can be obtained from the discussion of the toxicology of emitted chemicals.

The background concentrations of the criteria air pollutants that are respiratory irritants (ozone, nitrogen dioxide, sulfur oxide, sulfates, particulate matter and hydrogen sulfide)[1] should be included in the risk assessment if the HI for respiratory irritation exceeds 0.5. The background concentrations of the criteria air pollutant that is a cardiovascular toxicant (carbon monoxide), should be included in the risk assessment if the HI for cardiovascular toxicity exceeds 0.5. The annual average concentration of criteria air pollutants near the facility is available for most parts of California in the Air Resources Board's Annual California Air Quality Data Reports. To obtain this information, you can contact the Toxic Air Contaminant Identification Branch at ARB. In cases where the background concentrations are unavailable, the districts may direct the facility operator to make other assumptions. If criteria air pollutant emissions have been modeled for compliance to other district programs, that information should be included in the risk assessment. The contribution of criteria air pollutants should be listed separately from other emissions (see Table 2 and Appendix D).

Finally, a discussion of the toxicology of all emitted chemicals should also be included in the report. The Air Toxics "Hot Spots" Program is based on a right-to-know law. Such a discussion helps the public understand why these chemicals are being evaluated.

VII. SUMMARY STEPS FOR ACUTE RISK ASSESSMENT

A. Hazard Identification

1. List all Hot Spots chemicals, with CAS number, emitted from the facility. Include the chemical form of the substance if possible. The Hot Spot substances are listed in the ARB Emission

[1] An REL for acute exposure to lead has not been developed. The 30-day REL for lead will be discussed in the guidelines document for chronic exposure.

Inventory Criteria and Guidelines Regulations (California Code of Regulations (CCR), Title 17, Section 93300-93354) (see Appendix A). Identify any criteria air pollutants also emitted if determined by other district programs.

2. Describe the potential acute health effects associated with each substance emitted. A summary of the toxicologic effects similar to that described in Appendix D of the technical support document entitled The Determination of Acute Toxicity Exposure Levels for Airborne Toxicants is required.

3. Describe the types of continuous or intermittent short-term emissions from the facility that occurred during the reporting year. As required by statute, releases include spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping (fugitive), leaching, dumping, or disposing of a substance into ambient air that occur from the facility. Include the chemical(s) released, and a description of the processes that resulted in short-term releases. Include any officially documented short-term releases or violations that may have occurred.

B. Exposure Assessment

NOTE: Exposure assessment will be discussed thoroughly in a separate document. Any steps included in the exposure assessment document will also have to be followed.

1. Model the emissions of each Hot Spots chemical to determine the 1-hour maximum ground level concentration at each gridded receptor and specific sensitive receptors. Include sufficient detail to identify exposed individuals and populations. Details of dispersion modeling will be presented in a separate technical support document.

C. Dose-response Assessment

1. For all Hot Spots chemicals emitted for which emissions must be quantified determine whether a reference exposure level (REL) is listed in Table 1.

2. For those substances with an REL listed in Table 1, use the REL in further calculations.

3. For those substances without an REL listed in Table 1, interim RELs should be derived using the methodology in the technical support document entitled The Determination of Acute Toxicity Exposure Levels for Airborne Toxicants. OEHHA will review the interim REL when the risk assessment is submitted for review; however OEHHA may also be consulted during the interim REL development. For those chemicals currently undergoing a comprehensive dose-response analysis by OEHHA, RELs will not have to be developed; however modeling and dispersion information still needs to be submitted to OEHHA.

4. Indicate the toxic endpoint(s) reported for each chemical for which emissions must be quantified.

5. Indicate the level of severity reported for each chemical for which emissions must be quantified that have RELs listed in Table 1. For those substances without an REL listed in Table 1, the level of severity will be determined by OEHHA during the review of the interim REL. In each risk assessment the definitions of a Level I and Level II effect should be included.

D. Risk Characterization

1. For each substance emitted, using the estimated 1-hour maximum ground level concentration for specific receptor locations, and the acute REL (listed in Table 1) or the acute interim REL, calculate the HQ for individual substances using Equation 1.

$$HQ = C / REL \qquad \text{(Equation 1)}$$

where for a specific toxicant,

C is the 1-hour maximum concentration in $\mu g/m^3$

and REL is the acute reference exposure level in $\mu g/m^3$.

2. For those chemicals without OEHHA developed RELs, sufficient modeling and dispersion information must be submitted to OEHHA so that the health risks associated with the exposure can be assessed and quantified by OEHHA. If interim RELs have been developed, they should be used to calculate HQ and HI.

3. The individual HQ for each substance affecting each toxicological endpoint should be summed to arrive at a HI for a specific toxic effect, at a particular receptor location, as shown in Equation 2.

$$HI = C_1/REL_1 + C_2/REL_2 + \ldots + C_i/REL_i \qquad \text{(Equation 2)}$$

where C_i = 1-hour maximum concentration for the i^{th} toxicant
and REL_i = acute REL for the i^{th} toxicant.

4. Develop an acute HI isopleth map, when the HI is greater than 0.5, using specific grids surrounding the facility (specifics will be discussed in the documents on exposure assessment and modeling). The acute HI should be calculated for specific gridded receptors surrounding the facility to determine the location of receptors where the HI exceeds one.

5. The acute HI should be presented in tables for the offsite point of maximum impact (PMI). The PMI is defined as the offsite location with the highest one-hour maximum ground level concentration of the substance under evaluation when only one substance is evaluated, otherwise it is the maximum HI found when more than one substance is in the HI calculation; the maximum impacted offsite location where there is currently a residential receptor designated maximum exposed individual resident (MEIR); and the maximum impacted offsite location where there is an existing business designated maximum exposed individual worker (MEIW).

6. The background concentrations of the criteria air pollutants (ozone, nitrogen dioxide, sulfur dioxide, sulfates, particulate matter and hydrogen sulfide)[2] should be included in the risk assessment if the HI for their corresponding toxic endpoint exceeds 0.5. The acute hazard indices that include background contribution from criteria air pollutants should be presented separately from the hazard indices for the facility's emissions. An example is presented in Table 2 and Appendix D.

7. For each chemical emitted list the name of the substance, the 1-hour ground level concentration, the REL, the HQ for each substance, and the HI for each toxicologic endpoint at specific receptor locations.

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[2] An REL for acute exposure to lead has not been developed. The 30-day REL for lead will be discussed in the guidelines document for chronic exposure.

8. If the situation arises that exposure estimates exceed the REL, particularly for those chemicals based on Level II effects, consultation with OEHHA is urged.

Table 1

Acute Reference Exposure Levels (RELs) and Toxicologic Endpoints

CHEMICAL NAME	REL ($\mu g/m^3$)	TOXICOLOGIC ENDPOINT[2]	LEVEL[3]
ACETONE	1.7×10^5	Eye and Respiratory Irritation	I
ACROLEIN	1.2×10^{-1}	Eye Irritation	I
ACRYLIC ACID	6.0×10^3	Respiratory Irritation	I
AMMONIA	1.9×10^3	Eye and Respiratory Irritation	I
ANTIMONY TRIOXIDE	4.0×10^0	Skin Irritation	I
ARSENIC AND INORGANIC ARSENIC COMPOUNDS	4.8×10^{-1}	Reproductive/Developmental	II
ARSINE	7.1×10^2	Blood System	II
BENZENE	7.8×10^2	Immune Response	I
BENZYL CHLORIDE	1.5×10^2	Eye and Respiratory Irritation	I
CARBON DISULFIDE	3.1×10^3	Reproductive/Developmental	II
CARBON MONOXIDE[1]	2.3×10^4	Cardiovascular System	I
CARBON TETRACHLORIDE	8.4×10^2	Gastrointestinal/ Liver	I
CHLORINE	2.1×10^2	Respiratory Irritation	I
CHLOROFORM	3.6×10^2	Respiratory Irritation, Reproductive/Developmental	I, II[4]
CHLOROPICRIN	6.8×10^0	Eye and Respiratory Irritation	I
COPPER AND COMPOUNDS	1.0×10^2	Respiratory Irritation	I
1,4-DIOXANE	1.8×10^3	Eye Irritation	I
EPICHLOROHYDRIN	8.0×10^2	Eye and Respiratory Irritation	I
ETHYLENE GLYCOL MONOBUTYL ETHER	5.5×10^3	Respiratory Irritation, Reproductive/Developmental	I, II
ETHYLENE GLYCOL MONOETHYL ETHER	2.3×10^1	Blood System and Reproductive/Developmental	II

CHEMICAL NAME	REL ($\mu g/m^3$)	TOXICOLOGIC ENDPOINT[2]	LEVEL[3]
ETHYLENE GLYCOL MONOETHYL ETHER ACETATE	3.3×10^2	Reproductive/Developmental	II
ETHYLENE GLYCOL MONOMETHYL ETHER	2.3×10^1	Blood System and Reproductive/Developmental System	II
FORMALDEHYDE	1.7×10^1	Eye Irritation	I
HYDROCHLORIC ACID	6.0×10^1	Respiratory Irritation	I
HYDROGEN CYANIDE	3.4×10^1	Respiratory Irritation, CNS - mild	I
HYDROGEN FLUORIDE	1.4×10^2	Eye and Respiratory Irritation	I
HYDROGEN SULFIDE[1]	4.2×10^1	Respiratory Irritation	I
ISOPROPYL ALCOHOL	4.9×10^2	Eye and Respiratory Irritation	I
MALEIC ANHYDRIDE	1.0×10^0	Respiratory Irritation	I
MERCURY (INORGANIC)	1.8×10^0	Reproductive/Developmental	II
METHANOL	2.8×10^3	CNS - mild	I
METHYL BROMIDE	3.9×10^3	Reproductive/Developmental	II
METHYL CHLOROFORM	6.8×10^4	CNS - Mild	I
METHYL ETHYL KETONE	1.5×10^2	Respiratory Irritation	I
METHYLENE CHLORIDE	8.3×10^4	CNS - Mild	I
NICKEL AND NICKEL COMPOUNDS	1.6×10^0	Immunotoxicity	I
NITRIC ACID	8.6×10^1	Respiratory Irritation	I
NITROGEN DIOXIDE[1]	4.7×10^2	Respiratory Irritation	I
OZONE[1]	1.8×10^2	Respiratory Irritation	I
PERCHLOROETHYLENE	1.2×10^4	CNS - Serious	II
PHENOL	1.5×10^2	Respiratory Irritation	I

