South Coast Air Quality Management District

RISK ASSESSMENT PROCEDURES for Rules 1401, 1401.1 and 212

Version 8.0

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INTRODUCTION

Risk assessment procedures, including procedures for a simple risk screening, were originally developed by South Coast Air Quality Management District (SCAQMD) staff for the adoption of Rule 1401 - New Source Review of Toxic Air Contaminants, in June 1990. Since that time, this document has been revised several times to reflect updated risk assessment methodologies. This current version 8.0 has been updated to provide District specific guidance consistent with the OEHHA's 2015 revision to its Health Risk Assessment Guidance.

The purpose of this document is to:

- assist applicants and engineers to evaluate Rule 1401 and 1401.1 compliance;
- provide explanations and sample risk calculations; and
- provide industry worksheets.

This document describes the procedures for preparing risk assessments under Rule 1401 and Rule 212 – Standards for Approving Permits and Issuing Public Notice. It also applies to Rule 1401.1 for sources located near schools. It is intended to be a "living" document. That is, as new toxic air contaminants (TACs) are added, risk values changed, or procedures revised, the document will be updated. This version of "Risk Assessment Procedures for Rules 1401, 1401.1 and 212" is based on "The Air Toxics Hot Spots Program Guidance Manual for the Preparation of Health Risk Assessments" ("Guidance Manual") prepared by the state Office of Environmental Health Hazard Assessment (OEHHA) and approved on March 6, 2015. The Guidance Manual may be found at: http://oehha.ca.gov/air/hot_spots/2015/2015GuidanceManual.pdf. The 2015 Guidance Manual supersedes OEHHA'S 2003 version of its Guidance Manual. Past procedures will be archived and TAC toxicity criteria have been separated by the time period of significant Rule 1401 changes (see attachments). The revised OEHHA Guidance Manual incorporates age sensitivity factors which will increase cancer risk estimates to residential and sensitive receptors by approximately 3 times, and more than 3 times in some cases depending on whether the toxic air contaminant has multiple pathways of exposure in addition to inhalation. Under the revised OEHHA Guidance Manual, even though the toxic emissions from a facility have not increased, the estimated cancer risk to a residential receptor will increase. Cancer risks for off-site worker receptors are similar between the existing and revised methodology because the methodology for adulthood exposures remains relatively unchanged.

Background

There are four steps involved in the risk assessment process; 1) hazard identification, 2) exposure assessment, 3) dose-response assessment, and 4) risk characterization. Each step is briefly discussed below.

Hazard Identification

For air toxics sources, hazard identification involves determining the type of adverse health effect associated with exposure of the pollutant of concern emitted by a facility, including whether a pollutant is considered human carcinogen or a potential human carcinogen.

Exposure Assessment

The purpose of exposure assessment is to estimate the extent of public exposure to emitted substances for potential cancer, noncancer health hazards for chronic and acute, and repeated 8-hour exposures. This involves estimation of long-term (annual), short-term (1-hour maximum), and 8-hour average exposure levels.

Dose-Response Assessment

Dose-response assessment is the process of characterizing the relationship between exposure to a chemical by its modeled concentration. Dose can be calculated as follows:

Dose = Concentration x Exposure

Risk Characterization

This is the final step of the risk assessment in which the information from exposure assessment and dose-response assessment are combined to assess total risk to the surrounding community.

SCAQMD Rule 1401 History

Rule 1401, adopted June 1, 1990 and amended December 7, 1990, specified limits for maximum individual cancer risk (MICR) and excess cancer cases for new, relocated, or modified equipment which emits carcinogenic air contaminants. The rule was amended July 10, 1998 to include non-carcinogenic compounds. The rule was amended on March 17, 2000 to remove the requirement to assess cumulative risk from emissions from units permitted after 1990 located within 100 meters of the new equipment under evaluation for permit. And, the rule has been amended several times to change the list of regulated compounds (both additions and deletions) and their corresponding risk values (cancer potency factors and reference exposure levels).

Requirements

This document describes the procedures for determining cancer and non-cancer health effects for equipment subject to Rules 1401, 1401.1, and 212.

In general, these rules apply only if there is an increase in TAC emissions from new, relocated, or modified equipment. Details regarding applicability of these rules to facilities or equipment can be found within the rules themselves at: http://www.aqmd.gov/home/regulations/rules/proposed-rules#1401

Under Rule 1401, the following requirements must be met before a permit is granted for affected equipment.

- The cumulative increase from all TACs emitted from a single piece of equipment in maximum individual cancer risk (MICR) shall not exceed:

- one in one million (1×10^{-6}) if Best Available Control Technology for Toxics (T-BACT) is not used; or,
- ten in one million (10×10^{-6}) if T-BACT is used;

- The cumulative cancer burden from all TACs emitted from a single piece of equipment (increase in cancer cases in the population) shall not exceed 0.5; and,

- Neither the chronic hazard index (HIC), the 8-hour chronic hazard index (HIC8), nor the total acute hazard index (HIA) from all TACs emitted from a single piece of equipment shall exceed 1.0 for any target organ system, or an alternate hazard index level deemed to be safe.

Rule 1401.1 is designed to be more health protective for school children than Rule 1401 by establishing more stringent risk requirements related to facility-wide cancer risk and non-cancer acute and chronic HI for new and relocated facilities emitting toxic air contaminants near schools, thereby reducing the exposure of toxic emissions to school children. For new facilities, the rule requires the facility-wide cancer risk to be less than one in one million at any school or school under construction within 500 feet of the facility. If there are no schools within 500 feet, the same risk levels must be met at any school or school under construction within 500 to 1,000 feet unless there is a residential or sensitive receptor within 150 feet of the facility. For relocating facilities, the facility must demonstrate, for each school or school under construction within 500 feet of the facility, that either: 1) the risk at the school from the facility in its new location is no greater than the risk at that same school when the facility was at its previous location, or 2) the facility-wide cancer risk at the school does not exceed one in one million. Unlike other SCAQMD risk-based rules, the required risk thresholds of Rule 1401.1 do not change based on whether or not the source is equipped with T-BACT.

Rule 212 also applies to Rule 1401 exempt sources. Rule 212 (c)(3) requires public notification if the MICR, based on Rule 1401 risk assessment procedures, exceeds one in one million (1×10^{-6}), due to a project's proposed construction, modification, or relocation for facilities with more than one permitted equipment unless the applicant can show the total facility-wide MICR is below ten in a million (10×10^{-6}). For facilities with a single permitted piece of equipment, the MICR level must not exceed ten in a million (10×10^{-6}). The circulation and distribution of the notifications must meet the criteria in Rule 212.

Revisions

The major revisions to this document include incorporation of updated risk assessment methodologies pursuant to OEHHA's 2015 update of its Guidance Manual. These include:

- Increased risk to children from cancer causing substances;
- Higher breathing rates for children;
- Lower exposure durations for residents and workers;
- Different multipathway calculation methodologies and factor;
- Incorporation of AERMOD air dispersion model into HARP2 in place of the previously used ISCST3 model in HARP;
- Inclusion of the 8-hr chronic non-cancer risk estimate;

- Calculation of risk in individual age bins (e.g., third trimester, 0-2 years, etc.) rather than a single lifetime calculation;
- Removal of meteorological correction factors in favor of more precise dispersion factors provided for each meteorological station; and
- Inclusion of a short-term (i.e., 9-years) exposure risk calculation for permits that include a 'sunset' condition.

These items are described in greater detail in the following chapters. The first three come from the recent revisions to OEHHA's Guidance Manual. The last one is unique to the SCAQMD and these procedures.

OVERVIEW

This document provides several tiers for preparing a risk assessment, from a quick look-up table to a detailed risk assessment involving air quality dispersion modeling analysis. Permit applicants may use any of these tiers to demonstrate compliance with the risk limits of Rule 1401. The applicant should include a copy of the risk assessment with the permit application.

The tiers are designed to be used in order of increasing complexity with each higher tier providing a more refined estimate of risk than the lower tier. If compliance cannot be demonstrated using one tier, the permit applicant may proceed to the next tier. A permit applicant who can show compliance by using a lower tier does not need to perform an analysis for the higher tiers. In general, for most permits a detailed analysis is not required. The tiers are:

- Tier 1: Screening Emission Levels
- Tier 2: Screening Risk Assessment
- Tier 3: Screening Dispersion Modeling
- Tier 4: Detailed Risk Assessment

Please note that the OEHHA Guidance Manual "Tier" approach differs from these SCAQMD Risk Procedures "Tier" compliance. The OEHHA Tiers refer to the incorporation of stochastic modeling for the facility and population specific exposure parameters. In contrast, the SCAQMD Tiers refer to increasing complexity for deriving pollutant concentrations based on facility emissions. Regulatory compliance may be demonstrated with any SCAQMD Tier.

In addition, this document briefly discusses the Best Available Control Technology for Toxics (T-BACT) identification process for Rule 1401.

PRELIMINARY TASKS

Before conducting any of these risk assessment tiers, three preliminary tasks must be performed:

1. **Determine if the permitting action or equipment is exempt from the provisions of Rule 1401.** Exemptions are granted for:

   * permit renewal or change of ownership;
   * modifications with no increase in risk;
   * functionally identical equipment replacement;
   * equipment previously exempt under Rule 219 and filing for a permit to operate within one year of removing the Rule 219 exemption;
   * modifications to terminate research projects;
   * emergency internal combustion engines (ICEs) exempt under Rule 1304.

   An additional exemption is granted for demonstrations of contemporaneous emission reductions such that no receptor experiences a total increase in MICR of greater than one in one million and the contemporaneous reduction occurs within 100 meters of the equipment.

If the equipment falls under one of these exemptions, no further risk assessment is required.

2. **Identify the toxic air contaminants (TAC) emitted by the permit unit**. The risk assessment must include those TACs emitted by the permit unit which were listed in the rule when the permit application was deemed complete by SCAQMD staff. Sets of tables corresponding to each rule revision are included at the end of this document as attachments (i.e. Attachment L, M, etc.). Determine the date on which the application was deemed complete and refer to the appropriate attachments. The first table in the attachment lists the TACs subject to Rules 1401, 1401.1 and Rule 212.

   For guidance, California Air Resources Board (CARB) has prepared a table listing devices and processes as they relate to the types of emissions and the specific contaminants emitted. This table is available on the CARB webpage at: www.arb.ca.gov/ab2588/ab2588.htm. Click on "Inventory Guidelines", and then on "Appendix C - Facility Guideline Index." Please note that this table is not an exhaustive list. Facilities are, therefore, advised to use this table for guidance only.

   Default toxic emission factors for TACs associated with combustion equipment have been developed for use in the AB2588 Program and are available on the SCAQMD webpage at: http://www.aqmd.gov/docs/default-source/permitting/toxics-emission-factors-from-combustion-process-.pdf. If better source specific data such as SCAQMD approved source tests, manufacturer's data, or fuel analysis is available, it should be used rather than the default emission factors.

   If no TACs listed in the applicable version of Rule 1401 are emitted by the equipment, no further risk assessment is required.

3. **Estimate the quantity of emissions from the permit unit.** The appropriate emission estimation technique depends on the type of source. Techniques include emission testing, a mass balance or other engineering calculation, or emission factors for specific types of processes. The emissions used for the risk calculation should be post-control emissions (that is, reductions in emissions due to enforceable controls and permit conditions should be taken into account). SCAQMD permitting staff should be consulted regarding approved techniques for identifying contaminants and estimating emissions for specific sources.

   The SCAQMD also has a broader mandate to ensure that permits are not granted to facilities which may endanger public health (California Health and Safety Code Section 41700). In addition, under Rule 212, the applicant may be required to evaluate other compounds that are determined to be potentially toxic. Therefore, an applicant may be required to evaluate risks from compounds not listed in the attachment as part of the permitting process if they are a concern for a specific source. These may include substances with irritant effects or other adverse health effects.

Tier 1: Screening Emission Levels

OVERVIEW OF TIER 1

Tier 1 involves a simple look-up table (Table 1.1) in which the equipment's emissions are compared to Screening Levels. The Screening Levels are pollutant emission thresholds which are not expected to produce a MICR greater than one in one million nor a hazard index greater than one.

Tier 1 can be used by applicants to determine whether or not detailed risk analysis will be required when filing for a permit. It can also be used by applicants and SCAQMD staff to determine whether a permit is required based on paragraph (s)(2) in Rule 219 – Equipment not Requiring a Written Permit Pursuant to Regulation II.

Tier 1 may be used only for a single emission source and a single toxic air contaminant. However, it can be used for multiple pollutants if the Multiple Pollutant Screening Level Procedure (described below) is followed.

INSTRUCTIONS FOR TIER 1

The Tier 1 analysis is performed as follows:

1. Determine the maximum annual emissions (for cancer and non-cancer 8-hour and chronic TACs) and determine the maximum hourly emissions (for non-cancer acute TACs).
2. Compare the emissions to the Screening Levels for that contaminant in Table 1.1. Columns are labeled with the distance to the nearest receptor.
3. If the maximum annual emissions or the maximum hourly emissions do not exceed the Screening Levels, the equipment will comply with Rule 1401 and does not require notice under Rule 212 for toxics.
4. If the maximum annual emissions or the maximum hourly emissions exceed the Screening Levels, proceed to Tier 2.

The Screening Levels in Table 1.1 were determined by back calculation, using the highest dispersion factors (χ/Q) established in Tables 2.1 through 5.6 that would not exceed a cancer risk of one in one million or an 8-hour or chronic or acute hazard index of one.

MULTIPLE POLLUTANT SCREENING LEVEL PROCEDURE

1. Calculate the Pollutant Screening Index for each TAC (PSI_{TAC}). For each carcinogenic and/or 8-hour or chronic compound, divide the maximum annual emissions (in pounds per year) of each TAC (Q_{lbpy}) by the Annual Pollutant Screening Level ($PSL_{TAC,\ Annual}$) in pounds per year, as contained in Table 1.1. For each acute compound, divide the maximum hourly emission (Q_{lbph}) of each TAC by the Hourly Pollutant Screening Level ($PSL_{TAC,\ Hourly}$) as contained in Table 1.1.

$$PSI_{TAC,\ Cancer,\ 8\text{-}hr,\ or\ Chronic} = Q_{lbpy,TAC} / PSL_{TAC,\ Annual}$$

$$PSI_{TAC,\ Acute} = Q_{lbph,TAC} / PSL_{TAC,\ Hourly}$$

2. Calculate the Application Screening Index (ASI). Sum up the individual Pollutant Screening Indices for all chronic, 8-hr and carcinogenic pollutants (PSI_P) and, separately, for all acute TACs.

$$ASI_{cancer,8\text{-}hr,chronic} = PSI_{TAC1,cancer,8\text{-}hr,chronic} + PSI_{TAC2,cancer,8\text{-}hr,chronic} + PSI_{TAC3,cancer,8\text{-}hr,chronic} + \ldots$$

$$ASI_{acute} = PSI_{TAC1,acute} + PSI_{TAC2,acute} + PSI_{TAC3,acute} + \ldots$$

3. Neither the $ASI_{cancer,8\text{-}hr,chronic}$, nor the ASI_{acute} can exceed one.

Refer to Example 2 (starting on page 33) for multiple pollutant screening.

If step 3 cannot be met, proceed to Tier 2.

Tier 2: Screening Risk Assessment

OVERVIEW OF TIER 2

Tier 2 is a screening risk assessment, which includes procedures for determining the level of risk from a source for Cancer Risk, Cancer Burden, Acute, 8-hour and Chronic Hazard Indices. If the estimated risk from Tier 2 screening is below Rule 1401 limits, then a more detailed evaluation is not necessary. Examples of calculations are provided at the end of the description of Tier 4 risk assessment. (See page 26)

If the screening risk assessment results in a risk estimate that exceeds the risk limits or the permit applicant feels that a more detailed evaluation would result in a lower risk estimate, the applicant has the option of conducting a more detailed analysis using Tier 3 or 4.

To perform a Tier 2 screening risk assessment, the following information is needed:

- **Maximum annual emissions** of each carcinogen and non-cancer 8-hour and chronic TAC, and the **maximum hourly emissions** of each non-cancer acute TAC;
- The **distance** from the permit unit to the nearest off-site residential and worker receptor(s);
- Certain source characteristics, such as **stack height** and/or **building dimensions**;
- **Operating schedule**: whether the permit unit will operate more or less than 12 hr/day; and
- **Geographic location** of the permit unit (e.g., city).

In order to perform a Tier 2 screening risk assessment, it is necessary to identify the nearest receptor location. For the purpose of calculating the MICR, 8-hour and chronic HI, a receptor is any location outside the boundaries of the facility at which a person could experience repeated, continuous exposure. For the purpose of calculating the acute HI, a receptor is any location outside the boundaries of the facility at which a person could experience exposure over a short timeframe. Receptor locations include residential, commercial and industrial areas, and other locations where sensitive receptors may be located. Residential receptor locations include current residential land uses and areas which may be developed for residential uses in the future, given existing or planned zoning. Commercial/industrial receptor locations include areas zoned for manufacturing, light or heavy industry, office or retail activity. Sensitive receptor locations include any residence including private homes, condominiums, apartments, and living quarters, schools, preschools, daycare centers and health facilities such as hospitals, retirement and nursing homes, long term care hospitals, hospices in addition to prisons, dormitories or similar live-in housing, where children, chronically ill individuals or other sensitive persons could be exposed to TACs.

When identifying receptor locations in order to calculate cancer risk, 8-hour or chronic hazard index, the potential for chronic (long-term) exposure should be considered. Land uses at which it is not possible for individuals to be exposed on a long-term basis such as roadways or highways should not be used. When identifying receptor locations to calculate acute hazard index, all off-site locations where there is the potential for acute exposure should be considered (i.e. fenceline receptor). Refer to Rule 1401 – New Source Review of Toxic Air Contaminants for more information regarding receptor locations to be considered.

For assessment of residential cancer risk, the risk is calculated in individual age bins (e.g., third trimester, 0-2 years, etc.) rather than a single lifetime calculation, whereas, for off-site worker, the default assumption is that working age begins at 16 years.

INSTRUCTIONS FOR CALCULATING MAXIMUM INDIVIDUAL CANCER RISK (MICR)

The MICR Calculation Worksheet in Appendix I can be used to help with the calculation. This worksheet can be included in the permit application as documentation of the MICR calculation.

MICR is calculated as follows:

$$\mathbf{MICR = Cancer\ Potency\ (CP) \times Dose\ (D) \times 10^{-6}}$$

Where:

$$\mathbf{Dose = Concentration \times Exposure}$$

$$\mathbf{Concentration = GLC = (Q_{tpy} \times \chi/Q) \times MWAF}$$

$$\mathbf{Exposure_{AgeBin} = DBR_{AgeBin} \times ED_{AgeBin} \times ASF_{AgeBin} \times FAH_{AgeBin}}$$

$$\mathbf{CEF_R = (Exposure_{0.25\text{-}0} + Exposure_{0\text{-}2} + Exposure_{2\text{-}16} + Exposure_{16\text{-}30}) \times EF_R / AT}$$

$$\mathbf{Exposure_R = CEF_R \times MP_R}$$

$$\mathbf{CEF_W = DBR_W \times ED_W \times EF_W / AT}$$

$$\mathbf{Exposure_W = CEF_W \times MP_W \times WAF}$$

You may also use the following equation using **default combined exposure factor:**

$$\mathbf{MICR_R = CP \times Q_{tpy} \times \chi/Q \times CEF_R \times MP_R \times 10^{-6} \times MWAF}$$

$$\mathbf{MICR_W = CP \times Q_{tpy} \times \chi/Q \times CEF_W \times MP_W \times WAF \times 10^{-6} \times MWAF}$$

For Tier 2 screening risk assessment procedures for short-term projects, refer to Appendix IX.

Term	Description	Where to Find
GLC	Ground Level Concentration = Q_{tpy} x χ/Q	
Q_{tpy}	Maximum emission rate (tons/yr)	Emission estimate specific to permit unit
χ/Q	Concentration at a receptor distance / Emission Rate [$(\mu g/m^3)/(tons/yr)$]	Tables 2.1 thru 5.42 – Annual Tables 6.1 & 7.1 – Hourly
MWAF	Molecular Weight Adjustment Factor	Table 8.1
CP	Cancer Potency $(mg/kg\text{-}day)^{-1}$	Table 8.1
REL	Reference Exposure Level ($\mu g/m^3$)	Table 8.1
MP	Multipathway Factor (if applicable)	Table 8.1
CEF	Combined Exposure Factor	Tables 9.1 and 9.2
DBR	Daily breathing rate (L/kg body weight-day)	Tables 9.1 and 9.2
ASF	Age Specific factor (unitless)	Tables 9.1 and 9.2
ED_R	Exposure Duration (30 years) – Residential	Tables 9.1 and 9.2
ED_W	Exposure Duration (25 years) – Worker	Tables 9.1 and 9.2
FAH	Fraction of time spent at home (unitless)	Table 9.1
EF_R	Exposure Frequency, Residential = 0.96 (350 days / 365 days), unitless	Tables 9.1 and 9.2
EF_W	Exposure Frequency, Worker = 0.68 (250 days / 365 days), unitless	Tables 9.1 and 9.2
AT	Averaging Time (lifetime exposure = 70 years)	
WAF	Worker Adjustment Factor	Tables 10.1 and 10.2
10^{-6}	Micrograms to milligrams conversion, liters to cubic meters conversion	not applicable
	Target Organs	Tables 11.1 thru 11.3

Step 1: Estimate Emission Rate (Q_{tpy})

The maximum annual emissions of the TAC in tons/year (Q_{tpy}) must be estimated. The emission rate must be expressed in tons/year because the dispersion factors (**χ/Q**) are expressed in tons/year.

Step 2: Determine Release Type

Determine whether the permit unit is best characterized as a point source or a volume source:

- A **point source** is one that releases its emissions through a stack (designed with acceptable stack height). If the point source has a raincap or a horizontal release, a Tier 3 or 4 assessment is required.
- A **volume source** includes emissions that are unrestricted by any physical means (e.g. pipes or vents and/or vacuum or fan), including releases inside of a building or as fugitive emissions.

For permit units that have both point and volume releases, use the table that will result in the highest χ/Q value, or apportion the emissions between the point and volume sources.

Step 3: Determine Release Height

For a **point source**, determine the **stack height**, which is the distance from ground level to the top of the stack.

Acceptable Stack Height. Although a taller stack provides better dispersion, there are limits to the degree to which this factor can be incorporated into the risk assessment. Rule 1401 specifies that the stack height used to determine risk shall not exceed the "Acceptable Stack Height" for the permit unit. Acceptable stack height is defined as 2.5 times the height of the equipment or 2.5 times the height of the building housing the equipment, and may not exceed 65 meters (213 feet), unless the applicant demonstrates to the satisfaction of SCAQMD staff that a greater height is necessary. For example, for a building that is 14 feet high, the acceptable stack height is 35 feet, measured from ground level.