CHEMICAL NAME	REL ($\mu g/m^3$)	TOXICOLOGIC ENDPOINT[2]	LEVEL[3]
PHOSGENE	4.0×10^0	Respiratory Irritation	I
PROPYLENE OXIDE	9.3×10^2	Eye and Respiratory Irritation	I
SELENIUM AND SELENIUM COMPOUNDS	3.0×10^0	Eye and Respiratory Irritation	I
STYRENE	2.2×10^4	Eye and Respiratory Irritation	I
SULFATES[1]	1.2×10^2	Respiratory Irritation	I
SULFUR DIOXIDE[1]	6.6×10^2	Respiratory Irritation	I
SULFURIC ACID AND OLEUM	1.2×10^2	Respiratory Irritation	I
TOLUENE	3.7×10^4	Respiratory Irritation	I
TRIETHYLAMINE	2.8×10^3	Eye Irritation	I
VANADIUM PENTOXIDE	3.0×10^1	Respiratory Irritation	I
VINYL CHLORIDE	2.1×10^5	CNS - Mild	I
XYLENES (m, o, p-isomers)	2.2×10^3	Respiratory Irritation	I

[1] California Ambient Air Quality Standard
[2] CNS = Central Nervous System

[3] Level I - is termed the discomfort or mild effect level and refers to the concentration of an airborne substance at or below which exposure for one hour may result in some odors, tastes, visual cues and sensations but which will cause no adverse health effects in essentially all of the population. Exposure to concentrations above this level, depending on the chemical, may result in minor health effects, such as mild eye and respiratory irritation, skin irritation, minor histologic effects and headaches.

Level II - is termed the disability or serious effect level and exposure for one hour to an airborne substance above this level may lead individuals to seek assistance. Exposures above this level, depending on the chemical, may result in serious health effects such as severe eye irritation, severe respiratory

irritation, bronchospasm, shortness of breath, disorientation, blurred vision, vomiting, cardiac arrhythmias and adverse outcomes of an existing or subsequent pregnancy.

[4] Exposure above the REL may result in Level I and Level II effects.

Table 2

Sample Table for Reporting Acute Hazard Quotients and Indices

Endpoint	Pollutant	One Hour Concentration $\mu g/m^3$	Facility Hazard Quotient	Background Hazard Quotient
Respiratory Irritation	Toxic 1	1.0	0.1	
	Toxic 2	15.0	1.2	
	Criteria 1[a]	20.0	0.5	1.4
	Hazard Index		1.8	1.4
	Hazard Index (Facility + Background)			3.2
Cardiovascular	Toxic 2	2.0	0.2	
	Toxic 3	150.0	0.1	
	Criteria 2	70.0		1.5
	Hazard Index		0.3	1.5
	Hazard Index (Facility + Background)		0.3	2.0

[a] Pollutant was evaluated in another district program and is included here to better estimate impact

Appendix A

Glossary of Acronyms and Definitions of Selected Terms

Adverse Effect Any change in an organism which impairs the functional capacity of the organism (as determined by anatomical, physiological, biochemical or behavioral parameters); decreases the organism's ability to maintain its normal function; or enhances the susceptibility of the organism to the deleterious effects of environmental influences.

ARB State of California Air Resources Board

C Estimated one-hour maximum ground level concentration

CAS Chemical Abstract Services

CCR California Code of Regulations

Developmental toxicity Adverse effects on the developing organism that may result from exposure prior to conception (either parent), during prenatal development, or postnatally to the time of sexual maturation. Adverse developmental effects may be detected at any point in the life span of the organism. Major manifestations of developmental toxicity include: death of the developing organism; induction of structural birth defects; altered growth; and functional deficiency.

District Air pollution control or air quality management district

DTSC Department of Toxic Substances Control

Endpoint An observable or measurable biological or biochemical event used as an index of the effect of a chemical on a cell, tissue, organ, organism, etc.

Epidemiology The study of the occurrence and distribution of a disease or physiological condition in human populations and of the factors that influence this distribution.

Exposure Contact of an organism with a chemical, physical, or biological agent. Exposure is quantified as the amount of the agent available at the exchange boundaries of the organism (e.g., skin, lungs, digestive tract) and available for absorption.

HI Acute Hazard Index, the sum of individual acute HQs for each substance affecting a particular toxicological endpoint, at a particular receptor location.

HQ Acute Hazard Quotient, the estimated one-hour maximum concentration divided by the acute reference exposure level for a single substance and a particular endpoint

HSC Health and Safety Code

Interspecies Between different species.

Intraspecies Within the same species.

Level I - is termed the discomfort or mild effect level and refers to the concentration of an airborne substance at or below which exposure for one hour may result in some odors, tastes, visual cues, and sensations but which will cause no adverse health effects in essentially all of the population. Exposure to concentrations above this level, depending on the chemical, may result in minor health effects, such as mild eye and respiratory irritation, skin irritation, minor histologic effects, and headaches.

Level II - is termed the disability or serious effect level. Exposure for one hour to an airborne substance above this level may lead individuals to seek assistance. Exposures above this level, depending on the chemical, may result in serious health effects such as severe eye irritation, severe respiratory irritation, bronchospasm, shortness of breath, disorientation, blurred vision, vomiting, cardiac arrhythmias and adverse outcomes of an existing or subsequent pregnancy.

LOAEL Lowest-observed adverse effect level, the lowest dose or exposure level of a chemical in a study at which there is a statistically or biologically significant increase in the frequency or severity of an adverse effect in the exposed population as compared with an appropriate, unexposed control group.

Margin of safety The ratio of the no-observed-adverse-effect level (NOAEL) to the estimated human exposure.

MEIR Maximum exposed individual resident

MEIW Maximum exposed individual worker

NOAEL No Observed Adverse Effect Level, the highest experimental dose at which there is no statistically or biologically significant increase in frequency or severity of adverse health effects in the exposed population compared with an appropriate, unexposed population. Effects may be produced at this level, but they are not considered to be adverse.

OEHHA Office of Environmental Health Hazard Assessment

PMI Offsite point of maximum impact

REL Reference exposure level expressed in $\mu g/m^3$ in the Hot Spots Program, at which no effect is anticipated to occur in the exposed human population. An REL is virtually the same as the term, reference concentration (RfC) used by U.S. EPA, only it may be for varying amounts of time rather than lifetime only. It has been given a different name so that the levels estimated by the State Office of Environmental Health Hazard Assessment can easily be distinguished from those developed by the federal EPA.

Reproductive toxicity Harmful effects on fertility, gestation, or offspring, caused by exposure of either parent to a substance.

Risk The characterization of the probability of potentially adverse health effects from the human exposure to environmental hazards.

Risk assessment The characterization of the probability of potentially adverse health effects from human exposure to environmental hazards.

RMPP Risk Management and Prevention Program

Synergism A pharmacologic or toxicologic interaction in which the combined effect of two or more chemicals is greater than the sum of the effects of each chemical alone.

Threshold, nonthreshold A threshold dose is the minimally effective dose of any chemical that is observed to produce a response (e.g., enzyme change, liver toxicity, death). For most toxic effects, except possibly for carcinogenesis, there appear to be threshold doses. Nonthreshold substances are those substances that are known or assumed to have some risk of response at any dose above zero.

Toxicology The multidisciplinary study of toxicants, their harmful effects on biological systems, and the conditions under which these harmful effects occur. The mechanisms of action, detection, and treatment of the conditions produced by toxicants are studied.

Appendix B

Health and Safety Code Related to Hot Spots Program

PART 6. AIR TOXICS "HOT SPOTS" INFORMATION AND ASSESSMENT
(Part 6 added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384. Note: Sections 44380 and 44384 became operative Jan. 1, 1988.)

CHAPTER 1. LEGISLATIVE FINDINGS AND DEFINITIONS
(Chapter 1 added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384.)

44300. This part shall be known and may be cited as the Air Toxics "Hot Spots" Information and Assessment Act of 1987. (Added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384.)

44301. The Legislature finds and declares all of the following:

(a) In the wake of recent publicity surrounding planned and unplanned releases of toxic chemicals into the atmosphere, the public has become increasingly concerned about toxics in the air.

(b) The Congressional Research Service of the Library of Congress has concluded that 75 percent of the United States population lives in proximity to at least one facility that manufactures chemicals. An incomplete 1985 survey of large chemical companies conducted by the Congressional Research Service documented that nearly every chemical plant studied routinely releases into the surrounding air significant levels of substances proven to be or potentially hazardous to public health.

(c) Generalized emissions inventories compiled by air pollution control districts and air quality management districts in California confirm the findings of the Congressional Research Service survey as well as reveal that many other facilities and businesses which do not actually manufacture chemicals do use hazardous substances in sufficient quantities to expose, or in a manner that exposes, surrounding populations to toxic air releases.

(d) These releases may create localized concentrations or air toxics "hot spots" where emissions from specific sources may expose individuals and population groups to elevated risks of adverse health effects, including, but not limited to, cancer and contribute to the cumulative health risks of emissions from other sources in the area. In some cases where large populations may not be significantly affected by adverse health risks, individuals may be exposed to significant risks.

(e) Little data is currently available to accurately assess the amounts, types, and health impacts of routine toxic chemical releases into the air. As a result, there exists significant uncertainty about the amounts of potentially hazardous air

pollutants which are released, the location of those releases, and the concentrations to which the public is exposed.

(f) The State of California has begun to implement a long-term program to identify, assess, and control ambient levels of hazardous air pollutants, but additional legislation is needed to provide for the collection and evaluation of information concerning the amounts, exposures, and short- and long-term health effects of hazardous substances regularly released to the surrounding atmosphere from specific sources of hazardous releases.

(g) In order to more effectively implement control strategies for those materials posing an unacceptable risk to the public health, additional information on the sources of potentially hazardous air pollutants is necessary.

(h) It is in the public interest to ascertain and measure the amounts and types of hazardous releases and potentially hazardous releases from specific sources that may be exposing people to those releases, and to assess the health risks to those who are exposed. (Added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384.)

44302. The definitions set forth in this chapter govern the construction of this part. (Added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384.)

44303. "Air release" or "release" means any activity that may cause the issuance of air contaminants, including the actual or potential spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing of a substance into the ambient air and that results from the routine operation of a facility or that is predictable, including, but not limited to, continuous and intermittent releases and predictable process upsets or leaks. (Added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384.)

44304. "Facility" means every structure, appurtenance, installation, and improvement on land which is associated with a source of air releases or potential air releases of a hazardous material. (Added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384.)

44306. "Health risk assessment" means a detailed comprehensive analysis prepared pursuant to Section 44361 to evaluate and predict the dispersion of hazardous substances in the environment and the potential for exposure of human populations and to assess and quantify both the individual and population wide health risks associated with those levels of exposure. (Added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384.)

44307. "Operator" means the person who owns or operates a facility or part of a facility. (Added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384.)

44308. "Plan" means the emissions inventory plan which meets the conditions specified in Section

44342. (Added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384.)

44309. "Report" means the emissions inventory report specified in Section 44341. (Added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384.)

CHAPTER 2. FACILITIES SUBJECT TO THIS PART
(Chapter 2 added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384.)

44320. This part applies to the following:

(a) Any facility which manufactures, formulates, uses, or releases any of the substances listed pursuant to Section 44321 or any other substance which reacts to form a substance listed in Section 44321 and which releases or has the potential to release total organic gases, particulates, or oxides of nitrogen or sulfur in the amounts specified in Section 44322.

(b) Except as provided in Section 44323, any facility which is listed in any current toxics use or toxics air emission survey, inventory, or report released or compiled by a district. A district may, with the concurrence of the state board, waive the application of this part pursuant to this subdivision for any facility which the district determines will not release any substance listed pursuant to Section 44321 due to a shutdown or a process change.

(Amended by Stats. 1989, Ch. 1254, Sec. 7.)

References at the time of publication (see page iii):
Regulations: 17, CCR, sections 90700-90703, 90704, 93303, 93306

44321. For the purposes of Section 44320, the state board shall compile and maintain a list of substances that contains, but is not limited to, all of the following:

(a) Substances identified by reference in paragraph (1) of subdivision (b) of Section 6382 of the Labor Code and substances placed on the list prepared by the National Toxicology Program issued by the United States Secretary of Health and Human Services pursuant to paragraph (4) of Section 262 of Public Law 95-622 of 1978. For the purposes of this subdivision, the state board may remove from the list any substance which meets both of the following criteria:

(1) No evidence exists that it has been detected in air.

(2) The substance is not manufactured or used in California, or, if manufactured or used in California, because of the physical or chemical characteristics of the substance or the manner in which it is manufactured or used, there is no possibility that it will become airborne.

(b) Carcinogens and reproductive toxins referenced in or compiled pursuant to Section

25249.8, except those which meet both of the criteria identified in subdivision (a).

(c) The candidate list of potential toxic air contaminants and the list of designated toxic air contaminants prepared by the state board pursuant to Article 2 (commencing with Section 39660) of Chapter 3.5 of Part 2, including, but not limited to, all substances currently under review and scheduled or nominated for review and substances identified and listed for which health effects information is limited.

(d) Substances for which an information or hazard alert has been issued by the repository of current data established pursuant to Section 147.2 of the Labor Code.

(e) Substances reviewed, under review, or scheduled for review as air toxics or potential air toxics by the Office of Air Quality Planning and Standards of the Environmental Protection Agency, including substances evaluated in all of the following categories or their equivalent: preliminary health and source screening, detailed assessment, intent to list, decision not to regulate, listed, standard proposed, and standard promulgated.

(f) Any additional substances recognized by the state board as presenting a chronic or acute threat to public health when present in the ambient air, including, but not limited to, any neurotoxins or chronic respiratory toxins not included within subdivision (a), (b), (c), (d), or (e). (Added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44334.)

44322. This part applies to facilities specified in subdivision (a) of Section 44320 in accordance with the following schedule:

(a) For those facilities that release, or have the potential to release, 25 tons per year or greater of total organic gases, particulates, or oxides of nitrogen or sulfur, this part becomes effective on July 1, 1988.

(b) For those facilities that release, or have the potential to release, more than 10 but less than 25 tons per year of total organic gases, particulates, or oxides of nitrogen or sulfur, this part becomes effective July 1, 1989.

(c) For those facilities that release, or have the potential to release, less than 10 tons per year of total organic gases, particulates, or oxides of nitrogen or sulfur, the state board shall, on or before July 1, 1990, prepare and submit a report to the Legislature identifying the classes of those facilities to be included in this part and specifying a timetable for their inclusion. (Amended by Stats. 1989, Ch. 1254, Sec. 8.)

44323. A district may prepare an industrywide emissions inventory and health risk assessment for facilities specified in subdivision (b) of Section 44320 and subdivisions (a) and (b) of Section

44322, and shall prepare an industrywide emissions inventory for the facilities specified in subdivision (c) of Section 44322, in compliance with this part for any class of facilities that the district finds and determines meets all of the following conditions:

(a) All facilities in the class fall within one four-digit Standard Industrial Classification Code.

(b) Individual compliance with this part would impose severe economic hardships on the majority of the facilities within the class.

(c) The majority of the class is composed of small businesses.

(d) Releases from individual facilities in the class can easily and generically be characterized and calculated. (Amended by Stats. 1989, Ch. 1254, Sec. 9.)

44324. This part does not apply to any facility where economic poisons are employed in their pesticidal use, unless that facility was subject to district permit requirements on or before August 1,1987. As used in this section, "pesticidal use" does not include the manufacture or formulation of pesticides. (Added by Stats. 1981, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384.)

44325. Any solid waste disposal facility in compliance with Section 41805.5 is in compliance with the emissions inventory requirements of this part. (Added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384.)

CHAPTER 3. AIR TOXICS EMISSION INVENTORIES
(Chapter 3 added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384.)

44340. (a) The operator of each facility subject to this part shall prepare and submit to the district a proposed comprehensive emissions inventory plan in accordance with the criteria and guidelines adopted by the state board pursuant to Section 44342.

(b) The proposed plan shall be submitted to the district on or before August 1, 1989, except that, for any facility to which subdivision (b) of Section 44322 applies, the proposed plan shall be submitted to the district on or before August 1,1990. The district shall approve, modify, and approve as modified, or return for revision and resubmission, the plan within 120 days of receipt.

(c) The district shall not approve a plan unless all of the following conditions are met:

(1) The plan meets the requirements established by the state board pursuant to Section 44342.

(2) The plan is designed to produce, from the list compiled and maintained pursuant to Section

44321, a comprehensive characterization of the full range of hazardous materials that are released, or that may be released, to the surrounding air from the facility. Air release data shall be collected at, or calculated for, the primary locations of actual and potential release for each hazardous material. Data shall be collected or calculated for all continuous, intermittent, and predictable air releases.

(3) The measurement technologies and estimation methods proposed provide state-of-the-art effectiveness and are sufficient to produce a true representation of the types and quantities of air releases from the facility.

(4) Source testing or other measurement techniques are employed wherever necessary to verify emission estimates, as determined by the state board and to the extent technologically feasible. All testing devices shall be appropriately located, as determined by the state board.

(5) Data are collected or calculated for the relevant exposure rate or rates of each hazardous material according to its characteristic toxicity and for the emission rate necessary to ensure a characterization of risk associated with exposure to releases of the hazardous material that meets the requirements of Section 44361. The source of all emissions shall be displayed or described. (Added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384.)

44341. Within 180 days after approval of a plan by the district, the operator shall implement the plan and prepare and submit a report to the district in accordance with the plan. The district shall transmit all monitoring data contained in the approved report to the state board. (Added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384.)

44342. The state board shall, on or before May 1, 1989, in consultation with the districts, develop criteria and guidelines for site-specific air toxics emissions inventory plans which shall be designed to comply with the conditions specified in Section 44340 and which shall include at least all of the following:

(a) For each class of facility, a designation of the hazardous materials for which emissions are to be quantified and an identification of the likely source types within that class of facility. The hazardous materials for quantification shall be chosen from among, and may include all or part of, the list specified in Section 44321.

(b) Requirements for a facility diagram identifying each actual or potential discrete emission point and the general locations where fugitive
emissions may occur. The facility diagram shall include any nonpermitted and nonprocess sources of emissions and shall provide the necessary data to identify emission characteristics. An existing facility diagram which meets the requirements of this section may be submitted.

(c) Requirements for source testing and measurement. The guidelines may specify appropriate uses of estimation techniques including, but not limited to, emissions factors, modeling, mass balance analysis, and projections, except that source testing shall be required wherever necessary to verify emission estimates to the extent technologically feasible. The guidelines shall specify conditions and locations where source testing, fence-line monitoring, or other measurement techniques are to be required and the frequency of that testing and measurement.

(d) Appropriate testing methods, equipment, and procedures, including quality assurance criteria.

(e) Specifications for acceptable emissions factors, including, but not limited to, those which are acceptable for substantially similar facilities or equipment, and specification of procedures for other estimation techniques and for the appropriate use of available data.

(f) Specification of the reporting period required for each hazardous material for which emissions will be inventoried.

(g) Specifications for the collection of useful data to identify toxic air contaminants pursuant to Article 2 (commencing with Section 39660) of Chapter 3.5 of Part 2.

(h) Standardized format for preparation of reports and presentation of data.

(i) A program to coordinate and eliminate any possible overlap between the requirements of this chapter and the requirements of Section 313 of the Superfund Amendment and Reauthorization Act of 1986 (Public Law 99-499).