For a **volume source**, determine the **building height**, which is the distance from ground level to the top of the building in which the permit unit is located, and the **floor area**, which is the dimensions (length x width) of the building in which the permit unit is located.

An **area source** is similar to a volume source in that the emissions take place over an area (as opposed to a point such as from a stack). However, in an area source, the pollutants are released at a uniform height. Examples of area sources are storage piles, slag dumps, lagoons or ponds, and liquid spills. Toxic hydrocarbon emissions from open top and floating roof storage tanks are also often treated as elevated area sources. Use Tier 3 or 4 for area sources.

Step 4: Determine Operating Schedule

Determine whether the equipment will operate:

- 12 hr/day or less; or
- more than 12 hr/day

Step 5: Identify the Appropriate Meteorological Station

Attachment M provides the locations of meteorological stations in the air basin used for these calculations. Using Figures 1 and 2, or the links below, determine the Source Receptor Area (SRA) for the permit unit. Use Tables 12.1 and 12.2 to determine the meteorological site associated with the permit unit's SRA.
http://www3.aqmd.gov/webappl/gisaqi2/VEMap3D.aspx; and
http://www.aqmd.gov/docs/default-source/default-document-library/map-of-monitoring-areas.pdf

Step 6: Identify Type of Receptor and Distance from Receptor

Identify the nearest receptor locations. Receptor locations are off-site locations where persons may be exposed to emissions of a TAC from the equipment. Receptor locations include residential, commercial, and industrial land use areas, and other locations where sensitive populations may be located.

Residential receptor locations include current residential land uses and areas that may be developed for residential uses in the future, based on existing and planned zoning.

Worker receptor locations include areas zoned for manufacturing, light or heavy industry, retail activity, or other locations that are regular work sites.

Sensitive receptor locations include any residence including private homes, condominiums, apartments, and living quarters, schools, preschools, daycare centers and health facilities such as hospitals, retirement and nursing homes, long term care hospitals, hospices in addition to prisons, dormitories or similar live-in housing.

When identifying receptor locations to calculate MICR, the potential for chronic (long-term) exposure should be considered. Land uses at which it is not possible for individuals to be exposed on a long-term basis, either presently or in the future, should not be considered receptor locations for purposes of calculating MICR. Examples of such locations include flood channels, or roadways.

For a point source, the receptor distance is the distance from the center of the stack to the nearest receptor location.

For a volume source, the receptor distance is the distance from the edge of the building to the nearest receptor location.

Experience shows that in most cases, the receptor distance will be 50 meters or more. However, the table also provides χ/Q values for a 25-meter distance. The 25-meter distance should be used for circumstances in which there is a receptor located very close to the permit unit, for example, a residence located with a business, another business adjacent to the facility, or a sensitive receptor located less than 50 meters from the permit unit.

If the closest receptor location is a worker receptor, then the MICR must also be calculated for the closest residential or sensitive receptor. The greater of the two MICR values is used to determine compliance with the risk limits in the rule.

Care should be taken when estimating these distances since concentrations decrease rapidly with increasing distance. It is acceptable to linearly interpolate to estimate dispersion factors between the downwind distances given in the tables. If the receptor lies over 1,000 meters from the permit unit, use the concentration for 1,000 meters.

Step 7: Select χ/Q Value

What is a Dispersion Factor (χ/Q)?

The concentration of a contaminant decreases as it travels away from the site of release and spreads out or "disperses." Dispersion factors (χ/Q) are numerical estimates of the amount of dispersion that occurs under specific conditions.

The amount of dispersion depends on the distance traveled, the height of release and meteorological conditions such as wind speed and atmospheric stability.

The dispersion factors for the screening risk assessment procedure give the estimated annual average ground-level concentration ($\mu g/m^3$) resulting from a source emitting one ton/year of a contaminant. For a more detailed explanation of derivation of χ/Q for each meteorological station, please refer to Appendix VI.

Several tables are provided for χ/Q, based on the source parameters and the meteorological station. Select the appropriate χ/Q value from the table based on the **meteorological station, source characteristics** (i.e., stack height for point sources and building height and building area for volume sources) and the **receptor distance.** The selection of the appropriate table is summarized below:

Release Type	Building Area	Stack Height	Operating Schedule of Equipment	Table for χ/Q
Point	N/A	≥ 14 ft to 24 ft	≤ 12 hr/day	Table 2.1
			> 12 hr/day	Table 3.1
		> 24 ft to 49 ft	≤ 12 hr/day	Table 2.2
			> 12 hr/day	Table 3.2
		> 49 ft	≤ 12 hr/day	Table 2.3
			> 12 hr/day	Table 3.3
Volume	≤ 3,000 ft^2	≤ 20 ft	≤ 12 hr/day	Table 4.1
			> 12 hr/day	Table 5.1
	> 3,000 ft^2 to 10,000 ft^2	≤ 20 ft	≤ 12 hr/day	Table 4.2
			> 12 hr/day	Table 5.2
	> 3,000 ft^2 to 10,000 ft^2	> 20 ft	≤ 12 hr/day	Table 4.3
			> 12 hr/day	Table 5.3
	> 10,000 ft^2 to 30,000 ft^2	≤ 20 ft	≤ 12 hr/day	Table 4.4
			> 12 hr/day	Table 5.4
	> 10,000 ft^2 to 30,000 ft^2	> 20 ft	≤ 12 hr/day	Table 4.5
			> 12 hr/day	Table 5.5
	> 30,000 ft^2	> 20 ft	≤ 12 hr/day	Table 4.6
			> 12 hr/day	Table 5.6

Alternative Sets of Dispersion Factors (χ/Q) for Tier 2 Analysis Only

SCAQMD staff has developed alternative sets of dispersion factors to be used by certain industry or equipment categories. The Tier 2 χ/Q values for those categories are contained in separate appendices to this document along with supporting information as to how they were developed. Appendix VII contains χ/Q values for combustion sources such as diesel reciprocating internal combustion engines rated 50 bhp to 1,149 bhp, natural gas reciprocating internal combustion engines rated 50 bhp to 1,000 bhp, and natural gas boilers with an hourly rating of no more than 200 MMBTU/hr. Appendix VIII contains χ/Q values for crematoriums. Appendix IX contains χ/Q values for short-term projects. Appendix X contains χ/Q values for gasoline dispensing facilities. Appendix XI contains χ/Q values for spray booths.

Step 8: Identify Molecular Weight Adjustment Factor (MWAF)

Using Table 8.1, identify the Molecular Weight Adjustment Factor (MWAF) for the TAC.

What is a Molecular Weight Adjustment Factor (MWAF)?

MWAFs should be used when calculating the cancer risk, . For most of the Hot Spots toxic metals, the OEHHA cancer potency factor applies to the weight of the toxic metal atom contained in the overall compound. This ensures that the cancer potency factor is applied only to the fraction of the overall weight of the emissions that are associated with health effects of the metal.

For most of the Hot Spots toxic metals, the OEHHA cancer potency factors, acute and chronic RELs apply to the weight of the toxic metal atom contained in the overall compound. Some of the Hot Spots compounds contain various elements along with the toxic metal atom (e.g., "Nickel hydroxide", CAS number 12054-48-7, has a formula of H_2NiO_2). Therefore, an adjustment to the reported pounds of the overall compound is needed before applying the OEHHA cancer potency factor for "Nickel and compounds" to such a compound. This ensures that the cancer potency factor, acute or chronic REL is applied only to the fraction of the overall weight of the emissions that are associated with health effects of the metal. In other cases, the Hot Spots metals are already reported as the metal atom equivalent (e.g., CAS 7440-02- , "Nickel"), and these cases do not use any further molecular weight adjustment. The appropriate molecular weight adjustment factors (MWAF) to be used along with the OEHHA cancer potency factors, acute and chronic RELs for Hot Spots metals can be found in the MWAF column of the table containing OEHHA/ARB Approved Health Values for use in Hot Spots Facility Risk Assessments.

Step 9: Identify Cancer Potency Factor (CP) and Reference Exposure Level (REL)

Using Table 8.1, identify the cancer potency factor (CP) for the TAC.

What is a Cancer Potency Factor (CP)?

The cancer potency factor is a measure of the cancer potency of a carcinogen. Cancer potency describes the potential risk of developing cancer per unit of average daily dose over a 70-year lifetime.

The cancer potency factors in these procedures were approved by the state Scientific Review Panel and prepared by the state Office of Environmental Health Hazard Assessment (OEHHA).

What is a Reference Exposure Level (REL)?

The concentration level at or below which no adverse health effects are anticipated for a specified exposure duration is termed the reference exposure level (REL). RELs are based on the most sensitive, relevant, adverse health effect reported in the medical and toxicological literature. RELs are designed to protect the most sensitive individuals in the population by the inclusion of margins of safety. Since margins of safety are incorporated to address data gaps and uncertainties, exceeding the REL does not automatically indicate an adverse health impact.

Step 10: Identify Multi-pathway Factor (MP)

Using Table 8.1, identify the multi-pathway adjustment (MP) factor for the TAC, if applicable.

What is a Multi-Pathway Adjustment Factor (MP)?

The multi-pathway adjustment factor (MP) is used for substances that may contribute to risk from exposure pathways other than inhalation. These substances deposit on the ground in particulate form and contribute to risk through ingestion of soil or backyard garden vegetables or through other routes. The MP factor estimates the total risk in comparison to a given inhalation risk. MP factors are provided in Table 8.1.

These factors allow permit units that emit multi-pathway pollutants to use the risk screening procedure rather than proceeding directly to preparing a detailed risk assessment.

The MP factors are to be used only in urban residential or worker exposure situations. Note that there are separate MP factors for worker (MP_W), resident (MP_R) and short-term ($MP_{R,ST}$ and $MP_{W,ST}$) exposure (see Table 8.1 and Tables 9.11 to 9.32 in Appendix IX) since their potential routes and duration of exposure varies. If the facility is in the vicinity of other potential routes of population exposure such as agricultural areas, drinking water reservoirs, lakes or ponds used for fish that are consumed regularly, or areas used for livestock grazing, then these MP screening assumptions are not appropriate and a more detailed multi-pathway assessment (Tier 4) must be performed.

For a more detailed description of the derivation of the multipathway factors, please see Appendix II.

Step 11: Select Combined Exposure Factor (CEF)

Using Tables 9.1 and 9.2, select the appropriate CEF. The CEF for each exposure type (residential, worker, or short-term) combines default exposure parameters for DBR, ASF, ED, FAH, EF, and AT into a single value.

What are Daily Breathing Rate (DBR) Values?

Exposure to airborne chemicals occurs through inhalation and subsequent absorption into the body, potentially resulting in adverse health effects depending on toxicological properties of the chemical and other exposure parameters. For residential exposures, the breathing rates are determined for specific age groups (i.e., 3rd trimester, 0-2, 2-16, and 16-30 years). The Air Resources Board is developing an updated Risk Management Policy that includes recommendations for inhalation exposures. Information regarding ARB's Risk Management Policy (RMP) can be located at: http://www.arb.ca.gov/toxics/toxics.htm. For residential exposures, ARB's RMP recommends using the high end DBR (e.g., 95th percentile) for children from the 3rd trimester through age 2, and 80th percentile DBR for all other ages. This is reflected in Tables 9.1 and 9.2. For worker exposures, it is assumed that the working age begins at 16 years, and that exposures to facility emissions occur during the work shift which is typically up to 8 hours per day during work days.

What is Age Sensitivity Factor (ASF)?

Scientific data have shown that young animals are more sensitive than adult animals to exposure to many carcinogens. Therefore, OEHHA has developed age sensitivity factors (ASFs) to take into account the increased sensitivity to carcinogens during early-in-life exposure. OEHHA recommends an ASF of 10 for exposures that occur from the third trimester of pregnancy to 2 years, and an ASF of 3 for exposures that occur from 2 years through 15 years of age.

What is Exposure Duration (ED)?

A 30-year ED (residency time) should be used for residential and sensitive receptor locations. A 25-year ED should be used for off-site workers (i.e., receptor locations in commercial or industrial areas).

What is Fraction of Time Spent At Home (FAH)?

OEHHA and ARB have evaluated information from activity patterns databases to estimate the percentage of the day that people are at home. This information is used to adjust cancer risk from a facility's emissions, assuming that exposure to the facility's emissions are not occurring away from home. The FAH factor does not apply for workers since the worker is assumed to be present at the work site 100% of the work day. For Tiers 1, 2, and 3 screening purposes, the FAH is assumed to be 1 for ages 3rd trimester to 16. As a default, children are assumed to attend a daycare or school in close proximity to their home and no discount should be taken for time spent outside of the area affected by the facility's emissions. People older than age 16 are assumed to spend only 73% of their time at home.

What is Exposure Frequency (EF)?

Exposure Frequency (EF) is the number of days per year of exposure for the given scenario (i.e. residential, worker). OEHHA recommends use of 350 days/year for residential exposure (applicable to 30-year risk assessments), and 250 days/year for worker exposure.

What is Average Time (AT)?

Averaging Time (AT) is the lifetime exposure period OEHHA used to develop the cancer potency values. Cancer Potency (CP) factors are developed as estimates of cancer risk from exposure to a lifetime dose (i.e. 70 years) of a carcinogen. Since cancer risks are calculated on a yearly basis to account for age-specific factors (e.g., ASF, DBR, etc.) the CP factor must be divided by its original 70-year AT in the risk equation to generate an annual CP factor to be used in the cancer risk calculations. For AT, OEHHA recommends the use of 70 years.

Step 12: Calculate Worker Adjustment Factor (WAF)

What is Worker Adjustment Factor (WAF)?

In risk assessments, long-term averages are typically used for cancer risk calculations for residents and workers. Therefore, for an offsite worker, the long-term average should represent what the worker breaths during their work shift. However, the long-term averages calculated from AERMOD typically represent exposures for receptors that were present 24 hours a day and seven days a week which is the schedule of a residential receptor. When modeling a non-continuously emitting source (e.g., operating for 8 hours per day and 5 days per week), the long-term concentration has to be adjusted so that it is only based on the hours when the worker is present. WAF is the ratio between residential exposure and facility schedule. For screening purposes, the offsite worker schedule is assumed to always overlap with the facility's operating schedule.

For sources operating and emitting continuously (24 hours per day and 7 days per week), the worker is assumed to breathe the long-term annual concentration during their work shift and no adjustments are necessary when estimating the cancer risk. In these cases, the WAF is equal to one. For non-continuous sources operating, the appropriate WAF can be calculated using the following equation:

$$WAF = (H_{residential} / H_{source}) \times (D_{residential} / D_{source})$$

Where;

WAF = Worker adjustment factor

$H_{residential}$ = The number of hour per day the long-term concentration is based on (always 24 hours)

H_{source} = The number of hours the source operates per day

$D_{residential}$ = The number of days the per week the long-term residential concentration is based on (always 7 days)

D_{source} = The number of days the source operates per week

Although the 2015 OEHHA Guidance Manual allows the use of a discount factor (DF) when assessing inhalation cancer health impacts, if the offsite worker's schedule partially overlaps with the source's emission schedule, the DF should only be used when there are limits on the hours of operation specified in the facility's operating permits. Since SCAQMD permits do not typically include limits on the hours of operation, it is not appropriate to apply the DF when calculating the health impacts.

MICRs for Multiple Toxic Air Contaminants

If the equipment emits more than one TAC, the total MICR must be calculated. The total MICR is the sum of the MICRs for each of the TACs emitted by the equipment.

INSTRUCTIONS FOR CALCULATING CANCER BURDEN

The cancer burden is the estimated increase in the occurrence of cancer cases in a population as a result of exposures to TAC emissions from the equipment. The cancer burden for a population unit (city, census tract, sub-area or grid) is the product of the number of persons in the population and the estimated individual risk from TACs. The cancer burden only needs to be calculated if the MICR is greater than one (1) in one million.

The following procedure may be used to perform an acceptable screening analysis for cancer burden due to a single source of TAC:

- Calculate total MICR from all TACs from a single permit unit as previously outlined.

- Estimate the distance at which the MICR falls below one in one million. This distance can be estimated by back-calculating the distance that would result in a MICR of one in one million, using the χ/Q values in Tables 2.1 thru 5.6.

- Define a zone of impact in the shape of a circle. The radius (r) of this circle is the distance between the equipment and the point at which the risk falls below one in one million. The area of this circle is calculated using the equation for the area of a circle, which is $3.14 \times r^2$.

- Estimate the residential population within this zone of impact based on census data or a worst-case estimate. Generally, the residential population in the Basin is less than 4,000 persons/km^2, but some areas are as high as 7,000 persons/km^2.

  For areas where census data is available, it should be used. Where there is no census data, 7,000 persons/km^2 should be used for the areas with high population densities and 4,000 persons/km^2 should be used for areas with low population densities. Where the population densities are unknown, use 7,000 persons/km^2.

- Calculate the screening level cancer burden by multiplying the total residential population in the zone of impact by the maximum individual cancer risk.

If the dispersion factors in Tables 2.1 thru 5.6 are not sufficient to estimate the distance at which MICR falls below one in one million, then a more refined risk assessment is warranted.

INSTRUCTIONS FOR CALCULATING CHRONIC, 8-HOUR, AND ACUTE HAZARD INDEX (HIC, HIC8, AND HIA)

Some TACs have the potential to cause non-cancer health risk due to short term (acute) or long term (chronic) exposures. The screening risk assessment for those TACs must estimate acute, 8-hour, and/or chronic hazard indexes as applicable. Like the calculation procedure for MICR, one must first identify when the application was deemed complete and select the appropriate set of risk tables found in the attachments (e.g. Attachment M, Attachment L, etc).

Reference Exposure Level (REL) is used as an indicator of potential adverse non-cancer health effects. An inhalation REL is a concentration level ($\mu g/m^3$) at which no adverse health effects are anticipated. Inhalation RELs are provided in Table 8.1.

When a health impact calculation is performed for a single substance, it is called the **Hazard Quotient (HQ)**. When several TACs affect the same organ system in the body (e.g., respiratory system, nervous system, reproductive system), there can be a cumulative effect on the target organ. In these cases, the sum of the Hazard Quotients of all chemicals emitted that impact the same target organ called total **Hazard Index (HI)** is evaluated.

Detailed procedures for calculating the total hazard index are provided in the 2015 OEHHA Guidance Manual. The equations used to calculate the chronic, 8-hour chronic, and acute Hazard Index (HIC, HIC8 and HIA) per target organ are as follows:

$$\text{Total HIC}_{\text{target organ}} = \{[Q_{tpy,TAC1} \times (\chi/Q) \times MP_{TAC1} \times MWAF]/\text{Chronic REL}_{TAC1}\}_{\text{target organ}} + \{[Q_{tpy,TAC2} \times (\chi/Q) \times MP_{TAC2} \times MWAF]/\text{Chronic REL}_{TAC2}\}_{\text{target organ}} + \ldots.$$

$$\text{Total HIC8}_{\text{target organ}} = \{[Q_{tpy,TAC1} \times (\chi/Q) \times WAF \times MWAF]/\text{8-Hour REL}_{TAC1}\}_{\text{target organ}} + \{[Q_{tpy,TAC1} \times (\chi/Q) \times WAF \times MWAF]/\text{8-Hour REL}_{TAC2}\}_{\text{target organ}} + \ldots..$$

$$\text{Total HIA}_{\text{target organ}} = \{[Q_{lbph,TAC1} \times (\chi/Q)_{hr} \times MWAF]/\text{Acute REL}_{TAC1}\}_{\text{target organ}} + \{[Q_{lbph,TAC2} \times (\chi/Q)_{hr} \times MWAF]/\text{Acute REL}_{TAC2}\}_{\text{target organ}} + \ldots..$$

Note that the chronic HI is based upon an annual average emission per year whereas the acute HI is based upon a maximum one-hour emission level and the acute HI does not use a multi-pathway adjustment factor (MP). In addition, the 8-hour RELs were developed only for repeated, chronic daily 8-hour exposures (e.g. a typical worker or resident exposed to a facility that operates equal to or more than 8 hours per day and 5 days per week). The 8-hour HI is based upon the daily average 8-hour exposure only for those chemicals with 8-hour RELs. There are currently only a limited number of substances with an 8-hour inhalation REL. (See Table 8.1)

PROCEDURE FOR ALTERNATE HAZARD INDEX LEVEL EXEMPTION

Rule 1401 provides an exemption from the hazard index limit of one in cases in which a higher exposure level is deemed to be safe. This exemption has never been used. Under this exemption, the HIC and/or HIA limit of one does not apply if the applicant substantiates to the satisfaction of SCAQMD staff that at all receptor locations and for every target organ system, the total chronic and acute HI levels resulting from emissions from the equipment will not exceed alternate HI levels determined by OEHHA to be protective against adverse health effects. This applies only to TACs listed in Rule 1401 at the time the application was deemed complete. Refer to the attachments for the appropriate list of TACs.

Applicants should indicate in their permit application that they wish to apply for an exemption under the alternative hazard index provisions of the rule. The permit application should include both a risk assessment estimating the HIA and HIC levels and relevant information supporting the exemption. Depending on the particular health risks in question, additional information such as characterization of the surrounding population, the location of sensitive receptors, or other data may be required.

SCAQMD staff will consult with OEHHA staff regarding the request for the alternative HI level. If OEHHA staff finds that the levels of exposure to the public will not exceed levels that are protective against adverse health effects, the application will be eligible for the exemption.

In some cases, OEHHA staff may establish a general policy recommending different acceptable exposure levels for different exposed populations. For example, if exposure to a certain compound is particularly harmful to children but less of a concern for adults, OEHHA staff may determine as a general policy that higher exposure levels are acceptable in locations where children would not be exposed. OEHHA policy in these cases would be a basis for eligibility for the alternate hazard index exemption.

Tier 3: Screening Dispersion Modeling

Tier 3 uses a screening dispersion model to estimate risk. This tier requires more expertise than Tiers 1 and 2. For guidance on performing a Tier 3 analysis, refer to the SCAQMD webpage at: http://www.aqmd.gov/home/permits/risk-assessment.

Tier 3 screening dispersion modeling should only be used for a equipment with a single emission or release point. If there are multiple emission or release points, Tier 4 must be used. In addition, Tier 3 would only be beneficial for applications involving source parameters that differ substantially from those used to derive χ/Q values in Tables 2.1 thru 7.1 and Appendices VI through XI.

To perform a Tier 3 analysis, the following is needed:

- Air dispersion modeling expertise;
- An EPA-approved screening dispersion model program such as AERSCREN, which can be downloaded from www.epa.gov/scram001; and
- Additional equipment information such as stack gas temperature, stack gas exit velocity or flow rate, stack inside diameter, and albedo, Bowen ratio, and surface roughness of the appropriate meteorological station.