The state board shall design the guidelines and criteria to ensure that, in collecting data to be used for emissions inventories, actual measurement is utilized whenever necessary to verify the accuracy of emission estimates, to the extent technologically feasible. (Added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384.)

44343. The district shall review the reports submitted pursuant to Section 44341 and shall, within 90 days, review each report, obtain corrections and clarifications of the data, and notify the Office of Environmental Health Hazard Assessment, the Department of Industrial Relations, and the city or county health department of its findings and determinations as a result of its review of the report. (Added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384. Amended by Governor's Reorganization Plan No. 1 of 1991, §142.)

44344. Except as provided in Section 44391, emissions inventories developed pursuant to this chapter shall be updated every four years, in accordance with the procedures established by the state board. Those updates shall take into consideration improvements in measurement techniques and advancing knowledge concerning the types and toxicity of hazardous material released or potentially released. (Amended by Stats. 1993, Ch. 1041, Sec. 1. Effective January 1, 1994.)

44344.3. (a) A facility shall be granted an exemption by a district from further compliance with this part after meeting all of the following criteria:

(1) The facility was required to comply with this part only as a result of its particulate matter emissions.

(2) The facility has participated in, utilized data derived from, or is eligible to utilize data derived from, approved pooled source testing.

(3) The facility has submitted an emissions inventory plan and report that was subsequently accepted and approved.

(4) The facility has been designated by the district as a low priority facility under the guidelines set forth pursuant to this part for facility prioritization, and facility emissions do not present a significant health risk as specified in subdivision (b) of Section 44362.

(5) The facility handles, processes, stores, or distributes bulk agricultural commodities or handles, feeds, or rears livestock.

(b) Subdivision (a) does not apply to a facility that, because of information provided pursuant to Section 44344.7, is reclassified as an intermediate or high priority facility by the district.

(c) The operator of a facility that has been granted an exemption pursuant to this section shall biennially submit a statement to the district for the district's review, with a copy of the most recent emissions inventory for the facility, indicating that, except as to matters for which an emissions inventory update has been or will be submitted pursuant to Section 44344.7, there has been no significant change in facility operations or activities. The district shall not impose any fee upon the operator with regard to the submission of the statement. (Added by Stats. 1993, Ch. 1037, Sec. 1. Effective January 1, 1994.)

44344.5. The operator of any new facility that previously has not been subject to this part shall prepare and submit an emissions inventory plan and report. (Added by Stats. 1993, Ch. 1037, Sec. 2. Effective January 1, 1994.)

44344.7. The operator of a facility exempted pursuant to subdivision (a) of Section 44344.3 shall submit an emissions inventory update for those sources and substances for which a change in activities or operations has occurred, as follows:

(a) The facility emits a newly listed substance.

(b) A sensitive receptor has been established or constructed on or after January 1, 1994, within 500 meters of the facility.

(c) The facility emits a substance for which the potency factor has increased.

(d) The facility has begun emission of a listed substance not included in the previous emissions inventory. (Added by Stats. 1993, Ch. 1037, Sec. 3. Effective January 1, 1994.)

44345. (a) On or before July 1, 1989, the state board shall develop a program to compile and make available to other state and local public agencies and the public all data collected pursuant to this chapter.

(b) In addition, the state board, on or before March 1, 1990, shall compile, by district, emissions inventory data for mobile sources and area sources not subject to district permit requirements, and data on natural source emissions, and shall incorporate these data into data compiled and released pursuant to this chapter. (Added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384.)

44346. (a) If an operator believes that any information required in the facility diagram specified pursuant to subdivision (b) of Section 44342 involves the release of a trade secret, the operator shall nevertheless make the disclosure to the district, and shall notify the district in writing of that belief in the report.

(b) Subject to this section, the district shall protect from disclosure any trade secret designated as such by the operator, if that trade secret is not a public record.

(c) Upon receipt of a request for the release of information to the public which includes information which the operator has notified the district is a trade secret and which is not a public record, the following procedure applies:

(1) The district shall notify the operator of the request in writing by certified mail, return receipt requested.

(2) The district shall release the information to the public, but not earlier than 30 days after the date of mailing the notice of the request for information, unless, prior to the expiration of the 30-day period, the operator obtains an action in an appropriate court for a declaratory judgment that the information is subject to protection under this section or for a preliminary injunction prohibiting disclosure of the information to the public and promptly notifies the district of that action.

(d) This section does not permit an operator to refuse to disclose the information required pursuant to this part to the district.

(e) Any information determined by a court to be a trade secret, and not a public record pursuant to this section, shall not be disclosed to anyone except an officer or employee of the district, the state, or the United States, in connection with the official duties of that officer or employee under any law for the protection of health, or to contractors with the district or the state and its employees if, in the opinion of the district or the state, disclosure is necessary and required for the satisfactory performance of a contract, for performance of work, or to protect the health and safety of the employees of the contractor.

(f) Any officer or employee of the district or former officer or employee who, by virtue of that employment or official position, has possession of, or has access to, any trade secret subject to this section, and who, knowing that disclosure of the information to the general public is prohibited by this section, knowingly and willfully discloses the information in any manner to any person not entitled to receive it is guilty of a misdemeanor. Any contractor of the district and any employee of the contractor, who has been furnished information as authorized by this section, shall be considered an employee of the district for purposes of this section.

(g) Information certified by appropriate officials of the United States as necessary to be kept secret for national defense purposes shall be accorded the full protections against disclosure as specified by those officials or in accordance with the laws of the United States

(h) As used in this section, "trade secret" and "public record" have the meanings and protections given to them by Section 6254.7 of the Government Code and Section 1060 of the Evidence Code. All information collected pursuant to this chapter, except for data used to calculate emissions data required in the facility diagram, shall be considered "air pollution emission data," for the purposes of this section. (Added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384.)

CHAPTER 4. RISK ASSESSMENT

(Chapter 4 added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384.)

44360. (a) Within 90 days of completion of the review of all emissions inventory data for facilities specified in subdivision (a) of Section 44322, but not later than December 1,1990, the district shall, based on examination of the emissions inventory data and in consultation with the state board and the State Department of Health Services, prioritize and then categorize those facilities for the purposes of health risk assessment. The district shall designate high, intermediate, and low priority categories and shall include each facility within the appropriate category based on its individual priority. In establishing priorities pursuant to this section, the district shall consider

the potency, toxicity, quantity, and volume of hazardous materials released from the facility, the proximity of the facility to potential receptors, including, but not limited to, hospitals, schools, day care centers, worksites, and residences, and any other factors that the district finds and determines may indicate that the facility may pose a significant risk to receptors. The district shall hold a public hearing prior to the final establishment of priorities and categories pursuant to this section.

(b) (1) Within 150 days of the designation of priorities and categories pursuant to subdivision (a), the operator of every facility that has been included within the highest priority category shall prepare and submit to the district a health risk assessment pursuant to Section 44361. The district may, at its discretion, grant a 30-day extension for submittal of the health risk assessment.

(2) Health risk assessments required by this chapter shall be prepared in accordance with guidelines established by the Office of Environmental Health Hazard Assessment. The office shall prepare draft guidelines which shall be circulated to the public and the regulated community and shall adopt risk assessment guidelines after consulting with the state board and the Risk Assessment Committee of the California Air Pollution Control Officers Association and after conducting at least two public workshops, one in the northern and one in the southern part of the state. The adoption of the guidelines is not subject to Chapter 3.5 (commencing with Section 11340) of Part 1 of Division 3 of Title 2 of the Government Code. The scientific review panel established pursuant to Section 39670 shall evaluate the guidelines adopted under this paragraph and shall recommend changes and additional criteria to reflect new scientific data or empirical studies.

(3) The guidelines established pursuant to paragraph (2) shall impose only those requirements on facilities subject to this subdivision that are necessary to ensure that a required risk assessment is accurate and complete and shall specify the type of site-specific factors that districts may take into account in determining when a single health risk assessment may be allowed under subdivision (d). The guidelines shall, in addition, allow the operator of a facility, at the operator's option, and to the extent that valid and reliable data are available, to include for consideration by the district in the health risk assessment any or all of the following supplemental information:

(A) Information concerning the scientific basis for selecting risk parameter values that are different than those required by the guidelines and the likelihood distributions that result when alternative values are used.

(B) Data from dispersion models, microenvironment characteristics, and population distributions that may be used to estimate maximum actual exposure.

(C) Risk expressions that show the likelihood that any given risk estimate is the correct risk value.

(D) A description of the incremental reductions in risk that occur when exposure is reduced.

(4) To ensure consistency in the use of the supplemental information authorized by subparagraphs (A), (B), (C),and (D) of paragraph (3),the guidelines established pursuant to paragraph (2) shall include guidance for use by the districts in considering the supplemental information when it is included in the health risk assessment.

(c) Upon submission of emissions inventory data for facilities specified in subdivisions (b) and (c) of Section 44322, the district shall designate facilities for inclusion within the highest priority category, as appropriate, and any facility so designated shall be subject to subdivision (b). In addition, the district may require the operator of any facility to prepare and submit health risk assessments, in accordance with the priorities developed pursuant to subdivision (a).

(d) The district shall, except where site specific factors may affect the results, allow the use of a single health risk assessment for two or more substantially identical facilities operated by the same person.

(e) Nothing contained in this section, Section 44380.5, or Chapter 6 (commencing with Section 44390) shall be interpreted as requiring a facility operator to prepare a new or revised health risk assessment using the guidelines established pursuant to paragraph (2) of subdivision (a) of this section if the facility operator is required by the district to begin the preparation of a health risk assessment before those guidelines are established. (Amended by Stats. 1992, Ch. 1162, Sec. 1. Effective January 1, 1993.)

44361. (a) Each health risk assessment shall be submitted to the district. The district shall make the health risk assessment available for public review, upon request. After preliminary review of the emissions impact and modeling data, the district shall submit the health risk assessment to the Office of Environmental Health Hazard Assessment for review and, within 180 days of receiving the health risk assessment, the office shall submit to the district its comments on the data and findings relating to health effects. The district shall consult with the state board as necessary to adequately evaluate the emissions impact and modeling data contained within the risk assessment.