It should be noted that AERSCREEN estimates peak one-hour concentrations for HIA calculations. For the MICR and HIC calculations, use the annual average concentration estimated in the AERSCREEN output. Note that when modeling an area source in AERSCREEN, only the one-hour concentration is estimated. The EPA's user's guide for screening models states the following for area sources: "Do not use the multiplying factors to correct for averaging times greater than 1 hour. Concentrations close to an area source will not vary as much as those for point sources in response to varying wind directions, and the meteorological conditions which are likely to give maximum 1-hour concentrations can persist for several hours. Therefore it is recommended that the maximum 1-hour concentration be conservatively assumed to apply for averaging periods out to 24 hours."

In a Tier 3 approach, the Tier 2 equations for MICR, HIC, and HIA continue to be used except that a screening dispersion model is used to estimate each pollutant concentration. Thus, the Tier 3 equations to be used are as follows:

$$\mathbf{MICR_R = CP \times PeakConc \times CEF_R \times MP_R \times 10^{-6} \times MWAF}$$

$$\mathbf{MICR_W = CP \times PeakConc \times CEF_W \times MP_W \times WAF \times 10^{-6} \times MWAF}$$

$$\mathbf{Total\ HIC_{target\ organ} = \Sigma\ \{[AveConc_{TAC} \times MP \times MWAF]/Chronic\ REL_{TAC}\}_{target\ organ}}$$

$$\mathbf{Total\ HIC8_{target\ organ} = \Sigma\ \{[AveConc_{TAC} \times WAF \times MWAF]/8\text{-}Hour\ REL_{TAC}\}_{target\ organ}}$$

$$\mathbf{Total\ HIA_{target\ organ} = \Sigma\ \{[PeakConc_{TAC} \times MWAF]/Acute\ REL_{TAC}\}_{target\ organ}}$$

PeakConc is the peak one-hour pollutant concentration estimated by AERSCREEN and AveConc is the annual average concentration in the AERSCREEN output file. Refer to the section on Tier 2, Screening Risk Assessment for explanation of the other variables in the equations.

If the MICR, HIC, HIC8, and HIA do not exceed the rule limits, then the equipment complies with Rule 1401 and no further analysis is required. If any risk value exceeds the rule limits, then proceed to Tier 4.

Tier 4: Detailed Risk Assessment

Tier 4 is a detailed risk assessment using the Hotspots Analysis and Reporting Program Version 2 (HARP 2) software developed by ARB which replaces the prior version and incorporates the information in the 2015 OEHHA Guidance Manual. The HARP 2 software and documentation can be obtained at http://www.arb.ca.gov/toxics/harp/harp.htm. The U.S. EPA air quality dispersion model called AERMOD is used by HARP 2 to estimate the concentration of pollutants in place of the previously used ISCST3 model. ISCST3 dispersion modeling will no longer be allowed for determining TAC concentrations. ARB recommends AERMOD for Hot Spots risk assessments. AERMOD documentation is available at: http://www.epa.gov/ttn/scram/dispersion_prefrec.htm#aermod. Meteorological data for use in HARP 2 and AERMOD can be downloaded from http://www.aqmd.gov/home/library/air-quality-data-studies/meteorological-data/data-for-aermod.

Tier 4 is an option if neither Tier 2 nor Tier 3 can demonstrate compliance, or if the applicant wishes to obtain a more refined estimate of the cancer and non-cancer risk. Since Tier 4 involves detailed modeling using actual meteorological data from the closest air monitoring station, it will often result in a less conservative estimate of the risk than either Tiers 2 or 3. Tier 4 modeling will be most useful for analyses that have source parameters that differ substantially from defaults in Tables 2.1 through 7.1 and Appendices VI through XI, and/or analyses whose closest receptors do not lie immediately downwind of the emission sources.

A detailed risk assessment should be performed by individuals with experience and training in air quality modeling and risk assessment. In addition, SCAQMD modeling staff should be consulted before performing a detailed risk assessment. For guidance on performing a detailed risk assessment, refer to SCAQMD webpage at: http://www.aqmd.gov/home/permits/risk-assessment.

Written guidance on preparing a detailed risk assessment is contained in an OEHHA document titled, "Air Toxics Hot Spots Program Risk Assessment Guidelines (February 2015)" which may be obtained at: http://www.oehha.ca.gov/air/hot_spots/hotspots2015.html.

SCAQMD modeling staff has prepared supplemental risk assessment guidance which must be followed by all applicants submitting Tier 4 assessments. SCAQMD's supplemental guidance is available at: http://www.aqmd.gov/home/regulations/compliance/toxic-hot-spots-ab-2588/health-risk-assessment. Lastly, SCAQMD guidance on using AERMOD can be found at: http://www.aqmd.gov/home/library/air-quality-data-studies/meteorological-data/modeling-guidance.

EXAMPLE 1: MICR, CANCER BURDEN, and HIC CALCULATION

The facility does not have operating schedule restrictions and is located in an industrial and residential area. Chromium 6+ (hexavalent chromium) is emitted from the manufacturing process from one piece of equipment, which is fitted with control equipment considered as T-BACT. Chromium 6+ is a carcinogen and has chronic non-carcinogenic risks.

The application was deemed complete on July 15, 2015.
The nearest receptor distances:
Worker (Industrial) = 328 feet (100 meters)
Residential = 492 feet (150 meters)
Operating Schedule: 24 hours/day, 7 days/week since no schedule restrictions are included in the permit conditions.
Stack height = 28 ft
Facility location: Ontario, CA
TACs: Chromium 6+

Emission rates for the TACs are listed in Table A below.
Note: The maximum hourly emissions should be estimated based on the maximum operating parameters in any hour.

Table A

TAC	Emission Rate		
	Q_{lbph} (lbs/hr)	**Q_{lbpy} (lbs/yr)**	**Q_{tpy} (tons/yr)**
Chromium 6+	2.63E-07	2.30E-03	1.15E-06

(The list of TACs and their corresponding emission rates are for illustration purposes only. They may not reflect actual conditions.)

First, identify the appropriate risk assessment tables (included in the appendices) based upon when the application was deemed complete. In this case, the tables for applications deemed complete on or after July 5, 2015 (i.e., Permit Application Package "M") are used.

Second, calculate MICR for those TACs that have Inhalation Cancer Potency Values from Table 8.1. Table B below identifies the TACs and their corresponding inhalation cancer potency values for MICR calculations.

Table B

TAC	Inhalation Cancer Potency (CP) (mg/kg-day)$^{-1}$
Chromium 6+	5.10E+02

Based on the above table, MICR will be evaluated for residential and worker receptors for chromium 6+.

From Table 8.1, we can also determine if the emitted pollutant is carcinogenic, chronic, 8-hour chronic, and/or acute. The results are as follows:

TAC	MICR (cancer)	HIC (chronic)	8-hr HIC (chronic)	HIA (Acute)
Chromium 6+	√	√ (MP)		

MP indicates that the multi-pathway adjustment factor will be different than 1.0.

Next, for chronic and acute substances, review Tables 11.1, 11.2 and 11.3 to determine the target organs affected by TACs due to chronic and/or acute toxicity. Table C below indicates the target organs affected by the chronic TACs with chronic toxicity. In the table, check marks (√) indicate the affected target organs.

Table C (Chronic Toxicity)

TAC	AL	BN	CV	DEV	END	EYE	HEM	IMM	KID	NS	REP	RESP	SKIN
Chromium 6+							√					√	

HEM: Hematopoietic system
RESP: Respiratory system

Since no chronic 8-hour and acute health values have been adopted in Rule 1401 for chromium 6+, no target organs have been identified for those impacts.

Tier 1: Screening Emission Levels

The nearest receptor location should be used, in this case the worker location of 100m should be used.
Please note that this step is used to approximate the equipment's potential risk.

For Tier 1, the equipment's TACs emissions (annual and/or maximum hourly) should be compared with the Screening Levels for the chromium 6+ in Table 1.1 as appropriate. The annual emission rate for chromium 6+ in Table 1.1 is 4.31E-04 pounds per year at a distance of 100m. No maximum

hourly emissions are presented in Table 1.1 because no acute value has been adopted in Rule 1401 for chromium 6+.

Please note that the cumulative cancer/chronic risk cannot exceed the emissions presented in Table 1.1. In this example, this facility did not pass Tier I since the annual emissions (2.30E-03 lb/yr) are greater than those presented in Table 1.1 (4.31E-04 lb/yr) and would have to proceed to Tier 2 to demonstrate compliance with Rule 1401.

Tier 2: Screening Risk Assessment

Step 1: Estimate Emission Rate (Q_{tpy})

According to Table A of the example, **Q_{tpy} = 1.15E-06**.

Step 2: Determine Release Type

The TAC is released from one piece of equipment fitted with control equipment. This would be treated as a **point source**.

Step 3: Determine Release Height

The piece of equipment has a stack height of **28 feet**.

Step 4: Determine Operating Schedule

The equipment can operate 24 hours/day and 7 days/week as there are no restrictions on hours of use. Therefore, the operating schedule is **more than 12 hours/day**.

Step 5: Identify the Appropriate Meteorological Station

The facility is located in Ontario and according to Figure 1 in Attachment M, the closest monitoring station is **Upland**.

Step 6: Identify Type of Receptor and Distance from Receptor

There are two identified receptor types – **a worker receptor located 100 meters** away and a **residential receptor located 150 meters** away.

Step 7: Select χ/Q Value

Since the point source operates more than 12 hours/day and is 28 feet high, the χ/Q values from Table 3.2 for Upland at a distance of 100 meters (**4.35**) and 150 meters (**2.97**) were used. The χ/Q value at 150 meters was interpolated between 100 meters and 200 meters.

Step 8: Identify MWAF

The MWAF value for Chromium 6+ (**1**) was found in Table 8.1.

Step 9: Identify CP and REL

The CP value (**5.10E+02**) and chronic REL value (**2.00E-01**) for Chromium 6+ was found in Table 8.1. Note that there is no acute REL value for Chromium 6+.

Step 10: Identify MP

The MP values (**Cancer MP_R = 1.60, Cancer MP_W = 1.02, Chronic MP_R = 2.44, Chronic MP_W = 1.00**) for Chromium 6+ was found in Table 8.1.

Step 11: Select CEF

The CEF values (**CEF_R = 676.63, CEF_W = 56.26**) for residential and worker exposures were found in Tables 9.1 & 9.2.

Step 12: Calculate WAF

Since the point source operates 24 hours/day and 7 days/week, the WAF value (**1.0**) was found in Table 10.2.

MICR Calculation

(1) Worker: $\mathbf{MICR_W = CP \times Q_{tpy} \times \chi/Q \times CEF_W \times MP_W \times WAF \times 10^{-6} \times MWAF}$

TAC	CP	Q_{tpy}	χ/Q	CEF_W	MP_w	WAF	MWAF	MICR
Chromium 6+	5.10E+02	1.15E-06	4.35	56.26	1.02	1	1	1.46×10^{-7}

(2) Resident: $\mathbf{MICR_R = CP \times Q_{tpy} \times \chi/Q \times CEF_R \times MP_R \times 10^{-6} \times MWAF}$

TAC	CP	Q_{tpy}	χ/Q	CEF_R	MP_R	MWAF	MICR
Chromium 6+	5.10E+02	1.15E-06	2.97	676.63	1.60	1	1.89×10^{-6}

Please note that the higher of the worker and residential cancer risks needs to be selected. This value will be entered in MICR field in the NSR, 1401 section. In this example, the maximum cancer risk is at the residential receptor.

Cancer Burden Calculation

Cancer burden should always be calculated if the MICR exceeds one in a million, regardless of the type of receptor. Since the cancer risk at the residential receptor was calculated to be **1.89×10^{-6}**, the cancer burden needs to be calculated.

Estimate of distance at which MICR falls below one in one million.
The distance at which the MICR falls below one in one million requires you to take the reciprocal of the calculated MICR multiplied by 1.0×10^{-6}. This factor (F) will be the multiplier to the χ/Q value used in determining the MICR.

$$F = (1 / MICR) \times 1.0 \times 10^{-6}$$

$$F = (1 / 1.89 \times 10^{-6}) \times 1.0 \times 10^{-6}$$

$$F = 0.529$$

Determination of the new downwind distance will be based upon a new χ/Q value calculated by multiplying the originally used χ/Q value by F.
Therefore,

$$\text{New } \chi/Q = 2.97 \times 0.529$$

$$\text{New } \chi/Q = 1.57$$

Using Table 3.2, the new χ/Q lies between downwind distances of 200 to 300 meters. Interpolating for the new downwind distance gives is 201 meters.

This new Downwind Distance is where the MICR will fall below one in one million.

Define Zone of Impact
The zone of impact (ZI) is calculated using the New Downwind Distance as the radius of a circle and calculating the area of that circle.

Therefore,

$$ZI = 3.14\ r^2$$

$$ZI = 3.14\ (0.201\ km)^2$$

$$ZI = 0.13\ km^2$$

Estimate the population within the ZI
ZI should include both worker and residential populations.

For areas where census data is available, it should be used. Where there is no census data, 7,000 persons/km^2 should be used for the areas with high population densities and 4,000 persons per

square kilometer should be used for areas with low population densities. Where the population densities are unknown, use 7,000 persons per square kilometer.

In this example we have no information on census data or population density, therefore,

Zone of Impact Population = ZI x Population Density

Zone of Impact Population = 0.13 km^2 x 7,000 person/ km^2

Zone of Impact Population = 910 persons

Calculate Cancer Burden

For a screening level analysis, the cancer Burden (CB) is estimated using the zone of impact population multiplied by the calculated MICR.

Therefore,

CB = 910 persons x 1.89 x 10^{-6}

CB = 0.00172

Hazard Index Calculations

Chronic, 8-hour chronic and acute hazard indices should be calculated for each target organ. Since no acute or 8-hr chronic health values have been adopted for chromium 6+, only the chronic hazard index is estimated.

Chronic Hazard Index:

$$\mathbf{HIC = \Sigma [(Q_{tpy}) \times (\chi/Q)_{chronic} \times MP \times MWAF]/(Chronic\ REL)}$$

Based on Table 11.1, the target organs for the TACs for chronic toxicity have been listed in Table C. The Chronic Hazard Index for the TACs in this example are calculated as follows:

Chromium 6+:
Affects hematopoietic and respiratory systems.

Worker: HIC = [1.15E-06 x 4.35 x 1.00 x 1] / (2.00E-01) **= 2.5E-05**

Resident: HIC = [1.15E-06 x 2.97 x 2.44 x 1] / (2.00E-01) **= 4.2E-05**

Since there is only one TAC, the HI does not need to be summed across the target organs.

Summary of Results

	MICR	HIC	HIC8	HIA
Worker	1.46×10^{-7}	2.5E-05	N/A	N/A
Resident	1.89×10^{-6}	4.2E-05	N/A	N/A
Rule 1401 Threshold	10×10^{-6}	1	1	1
Exceeds Threshold?	No	No	N/A	N/A

RESULT:

- ***MICRs for residential and commercial receptors do not exceed 10×10^{-6} (ten in one million).***
- ***Cancer burden is less than 0.5.***
- ***HICs for residential and commercial receptors are less than 1.***
- ***There are no health values associated with the chronic 8-hour or acute exposures and those hazard indices have not been calculated.***

The equipment in this example contains T-BACT; therefore, it would pass the Rule 1401 MICR limit. A Tier 3 or 4 analysis is not necessary.

EXAMPLE 2: MICR, CANCER BURDEN, HIC, HIC8, and HIA CALCULATIONS

An industrial operation generates benzene, arsenic and dioxin emissions.

The application was deemed complete on July 15, 2015.
Volume source: Building dimensions 40'(W) x 70'(L) x 17'(H)
The nearest receptor distances are:
Worker (Industrial) = 100 meters
Residential = 500 meters
Permitted Operating Schedule: 8 hr /day, 5 days/wk, 50 wks/yr = 2,000 hours/year
Facility location: Azusa, CA
TACs: Arsenic, Benzene, Dioxin, Nickel hydroxide.

Emission rates for the TACs are listed in Table A below.
Note: The maximum hourly emissions should be estimated based on the maximum operating parameters in any hour.

Table A

TAC	Emission Rate		
	Q_{lbph} (lbs/hr)	Q_{lbpy} (lbs/yr)	Q_{tpy} (tons/yr)
Arsenic	8.30E-06	1.66E-02	8.30E-06
Benzene	7.50E-03	1.50E+01	7.50E-03
Dioxin	6.10E-10	1.22E-06	6.10E-10
Nickel hydroxide	2.30E-03	4.60E+00	2.30E-03

(The list of TACs and their corresponding emission rates are for illustration purposes only. They may not reflect actual conditions.)

First, identify the appropriate risk assessment tables (included in the appendices) based upon when the application was deemed complete. In this case, the tables for applications deemed complete on or after July 5, 2015 (i.e., Permit Application Package "M") are used.

Second, calculate MICR for those TACs that have Inhalation Cancer Potency Values from Table 8.1. Table B below identifies the TACs and their corresponding inhalation cancer potency values for MICR calculations.

Table B

TAC	Inhalation Cancer Potency (CP) (mg/kg-day)$^{-1}$
Arsenic	$1.20 \times 10^{+1}$
Benzene	1.00×10^{-1}
Dioxin	$1.30 \times 10^{+5}$
Nickel hydroxide	9.10×10^{-1}

Based on the above table, MICR will be evaluated for residential and worker receptors for arsenic, benzene, dioxin, and calcium chromate.

From Table 8.1, we can also determine if the emitted pollutant is carcinogenic, chronic, 8-hour chronic, and/or acute. The results are as follows:

TAC	MICR (cancer)	HIC (chronic)	8-hr HIC (chronic)	HIA (Acute)
Arsenic	√ (MP)	√ (MP)	√	√
Benzene	√	√	√	√
Dioxin	√ (MP)	√ (MP)		
Nickel hydroxide	√	√		

MP indicates that the multi-pathway adjustment factor will be different than 1.0.

Next, for chronic and acute substances, review Tables 11.1, 11.2 and 11.3 to determine the target organs affected by TACs due to chronic and/or acute toxicity. Tables C, D, and E below indicate the target organs affected by the TACs with chronic toxicity, chronic 8-hour toxicity, and acute toxicity, respectively. In the table, check marks (√) indicate the affected target organs.

Table C (Chronic Toxicity)

TAC	AL	BN	CV	DEV	END	EYE	HEM	IMM	KID	NS	REP	RESP	SKIN
Arsenic			√	√						√	√	√	√
Benzene							√						
Dioxin	√			√	√		√				√	√	
Nickel hydroxide				√			√				√	√	

AL: Alimentary system (liver)
BN: Bones and teeth
CV: Cardiovascular system
DEV: Developmental
END: Endocrine system
EYE: Eye
HEM: Hematopoietic system
IMM: Immune system
KID: Kidney
NS: Nervous system
REP: Reproductive system
RESP: Respiratory system
SKIN: Skin

Table D (Chronic 8-hour Toxicity)

TAC	AL	BN	CV	DEV	END	EYE	HEM	IMM	KID	NS	REP	RESP	SKIN
Arsenic			√	√						√	√	√	√
Benzene							√						
Dioxin													
Nickel hydroxide								√				√	

Table E (Acute Toxicity)

TAC	AL	BN	CV	DEV	END	EYE	HEM	IMM	KID	NS	REP	RESP	SKIN
Arsenic			√	√						√	√		
Benzene				√			√	√			√		
Dioxin													
Nickel hydroxide								√					

Tier 1: Screening Emission Levels

The nearest receptor location should be used, in this case the worker location of 100m should be used.

For Carcinogenic and/or Chronic Compounds:

Calculate the Pollutant Screening Index for each pollutant (PSI_P).

$$PSI_P = Q_{lbpy,P} / PSL_P$$

The Q_{lbpy} is based upon the annual emissions of each TAC (lbs/yr). The PSLs are found in Table 1.1 and are expressed in lb/yr.

Sum up the individual Pollutant Screening Indices for each pollutant ($\sum PSI_P$).

TAC	$Q_{lbpy,P}$	PSL_P	PSI_P
Arsenic	1.66E-02	3.01E-03	5.51
Benzene	1.50E+01	3.51E+00	4.27
Dioxin	1.22E-06	2.70E-06	0.45
Nickel hydroxide	4.60E+00	6.09E-01	7.55
		$\sum PSI_P$ =	**17.85**

Calculate the Application Screening Index (ASI).

$$ASI_{cancer\ and/or\ chronic} = \Sigma\ PSI_P = 17.85$$

For Acute Compounds:

Calculate the Pollutant Screening Index for each pollutant (PSI_P).

$$PSI_P = Q_{lbph,P} / PSL_P$$

The Q_{lbph} is based upon the maximum hourly emissions (lb/hr). The PSLs for acute compounds are found in Table 1.1 and are expressed in lb/hr.

Sum up the individual pollutant screening indices for each acute pollutant ($\sum PSI_P$).

TAC	$Q_{lbph,P}$	PSL_P	PSI_P
Arsenic	8.30E-06	8.91E-04	9.32E-03
Benzene	7.50E-03	1.20E-01	6.25E-02
Nickel hydroxide	2.30E-03	1.41E-03	1.63E+00
		$\sum$ PSIp =	**1.70**

Calculate the Application Screening Index (ASI).

$$ASI_{acute} = \Sigma\ PSI_P = 1.70$$

Please note that the cumulative cancer/chronic risk and the cumulative acute hazard index exceeded 1. In this example, this facility did not pass Tier 1 as the ASI exceeded 1 for cancer/chronic and acute. Since this Tier I screening was calculated to be greater than 1, the applicant would have to proceed with further health risk screening assessment procedures.

Tier 2: Screening Risk Assessment

Step 1: Estimate Emission Rate (Q_{tpy})

The emission rates are listed in Table A of the example.

Step 2: Determine Release Type

The TAC is released from a building with dimensions of 40' x 70' (2,800 ft^2 area) and height of 17 feet. This would be treated as a **volume source**.

Step 3: Determine Release Height

Since the source is a volume source, the release height is not relevant.

Step 4: Determine Operating Schedule

The facility operates 8 hours/day and 5 days/week as specified in the permit conditions. Therefore, the operating schedule is **less than 12 hours/day**.

Step 5: Identify the Appropriate Meteorological Station

The facility is located in Azusa and according to Figure 1 in Attachment M, the closest monitoring station is **Azusa**.

Step 6: Identify Type of Receptor and Distance from Receptor

There are two identified receptor types – **a worker receptor located 100 meters** away and a **residential receptor located 500 meters** away.

Step 7: Select χ/Q Value

Since the volume source of 2,800 ft^2 and height of 17 feet operates less than 12 hours/day, the χ/Q values from Table 4.1 for Azusa at a distance of 100 meters (**1.15**) and 500 meters (**0.06**) were used.

Step 8: Identify MWAF

The MWAF values for all TACs were found in Table 8.1.

Step 9: Identify CP and REL

The CP values and chronic REL values for all TACs were found in Table 8.1.

Step 10: Identify MP

The MP values for all TACs were found in Table 8.1.