(b) For the purposes of complying with this section, the Office of Environmental Health Hazard Assessment may select a qualified independent contractor to review the data and findings relating to health effects. The office shall not select an independent contractor to review a specific health risk assessment who may have a conflict of interest with regard to the review of that health risk assessment. Any review by an independent contractor shall comply with the following requirements:

(1) Be performed in a manner consistent with guidelines provided by the office.

(2) Be reviewed by the office for accuracy and completeness.

(3) Be submitted by the office to the district in accordance with this section.

(c) The district shall reimburse the Office of Environmental Health Hazard Assessment or the qualified independent contractor designated by the office pursuant to subdivision (b), within 45 days of its request, for its actual costs incurred in reviewing a health risk assessment pursuant to this section.

(d) If a district requests the Office of Environmental Health Hazard Assessment to consult with the district concerning any requirement of this part, the district shall reimburse the office, within 45 days of its request, for the costs incurred in the consultation.

(e) Upon designation of the high priority facilities, as specified in subdivision (a) of Section 44360, the Office of Environmental Health Hazard Assessment shall evaluate the staffing requirements of this section and may submit recommendations to the Legislature, as appropriate, concerning the maximum number of health risk assessments to be reviewed each year pursuant to this section. (Added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section

44384. Amended by Governor's Reorganization Plan No. 1 of 1991, §144.)

44362. (a) Taking the comments of the Office of Environmental Health Hazard Assessment into account, the district shall approve or return for revision and resubmission and then approve, the health risk assessment within 180 days of receipt. If the health risk assessment has not been revised and resubmitted within 60 days of the district's request of the operator to do so, the district may modify the health risk assessment and approve it as modified.

(b) Upon approval of the health risk assessment, the operator of the facility shall provide notice to all exposed persons regarding the results of the health risk assessment prepared pursuant to Section 44361 if, in the judgment of the district, the health risk assessment indicates there is a significant health risk associated with emissions from the facility. If notice is required under this subdivision, the notice shall include only information concerning significant health risks attributable to the specific facility for which the notice is required. Any notice shall be made in accordance with procedures specified by the district. (Added by Stats. 1981, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384. Amended by Governor's Reorganization Plan No. 1 of 1991, 145.)

44363. (a) Commencing July 1, 1991, each district shall prepare and publish an annual report which does all of the following:

(1) Describes the priorities and categories designated pursuant to Section 44360 and summarizes the results and progress of the health risk assessment program undertaken pursuant to this part.

(2) Ranks and identifies facilities according to the degree of cancer risk posed both to individuals and to the exposed population.

(3) Identifies facilities which expose individuals or populations to any noncancer health risks.

(4) Describes the status of the development of control measures to reduce emissions of toxic air contaminants, if any.

(b) The district shall disseminate the annual report to county boards of supervisors, city councils, and local health officers and the district board shall hold one or more public hearings to present the report and discuss its content and significance. (Added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384.)

44364. The state board shall utilize the reports and assessments developed pursuant to this part for the purposes of identifying, establishing priorities for, and controlling toxic air contaminants pursuant to Chapter 3.5 (commencing with Section 39650) of Part 2. (Added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384.)

44365. (a) If the state board finds and determines that a district's actions pursuant to this part do not meet the requirements of this part, the state board may exercise the authority of the district pursuant to this part to approve emissions inventory plans and require the preparation of health risk assessments.

(b) This part does not prevent any district from establishing more stringent criteria and requirements than are specified in this part for approval of emissions inventories and requiring the preparation and submission of health risk assessments. Nothing in this part limits the authority of a district under any other provision of law to assess and regulate releases of hazardous substances. (Added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384.)

44366. (a) In order to verify the accuracy of any information submitted by facilities pursuant to this part, a district or the state board may proceed in accordance with Section 41510. (Added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384.)

CHAPTER 5. FEES AND REGULATIONS

Chapter 5 added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 198-, pursuant to Section 44384.)

44380. (a) The state board shall adopt a regulation which does all of the following:

(1) Sets forth the amount of revenue which the district must collect to recover the reasonable anticipated cost which will be incurred by the state board and the Office of Environmental Health Hazard Assessment to implement and administer this part.

(2) Requires each district to adopt a fee schedule which recovers the costs of the district and which assesses a fee upon the operator of every facility subject to this part. A district may request the state board to adopt a fee schedule for the district if the district's program costs are approved by the district board and transmitted to the state board by April 1 of the year in which the request is made.

(3) Requires any district that has an approved toxics emissions inventory compiled pursuant to this part by August 1 of the preceding year to adopt a fee schedule, as described in paragraph (2), which imposes on facility operators fees which are, to the maximum extent practicable, proportionate to the extent of the releases identified in the toxics emissions inventory and the level of priority assigned to that source by the district pursuant to Section 44360.

(b) Commencing August 1, 1992, and annually thereafter, the state board shall review and may amend the fee regulation.

(c) The district shall notify each person who is subject to the fee of the obligation to pay the fee. If a person fails to pay the fee within 60 days after receipt of this notice, the district, unless otherwise provided by district rules, shall require the person to pay an additional administrative civil penalty. The district shall fix the penalty at not more than 100 percent of the assessed fee, but in an amount sufficient in its determination, to pay the district's additional expenses incurred by the person's noncompliance. If a person fails to pay the fee within 120 days after receipt of this notice, the district may initiate permit revocation proceedings. If any permit is revoked, it shall be reinstated only upon full payment of the overdue fee plus any late penalty, and a reinstatement fee to cover administrative costs of reinstating the permit.

(d) Each district shall collect the fees assessed pursuant to subdivision (a). After deducting the costs to the district to implement and administer this part, the district shall transmit the remainder to the Controller for deposit in the Air Toxics Inventory and Assessment Account, which is hereby created in the General Fund. The money in the account is available, upon appropriation by the Legislature, to the state board and the Office of Environmental Health Hazard Assessment for the purposes of administering this part. (Amended by Stats. 1992, Ch. 375, Sec. 1. Effective January 1, 1993.)

44380.1. A facility shall be granted an exemption by a district from paying a fee in accordance with Section 44380 if all of the following criteria are met:

(a) The facility primarily handles, processes, stores, or distributes bulk agricultural commodities or handles, feeds, or rears livestock.

(b) The facility was required to comply with this part only as a result of its particulate matter emissions.

(c) The fee schedule adopted by the district or the state board for these types of facilities is not solely based on toxic emissions weighted for potency or toxicity. (Added by Stats. 1993, Ch. 1037, Sec. 4. Effective January 1, 1994.)

44380.5. In addition to the fee assessed pursuant to Section 44380, a supplemental fee may be assessed by the district, the state board, or the Office of Environmental Health Hazard Assessment upon the operator of a facility that, at the operator's option, includes supplemental information authorized by paragraph (3) of subdivision (b) of Section 44360 in a health risk assessment, if the review of that supplemental information substantially increases the costs of reviewing the health risk assessment by the district, the state board, or the office. The supplemental fee shall be set by the state board in the regulation required by subdivision (a) of Section 44380 and shall be set in an amount sufficient to cover the direct costs to review the information supplied by an operator pursuant to paragraph (3) of subdivision (b) of Section 44360. (Added by Stats. 1992, Ch. 1162, Sec. 2. Effective January 1, 1993.)

44381. (a) Any person who fails to submit any information, reports, or statements required by this part, or who fails to comply with this part or with any permit, rule, regulation, or requirement issued or adopted pursuant to this part, is subject to a civil penalty of not less than five hundred dollars ($500) or more than ten thousand dollars ($10,000) for each day that the information, report, or statement is not submitted, or that the violation continues.

(b) Any person who knowingly submits any false statement or representation in any application, report, statement, or other document filed, maintained, or used for the purposes of compliance with this part is subject to a civil penalty of not less than one thousand dollars ($1,000) or more than twenty-five thousand dollars ($25,000) per day for each day that the information remains uncorrected. (Added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1988, pursuant to Section 44384.)

44382. Every district shall, by regulation, adopt the requirements of this part as a condition of every permit issued pursuant to Chapter 4 (commencing with Section 42300) of Part 4 for all new and modified facilities. (Added by Stats. 1987, Ch. 1252, Sec. 1. Operative July 1, 1988, pursuant to Section 44384.)

44384. Except for Section 44380 and this section, all provisions of this part shall become operative on July 1, 1988. (Added by Stats. 1987, Ch. 1252, Sec. 1. Operative January 1, 1988, by its own provisions.)

CHAPTER 6. FACILITY TOXIC AIR CONTAMINANT RISK REDUCTION AUDIT AND PLAN

(Chapter 6 added by Stats. 1992, Ch. 1162, Sec. 3. Effective January 1, 1993.)

44390. For purposes of this chapter, the following definitions apply:

(a) "Airborne toxic risk reduction measure" or "ATRRM" means those in-plant changes in production processes or feedstocks that reduce or eliminate toxic air emissions subject to this part. ATRRM's may include:

(1) Feedstock modification.

(2) Product reformulations.

(3) Production system modifications.

(4) System enclosure, emissions control, capture, or conversion.

(5) Operational standards and practices modification.

(b) Airborne toxic risk reduction measures do not include measures that will increase risk from exposure to the chemical in another media or that increase the risk to workers or consumers.

(c) "Airborne toxic risk reduction audit and plan'' or "audit and plan" means the audit and plan specified in Section 44392. (Added by Stats. 1992, Ch. 1162, Sec. 3. Effective January 1, 1993.)

44391. (a) Whenever a health risk assessment approved pursuant to Chapter 4 (commencing with Section 44360) indicates, in the judgment of the district, that there is a significant risk associated with the emissions from a facility, the facility operator shall conduct an airborne toxic risk reduction audit and develop a plan to implement airborne toxic risk reduction measures that will result in the reduction of emissions from the facility to a level below the significant risk level within five years of the date the plan is submitted to the district. The facility operator shall implement measures set forth in the plan in accordance with this chapter.