Step 11: Select CEF

The CEF values (**CEF_R = 676.63, CEF_W = 56.26**) for residential and worker exposures were found in Tables 9.1 & 9.2.

Step 12: Calculate WAF

Since the volume source operates 8 hours/day and 5 days/week, the WAF value (**4.2**) was found in Table 10.2.

MICR Calculation

(1) Worker: $\mathbf{MICR_W = CP \times Q_{tpy} \times \chi/Q \times CEF_W \times MP_W \times WAF \times 10^{-6} \times MWAF}$

TAC	CP	Q_{tpy}	χ/Q	CEF_W	MP_w	WAF	MWAF	MICR
Arsenic	$1.20 \times 10^{+1}$	8.30E-06	1.15	56.26	4.52	4.2	1	1.22×10^{-7}
Benzene	1.00×10^{-1}	7.50E-03	1.15	56.26	1.00	4.2	1	2.04×10^{-7}
Dioxin	$1.30 \times 10^{+5}$	6.10E-10	1.15	56.26	7.58	4.2	1	1.63×10^{-7}
Nickel hydroxide	9.10×10^{-1}	2.30E-03	1.15	56.26	1.00	4.2	0.6332	3.60×10^{-7}
							TOTAL	**8.50×10^{-7}**

(2) Resident: $\mathbf{MICR_R = CP \times Q_{tpy} \times \chi/Q \times CEF_R \times MP_R \times 10^{-6} \times MWAF}$

TAC	CP	Q_{tpy}	χ/Q	CEF_R	MP_R	MWAF	MICR
Arsenic	$1.20 \times 10^{+1}$	8.30E-06	0.06	676.63	9.71	1	3.93×10^{-8}
Benzene	1.00×10^{-1}	7.50E-03	0.06	676.63	1.00	1	3.04×10^{-8}
Dioxin	$1.30 \times 10^{+5}$	6.10E-10	0.06	676.63	25.72	1	8.28×10^{-8}
Nickel hydroxide	9.10×10^{-1}	2.30E-03	0.06	676.63	1.00	0.6332	5.38×10^{-8}
						TOTAL	**2.06×10^{-7}**

Please note that the higher of the worker and residential cancer risks needs to be selected. This value will be entered in MICR field in the NSR, 1401 section. In this example, the maximum cancer risk is at the worker receptor.

Cancer Burden Calculation

Cancer burden should always be calculated if the MICR exceeds one in a million, regardless of the type of receptor. For this example, cancer burden was not calculated because neither worker nor residential risk exceeded one in a million.

Hazard Index Calculations

Chronic, 8-hour and acute hazard indices should be calculated for each target organ.

Chronic Hazard Index:

Worker: $HIC_W = \Sigma [(Q_{tpy}) \times (\chi/Q)_{chronic} \times MP_W \times MWAF]/(Chronic\ REL)$

Resident: $HIC_R = \Sigma [(Q_{tpy}) \times (\chi/Q)_{chronic} \times MP_R \times MWAF]/(Chronic\ REL)$

Based on Table 11.1, the target organs for the TACs for chronic toxicity have been listed in Table C. The Chronic Hazard Index for the TACs in this example are calculated as follows:

Arsenic: HIC_W = [8.30E-06 x 1.15 x 28.37 x 1] / (1.50E-02) = **1.8E-02**

HIC_R = [8.30E-06 x 0.06 x 88.03 x 1] / (1.50E-02) **= 2.9E-03**

Benzene: HIC_W = [7.50E-03 x 1.15 x 1.00 x 1] / (3.00E+00) = **2.9E-03**

HIC_R = [7.50E-03 x 0.06 x 1.00 x 1] / (3.00E+00) **= 1.5E-04**

Dioxin: HIC_W = [6.10E-10 x 1.15 x 307.60 x 1] / (4.00E-05) = **1.2E-04**

HIC_R = [6.10E-10 x 0.06 x 6.73 x 1] / (4.00E-05) **= 2.8E-04**

Nickel hydroxide: HIC_W = [2.30E-03 x 1.15 x 1.00 x 0.6332] / (1.40E-02) = **1.2E-01**

HIC_R = [2.30E-03 x 0.06 x 1.00 x 0.6332] / (1.40E-02) **= 6.2E-03**

(1) Worker: HIC_W (summed across each target organ)

TAC	AL	BN	CV	DEV	END	EYE	HEM	IMM	KID	NS	REP	RESP	SKIN
Arsenic			1.8E-2	1.8E-2						1.8E-2	1.8E-2	1.8E-2	1.8E-2
Benzene							2.9E-3						
Dioxin	1.2E-4			1.2E-4	1.2E-4		1.2E-4				1.2E-4	1.2E-4	
Nickel hydroxide				1.2E-1			1.2E-1				1.2E-1	1.2E-1	
TOTAL	1.2E-4		1.8E-2	**1.4E-1**	1.2E-4		1.2E-1			1.8E-2	**1.4E-1**	**1.4E-1**	1.8E-2

(2) Resident: HIC_R (summed across each target organ)

TAC	AL	BN	CV	DEV	END	EYE	HEM	IMM	KID	NS	REP	RESP	SKIN
Arsenic			2.9E-3	2.9E-3						2.9E-3	2.9E-3	2.9E-3	2.9E-3
Benzene							1.5E-4						
Dioxin	2.8E-4			2.8E-4	2.8E-4		2.8E-4				2.8E-4	2.8E-4	
Nickel hydroxide				6.2E-3			6.2E-3				6.2E-3	6.2E-3	
TOTAL	2.8E-4		2.9E-3	**9.4E-3**	2.8E-4		6.6E-3			2.9E-3	**9.4E-3**	**9.4E-3**	2.9E-3

8-Hour Chronic Hazard Index:

Worker: $\mathbf{HIC8_W = \Sigma [(Q_{tpy}) \times (\chi/Q)_{chronic} \times WAF]/(8\text{-hour Chronic REL})}$

Resident: $\mathbf{HIC8_R = \Sigma [(Q_{tpy}) \times (\chi/Q)_{chronic} \times WAF]/(8\text{-hour Chronic REL})}$

Based on Table 11.3, the target organs for the TACs with chronic RELs have been listed in Table D. The 8-hour chronic hazard indices for the TACs in this example are calculated as follows:

Arsenic: $HIC8_W$ = [8.30E-06 x 1.15 x 4.2 x 1] / (1.50E-02) = **2.7E-03**

$HIC8_R$ = [8.30E-06 x 0.06 x 1.0 x 1] / (1.50E-02) **= 3.3E-05**

Benzene: $HIC8_W$ = [7.50E-03 x 1.15 x 4.2 x 1] / (3.00E+00) = **1.2E-02**

$HIC8_R$ = [7.50E-03 x 0.06 x 1.0 x 1] / (3.00E+00) **= 1.5E-04**

Dioxin: **There are no 8-hour chronic REL values established for dioxin.**

Nickel hydroxide: $HIC8_W$ = [2.30E-03 x 1.15 x 4.2 x 0.6332] / (6.00E-02) = **1.2E-01**

$HIC8_R$ = [2.30E-03 x 0.06 x 1.0 x 0.6332] / (6.00E-02) **= 1.5E-03**

(1) Worker: $HIC8_W$ (summed across each target organ)

TAC	AL	BN	CV	DEV	END	EYE	HEM	IMM	KID	NS	REP	RESP	SKIN
Arsenic			2.7E-3	2.7E-3						2.7E-3	2.7E-3	2.7E-3	2.7E-3
Benzene							1.2E-2						
Dioxin													
Nickel hydroxide								1.2E-1				1.2E-1	
TOTAL			2.7E-3	2.7E-3			1.2E-2	**1.2E-1**		2.7E-3	2.7E-3	**1.2E-1**	2.7E-3

(2) Resident: $HIC8_R$ (summed across each target organ)

TAC	AL	BN	CV	DEV	END	EYE	HEM	IMM	KID	NS	REP	RESP	SKIN
Arsenic			3.3E-5	3.3E-5						3.3E-5	3.3E-5	3.3E-5	3.3E-5
Benzene							1.5E-4						
Dioxin													
Nickel hydroxide								1.5E-3				1.5E-3	
TOTAL			3.3E-5	3.3E-5			1.5E-4	**1.5E-3**		3.3E-5	3.3E-5	**1.5E-3**	3.3E-5

Acute Hazard Index:

For all acute compounds with RELs developed over 1 hour average, the acute hazard indices are estimated using the equation below:

Worker & Resident: HIA= $[Q_{lbph} \times (\chi/Q)_{hr}]/$(Acute REL)

Based on Table 11.2, the target organs for the TACs have been listed in Table E. The χ/Q values were taken from Table 7. Since the

Note: The χ/Q values in Table 7 are based upon the maximum hourly emission rates.

Arsenic: HIA_W = [8.30E-06 x 107.4 x 1] / (2.00E-01) = **4.5E-03**
HIA_R = [8.30E-06 x 10.44 x 1] / (2.00E-01) **= 4.3E-04**

Benzene: HIA_W = [7.50E-03 x 107.4 x 1] / (2.70E+01) = **3.0E-02**
HIA_R = [7.50E-03 x 10.44 x 1] / (2.70E+01) **= 2.9E-03**

Dioxin: **There are no acute REL values established for dioxin.**

Nickel hydroxide: HIA_W = [2.30E-03 x 107.4 x 0.6332] / (2.00E-01) = **7.8E-01**
HIA_R = [2.30E-03 x 10.44 x 0.6332] / (2.00E-01) **= 7.6E-02**

(1) Worker: HIA_W (summed across each target organ)

TAC	AL	BN	CV	DEV	END	EYE	HEM	IMM	KID	NS	REP	RESP	SKIN
Arsenic			4.5E-3	4.5E-3						4.5E-3	4.5E-3		
Benzene				3.0E-2			3.0E-2	3.0E-2			3.0E-2		
Dioxin													
Nickel hydroxide								7.8E-1					
TOTAL			4.5E-3	3.5E-2			3.0E-2	**8.1E-1**		4.5E-3	3.5E-2		

(2) Resident: HIA_R (summed across each target organ)

TAC	AL	BN	CV	DEV	END	EYE	HEM	IMM	KID	NS	REP	RESP	SKIN
Arsenic			4.3E-4	4.3E-4						4.3E-4	4.3E-4		
Benzene				2.9E-3			2.9E-3	2.9E-3			2.9E-3		
Dioxin													
Nickel hydroxide								7.6E-2					
TOTAL			4.3E-4	3.3E-3			2.9E-3	**7.9E-2**		4.3E-4	3.3E-3		

Summary of Results

	MICR	HIC	HIC8	HIA
Worker	8.50×10^{-7}	1.4E-01	1.2E-01	8.1E-01
Resident	2.06×10^{-7}	9.4E-03	1.5E-03	7.9E-02
Rule 1401 Threshold	1×10^{-6}	1	1	1
Exceeds Threshold?	No	No	No	No

RESULT:

- ***MICRs for residential and commercial receptors do not exceed 1×10^{-6} (one in one million).***
- ***Calculation of cancer burden is not necessary.***
- ***HIC, HIC8, and HIA for residential and commercial receptors are less than 1 for all organ systems.***

The equipment in this example does not contain T-BACT; therefore, it would pass the Rule 1401 limits. A Tier 3 or 4 analysis is not necessary.

EXAMPLE 3: CONTEMPORANEOUS RISK REDUCTION

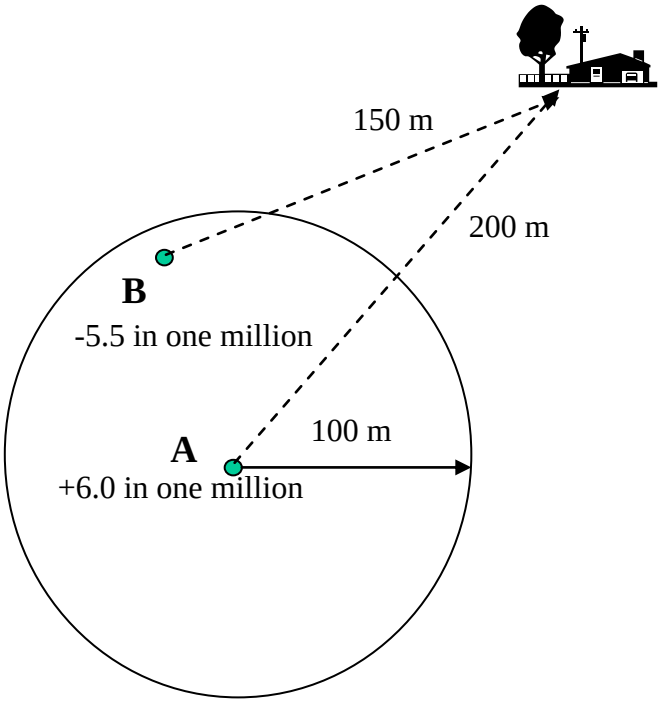
Rule 1401(g)(2)(A): The requirements of paragraph (d)(1) and (d)(4) shall not apply if the applicant demonstrates that a contemporaneous risk reduction resulting in a decrease in emissions will occur such that both of the following conditions are met:

(i) no receptor location will experience a total increase in MICR of greater than one in one million due to the cumulative impact of both the permit unit and the contemporaneous risk reduction, and

(ii) the contemporaneous risk reduction occurs within 100 meters of the permit unit.

T-BACT shall be used on permit units exempted under this subparagraph if the MICR from the permit unit exceeds one in one million (1×10^{-6}).

Note: All permit applications associated with the increases and decreases in risk for contemporaneous risk reduction must be submitted together and the reduction in risk must occur before the start of operation of the equipment that will have an increase in risk.



Assumptions:

Units A and B: Only have cancer impacts.

Unit A: New equipment, installed with T-BACT, MICR = 6.0 in one million

Unit B: Existing equipment with decreased MICR of 5.5 in one million due to change in operating conditions or process. Unit B emissions, prior to modification, resulted in an 8 in a million risk for the nearest receptor. After modification, Unit B risk is 2.5 in a million which is a decrease of 5.5 in a million.

Receptor R1: The increased risk for Receptor R1 is the MICR for Unit A less the decrease in risk for Unit B.

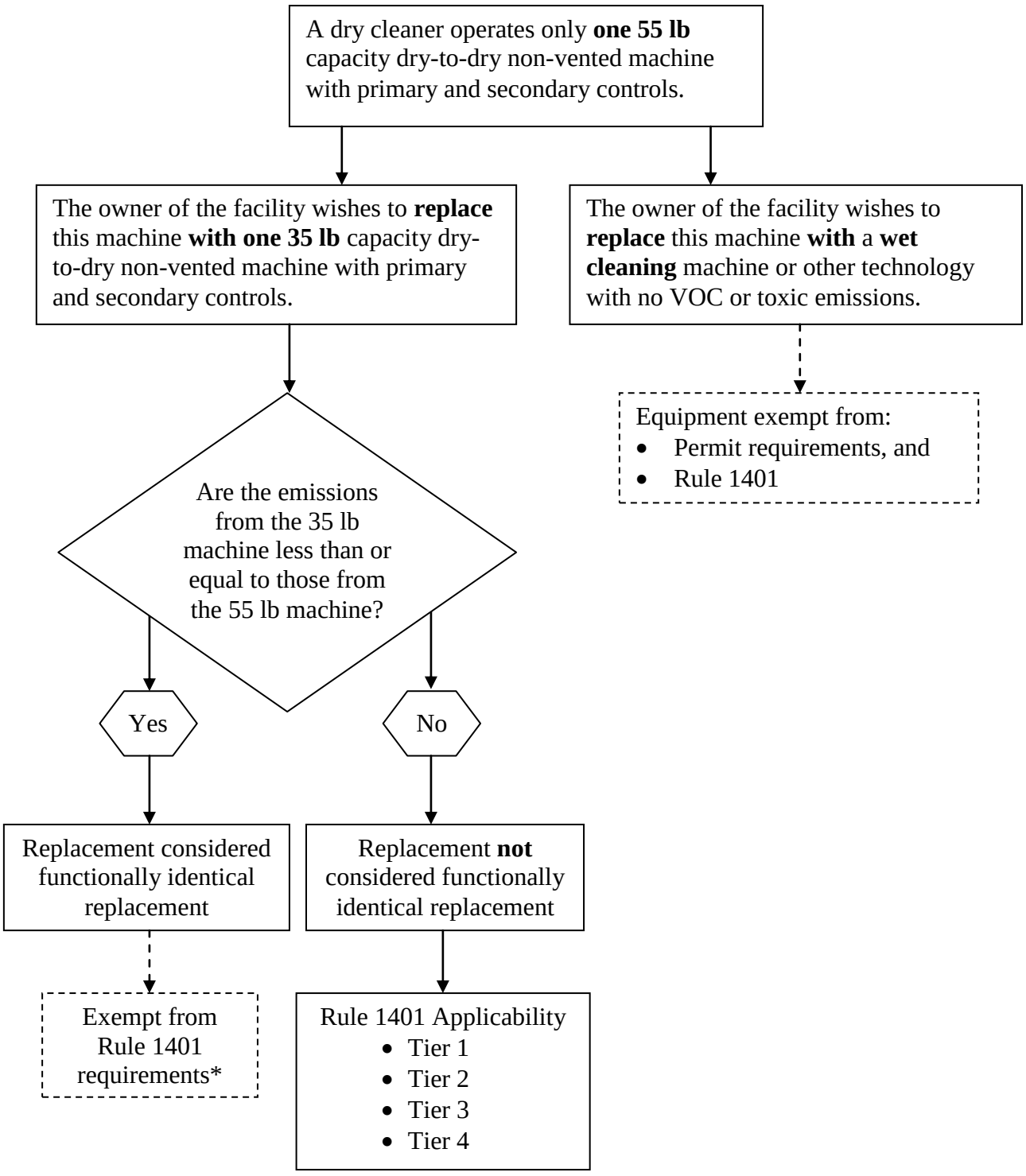
6.0 – 5.5 = **0.5 in one million**.

Note: This demonstaration is best achieved with a Tier 4 analysis (detailed air dispersion modeling) and must be performed for all possible receptors.

RESULT:

- ***Equipment was installed using T-BACT.***
- ***No receptor experiences an increase in risk greater than one in** one **million.***
- ***The contemporaneous risk reduction occurs within 100 meters of the new equipment.***
- ***If all other rule requirements are met, a permit would be issued.***

EXAMPLE 4: FUNCTIONALLY IDENTICAL EQUIPMENT REPLACEMENT



* Rule 1421(d)(1)(F) allows for the functionally identical equipment replacement of **only one** machine. Please note that all perchloroethylene machines must comply with Rule 1402 as well. As of December 31, 2020, no new or existing dry cleaning facility may use a perchloroethylene dry cleaning system.

BEST AVAILABLE CONTROL TECHNOLOGY FOR TOXICS

Best Available Control Technology for Toxics (T-BACT) is not required if the MICR is less than or equal to one in one million. If cancer risk is greater than one in a million, T-BACT is required and must reduce risk to less than or equal to 10 in a million.

SIC Codes, which describe industry types or classifications, or SCC Codes, which describe emitting processes or equipment, can be used to help identify T-BACT. If no standard is available, SCAQMD staff works with the applicant to identify T-BACT when required.

SCAQMD staff is continually examining and updating control technologies that comply with the definition presented in Rule 1401(c)(2). However, in many situations T-BACT is equivalent to BACT. The applicant is encouraged to contact the SCAQMD permit processing division for current T-BACT information.

T-BACT EXAMPLES

Type of Industry:	*Wood Finishing*
Type of Emitting Process:	***Wood Coatings***
Specific TAC Emissions:	***Ethyl Benzene,***
	Formaldehyde
Applicable BACT:	*Thermal Oxidizer*
T-BACT:	*Thermal Oxidizer*

BACT = T-BACT

With T-BACT, risk is 10 in one million or less

T-BACT is acceptable

Type of Industry:	*Metal Plating*
Type of Emitting Process:	***Nickel Plating, Chromium Plating***
Specific TAC Emissions:	***Nickel, Hexavalent Chromium***
Applicable BACT:	*Wet Scrubber*
T-BACT:	*HEPA*

With T-BACT, risk is 10 in one million or less

T-BACT is acceptable

APPENDIX I

Calculation Worksheets

Maximum Individual Cancer Risk (MICR) Calculation Worksheet
Acute Hazard Index (HIA) Calculation Worksheet
Chronic Hazard Index (HIC) Calculation Worksheet
8-Hour Chronic Hazard Index (HIC8) Calculation Worksheet

Maximum Individual Cancer Risk (MICR) CALCULATION WORKSHEET

Facility Name: _____

Facility Address: _____

Description of Equipment: _____

Equipment is (circle one): **Point Source** or **Volume Source**

Toxic Air Contaminants Emitted by Equipment	Maximum Annual Emissions, Q_{lbpy} (lb/yr)	Maximum Annual Emissions, Q_{tpy} (ton/yr)	CP (Table 8.1)	MICR MP (Table 8.1)	
				Resident	Worker
1.					
2.					
3.					

Equipment operates (circle one) ≤ **12 hr/day** or > **12 hr/day**

If equipment is a **point source**, enter **Stack Height:** _____ ft

If equipment is a **volume source**, enter **Building Height:** _____ ft & **Floor Area:** _____ ft^2

Distance **to nearest residential or sensitive receptor:**_____ m &
Off-site worker receptor: _____ m

Nearest **SCAQMD meteorological station:** _____ (Tables 12.1 & 12.2 & Fig 1 & 2)

Select **χ/Q** and **WAF Tables** as follows (circle tables selected)

	Point Source	Volume Source
≤ 12 hr/day	Tables 2.1, 2.2, 2.2, 10.1	Tables 4.1, 4.2, 4.3, 4.4, 4.6, 4.6, 10.1
> 12 hr/day	Tables 3.1, 3.2, 3.3, 10.2	Tables 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 10.2

Select **CP** and **MP** from Table 8.1

χ/Q value for nearest residential/sensitive receptor: _____
for nearest off-site worker receptor: _____

WAF value for nearest residential/sensitive receptor: 1.0
for nearest off-site worker receptor: _____

CEF value for nearest residential/sensitive receptor: 676.63
for nearest off-site worker receptor: 56.2

MICR CALCULATION

TACs	CP	Q_{tpy}	χ/Q	CEF	MP	WAF	10^{-6}	MWAF	MICR
1.		**x**	**x**	**x**	**x**	**x**	**x** 10^{-6}	**x**	=
2.		**x**	**x**	**x**	**x**	**x**	**x** 10^{-6}	**x**	=
3.		**x**	**x**	**x**	**x**	**x**	**x** 10^{-6}	**x**	=
4.		**x**	**x**	**x**	**x**	**x**	**x** 10^{-6}	**x**	=

MICR =_____

Chronic Hazard Index (HIC) CALCULATION WORKSHEET

Target Organ/System*: (Table 11.1)

Facility Name: _____

Facility Address: _____

Description of Equipment: _____

Equipment operates (circle one) ≤ **12 hr/day** or > **12 hr/day**

Equipment is (circle one): **Point Source** or **Volume Source**

If equipment is a **point source**, enter:

Stack Height: _____ ft

If equipment is a **volume source**, enter

Building Height: _____ ft & **Floor Area**: _____ ft^2

Distance **to nearest residential or sensitive receptor:** _____ meters

Distance to **nearest off-site worker receptor**: _____ meters

Nearest **SCAQMD meteorological station:** _____ (Tables 12.1 & 12.2 & Fig 1 & 2)

Select **χ/Q** as follows (circle tables selected)

	Point Source	Volume Source
≤ 12 hr/day	Tables 2.1, 2.2, 2.2	Tables 4.1, 4.2, 4.3, 4.4, 4.6, 4.6
> 12 hr/day	Tables 3.1, 3.2, 3.3	Tables 5.1, 5.2, 5.3, 5.4, 5.5, 5.6

Select **Chronic REL** and **Chronic MP** from Table 8.1

Toxic Air Contaminants Emitted by Equipment	Maximum Annual Emissions, Q_{lbpy} (lb/yr)	Maximum Annual Emissions, Q_{tpy} (ton/yr)	Dispersion Factor (χ/Q)	Chronic Reference Exposure Level (REL)	Chronic Multi-pathway Factor (MP)
1.					
2.					
3.					
2.					
3.					

CHRONIC HAZARD INDEX (HIC) CALCULATION:

Σ [(Q_{tpy}) x (χ/Q) x MP] / (Chronic REL) for each TAC

TACs	Q_{tpy}		χ/Q		MP		REL		HIC
1.		**x**		**x**		/		=	
2.		**x**		**x**		/		=	
3.		**x**		**x**		/		=	

* A worksheet needs to be filled out for each affected target organ/system.

8-Hour Chronic Hazard Index (HIC8) CALCULATION WORKSHEET

Target Organ/System*:_____ (Table 11.3)

Facility Name: _____
Facility Address: _____
Description of Equipment: _____
Equipment operates (circle one) ≤ **12 hr/day** or > **12 hr/day**
Equipment is (circle one): **Point Source** or **Volume Source**
If equipment is a **point source**, enter:
Stack Height: _____ ft
If equipment is a **volume source**, enter
Building Height: _____ ft & **Floor Area**: _____ ft^2
Distance **to nearest residential or sensitive receptor:** _____ meters
Distance to **nearest off-site worker receptor**: _____ meters
Nearest **SCAQMD meteorological station:** _____ (Tables 12.1 & 12.2 & Fig 1 & 2)

	Point Source	Volume Source
≤ 12 hr/day	Tables 2.1, 2.2, 2.2, 10.1	Tables 4.1, 4.2, 4.3, 4.4, 4.6, 4.6, 10.1
> 12 hr/day	Tables 3.1, 3.2, 3.3, 10.2	Tables 5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 10.2

Select **8-Hour Chronic REL** and **8-Hour Chronic MP from Table 8.1;** and **WAF from Table 10.2**

Toxic Air Contaminants Emitted by Equipment	Maximum Annual Emissions, Q_{lbpy} (lb/yr)	Maximum Annual Emissions, Q_{tpy} (ton/yr)	Dispersion Factor (χ/Q)	Worker Adjustment Factor (WAF)	Chronic Reference Exposure Level (REL)
1.					
2.					
3.					

8-HOUR CHRONIC HAZARD INDEX (HIC8) CALCULATION:

Σ [(Q_{tpy}) x (χ/Q) x WAF] / (8-Hour Chronic REL) for each TAC

TAC	Q_{tpy}		χ/Q		WAF		REL		HIC8
1.		**x**		**x**		/		=	
2.		**x**		**x**		/		=	
3.		**x**		**x**		/		=	

* A worksheet needs to be filled out for each affected target organ/system.

Acute Hazard Index (HIA) CALCULATION WORKSHEET

Target Organ/System*: (Table 11.2)

Facility Name: _____

Facility Address: _____

Description of Equipment: _____

Equipment is (circle one): **Point Source** or **Volume Source**

If equipment is a **point source**, enter:

Stack Height: _____ ft

If equipment is a **volume source**, enter

Building Height: _____ ft & **Floor Area**: _____ ft^2

Distance **to nearest residential or sensitive receptor:** _____ meters

Distance to **nearest off-site worker receptor**: _____ meters

Nearest **SCAQMD meteorological station:** _____ (Tables 12.1 & 12.2 & Fig 1 & 2)

Select **χ/Q:** _____

Select **χ/Q**: from Table 6.1 if Point Source or from Table 7.1 if Volume Source

Select **Acute REL** from Table 8.1

Toxic Air Contaminants Emitted by Equipment	Maximum Hourly Emissions, Q_{lbph} (lb/hr)	Peak Hourly Dispersion Factor χ/Q	Acute Reference Exposure Level (REL)
1.			
2.			
3.			

ACUTE HAZARD INDEX (HIA) CALCULATION:

$[Q_{lbph}$ x (χ/Q)] / (Acute REL)

TAC	Q_{lbph}		χ/Q		REL		HIA
1.		**x**		/		=	
2.		**x**		/		=	
3.		**x**		/		=	

* A worksheet needs to be filled out for each affected target organ/system.

APPENDIX II

Derivation of Tier 2 Multi-pathway Adjustment Factors (MP)

DERIVATION OF TIER 2 MULTI-PATHWAY ADJUSTMENT FACTORS (MP)

MULTI-PATHWAY FACTORS (MP)

Toxic air contaminants enter the body through a number of routes: inhalation; absorption through the skin; and ingestion from contaminated food, water, milk and soil. To account for uptake of toxics through routes of exposure other than inhalation, risk assessments often include a "multi-pathway" exposure analysis.

To simplify the screening risk assessment, multi-pathway adjustment (MP) factors were developed. The inhalation risk is multiplied by the MP factors to account for the additional health risk due to other pathways of exposure.

SCAQMD staff has previously developed multi-pathway factors in its risk assessment and screening procedures. For this update of the risk assessment procedures, the methodology has been updated and multi-pathway factors have been developed for additional compounds.

The MP factors were developed using the Risk Assessment Standalone Tool (RAST) build 15071, a computer software package that calculates risks based on ground level concentrations (GLC). Assumptions and parameters used to develop the MP factors are listed below:

Risk assessment options:

- Deposition velocity – 0.02 m/sec
- OEHHA default exposures are assumed for mother's milk, homegrown produce, and soil exposure
- A 'warm' climate, typical for Southern California is assumed for the dermal exposure pathway
- For noncancer chronic risk estimates, the "OEHHA Derived Method" risk analysis method is used. In this approach, the inhalation pathway is always considered a driving pathway, the next two dominant (driving) exposure pathways use the high-end point-estimates of exposure, while the remaining exposure pathways use mean point estimates.
- For residential cancer risk estimates, the "RMP (Derived) Method" risk analysis method is used. In this method, if inhalation is one of the top two dominant pathways, the method uses the breathing rate at 95th percentile of exposure for $\leq$ 2 years of age, and the breathing rate at the 80th percentile exposure for > 2 years of age. If inhalation is not the top two dominant pathways, it uses mean. For worker cancer risk, the "OEHHA Derived Method" risk analysis method is used.
- Pathways considered for residential exposure include inhalation, soil ingestion, dermal absorption, homegrown produce, and mother's milk.
- Pathways considered for worker exposure include inhalation, soil ingestion, and dermal absorption.

- The cancer risk estimates, including the Derived equations (both OEHHA and Adjusted), are based on 30-year exposures.
- The chronic multipathway factors (resident and worker) for the group listing of polychlorinated biphenyls (CAS number 57465-28-8) has been assigned those of its individual subspecies (243.908 and 10.82, respectively). (The group listing of PCBs does not include the Toxicity Equivalency Factors as developed by the World Health Organization 1997 and as adopted by the Office of Environmental Health Hazards Assessment in 2015.) PCB 126 (3,3',4,4',5-Pentachlorobiphenyl), CAS number 57465-28-8 was used in the calculation of the screening approach since it has the most stringent REL. In a case that a facility provides speciated PCB data, or other justification is available, different MP factor can be used subject to SCAQMD approval.

APPENDIX III

PROCEDURES FOR ADDRESSING NON-DETECTED COMPOUNDS AND BLANKS IN RISK ASSESSMENT

Procedures for Addressing Non-detected Toxic Air Contaminants and Blanks in Risk Assessment

INTRODUCTION

This appendix describes guidelines for estimating emissions of non-detected toxic air contaminants (TACs) and using blanks in emissions estimations for purposes of preparing health risk assessments for Rules 1401, 1402 and the Air Toxics "Hot Spots" program (AB 2588). Procedures are the same for preparing risk assessments for Rules 1401, 1402 and AB2588, however the lists of compounds are different. Rule 1401 uses only cancer potency factors (CPc) and reference exposure levels (RELs) approved by the Scientific Review Panel and prepared by the state Office of Environmental Health Hazard Assessment (OEHHA), whereas Rule 1402 and AB2588 use different sources for CPs and RELs, including draft numbers.

Under previous policy, the SCAQMD required that if a TAC could be present in emissions from a source but not detected during air testing, it must be assumed to be present below the limit of detection (LOD). This approach has been applied to stack testing, to measurements such as laboratory analysis of materials, and other monitoring and measurement methods. The concentration of non-detected TACs were to be reported as one-half (1/2) of the LOD.

Concerns were raised that this policy of carrying undetected TACs through a health risk assessment at half of the LOD could inflate risk estimates and might require facilities to install control equipment for emissions that may not be present. In addition, it would not be possible to detect the TAC after its emissions had been controlled and reduced.

Also, in the past, the SCAQMD did not allow any adjustments in the measured values of samples based on the results of reagent blanks. Concerns were raised that in certain cases the concentration of TACs measured in reagent blanks should be deducted from the actual measured samples.

To address these concerns, SCAQMD staff worked closely with affected facilities such as publicly owned treatment works (POTWs) and others during previous rulemaking efforts for Rules 1401 and 1402 to develop guidelines for addressing non-detected TACs and blanks in risk assessment.

OVERVIEW

The new approach begins with an initial level of screening to determine whether or not a TAC is likely to be present and therefore should be tested for. If the conditions in the screening guidelines are met, no further testing or analysis is required. If a TAC does not pass the screening guidelines, the facility must quantify and report the emissions of the compound through testing or other methods as approved by SCAQMD staff. The reported emission levels are calculated based on the number of test runs or analyses that are below the LOD.

SCREENING GUIDELINES

For a TAC to be excluded from testing or analysis and hence quantification for health risk assessment, it must meet either condition A, B, or C listed below.

Proof for exclusion of any TAC based on literature studies on physical nature or chemistry of the compounds to substantiate the findings, and any prior analysis or testing shall be deemed complete for SCAQMD approval. Any prior testing must have been conducted according to SCAQMD's approved test methods or other recognized standards, as approved by SCAQMD staff.

If a list of TACs to be tested for is agreed upon but is subsequently discovered by the facility or the SCAQMD that additional compounds may be present, SCAQMD staff may require that the facility test for the presence of the additional TACs.

The screening criteria to be used for determining the presence of TACs are the following.

Condition A: No likelihood of the presence of a TAC

A facility may choose to demonstrate that there is no likelihood of a TAC being present in the raw materials, process streams or materials introduced into the equipment or process. The methodology or documentation to show proof of the non-existence of the TAC must be deemed complete with the source test protocol or test method analysis protocol for SCAQMD approval. If the evidence to substantiate the absence of a TAC is insufficient, or SCAQMD staff has reason to believe that the TAC may be present, it must be tested for and quantified (see Cases 1, 2, and 3).

For example, a facility operator can demonstrate the absence of cadmium in emissions from the melting of lead ingots in a pot furnace by presenting the following documentation:

- Certified analysis of the lead ingots showing that cadmium is not a constituent of the ingot.
- Description of the process substantiating that no other material is added to the furnace that will contribute to cadmium emissions. The operator must also provide analysis for the fuel used in the process to demonstrate that it does not contain cadmium.
- Documentation substantiating that melting lead ingots without cadmium present in the ingot in a pot furnace will not result in the emissions of cadmium when the firebricks or pot liner are heated during the melting operations.

In addition, the facility operator may submit test results based on tests performed within the last two years, or a longer period if the facility can demonstrate that no significant changes have occurred to the SCAQMD-approved test method, process equipment or process materials, that indicate cadmium was reported as below LOD.

Condition B: Absence of a TAC or its precursors in the process

If there is any evidence that precursors, which could lead to formation of a TAC during a process or reaction, may be present, then a facility may have to test for the TAC. To be excluded from testing and quantification requirements, the facility must provide documentation to demonstrate, based on test results, that none of the essential precursors are present in the material or process. This is similar to the previous criteria and differs only in that precursor compounds that could contribute to the formation of the subject TAC must also be identified as not being present.

An example is emission of dioxins from a waste incinerator. In this case, test data may be available to show that there are no dioxins present in the waste stream being incinerated. However, the presence of chlorine and hydrocarbons in the combustion process could result in the formation of products of incomplete combustion (PICs) such as dioxins or other toxic compounds. Testing for these compounds would be required unless the facility operator demonstrates that none of the essential precursors are present in the waste stream or the process itself.

Condition C: Special TAC list for POTWs

Unlike other industrial sources whose potential toxic air emissions are relatively well defined and which contain limited species, proving the absence of TACs from emissions from POTWs is more difficult. This is because the instantaneous discharge of wastewater from various residential, commercial and industrial system users could potentially result in the presence of different toxic contaminants in the influent sewage. Therefore, it is recommended that a special TAC list be developed for POTWs to select appropriate TACs for testing and determination of health risk associated with air emissions from liquid phase and sludge treatment processes.

The special TAC list for POTWs will be approved by SCAQMD staff with consideration given to information including but not limited to the following:

1. The Pooled Emission Estimating Program (PEEP) identified and selected compounds under the AB 2588 emissions inventory program, as approved by SCAQMD staff.

2. The Joint Emissions Inventory Program (JEIP) identified and selected compounds under SCAQMD Rule 1179 inventory requirements, as approved by SCAQMD staff.

3. TACs that have a reasonable likelihood of being present in the air emissions of POTWs, based on other test results or information sources, as approved by SCAQMD staff.

Additionally, based on the specific sources of sewage for certain POTWs, specific TACs in addition to the ones identified through the above steps could be added or deleted from the list on a case-by-case basis.

Based on the special TAC list for POTWs as developed from the above procedure and subject to approval by SCAQMD staff, facilities will be required to quantify the listed compounds through

testing or other methods approved by SCAQMD staff for inclusion in the health risk assessment. The facility will not have to test for compounds not included in the special TAC list for POTWs, and the inclusion of non-listed TACs in the health risk assessment is not required. However, if after the industry-specific list is developed and approved, the facility or the SCAQMD later discovers information that additional TACs may be present, SCAQMD staff may revise the industry-specific list and may require the facility to quantify emissions of such TACs that were previously excluded from quantification.

QUANTIFICATION OF EMISSIONS BASED ON SOURCE TEST RESULTS

The cases listed below explain the process for quantification of emissions based on the source test results.

Treatment of Test Runs Below LOD

If some test runs are below LOD, quantification of the TAC depends on the percent of the test runs and analyses that are below LOD. Three possible scenarios are discussed below. In all of these cases, all of the following three conditions must be met:

1. All tests should be performed using SCAQMD-approved test methods, triplicate sample runs and SCAQMD-approved detection limits. When non-detected values are reported, the actual analytical limit of detection for all runs and the number of sample runs shall be reported; and

2. The data from the analyses or tests were obtained within a period of two (2) years prior to the time the data is to be used by SCAQMD staff, unless the facility demonstrates to the SCAQMD's satisfaction that earlier test data remain valid due to lack of significant changes in test methods, process equipment or process materials; and

3. For cyclic operations or variations in feedstock, the tests or analyses conducted should be representative of the variations in loads, feed rates and seasons, if applicable. In such cases, an adequate number of test runs should be conducted for all cyclic or seasonal operations.

Case #1: TAC is not detected in any test runs or analyses

In situations in which all test runs and analyses consistently indicate levels below the LOD, the compound can be identified as "not detected" and its inclusion in the health risk assessment will not be required, provided all three conditions listed above are met.

Case #2: TAC is detected in less than 10% of the test runs or analyses

In situations in which a compound has been detected and the percentage of samples in which it is detected is less than ten percent, and provided that all three conditions listed above are met, the following procedure shall be used to average the results:

1. For those runs or analyses that were below LOD, assign zero.
2. Average the measured values obtained for the runs that were above LOD with zero values for the runs below LOD and report the final average result for use in the risk estimation.

Case #3: TAC is detected in 10% or more of the test runs or analyses

In cases in which ten or more percent of the test runs and analyses show measured values of a TAC above the LOD, and provided that all three condition listed above are met, the following procedure shall be used to average the results:

1. For those runs or analysis that were below LOD, assign one half (1/2) of the corresponding LOD for each run.
2. Average the measured values obtained for the runs that were above LOD with 1/2 LOD values for the runs below LOD and report the final average result for use in the risk estimation.

In cases in which there are fewer than ten samples (for example, two triplicate samples have been taken) and a TAC has been detected in one or more samples, the following procedures shall be used.

- If the TAC is detected in one sample, use Case #2.
- If the TAC is detected in two or more samples, use Case #3.

Use of Reagent Blanks

Reagent blank values may be subtracted from sample values under the conditions specified below. In order to use these procedures, it will be necessary to obtain from SCAQMD staff, prior to the test or analyses, a determination as to the maximum allowable value for the blank.

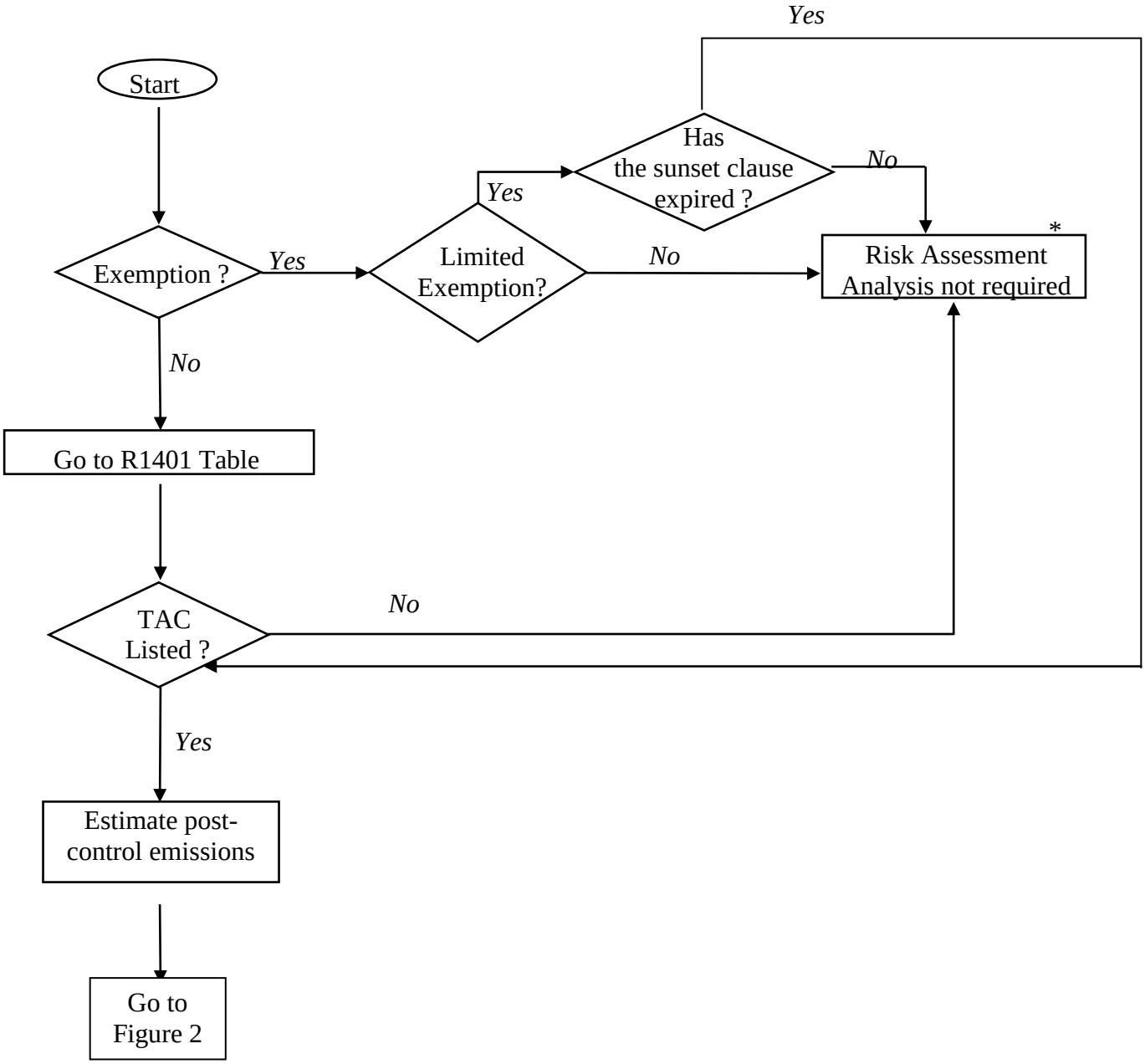
If the level of the TAC in the reagent blank is less than or equal to the maximum allowable blank, the reagent blank may be subtracted. The data must be reported with and without the correction. If the level of the TAC in the reagent blank is greater than the maximum allowable blank and the concentration of the sample is greater than 3 times the reagent blank value, then the maximum allowable reagent blank value can be subtracted. The data must be reported with and without correction.

APPENDIX IV

FLOW CHARTS AND DIAGRAMS

Note: The reader needs to ascertain the date in which the subject equipment's permit application was deemed complete. This date is used to identify the correct set of permitting tables (see Attachments) to be used for permit processing.

Figure 1
Preliminary Tasks



* Consult with SCAQMD staff for other TACs not listed in Table 1.1, which potentially endanger public health or may require a Rule 212 evaluation.