(b) The period to implement the plan required by subdivision (a) may be shortened by the district if it finds that it is technically feasible and economically practicable to implement the plan to reduce emissions below the significant risk level more quickly or if it finds that the emissions from the facility pose an unreasonable health risk.

(c) A district may lengthen the period to implement the plan required by subdivision (a) by up to an additional five years if it finds that a period longer than five years will not result in an unreasonable risk to public health and that requiring implementation of the plan within five years places an unreasonable economic burden on the facility operator or is not technically feasible.

(d) (1) The state board and districts shall provide assistance to smaller businesses that have inadequate technical and financial resources for obtaining information, assessing risk reduction methods, and developing and applying risk reduction techniques.

(2) Risk reduction audits and plans for any industry subject to this chapter which is comprised mainly of small businesses using substantially similar technology may be completed by a self-conducted audit and checklist developed by the state board. The state board, in coordination with the districts, shall provide a copy of the audit and checklist to small businesses

within those industries to assist them to meet the requirements of this chapter.

(e) The audit and plan shall contain all the information required by Section 44392.

(f) The plan shall be submitted to the district, within six months of a district's determination of significant risk, for review of completeness. Operators of facilities that have been notified prior to January 1, 1993, that there is a significant risk associated with emissions from the facility shall submit the plan by July 1, 1993. The district's review of completeness shall include a substantive analysis of the emission reduction measures included in the plan, and the ability of those measures to achieve emission reduction goals as quickly as feasible as provided in subdivisions (a) and (b).

(g) The district shall find the audit and plan to be satisfactory within three months if it meets the requirements of this chapter, including, but not limited to, subdivision (f) . If the district determines that the audit and plan does not meet those requirements, the district shall remand the audit and plan to the facility specifying the deficiencies identified by the district. A facility operator shall submit a revised audit and plan addressing the deficiencies identified by the district within 90 days of receipt of a deficiency notice.

(h) Progress on the emission reductions achieved by the plan shall be reported to the district in emissions inventory updates. Emissions inventory updates shall be prepared as required by the audit and plan found to be satisfactory by the district pursuant to subdivision (g).

(i) If new information becomes available after the initial risk reduction audit and plan, on air toxics risks posed by a facility, or emission reduction technologies that may be used by a facility that would significantly impact risks to exposed persons, the district may require the plan to be updated and resubmitted to the district.

(j) This section does not authorize the emission of a toxic air contaminant in violation of an airborne toxic control measure adopted pursuant to Chapter 3.5 (commencing with Section 39650) or in violation of Section 41700. (Amended by Stats. 1993, Ch. 1041, Sec. 2. Effective January 1, 1994.)

44392. A facility operator subject to this chapter shall conduct an airborne toxic risk reduction audit and develop a plan which shall include at a minimum all of the following:

(a) The name and location of the facility.

(b) The SIC code for the facility.

(c) The chemical name and the generic classification of the chemical.

(d) An evaluation of the ATRRM's available to the operator.

(e) The specification of, and rationale for, the ATRRMs that will be implemented by the operator. The audit and plan shall document the rationale for rejecting ATRRMs that are identified as infeasible or too costly.

(f) A schedule for implementing the ATRRMs. The schedule shall meet the time requirements of subdivision (a) of Section

44391 or the time period for implementing the plan set by the district pursuant to subdivision (b) or (c) of Section 44391, whichever is applicable.

(g) The audit and plan shall be reviewed and certified as meeting this chapter by an engineer who is registered as a professional engineer pursuant to Section 6762 of the Business and Professions Code, by an individual who is responsible for the processes and operations of the site, or by an environmental assessor registered pursuant to Section 25570.3. (Added by Stats. 1992, Ch. 1162, Sec. 3. Effective January 1, 1993.)

44393. The plan prepared pursuant to Section 44391 shall not be considered to be the equivalent of a pollution prevention program or a source reduction program, except insofar as the audit and plan elements are consistent with source reduction, as defined in Section 25244.14, or subsequent statutory definitions of pollution prevention. (Added by Stats. 1992, Ch. 1162, Sec. 3. Effective January 1, 1993.)

44394. Any facility operator who does not submit a complete airborne toxic risk reduction audit and plan or fails to implement the measures set forth in the plan as set forth in this chapter is subject to the civil penalty specified in subdivision (a) of Section 44381, and any facility operator who, in connection with the audit or plan, knowingly submits any false statement or representation is subject to the civil penalty specified in subdivision (b) of Section 44381. (Added by Stats. 1992, Ch. 1162, Sec. 3. Effective January 1, 1993.)

Appendix C
Substances for which emissions must be quantified

75070	Acetaldehyde
60355	Acetamide
67641	Acetone
75058	Acetonitrile
98862	Acetophenone
53963	2-Acetylaminofluorene [PAH-Derivative, POM]
107028	Acrolein
79061	Acrylamide
79107	Acrylic acid
107131	Acrylonitrile
107051	Allyl chloride
7429905	Aluminum
1344281	Aluminum oxide (fibrous forms)
117793	2-Aminoanthraquinone [PAH-Derivative, POM]
92671	4-Aminobiphenyl [POM]
61825	Amitrole
7664417	Ammonia
6484522	Ammonium nitrate
7783202	Ammonium sulfate
62533	Aniline
90040	o-Anisidine
	- Anthracene [PAH, POM], (see PAH)
7440360	Antimony
	* Antimony compounds including but not limited to:
1309644	-Antimony trioxide
7440382	Arsenic
1016	Arsenic compounds (inorganic) including but not limited to:
7784421	--Arsine
1017	Arsenic compounds (other than inorganic)
7440393	Barium
	• Barium compounds
	- Benz[a]anthracene [PAH, POM], (see PAH)
71432	Benzene
92875	Benzidine (and its salts) [POM]
1020	Benzidine-based dyes [POM] including but not limited to:
1937377	--Direct Black 38 [PAH-Derivative, POM]
2602462	--Direct Blue 6 [PAH-Derivative, POM]
16071866	--Direct Brown 95 (technical grade) [POM]
	Benzo[a]pyrene [PAH, POM], (see PAH)
	- Benzo[b]fluoranthene [PAH, POM], (see PAH)
271896	Benzofuran
98077	Benzoic trichloride Benzotrichloride}
	- Benzo[j]fluoranthene [PAH, POM], (see PAH)
	- Benzo[k]fluoranthene [PAH, POM], (see PAH)
98884	Benzoyl chloride
94360	Benzoyl peroxide
100447	Benzyl chloride
7440417	Beryllium
	• Beryllium compounds
92524	Biphenyl [POM]
111444	Bis(2-chloroethyl) ether DCEE}
542881	Bis(chloromethyl) ether
103231	Bis(2-ethylhexyl) adipate
7726956	Bromine
	* Bromine compounds (inorganic)including but not limited to:
7758012	--Potassium bromate
75252	Bromoform
106990	1,3-Butadiene
141322	Butyl acrylate
71363	n-Butyl alcohol
78922	sec-Butyl alcohol
75650	tert-Butyl alcohol
85687	Butyl benzyl phthalate
7440439	Cadmium
	* Cadmium compounds
156627	Calcium cyanamide
	Caprolactam
2425061	Captafol
133062	Captan
63252	Carbaryl [PAH-Derivative, POM]
1050	Carbon black extracts
75150	Carbon disulfide
56235	Carbon tetrachloride
463581	Carbonyl sulfide
1055	Carrageenan (degraded)
120809	Catechol
133904	Chloramben
56757	Chloramphenicol
57749	Chlordane
108171262	Chlorinated paraffins (average chain length, C12; approximately 60% chlorine by weight)
7782505	Chlorine
10049044	Chlorine dioxide
79118	Chloroacetic acid
532274	2-Chloroacetophenone
1058	Chlorobenzenes including but not limited to:
108907	--Chlorobenzene
25321226	--Dichlorobenzenes (mixed isomers)--including:
95501	-- 1,2-Dichlorobenzene
541731	-- 1,3-Dichlorobenzene
106467	-- p-Dichlorobenzene {1,4-Dichlorobenzene}
120821	--1,2,4-Trichlorobenzene
510156	Chlorobenzilate [POM] {Ethyl-4,4' -dichlorobenzilate}
13909096	1-(2-Chloroethyl)-3-(4-methylcyclohexyl)-1-nitrosourea {Methyl CCNU}
67663	Chloroform
107302	Chloromethyl methyl ether (technical grade)
1060	Chlorophenols including but not limited to:
120832	--2,4-Dichlorophenol
87865	--Pentachlorophenol
95954	--2,4,5-Trichlorophenol
88062	--2,4,6-Trichlorophenol
95830	4-Chloro-o-phenylenediamine
76062	Chloropicrin
126998	Chloroprene
95692	p-Chloro-o-toluidine
7440473	Chromium
	• Chromium compounds (other than hexavalent)
18540299	Chromium, hexavalent (and compounds) including but not limited to:
10294403	--Barium chromate
13765190	--Calcium chromate
1333820	--Chromium trioxide