Figure 2
Tier 1 - Screening Levels

Tier 1 involves comparing emissions or source specific units from a piece of equipment to Screening Levels

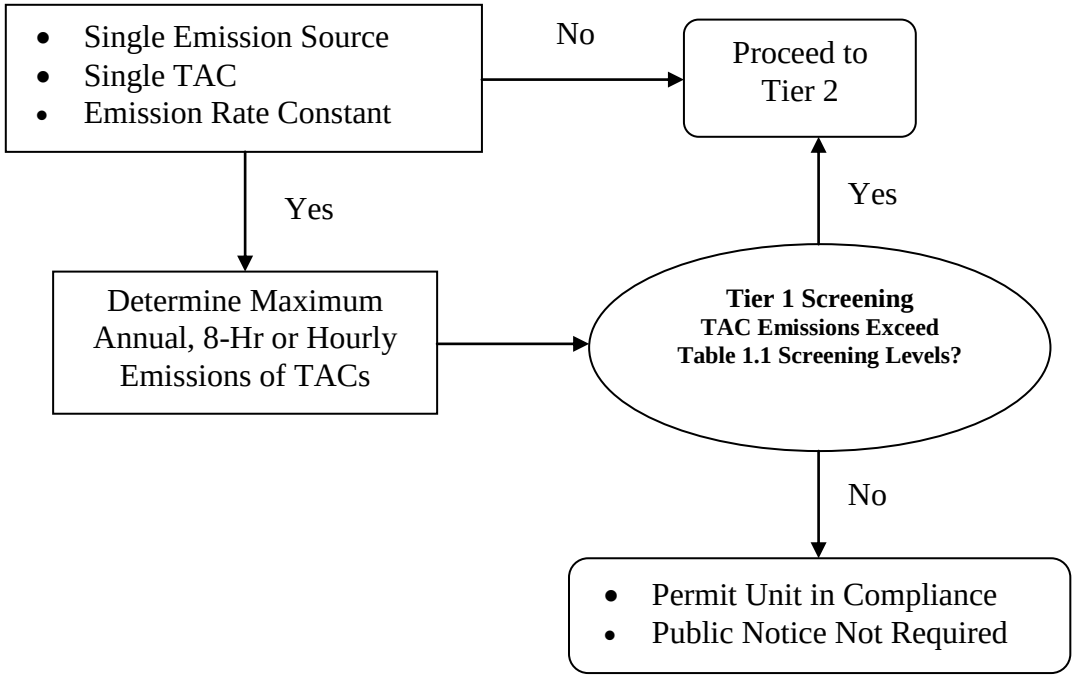
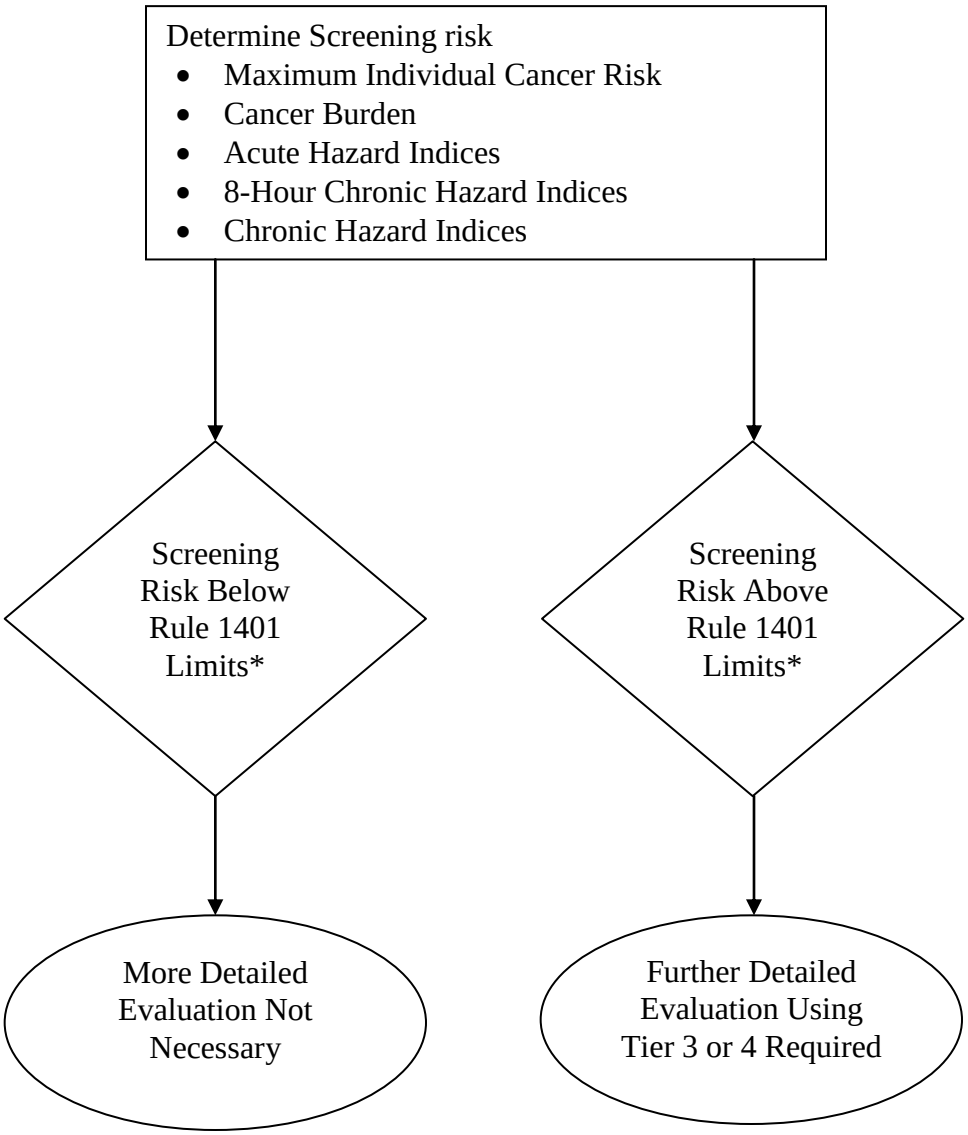


Figure 3A
Tier 2 - Screening Levels

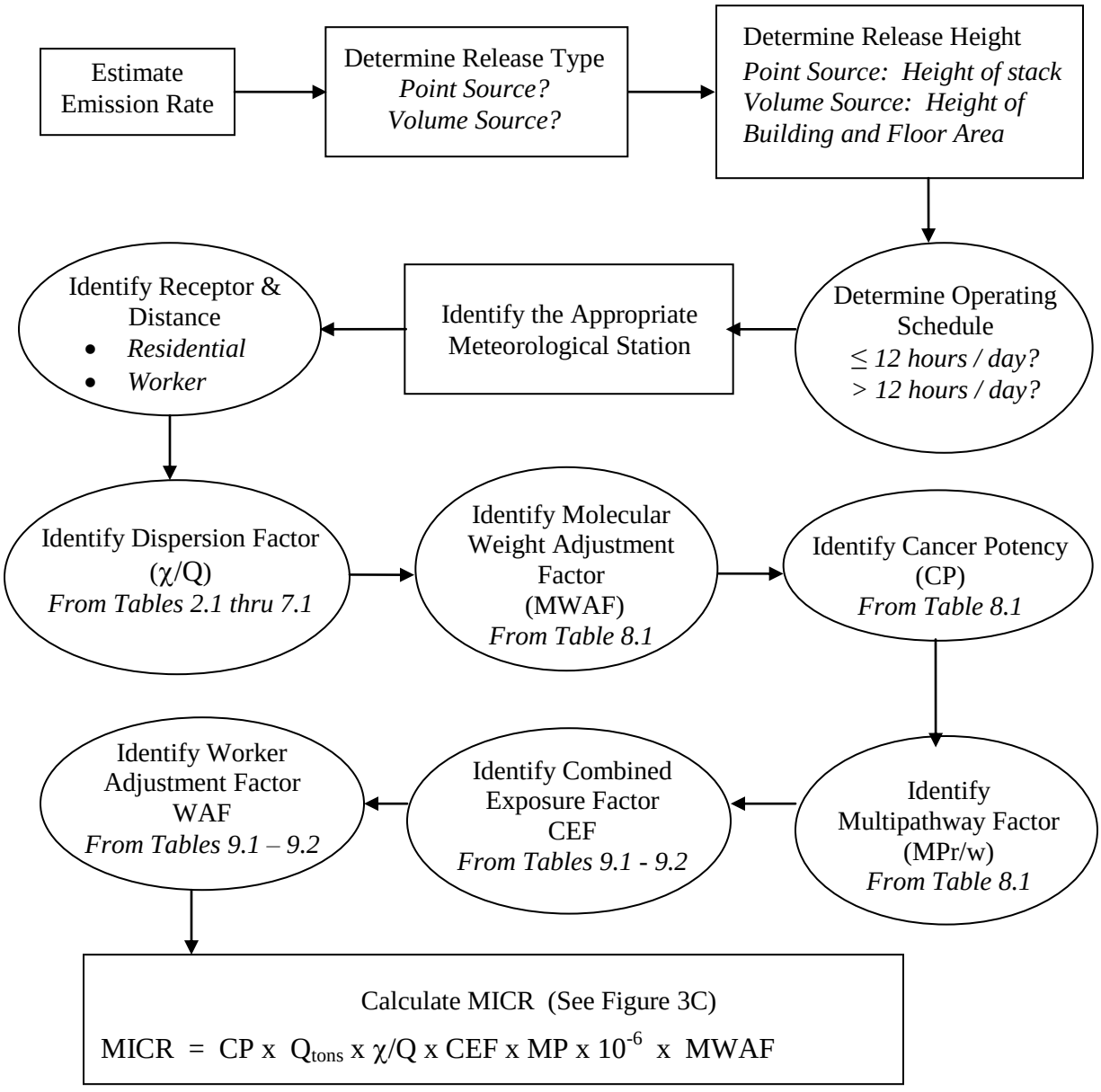
Tier 2 is a screening risk assessment, which includes procedures for determining level of risk from MICR, Cancer Burden, Acute, 8-Hour Chronic & Chronic Hazard Indices



* *Level of Concern:*

- *MICR exceeds one in one million with no T-BACT*
- *MICR exceeds 10 in one million with T-BACT*
- *Cancer burden exceeds 0.5*
- *HIA, HIC8 or HIC exceeds 1 for any target organ system*

Figure 3B
Tier 2 - Maximum Individual Cancer Risk (MICR) Calculation



If MICR exceeds one in one million, cancer burden must also be estimated. (See Figure 4.)

Figure 3C
Tier 2 - Maximum Individual Cancer Risk (MICR) Equation

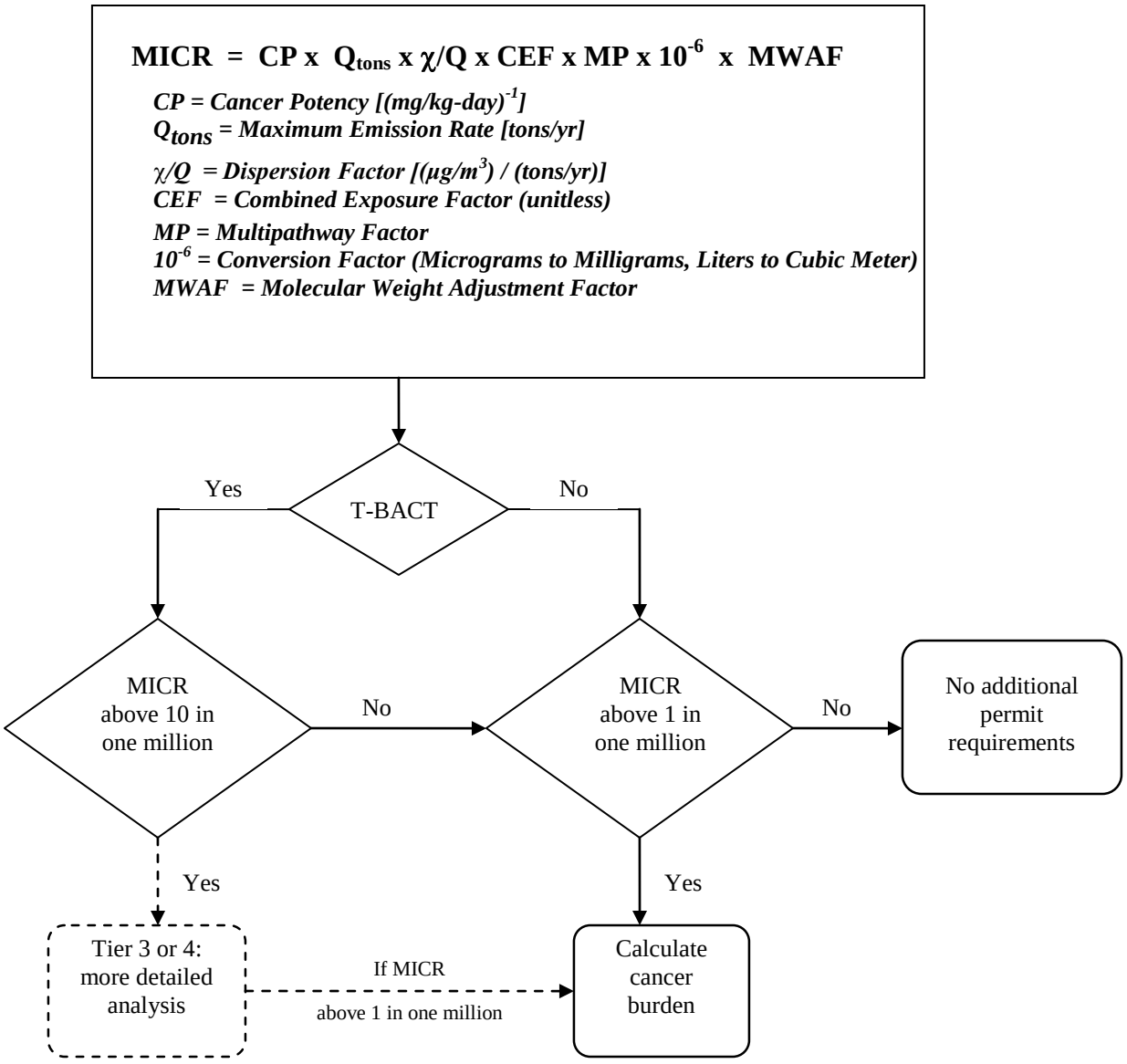


Figure 3D
Tier 2 - Dispersion Factor

Dispersion Factor (χ/Q): Numerical estimates of the amount of decrease in concentration of a contaminant as it travels away from the site of release.

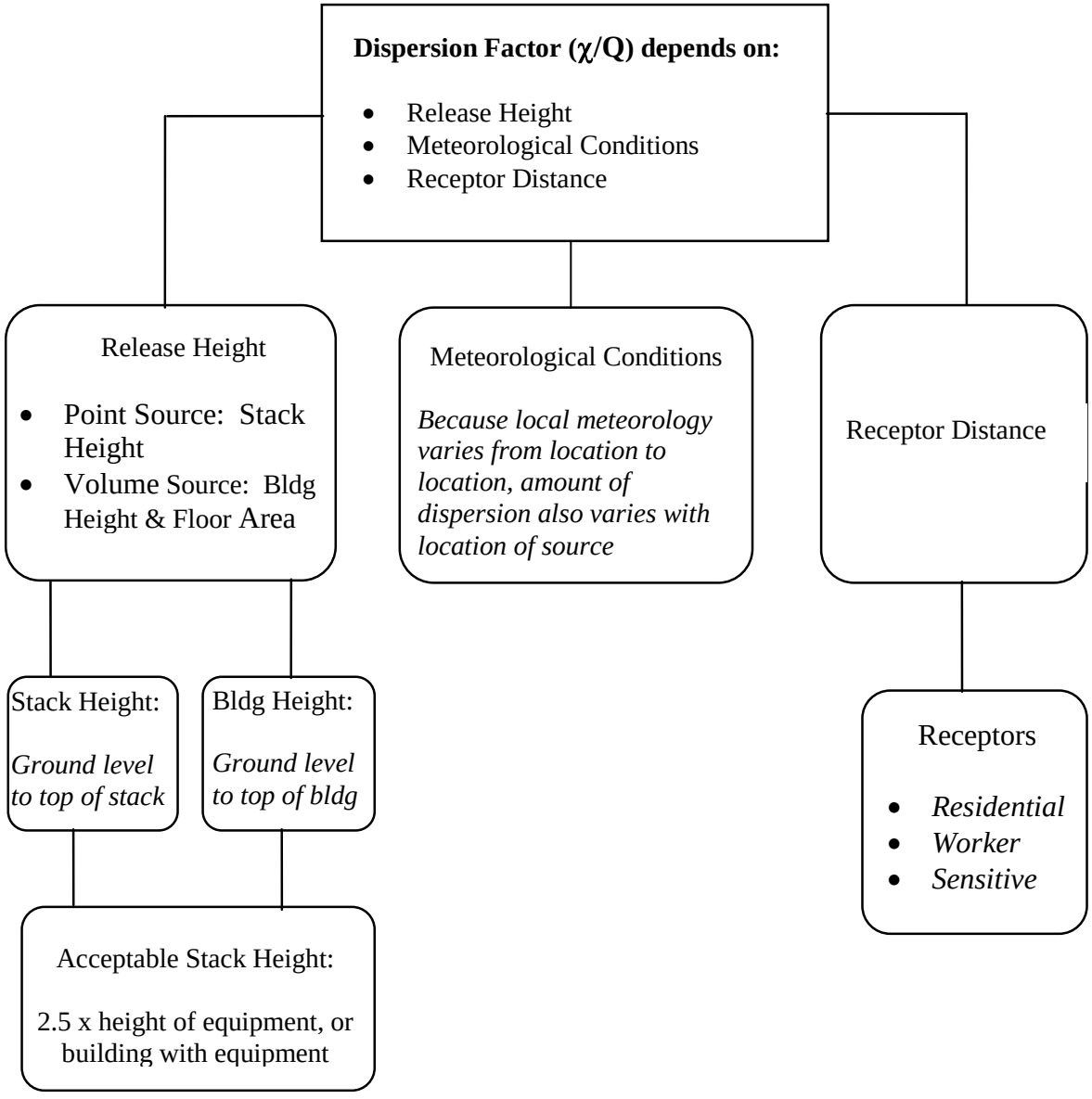


Figure 3E
Tier 2 - Multi-pathway Adjustment Factor

Multi-pathway Adjustment Factor (MP)

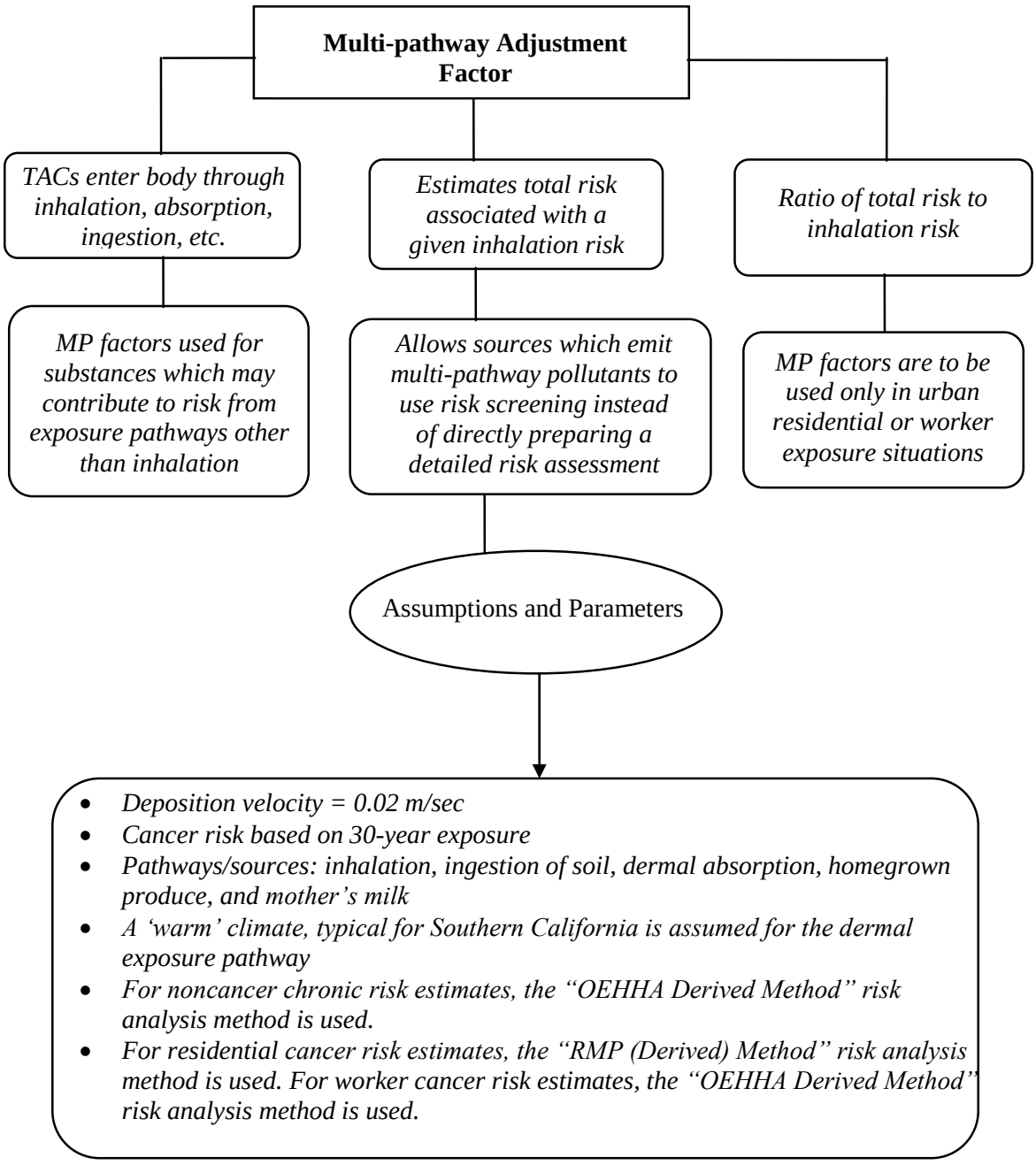


Figure 3F
Tier 2 - Combined Exposure Factor

Combined Exposure Factor (CEF)

CEF

Combines default exposure parameters for:

- Daily Breathing Rate (DBR)
- Age Sensitivity Factor (ASF)
- Exposure Duration (ED)
- Fraction of Time Spent at Home (FAH)
- Exposure Frequency (EF)
- Average Time (AT)