7758976	--Lead chromate
10588019	--Sodium dichromate
7789062	--Strontium chromate
	- Chrysene [PAH, POM], (see PAH)
7440484	Cobalt
	* Cobalt compounds
1066	Coke oven emissions
7440508	Copper
	* Copper compounds
1070	Creosotes
120718	p-Cresidine
1319773	Cresols (mixtures of) {Cresylic acid} including:
108394	--m-Cresol
95487	--o-Cresol
106445	--p-Cresol
98828	Cumene
80159	Cumene hydroperoxide
135206	Cupferron
1073	Cyanide compounds including but not limited to:
74908	--Hydrocyanic acid
110827	Cyclohexane
66819	Cycloheximide
1163195	Decabromodiphenyl oxide [POM]
1075	Dialkylnitrosamines including but not limited to:
924163	--N-Nitrosodi-n-butylamine
1116547	--N-Nitrosodiethanolamine
55185	--N-Nitrosodiethylamine
62759	--N-Nitrosodimethylamine
621647	--N-Nitrosodi-n-propylamine
10595956	--N-Nitrosomethylethylamine
615054	2,4-Diaminoanisole
1078	Diaminotoluenes (mixed isomers) including but not limited to:
95807	--2,4-Diaminotoluene {2,4-Toluenediamine}
334883	Diazomethane
226368	Dibenz[a,h]acridine [POM]
224420	Dibenz[a,j]acridine [POM]
	- Dibenz[a,h]anthracene [PAH, POM], (see PAH)
194592	7H-Dibenzo[c,g]carbazole
	- Dibenzo[a,e]pyrene [PAH, POM], (see PAH)
	- Dibenzo[a,h]pyrene [PAH, POM], (see PAH)
	- Dibenzo[a,i]pyrene [PAH, POM], (see PAH)
	- Dibenzo[a,l]pyrene [PAH, POM], (see PAH)
132649	Dibenzofuran [POM]
	- Dibenzofurans (chlorinated) (see Polychlorinated dibenzofurans) [POM]
96128	1,2-Dibromo-3-chloropropane {DBCP}
84742	Dibutyl phthalate
	- p-Dichlorobenzene {1,4-Dichlorobenzene} (see Chlorobenzenes)
91941	3,3'-Dichlorobenzidine [POM]
72559	Dichlorodiphenyldichloroethylene {DDE} [POM]
75343	1,1-Dichloroethane {Ethylidene dichloride}
94757	Dichlorophenoxyacetic acid, salts and esters {2,4-D}
78875	1,2-Dichloropropane {Propylene dichloride}
542756	1,3-Dichloropropene
62737	Dichlorovos {DDVP}
115322	Dicofol [POM]
	- - Diesel engine exhaust
9901	--Diesel engine exhaust, particulate matter
9902	--Diesel engine exhaust, total organic gas
	# Diesel fuel (marine)
111422	Diethanolamine
117817	Di(2-ethylhexyl) phthalate {DEHP}
64675	Diethyl sulfate
119904	3,3'-Dimethoxybenzidine [POM]
60117	4-Dimethylaminoazobenzene [POM]
121697	N,N-Dimethylaniline
57976	7,12-Dimethylbenz[a]anthracene [PAH-Derivative, POM]
119937	3,3'-Dimethylbenzidine {o-Tolidine} [POM]
79447	Dimethyl carbamoyl chloride
68122	Dimethyl formamide
57147	1,1-Dimethylhydrazine
131113	Dimethyl phthalate
77781	Dimethyl sulfate
534521	4,6-Dinitro-o-cresol (and salts)
51285	2,4-Dinitrophenol
42397648	1,6-Dinitropyrene [PAH-Derivative, POM]
42397659	1,8-Dinitropyrene [PAH-Derivative, POM]
25321146	Dinitrotoluenes (mixed isomers) including but not limited to:
121142	--2,4-Dinitrotoluene
606202	--2,6-Dinitrotoluene
123911	1,4-Dioxane
	- Dioxins {Chlorinated dibenzodioxins} (see Polychlorinated dibenzo-p-dioxins) [POM]
630933	Diphenylhydantoin [POM]
122667	1,2-Diphenylhydrazine {Hydrazobenzene} [POM]
1090	Environmental Tobacco Smoke
106898	Epichlorohydrin
106887	1,2-Epoxybutane
1091	Epoxy resins
140885	Ethyl acrylate
100414	Ethyl benzene
75003	Ethyl chloride {Chloroethane}
	- Ethyl-4,4'-dichlorobenzilate (see Chlorobenzilate)
74851	Ethylene
106934	Ethylene dibromide {1,2-Dibromoethane}
107062	Ethylene dichloride {1,2-Dichloroethane}
107211	Ethylene glycol
151564	Ethyleneimine {Aziridine}
75218	Ethylene oxide
96457	Ethylene thiourea
1101	Fluorides and compounds including but not limited to:
7664393	--Hydrogen fluoride

1103	Fluorocarbons (brominated)
1104	Fluorocarbons (chlorinated) including but not limited to:
76131	--Chlorinated fluorocarbon (CFC-113)
50000	Formaldehyde - - Gasoline engine exhaust including but not limited to:- - Gasoline engine exhaust (condensates & extracts)
9910	--Gasoline engine exhaust, particulate matter
9911	--Gasoline engine exhaust, total organic gas
1110	Gasoline vapors
111308	Glutaraldehyde
1115	Glycol ethers and their acetates including but not limited to:
111466	--Diethylene glycol
111966	--Diethylene glycol dimethyl ether
112345	--Diethylene glycol monobutyl ether
111900	--Diethylene glycol monoethyl ether
111773	--Diethylene glycol monomethyl ether
25265718	--Dipropylene glycol
34590948	--Dipropylene glycol monomethyl ether
629141	--Ethylene glycol diethyl ether
110714	--Ethylene glycol dimethyl ether
111762	--Ethylene glycol monobutyl ether
110805	--Ethylene glycol monoethyl ether
111159	--Ethylene glycol monoethyl ether acetate
109864	--Ethylene glycol monomethyl ether
110496	--Ethylene glycol monomethyl ether acetate
2807309	--Ethylene glycol monopropyl ether
107982	--Propylene glycol monomethyl ether
108656	--Propylene glycol monomethyl ether acetate
112492	--Triethylene glycol dimethyl ether
126078	Griseofulvin
76448	Heptachlor
118741	Hexachlorobenzene
87683	Hexachlorobutadiene
1120	Hexachlorocyclohexanes including but not limited to:
58899	--Lindane
77474	Hexachlorocyclopentadiene
67721	Hexachloroethane
680319	Hexamethylphosphoramide
110543	Hexane
302012	Hydrazine
7647010	Hydrochloric acid-Hydrocyanic acid (see Cyanide compounds)
7783064	Hydrogen sulfide
123319	Hydroquinone - Indeno[1,2,3-cd]pyrene [PAH, POM], (see PAH)
1125	Isocyanates including but not limited to:
822060	--Hexamethylene-1,6-diisocyanate
101688	--Methylene diphenyl diisocyanate (MDI) [POM]
62483	--Methyl isocyanate- Toluene-2,4-diisocyanate(see Toluene diisocyanates)- -- Toluene-2,6-diisocyanate (see Toluene diisocyanates)
78591	Isophorone sopropyl alcohol
80057	4,4'-Isopropylidenediphenol [POM]
7439921	Lead
1128	Lead compounds (inorganic) including but not limited to:
301042	--Lead acetate - --Lead chromate (see Chromium, hexavalent)
7446277	--Lead phosphate 1335326 --Lead subacetate
1129	Lead compounds (other than inorganic)
108316	Maleic anhydride
7439965	Manganese* Manganese compounds
7439976	Mercury • Mercury compounds including but not limited to:
7487947	--Mercuric chloride
593748	--Methyl mercury (Dimethylmercury)
67561	Methanol
72435	Methoxychlor [POM]
75558	2-Methylaziridine (1,2-Propyleneimine)
74839	Methyl bromide (Bromomethane)
74873	Methyl chloride (Chloromethane)
71556	Methyl chloroform (1,1,1-Trichloroethane)
56495	3-Methylcholanthrene [PAH-Derivative, POM]
3697243	5-Methylchrysene [PAH-Derivative, POM]
101144	4,4'-Methylene bis(2-chloroaniline) (MOCA) [POM]
75092	Methylene chloride (Dichloromethane)
101779	4,4'-Methylenedianiline (and its dichloride) [POM]
78933	Methyl ethyl ketone (2-Butanone)
60344	Methyl hydrazine
74884	Methyl iodide (Iodomethane)
108101	Methyl isobutyl ketone (Hexone)
80626	Methyl methacrylate
1634044	Methyl tert-butyl ether
443481	Metronidazole
90948	Michler's ketone [POM]
1136	Mineral fibers (fine, manmade) --(fine mineral fibers which are manmade and are--airborne particles of a respirable size greater--than 5 microns in length, less than or equal to--3.5 microns in diameter, with a length to--diameter