From Tables 9.1 and 9.2

Figure 4
Cancer Burden

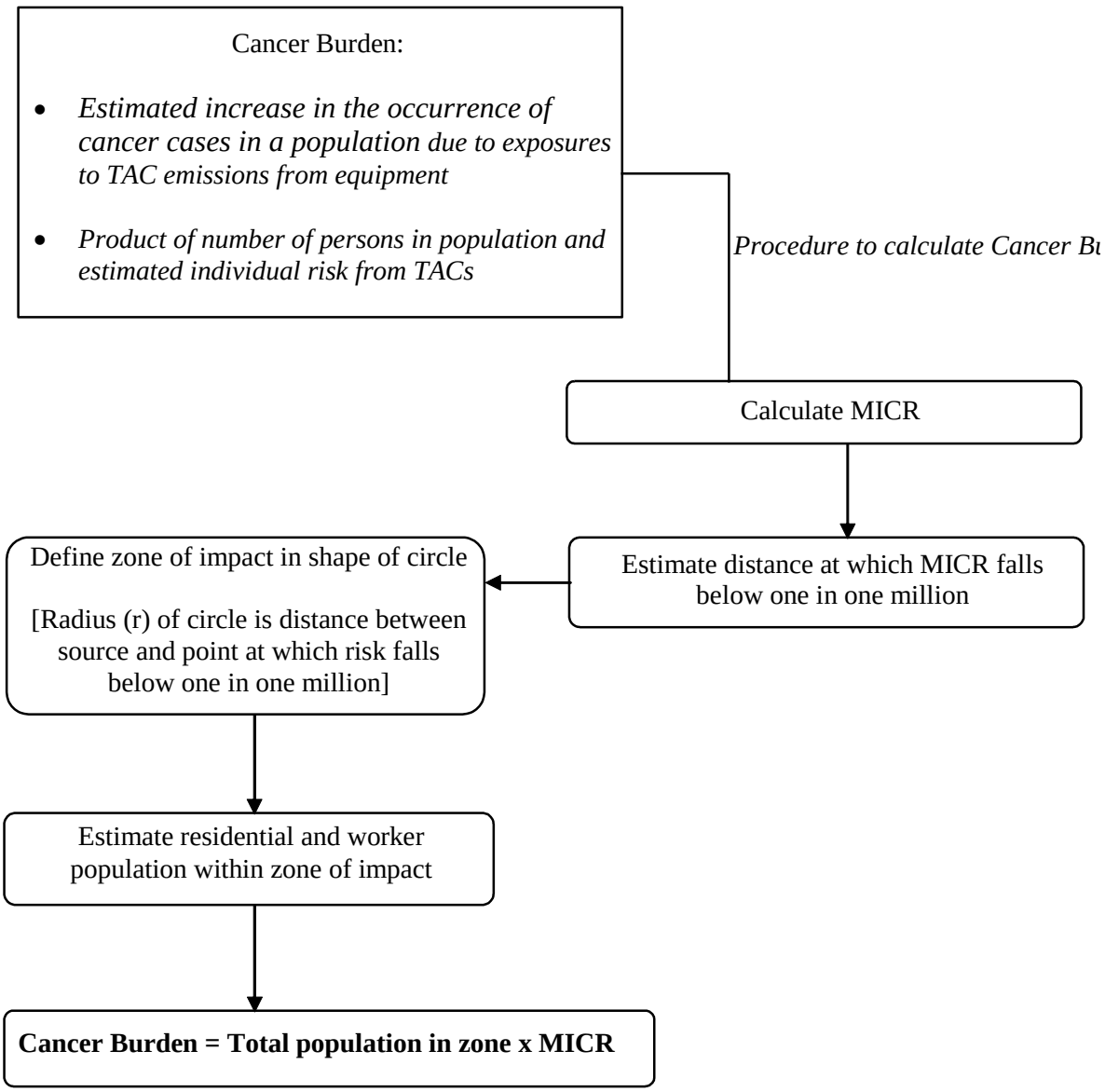


Figure 5
Chronic and 8-Hour Chronic Hazard Index (HIC and HIC8)

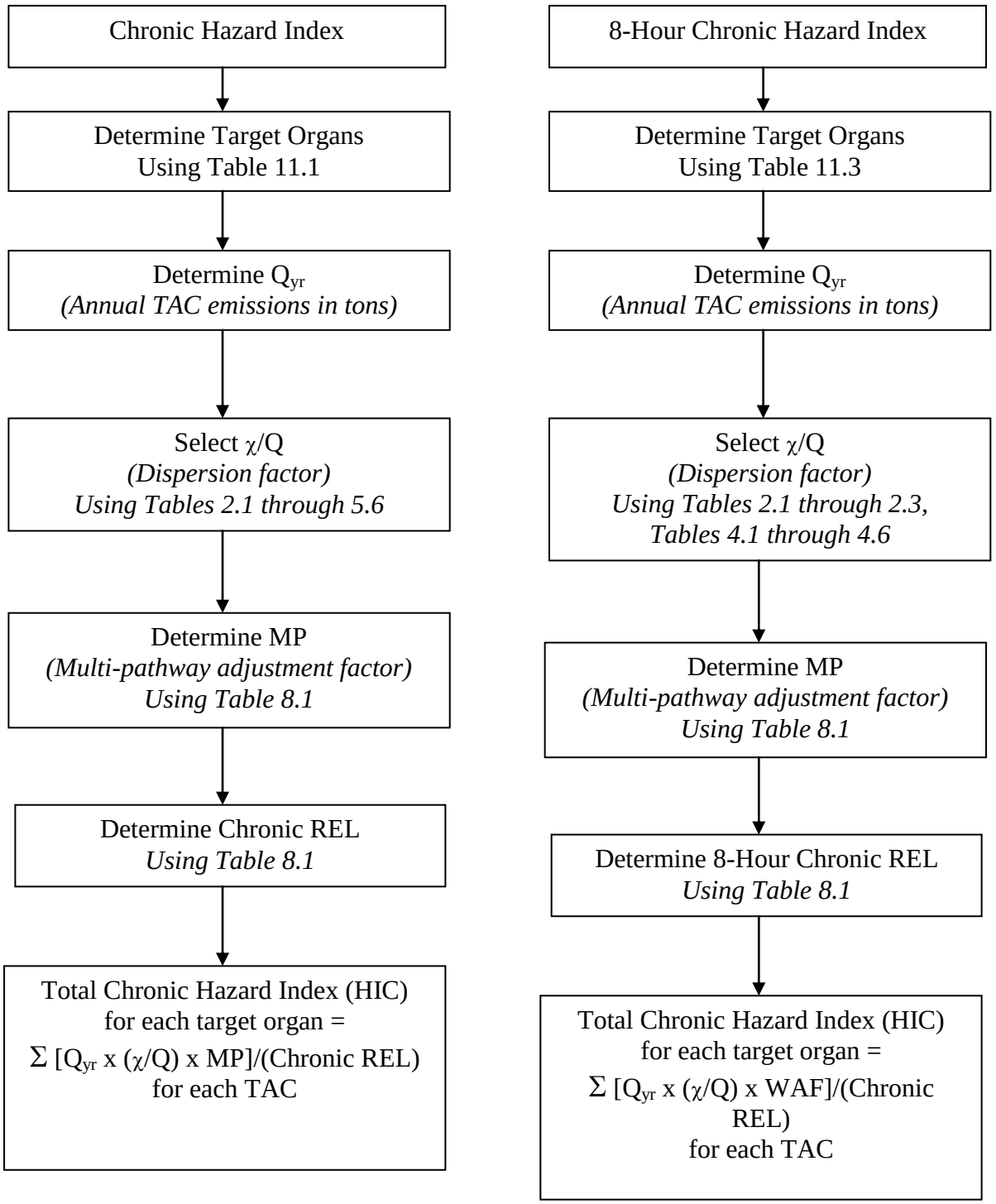
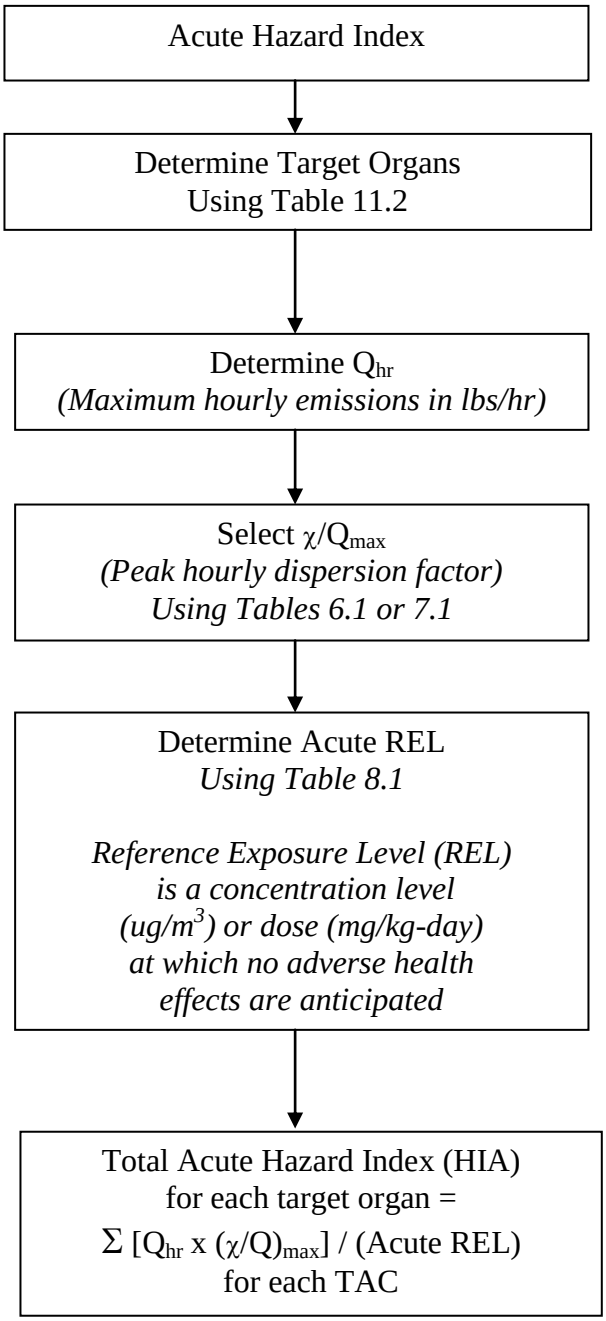


Figure 6
Acute Hazard Index (HIA)



APPENDIX V

RULE 1401 EXEMPTION PROVISIONS

Exemption Provisions

Rule 1401 (g)(1)(A): Permit Renewal or Change of Ownership

Any equipment which is in continuous operation, without modification or change in operating conditions, for which a new permit to operate is required solely because of permit renewal or change of ownership.

Rule 1401 (g)(1)(B): Modification with No Increase in Risk

A modification of a permit unit that causes a reduction or no increase in the cancer burden, MICR or acute or chronic HI at any receptor location.

Rule 1401 (g)(1)(C): Functionally Identical Replacement

A permit unit replacing a functionally identical permit unit, provided there is no increase in maximum rating or increase in emissions of any toxic air contaminants. For replacement of dry cleaning permit units only, provided there is no increase in any toxic air contaminants.

Rule 1401 (g)(1)(D): Equipment Previously Exempt Under Rule 219

Equipment which previously did not require a written permit pursuant to Rule 219 that is no longer exempt, provided that the equipment was installed prior to the Rule 219 amendment eliminating the exemption and a complete application for the permit is received within one (1) year after the Rule 219 amendment removing the exemption.

Rule 1401 (g)(1)(E): Modifications to Terminate Research Projects

Modifications restoring the previous permit conditions of a permit unit, provided that: the applicant demonstrates that the previous permit conditions were modified solely for the purpose of installing innovative control equipment as part of a demonstration or investigation designed to advance the state of the art with regard to controlling emissions of toxic air contaminants; the emission reductions achieved by the demonstration project are not used for permitting any equipment with emission increases under the contemporaneous emission reduction exemption as specified in paragraph (g)(2); the demonstration project is completed within two (2) years; and a complete application is submitted no later than two (2) years after the date of issuance of the permit which modified the conditions of the previous permit for the purpose of the demonstration or investigation.

Rule 1401 (g)(1)(F): Emergency Internal Combustion Engines

Emergency internal combustion engines that are exempted under Rule 1304.

Rule 1401 (g)(1)(G): Wood Product Stripping (Expired)

Wood product stripping permit units, provided that the risk increases due to emissions from the permit unit owned or operated by the applicant for which complete applications were submitted on or after July 10, 1998 will not exceed a MICR of 100 in one million (1.0×10^{-4}) or a total acute or chronic hazard index of five (5) at any receptor location. This exemption shall not apply to permit applications received after January 10, 2000, or sooner if the Executive Officer makes a determination that T-BACT is available to enable compliance with the requirements of paragraphs (d)(1), (d)(2) and (d)(3).

Rule 1401 (g)(1)(H): Gasoline Transfer and Dispensing Facilities (Expired)

For gasoline transfer and dispensing facilities, as defined in Rule 461 – Gasoline Transfer and Dispensing, the Executive Officer shall not, for the purposes of paragraphs (d)(1) through (d)(5), consider the risk contribution of methyl tert-butyl ether for any gasoline transfer and dispensing permit applications deemed complete on or before December 31, 2003. If the state of California extends the phase-out requirement for methyl tert-butyl ether as an oxygenate in gasoline, the limited time exemption shall be extended to that expiration date or December 31, 2004, whichever is sooner.

Rule 1401 (g)(2): Contemporaneous Risk Reduction

Simultaneous risk reduction such that an increase in MICR or HI from a equipment will be mitigated by a risk reduction from another equipment within 100 meters and the net impact on any receptor will be less than or equal to an increased MICR of 1 in 1 million or an HI of 1, provided that both applications for the increase and decrease are deemed complete together, the risk reduction occurs first, and the reduction is enforceable.

APPENDIX VI

TIER 2 SCREENING TABLES FOR NON-COMBUSTION SOURCES FOR USE IN RULE 1401

Introduction

The purpose of this report is to document the methods used by SCAQMD staff to estimate cancer risks from non-combustion sources. The methods are consistent with SCAQMD's risk assessment procedures for Rule 1401 and were used to update the Rule 1401 Tier 2 screening tables using AERMOD.

Emission Inventory Methods

In order to determine the appropriate emission rates to use, please contact the appropriate SCAQMD Engineering staff (http://www.aqmd.gov/contact/permitting-staff) for more information.

Exposure Modeling Methods

Air quality modeling was performed using AERMOD (American Meteorological Society/U.S. EPA Regulatory Model). As of December 9, 2006, U.S. EPA promulgated AERMOD as a replacement for ISCST3 (Industrial Source Complex – Short Term, Version 3) as the recommended dispersion model. AERMOD is a steady-state plume model that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrain.

AERMOD (version 14134) was executed using the urban option, which is SCAQMD policy for all permitting in its jurisdiction. The U.S. EPA regulatory default options, with the exception of the FLAT terrain option, were implemented and the SCAQMD AERMOD-ready meteorological data was used. The County populations used are based on the 2008 estimates from the U.S. Census Bureau. The Los Angeles County population was 9,862,049; Orange County population was 3,010,759; Riverside County population was 2,100,516; and San Bernardino County population was 2,015,355. SCAQMD's meteorological data is updated on a tri-annual basis and the population estimates will also be updated at that time.

For screening purposes, flat terrain was assumed. Although this is appropriate for most projects within the South Coast Air Basin, it is important to note that if complex terrain is present, the screening tables are not appropriate to be used and project-specific modeling using the elevated terrain option is recommended.

The non-combustion sources were modeled as either a point source or volume source with the parameters presented in Tables 1 and 2. Consistent with the modeling prepared for SCAQMD's risk assessment procedures for Rule 1401, building downwash effects were analyzed for point sources with a 20 meter by 30 meter building, 4 meters high.

Table 1: Stack Parameters for Point Sources

Source ID	Release Height (m)	Temperature (K)	Exit Velocity (m/s)	Stack Diameter (m)
P1	4.27	0*	10	0.3
P2	7.62	0*	10	0.3
P3	15.24	0*	10	0.3

Note: * The temperature used in AERMOD was set to 0 K, which indicates that the ambient temperature was used in the model run.

Table 2: Stack Parameters for Volume Sources

Source ID	Release Height (m)	Initial Lateral Dimension (m)	Initial Vertical Dimension (m)
V1	2.29	2.84	2.13
V2	2.29	5.01	2.13
V3	4.57	5.01	4.25
V4	2.29	8.679	2.13
V5	4.57	8.679	4.25
V6	4.57	15.04	4.25

Modeling was performed at 27 SCAQMD meteorological stations shown in Figure 1. The locations of each of the sites are given in Table 3. The data are available on the SCAQMD website (http://www.aqmd.gov/home/library/air-quality-data-studies/meteorological-data/data-for-aermod). A polar receptor grid is assumed at ten degree azimuth increments at the following downwind distances: 25, 50, 75, 100, 200, 300, 500, and 1,000 meters.

The peak model-predicted impacts at each downwind distance over the 36 azimuth angles for each meteorological station were used to develop the attached tables.

A sample AERMOD model input file is provided in Exhibit 1.

Figure 1: Meteorological Monitoring Stations in the South Coast Air Basin

Table 3: Locations of Meteorological Stations and Elevations

Station name	UTM Coordinates (km)		Lat./Long. Coordinates		Elevation
	Easting	Northing	Latitude	Longitude	(m)
Anaheim	413.14	3743.57	33:49:50	117:56:19	41
Azusa	414.81	3777.47	34:08:11	117:55:26	182
Banning	513.10	3753.19	33:55:15	116:51:30	660
Burbank	378.62	3782.24	34:10:33	118:19:01	175
Central LA	386.79	3770.00	34:03:59	118:13:36	87
Compton	388.59	3751.88	33:54:05	118:12:18	22
Costa Mesa	414.16	3726.19	33:40:26	117:55:33	20
Crestline	474.62	3788.76	34:14:29	117:16:32	1387
Fontana	454.62	3773.19	34:06:01	117:29:31	367
Indio	572.67	3729.90	33:42:30	116:12:57	-4
La Habra	411.98	3754.08	33:55:31	117:57:08	82
Lake Elsinore	469.33	3726.13	33:40:35	117:19:51	406
LAX	367.83	3757.80	33:57:15	118:25:49	42
Long Beach	389.99	3743.04	33:49:25	118:11:19	30
Lynwood	388.07	3754.73	33:55:44	118:12:39	29
Mission Viejo	437.39	3721.17	33:37:49	117:40:30	170
Palm Springs	542.46	3745.73	33:51:10	116:32:28	171
Perris	478.91	3738.58	33:47:20	117:13:40	442
Pico Rivera	401.31	3763.61	34:00:37	118:04:07	58
Pomona	430.78	3769.61	34:04:00	117:45:00	270
Redlands	486.36	3768.50	34:03:32	117:08:52	481
Reseda	358.76	3785.11	34:11:57	118:31:58	228
Riverside	461.64	3762.10	34:00:02	117:24:55	250
San Bernardino	474.76	3773.82	34:06:24	117:16:25	305
Santa Clarita	359.48	3805.52	34:23:00	118:31:42	375
Upland	441.96	3773.66	34:06:14	117:37:45	379
West LA	365.54	3768.52	34:03:02	118:27:24	97

Exhibit 1: AERMOD Model Input File for Non-Combustion Sources

```
CO STARTING
   TITLEONE R1401 Risk Assessment Procedures - Anah
   TITLETWO 8 hrs/day; 7 days/week; 52 weeks/yr
   MODELOPT CONC FLAT
   AVERTIME 1   PERIOD
   POLLUTID Any
   RUNORNOT RUN
   ERRORFIL ERRORS.OUT
   URBANOPT 3010759 OC
CO FINISHED

SO STARTING
   LOCATION P1 POINT     0.0    0.0    0.0
   LOCATION P2 POINT     0.0    0.0    0.0
   LOCATION P3 POINT     0.0    0.0    0.0

** Point Source      Q      RelHgt   Temp     Vel       Dia
**              ---------  ------  ------  ------    ------
   SRCPARAM P1     0.0865     4.27    0      10.0      0.3
   SRCPARAM P2     0.0865     7.62    0      10.0      0.3
   SRCPARAM P3     0.0865    15.24    0      10.0      0.3

SO BUILDHGT P1    4.00    4.00    4.00    4.00    4.00    4.00
SO BUILDHGT P1    4.00    4.00    4.00    4.00    4.00    4.00
SO BUILDHGT P1    4.00    4.00    4.00    4.00    4.00    4.00
SO BUILDHGT P1    4.00    4.00    4.00    4.00    4.00    4.00
SO BUILDHGT P1    4.00    4.00    4.00    4.00    4.00    4.00
SO BUILDHGT P1    4.00    4.00    4.00    4.00    4.00    4.00
SO BUILDWID P1   24.91   29.05   32.32   34.60   35.84   35.98
SO BUILDWID P1   35.03   33.02   30.00   33.02   35.03   35.98
SO BUILDWID P1   35.84   34.60   32.32   29.05   24.91   20.00
SO BUILDWID P1   24.91   29.05   32.32   34.60   35.84   35.98
SO BUILDWID P1   35.03   33.02   30.00   33.02   35.03   35.98
SO BUILDWID P1   35.84   34.60   32.32   29.05   24.91   20.00
SO BUILDLEN P1   33.02   35.03   35.98   35.84   34.60   32.32
SO BUILDLEN P1   29.05   24.91   20.00   24.91   29.05   32.32
SO BUILDLEN P1   34.60   35.84   35.98   35.03   33.02   30.00
SO BUILDLEN P1   33.02   35.03   35.98   35.84   34.60   32.32
SO BUILDLEN P1   29.05   24.91   20.00   24.91   29.05   32.32
SO BUILDLEN P1   34.60   35.84   35.98   35.03   33.02   30.00
SO XBADJ    P1  -16.51  -17.52  -17.99  -17.92  -17.30  -16.16
SO XBADJ    P1  -14.53  -12.45  -10.00  -12.45  -14.53  -16.16
SO XBADJ    P1  -17.30  -17.92  -17.99  -17.52  -16.51  -15.00
SO XBADJ    P1  -16.51  -17.52  -17.99  -17.92  -17.30  -16.16
SO XBADJ    P1  -14.53  -12.45  -10.00  -12.45  -14.53  -16.16
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SO YBADJ    P1    0.00    0.00    0.00    0.00    0.00    0.00
SO YBADJ    P1    0.00    0.00    0.00    0.00    0.00    0.00
SO YBADJ    P1    0.00    0.00    0.00    0.00    0.00    0.00
SO YBADJ    P1    0.00    0.00    0.00    0.00    0.00    0.00
SO YBADJ    P1    0.00    0.00    0.00    0.00    0.00    0.00

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SO BUILDHGT P2    4.00    4.00    4.00    4.00    4.00    4.00
SO BUILDHGT P2    4.00    4.00    4.00    4.00    4.00    4.00
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SO BUILDWID P2   35.03   33.02   30.00   33.02   35.03   35.98
SO BUILDWID P2   35.84   34.60   32.32   29.05   24.91   20.00
SO BUILDWID P2   24.91   29.05   32.32   34.60   35.84   35.98
SO BUILDWID P2   35.03   33.02   30.00   33.02   35.03   35.98
SO BUILDWID P2   35.84   34.60   32.32   29.05   24.91   20.00
SO BUILDLEN P2   33.02   35.03   35.98   35.84   34.60   32.32
SO BUILDLEN P2   29.05   24.91   20.00   24.91   29.05   32.32
SO BUILDLEN P2   34.60   35.84   35.98   35.03   33.02   30.00
SO BUILDLEN P2   33.02   35.03   35.98   35.84   34.60   32.32
SO BUILDLEN P2   29.05   24.91   20.00   24.91   29.05   32.32
SO BUILDLEN P2   34.60   35.84   35.98   35.03   33.02   30.00
SO XBADJ    P2  -16.51  -17.52  -17.99  -17.92  -17.30  -16.16
SO XBADJ    P2  -14.53  -12.45  -10.00  -12.45  -14.53  -16.16
SO XBADJ    P2  -17.30  -17.92  -17.99  -17.52  -16.51  -15.00
SO XBADJ    P2  -16.51  -17.52  -17.99  -17.92  -17.30  -16.16
SO XBADJ    P2  -14.53  -12.45  -10.00  -12.45  -14.53  -16.16
```