	ratio of 3:1) including but not limited to:
1056	--Ceramic fibers
1111	--Glasswool fibers
1168	--Rockwool fibers
1181	--Slagwool fibers
1135	Mineral fibers (other than manmade) including but not limited to:
1332214	--Asbestos
12510428	--Erionite
1190	--Talc containing asbestiform fibers
1313275	Molybdenum trioxide - - Naphthalene [PAH, POM], (see PAH)
7440020	Nickel * Nickel compounds including but not limited to:
373024	--Nickel acetate
3333393	--Nickel carbonate
13463393	--Nickel carbonyl
12054487	--Nickel hydroxide
1271289	--Nickelocene
1313991	--Nickel oxide
12035722	--Nickel subsulfide
1146	Nickel refinery dust from the pyrometallurgical process
61574	Niridazole
7697372	Nitric acid
139139	Nitrilotriacetic acid
98953	Nitrobenzene
92933	4-Nitrobiphenyl [POM]
7496028	6-Nitrochrysene [PAH-Derivative, POM]
607578	2-Nitrofluorene [PAH-Derivative, POM]
302705	Nitrogen mustard N-oxide
100027	4-Nitrophenol
79469	2-Nitropropane
5522430	1-Nitropyrene [PAH-Derivative, POM]
156105	p-Nitrosodiphenylamine [POM]
684935	N-Nitroso-N-methylurea
59892	N-Nitrosomorpholine
100754	N-Nitrosopiperidine
930552	N-Nitrosopyrrolidine - - PAHs (Polycyclic aromatic hydrocarbons) [POM] including but not limited to:
1151	-PAHs, total, w/o individ. components reported
1150	-PAHs, total, with individ. components also --reported
120127	--Anthracene
56553	--Benz[a]anthracene
50328	--Benzo[a]pyrene
205992	--Benzo[b]fluoranthene
205823	--Benzo[j]fluoranthene
207089	--Benzo[k]fluoranthene
218019	--Chrysene
53703	--Dibenz[a,h]anthracene
192654	--Dibenzo[a,e]pyrene
189640	--Dibenzo[a,h]pyrene
189559	--Dibenzo[a,i]pyrene
191300	--Dibenzo[a,l]pyrene
193395	--Indeno[1,2,3-cd]pyrene
91203	--Naphthalene # PAH-Derivatives (Polycyclic aromatic hydrocarbon derivatives) [POM]--(including but not limited to those substances--listed in Appendix A with the bracketed--designation [PAH-Derivative, POM])
56382	Parathion
1336363	PCBs (Polychlorinated biphenyls) [POM]
82688	Pentachloronitrobenzene (Quintobenzene)
79210	Peracetic acid
127184	Perchloroethylene (Tetrachloroethane)
50066	Phenobarbital
108952	Phenol
06503	p-Phenylenediamine
90437	2-Phenylphenol [POM]
75445	Phosgene
7723140	Phosphorus - - Phosphorus compounds:
7803512	--Phosphine
7664382	--Phosphoric acid
10025873	--Phosphorus oxychloride
10026138	--Phosphorus pentachloride
1314563	--Phosphorus pentoxide
7719122	--Phosphorus trichloride
126738	--Tributyl phosphate
78400	--Triethyl phosphine
512561	--Trimethyl phosphate
78308	--Triorthocresyl phosphate [POM]
115866	--Triphenyl phosphate [POM]
101020	--Triphenyl phosphite [POM]
85449	Phthalic anhydride - - Polychlorinated dibenzo-p-dioxins (PCDDs or Dioxins) [POM] including but not limited to:
1086	-Dioxins, total, wo -- individ. isomers reported --(PCDDs)
1085	-Dioxins, total, with individ. isomers also -- reported (PCDDs)
1746016	--2,3,7,8-Tetrachlorodibenzo-p-dioxin (TCDD) [POM]
40321764	--1,2,3,7,8-Pentachlorodibenzo-p-dioxin [POM]
39227286	--1,2,3,4,7,8-Hexachlorodibenzo-p-dioxin [POM]
57653857	--1,2,3,6,7,8-Hexachlorodibenzo-p-dioxin [POM]
19408743	--1,2,3,7,8,9-Hexachlorodibenzo-p-dioxin [POM]
35822469	--1,2,3,4,6,7,8-Heptachlorodibenzo-p-dioxin [POM] - - Polychlorinated dibenzofurans (PCDFs or Dibenzofurans) [POM] including but not limited to:
1080	-Dibenzofurans (Polychlorinated dibenzofurans) --(PCDFs) [POM]
51207319	--2,3,7,8-Tetrachlorodibenzofuran [POM]
57117416	--1,2,3,7,8-Pentachlorodibenzofuran [POM]
57117314	--2,3,4,7,80-Pentachlorodibenzofuran [POM]

70648269	--1,2,3,4,7,8-Hexachlorodibenzofuran [POM]
57117449	--1,2,3,6,7,8-Hexachlorodibenzofuran [POM]
72918219	--1,2,3,7,8,9-Hexachlorodibenzofuran [POM]
60851345	--2,3,4,6,7,8-Hexachlorodibenzofuran [POM]
67562394	--1,2,3,4,6,7,8-Heptachlorodibenzofuran [POM]
55673897	--1,2,3,4,7,8,9-Heptachlorodibenzofuran [POM]
# POM	(Polycyclic organic matter)--(including but not limited to those substances--listed in Appendix A with the bracketed--designation of [POM], [PAH, POM], or--[PAH-Derivative, POM])
57830	Progesterone
1120714	1,3-Propane sultone
57578	beta-Propiolactone
123386	Propionaldehyde
114261	Propoxur (Baygon)
115071	Propylene
75569	Propylene oxide - 1,2-Propyleneimine (see 2-Methylaziridine).
110861	Pyridine
91225	Quinoline
106514	Quinone
1165	Radionuclides including but not limited to:
24267569	--Iodine-131
1166	--Radon and its decay products
0555	eserpine [POM]
#	Residual (heavy) fuel oils
7782492	Selenium
*	Selenium compounds including but not limited to:
7446346	--Selenium sulfide
1175	Silica, crystalline
7440224	Silver
*	Silver compounds
1310732	Sodium hydroxide
100425	Styrene
96093	Styrene oxide
7664939	Sulfuric acid
100210	Terephthalic acid
79345	1,1,2,2-Tetrachloroethane
7440280	Thallium
*	Thallium compounds
62555	Thioacetamide
62566	Thiourea
7550450	Titanium tetrachloride
108883	Toluene - 2,4-Toluenediamine (see 2,4-Diaminotoluene)
1204	Toluene diisocyanates including but not limited to:
584849	--Toluene-2,4-diisocyanate
91087	--Toluene-2,6-diisocyanate
95534	o-Toluidine
8001352	Toxaphene {Polychlorinated camphenes}
79005	1,1,2-Trichloroethane {Vinyl trichloride} - 1,1,1-Trichloroethane (see Methyl chloroform)
79016	Trichloroethylene - 2,4,6-Trichlorophenol (see Chlorophenols)
121448	Triethylamine
1582098	Trifluralin
95636	1,2,4-Trimethylbenzene
540841	2,2,4-Trimethylpentane
51796	Urethane {Ethyl carbamate}
7440622	Vanadium (fume or dust)
108054	Vinyl acetate
593602	Vinyl bromide
75014	Vinyl chloride
75354	Vinylidene chloride
1206	Wood preservatives (containing arsenic and chromate)
1210	Xylenes (mixed xylenes) including:
108383	--m-Xylene
95476	--o-Xylene
106423	--p-Xylene
7440666	Zinc
•	Zinc compounds including but not limited to:
1314132	--Zinc oxide

Appendix D

Sample Hazard Index Calculation

The example in Tables D-1, D-2, and D-3 illustrate the approach for calculating an acute hazard index as described in Section VII of these guidelines. The examples provided are for a hypothetical facility that emits hydrogen cyanide, benzene, and 1,4-dioxane.

Calculations

Table D-1 includes the estimated maximum one hour concentrations of hydrogen cyanide, benzene, and 1,4-dioxane at the maximum impacted offsite location at an existing receptor. It is assumed that the maximum one hour concentrations that are reported in Table D-1 for hydrogen cyanide, benzene, and 1,4-dioxane are based on dispersion modeling. Table D-1 also includes the background concentrations of criteria pollutants with acute RELs (i.e., nitrogen dioxide, sulfur dioxide, sulfates, hydrogen sulfide and ozone). The background concentrations (i.e., annual average concentrations) of the criteria pollutants are based on ambient monitoring results for the monitoring station that best represents the facility. The acute RELs presented in Table D-1 are from Table 1 of these guidelines.

Table D-2 uses the information presented in Table D-1 to present the hazard quotient (i.e., the maximum one hour concentration divided by the applicable acute REL) for the substances emitted by the hypothetical facility.

Table D-3 uses the information presented in Table D-2 as well as the acute toxicological endpoint information presented in Table 2 of these guidelines to calculate the hazard index.

Results

Based on the results in Table D-2, an acute hazard quotient of one is not equaled or exceeded for any individual substance. However, Table D-3 shows that an acute hazard index of one is exceeded for respiratory effects. In the case of respiratory effects, the background concentrations of the criteria pollutants are significantly contributing to the exceedance of one. However, respiratory effects of benzene, 1,4-dioxane were not accounted for. The effects of nitrogen dioxide, ozone and sulfates have not been accounted for in the HI for immunological responses. The effects of benzene, hydrogen cyanide, nitrogen dioxide, ozone, sulfates, and sulfur dioxide were not accounted for in the HI for eye irritation.

Table D-1

Concentration at the Maximum Impacted Offsite Location Where an Existing Receptor is Located

Substance	Maximum One Hour Concentration $\mu g/m^3$	Acute REL $\mu g/m^3$
Hydrogen cyanide	11	34
Benzene	500	780
1,4-Dioxane	900	1800
Background Concentrations[a] Criteria Pollutants:		
Ozone	25	180
Nitrogen Dioxide	50	470
Sulfur Dioxide	150	660
Sulfates	24	120
Hydrogen Sulfide	0	42

a - The concentrations reported for the criteria pollutants with acute RELs.

Table D-2

Calculation of Hazard Quotient

Substances	One Hour Maximum Concentration/ Acute REL
Hydrogen cyanide	0.33
Benzene	0.70
1,4-Dioxane	0.50
Criteria Pollutants	
Lead	0
Ozone	0.14
Nitrogen Dioxide	0.11
Sulfur Dioxide	0.23
Sulfates	0.20
Hydrogen Sulfide	0

Table D-3

Calculation of Acute Hazard Quotients and Hazard Index

Substance	Toxicological Endpoints [a,b]								
	CV/BL	CNS/PNS	IMMUN	KIDN	GI/LV	REPRO	RESP	SKIN	EYE
Benzene			0.7				yes[c]		yes
1,4-Dioxane							yes		0.5
Hydrogen cyanide		0.33					0.33		yes
Criteria Pollutants:									
Hydrogen sulfide									
Lead/lead compounds									
Nitrogen dioxide			yes				0.11		yes
Ozone			yes				0.14		yes
Sulfates			yes				0.20		yes
Sulfur dioxide							0.23		yes
Hazard Index		0.33	0.7				1.01[d]		0.5

a- Refers to primary target system(s) of concern for each chemical. CV/BL - cardiovascular or blood system; CNS/PNS - central or peripheral nervous system; IMMUN - immune system; KIDN - kidney; GI/LV - gastrointestinal system or liver; RESP - respiratory system; REPRO - reproductive system including teratogenic and developmental effects; SKIN - skin irritation or other effects; EYE - eye irritation.

b- Hazard quotients and hazard indices should be calculated for each specified toxicological endpoint and should include all emitted chemicals that impact that endpoint. Each value reported is the ratio of the maximum one hour concentration over the acute REL and represents the hazard quotient or hazard index. The acute RELs are provided in Table 1 along with the acute toxicological endpoints.

c- The Hazard Index for immunotoxicity and respiratory effects equals or exceeds 0.5. However, the reference exposure level is developed for a much more sensitive toxic endpoint. Hence, the chemicals are not included in the hazard index calculation.

d- Hazard index for specific toxicological endpoint exceeds one.