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SO XBADJ    P2  -17.30  -17.92  -17.99  -17.52  -16.51  -15.00
SO YBADJ    P2    0.00    0.00    0.00    0.00    0.00    0.00
SO YBADJ    P2    0.00    0.00    0.00    0.00    0.00    0.00
SO YBADJ    P2    0.00    0.00    0.00    0.00    0.00    0.00
SO YBADJ    P2    0.00    0.00    0.00    0.00    0.00    0.00
SO YBADJ    P2    0.00    0.00    0.00    0.00    0.00    0.00
SO YBADJ    P2    0.00    0.00    0.00    0.00    0.00    0.00

SO BUILDHGT P3    4.00    4.00    4.00    4.00    4.00    4.00
SO BUILDHGT P3    4.00    4.00    4.00    4.00    4.00    4.00
SO BUILDHGT P3    4.00    4.00    4.00    4.00    4.00    4.00
SO BUILDHGT P3    4.00    4.00    4.00    4.00    4.00    4.00
SO BUILDHGT P3    4.00    4.00    4.00    4.00    4.00    4.00
SO BUILDHGT P3    4.00    4.00    4.00    4.00    4.00    4.00
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SO BUILDWID P3   35.03   33.02   30.00   33.02   35.03   35.98
SO BUILDWID P3   35.84   34.60   32.32   29.05   24.91   20.00
SO BUILDWID P3   24.91   29.05   32.32   34.60   35.84   35.98
SO BUILDWID P3   35.03   33.02   30.00   33.02   35.03   35.98
SO BUILDWID P3   35.84   34.60   32.32   29.05   24.91   20.00
SO BUILDLEN P3   33.02   35.03   35.98   35.84   34.60   32.32
SO BUILDLEN P3   29.05   24.91   20.00   24.91   29.05   32.32
SO BUILDLEN P3   34.60   35.84   35.98   35.03   33.02   30.00
SO BUILDLEN P3   33.02   35.03   35.98   35.84   34.60   32.32
SO BUILDLEN P3   29.05   24.91   20.00   24.91   29.05   32.32
SO BUILDLEN P3   34.60   35.84   35.98   35.03   33.02   30.00
SO XBADJ    P3  -16.51  -17.52  -17.99  -17.92  -17.30  -16.16
SO XBADJ    P3  -14.53  -12.45  -10.00  -12.45  -14.53  -16.16
SO XBADJ    P3  -17.30  -17.92  -17.99  -17.52  -16.51  -15.00
SO XBADJ    P3  -16.51  -17.52  -17.99  -17.92  -17.30  -16.16
SO XBADJ    P3  -14.53  -12.45  -10.00  -12.45  -14.53  -16.16
SO XBADJ    P3  -17.30  -17.92  -17.99  -17.52  -16.51  -15.00
SO YBADJ    P3    0.00    0.00    0.00    0.00    0.00    0.00
SO YBADJ    P3    0.00    0.00    0.00    0.00    0.00    0.00
SO YBADJ    P3    0.00    0.00    0.00    0.00    0.00    0.00
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SO YBADJ    P3    0.00    0.00    0.00    0.00    0.00    0.00

   URBANSRC P1
   URBANSRC P2
   URBANSRC P3

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   SRCGROUP  P1  P1
   SRCGROUP  P2  P2
   SRCGROUP  P3  P3

SO SRCGROUP  ALL

SO FINISHED

RE STARTING
   GRIDPOLR POL1 STA
                ORIG     0.0     0.0
                DIST  25 50 75 100 200 300 500 1000
                GDIR     36     10.0     10.0
   GRIDPOLR POL1 END
RE FINISHED

ME STARTING
   SURFFILE anah8.sfc
   PROFFILE anah8.pfl
   SURFDATA 0 2006
   UAIRDATA 3190 2006
   PROFBASE 0.0 METERS
ME FINISHED

OU STARTING
   RECTABLE  1       FIRST
   RECTABLE  ALLAVE  FIRST
   PLOTFILE  1       P1  FIRST  AM1T1P1.TXT
   PLOTFILE  PERIOD  P1         AM1T2P1.TXT
   PLOTFILE  1       P2  FIRST  AM1T1P2.TXT
   PLOTFILE  PERIOD  P2         AM1T2P2.TXT
   PLOTFILE  1       P3  FIRST  AM1T1P3.TXT
   PLOTFILE  PERIOD  P3         AM1T2P3.TXT

OU FINISHED
```

Results

Figure 2 shows the source receptor areas (SRA) within the South Coast Air Basin and Table 4 lists the appropriate meteorological station to use for each SRA.

Figure 2: Source/Receptor Areas

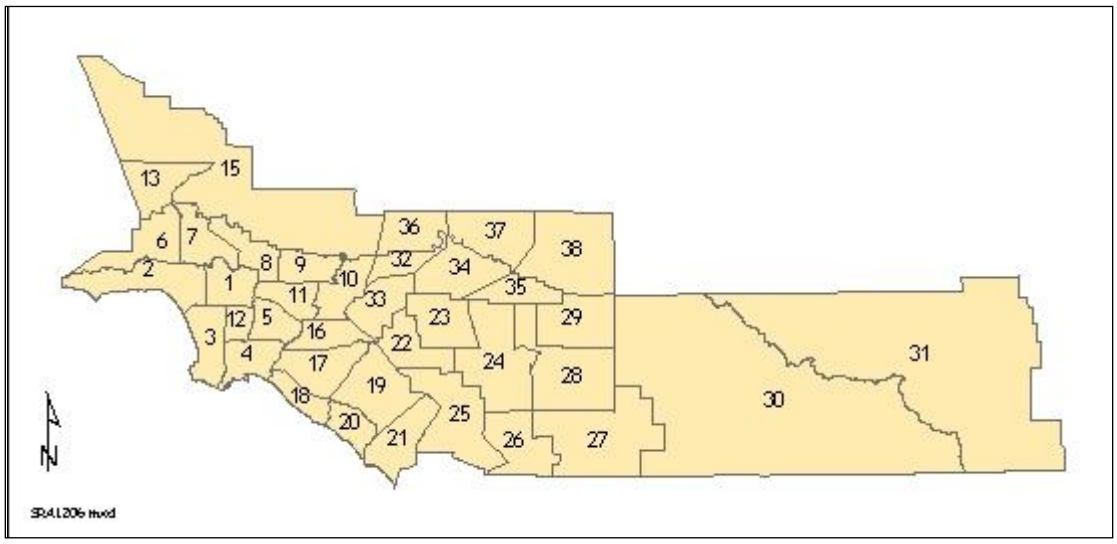

Table 4: Meteorological Stations for Each Source/Receptor Area.

Meteorological Station	Source/ Receptor Area	Meteorological Station	Source/ Receptor Area
Anaheim	17	Compton/Lynwood	12
Azusa	8, 9	Mission Viejo	19, 21
Banning	29	Perris	24, 28
Burbank	7	Palm Springs	30, 31
Central LA	1	Pico Rivera	5, 11
Crestline	37	Pomona	10
Costa Mesa	18, 20	Redlands	35, 38
Fontana	34	Reseda	6
Indio	30	Riverside	22, 23
La Habra	16	Santa Clarita	13, 15
Lake Elsinore	25, 26, 27	San Bernardino	34
LAX	3	Upland	32, 33, 36
Long Beach	4	West LA	2

The Tier 2 tables developed using this methodology are included in Permit Application Attachment "M" for the Risk Assessment Procedures for Rules 1401 & 212.

APPENDIX VII

TIER 2 SCREENING TABLES FOR COMBUSTION SOURCES (NATURAL GAS BOILERS, NATURAL GAS INTERNAL COMBUSTION ENGINES, DIESEL INTERNAL COMBUSTION ENGINES) FOR USE IN RULE 1401

Introduction

The purpose of this report is to document the methods used by SCAQMD staff to estimate cancer risks from natural gas-fueled boilers, natural gas-fueled internal combustion engines (ICEs) and diesel-fueled ICEs. The methods are consistent with SCAQMD's risk assessment procedures for Rule 1401 and were used to update the Rule 1401 Tier 2 screening tables using AERMOD.

Emission Inventory Methods

In order to determine the appropriate/default emission rates to use for fuel combustion sources, please refer to "Supplemental Instructions, Reporting Procedures for AB2588 Facilities for Reporting their Quadrennial Air Toxics Emissions Inventory, Annual Emissions Reporting Program" (http://www.aqmd.gov/docs/default-source/planning/annual-emission-reporting/supplemental-instructions-for-ab2588-facilities.pdf) for more information.

Exposure Modeling Methods

Air quality modeling was performed using AERMOD (American Meteorological Society/U.S. EPA Regulatory Model). As of December 9, 2006, U.S. EPA promulgated AERMOD as a replacement for ISCST3 (Industrial Source Complex – Short Term, Version 3) as the recommended dispersion model. AERMOD is a steady-state plume model that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrain.

AERMOD (version 14134) was executed using the urban option, which is SCAQMD policy for all permitting in its jurisdiction. The U.S. EPA regulatory defaults options, with the exception of the FLAT terrain option, were implemented and the SCAQMD AERMOD-ready meteorological data was used. The County populations used are based on the 2008 estimates from the U.S. Census Bureau. The Los Angeles County population was 9,862,049; Orange County population was 3,010,759; Riverside County population was 2,100,516; and San Bernardino County population was 2,015,355. SCAQMD's meteorological data is updated on a tri-annual basis and the population estimates will also be updated at that time.

For screening purposes, flat terrain was assumed. Although this is appropriate for most projects within the South Coast Air Basin, it is important to note that if complex terrain is present, the screening tables are not appropriate to be used and project-specific modeling using the elevated terrain option is recommended.

Combustion source stacks were modeled as a point source with the stack parameters presented in Table 1. These parameters were based on the San Joaquin Valley Unified Air Pollution Control District's modeling parameters[1]. Consistent with the modeling prepared for SCAQMD's risk

[1] San Joaquin Valley Unified Air Pollution Control District, Draft Staff Report with Appendices for Proposed Update to District's Risk Management Policy to Address OEHHA's Revised Risk Assessment Guidance Document,

assessment procedures for Rule 1401, building downwash effects were analyzed with a 20 meter by 30 meter building, 4 meters high.

Table 1: Stack Parameters by Combustion Source Type

Source ID	Equipment Rating	Release Height (m)	Stack Inside Diameter (m)	Gas Exit Temp. (K)	Gas Exit Velocity (m/s)	Gas Exit Flow Rate (m^3/min)
Gaseous Fuel Fired (Natural Gas) Boilers						
B1	0 – 4.9 MMBTU/hr	9.0	0.40	440	5	37.7
B2	5 – 9.9 MMBTU/hr	9.0	0.50	470	7	82.5
B3	10 – 19.9 MMBTU/hr	9.0	0.55	470	9	128.3
B4	20 – 29.9 MMBTU/hr	10.0	0.67	470	10	211.5
B5	30 – 49.9 MMBTU/hr	10.0	0.72	495	12	293.1
B6	50 – 149.9 MMBTU/hr	14.0	1.10	440	10	570.2
B7	150 – 200 MMBTU/hr	16.0	1.50	430	12	1,272.3
Natural Gas Reciprocating Internal Combustion Engines						
N1	50 – 74.9 BHP	4.0	0.07	850	40	9.2
N2	75 – 149.9 BHP	4.0	0.08	850	65	19.6
N3	150 – 249.9 BHP	4.0	0.14	890	55	50.8
N4	250 – 999.9 BHP	5.0	0.19	820	60	102.1
N5	> 1,000 BHP	7.0	0.35	750	65	375.2
Diesel Reciprocating Internal Combustion Engines						
D1	50 – 174.9 BHP	3.0	0.09	760	65	24.8
D2	175 – 299.9 BHP	3.0	0.12	760	55	37.3
D3	300 – 399.9 BHP	3.0	0.13	760	80	63.7
D4	400 – 599.9 BHP	3.0	0.15	770	90	95.4
D5	600 – 1,149.9 BHP	4.0	0.17	800	160	217.9

Modeling was performed at 27 SCAQMD meteorological stations shown in Figure 1. The locations of each of the sites are given in Table 2. The data are available on the SCAQMD website (http://www.aqmd.gov/home/library/air-quality-data-studies/meteorological-data/data-for-aermod). A polar receptor grid is assumed at ten degree azimuth increments at the following downwind distances: 25, 50, 75, 100, 200, 300, 500, and 1,000 meters.

The peak model-predicted impacts at each downwind distance over the 36 azimuth angles for each meteorological station were used to develop the attached tables.

A sample AERMOD model input file is given in Exhibit 1.

found at http://www.valleyair.org/Workshops/postings/2014/10-09-14_OEHHA/Draft-Staff-Report-9-23-14.pdf, accessed on March 2, 2015.

Figure 1: Meteorological Monitoring Stations in the South Coast Air Basin

Table 2: Locations of Meteorological Stations and Elevations

Station name	UTM Coordinates (km)		Lat./Long. Coordinates		Elevation
	Easting	Northing	Latitude	Longitude	(m)
Anaheim	413.14	3743.57	33:49:50	117:56:19	41
Azusa	414.81	3777.47	34:08:11	117:55:26	182
Banning	513.10	3753.19	33:55:15	116:51:30	660
Burbank	378.62	3782.24	34:10:33	118:19:01	175
Central LA	386.79	3770.00	34:03:59	118:13:36	87
Compton	388.59	3751.88	33:54:05	118:12:18	22
Costa Mesa	414.16	3726.19	33:40:26	117:55:33	20
Crestline	474.62	3788.76	34:14:29	117:16:32	1387
Fontana	454.62	3773.19	34:06:01	117:29:31	367
Indio	572.67	3729.90	33:42:30	116:12:57	-4
La Habra	411.98	3754.08	33:55:31	117:57:08	82
Lake Elsinore	469.33	3726.13	33:40:35	117:19:51	406
LAX	367.83	3757.80	33:57:15	118:25:49	42
Long Beach	389.99	3743.04	33:49:25	118:11:19	30
Lynwood	388.07	3754.73	33:55:44	118:12:39	29
Mission Viejo	437.39	3721.17	33:37:49	117:40:30	170
Palm Springs	542.46	3745.73	33:51:10	116:32:28	171
Perris	478.91	3738.58	33:47:20	117:13:40	442
Pico Rivera	401.31	3763.61	34:00:37	118:04:07	58
Pomona	430.78	3769.61	34:04:00	117:45:00	270
Redlands	486.36	3768.50	34:03:32	117:08:52	481
Reseda	358.76	3785.11	34:11:57	118:31:58	228
Riverside	461.64	3762.10	34:00:02	117:24:55	250
San Bernardino	474.76	3773.82	34:06:24	117:16:25	305
Santa Clarita	359.48	3805.52	34:23:00	118:31:42	375
Upland	441.96	3773.66	34:06:14	117:37:45	379
West LA	365.54	3768.52	34:03:02	118:27:24	97

Exhibit 1: AERMOD Model Input File for Combustion Sources

```
CO STARTING
   TITLEONE COMBUSTION SCREENING TABLE - ANAH
   TITLETWO 8 HRS/DAY; 7 DAYS/WEEK; 52 WEEKS/YR
   MODELOPT CONC FLAT
   AVERTIME 1   PERIOD
   POLLUTID ANY
   RUNORNOT RUN
   URBANOPT 3010759 OC
CO FINISHED

SO STARTING
   LOCATION D1 POINT     0.0    0.0    0.0
   LOCATION D2 POINT     0.0    0.0    0.0
   LOCATION D3 POINT     0.0    0.0    0.0
   LOCATION D4 POINT     0.0    0.0    0.0
   LOCATION D5 POINT     0.0    0.0    0.0
   LOCATION N1 POINT     0.0    0.0    0.0
   LOCATION N2 POINT     0.0    0.0    0.0
   LOCATION N3 POINT     0.0    0.0    0.0
   LOCATION N4 POINT     0.0    0.0    0.0
   LOCATION N5 POINT     0.0    0.0    0.0
   LOCATION B1 POINT     0.0    0.0    0.0
   LOCATION B2 POINT     0.0    0.0    0.0
   LOCATION B3 POINT     0.0    0.0    0.0
   LOCATION B4 POINT     0.0    0.0    0.0
   LOCATION B5 POINT     0.0    0.0    0.0
   LOCATION B6 POINT     0.0    0.0    0.0
   LOCATION B7 POINT     0.0    0.0    0.0

** POINT SOURCE      Q      RELHGT   TEMP     VEL      DIA
**              ---------  ------  ------  ------    ------
   SRCPARAM D1     0.0865     3.0     760    65.0      0.09
   SRCPARAM D2     0.0865     3.0     760    55.0      0.12
   SRCPARAM D3     0.0865     3.0     760    80.0      0.13
   SRCPARAM D4     0.0865     3.0     770    90.0      0.15
   SRCPARAM D5     0.0865     4.0     800   160.0      0.17
   SRCPARAM N1     0.0865     4.0     850    40.0      0.07
   SRCPARAM N2     0.0865     4.0     850    65.0      0.08
   SRCPARAM N3     0.0865     4.0     890    55.0      0.14
   SRCPARAM N4     0.0865     5.0     820    60.0      0.19
   SRCPARAM N5     0.0865     7.0     750    65.0      0.35
   SRCPARAM B1     0.0865     9.0     440     5.0      0.40
   SRCPARAM B2     0.0865     9.0     470     7.0      0.50
   SRCPARAM B3     0.0865     9.0     470     9.0      0.55
   SRCPARAM B4     0.0865    10.0     470    10.0      0.67
   SRCPARAM B5     0.0865    10.0     495    12.0      0.72
   SRCPARAM B6     0.0865    14.0     440    10.0      1.10
   SRCPARAM B7     0.0865    16.0     430    12.0      1.50

   BUILDHGT D1              4.00     4.00     4.00     4.00     4.00     4.00
   BUILDHGT D1              4.00     4.00     4.00     4.00     4.00     4.00
   BUILDHGT D1              4.00     4.00     4.00     4.00     4.00     4.00
   BUILDHGT D1              4.00     4.00     4.00     4.00     4.00     4.00
   BUILDHGT D1              4.00     4.00     4.00     4.00     4.00     4.00
   BUILDHGT D1              4.00     4.00     4.00     4.00     4.00     4.00
   BUILDWID D1             24.91    29.05    32.32    34.60    35.84    35.98
   BUILDWID D1             35.03    33.02    30.00    33.02    35.03    35.98
   BUILDWID D1             35.84    34.60    32.32    29.05    24.91    20.00
   BUILDWID D1             24.91    29.05    32.32    34.60    35.84    35.98
   BUILDWID D1             35.03    33.02    30.00    33.02    35.03    35.98
   BUILDWID D1             35.84    34.60    32.32    29.05    24.91    20.00
   BUILDLEN D1             33.02    35.03    35.98    35.84    34.60    32.32
   BUILDLEN D1             29.05    24.91    20.00    24.91    29.05    32.32
   BUILDLEN D1             34.60    35.84    35.98    35.03    33.02    30.00
   BUILDLEN D1             33.02    35.03    35.98    35.84    34.60    32.32
   BUILDLEN D1             29.05    24.91    20.00    24.91    29.05    32.32
   BUILDLEN D1             34.60    35.84    35.98    35.03    33.02    30.00
   XBADJ    D1            -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
   XBADJ    D1            -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
   XBADJ    D1            -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
   XBADJ    D1            -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
   XBADJ    D1            -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
   XBADJ    D1            -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
   YBADJ    D1              0.00     0.00     0.00     0.00     0.00     0.00
   YBADJ    D1              0.00     0.00     0.00     0.00     0.00     0.00
   YBADJ    D1              0.00     0.00     0.00     0.00     0.00     0.00
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YBADJ    D1           0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    D1           0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    D1           0.00     0.00     0.00     0.00     0.00     0.00

BUILDHGT D2           4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT D2           4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT D2           4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT D2           4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT D2           4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT D2           4.00     4.00     4.00     4.00     4.00     4.00
BUILDWID D2          24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID D2          35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID D2          35.84    34.60    32.32    29.05    24.91    20.00
BUILDWID D2          24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID D2          35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID D2          35.84    34.60    32.32    29.05    24.91    20.00
BUILDLEN D2          33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN D2          29.05    24.91    20.00    24.91    29.05    32.32
BUILDLEN D2          34.60    35.84    35.98    35.03    33.02    30.00
BUILDLEN D2          33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN D2          29.05    24.91    20.00    24.91    29.05    32.32
BUILDLEN D2          34.60    35.84    35.98    35.03    33.02    30.00
XBADJ    D2         -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
XBADJ    D2         -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
XBADJ    D2         -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
XBADJ    D2         -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
XBADJ    D2         -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
XBADJ    D2         -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
YBADJ    D2           0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    D2           0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    D2           0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    D2           0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    D2           0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    D2           0.00     0.00     0.00     0.00     0.00     0.00

BUILDHGT D3           4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT D3           4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT D3           4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT D3           4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT D3           4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT D3           4.00     4.00     4.00     4.00     4.00     4.00
BUILDWID D3          24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID D3          35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID D3          35.84    34.60    32.32    29.05    24.91    20.00
BUILDWID D3          24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID D3          35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID D3          35.84    34.60    32.32    29.05    24.91    20.00
BUILDLEN D3          33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN D3          29.05    24.91    20.00    24.91    29.05    32.32
BUILDLEN D3          34.60    35.84    35.98    35.03    33.02    30.00
BUILDLEN D3          33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN D3          29.05    24.91    20.00    24.91    29.05    32.32
BUILDLEN D3          34.60    35.84    35.98    35.03    33.02    30.00
XBADJ    D3         -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
XBADJ    D3         -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
XBADJ    D3         -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
XBADJ    D3         -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
XBADJ    D3         -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
XBADJ    D3         -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
YBADJ    D3           0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    D3           0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    D3           0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    D3           0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    D3           0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    D3           0.00     0.00     0.00     0.00     0.00     0.00

BUILDHGT D4           4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT D4           4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT D4           4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT D4           4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT D4           4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT D4           4.00     4.00     4.00     4.00     4.00     4.00
BUILDWID D4          24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID D4          35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID D4          35.84    34.60    32.32    29.05    24.91    20.00
BUILDWID D4          24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID D4          35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID D4          35.84    34.60    32.32    29.05    24.91    20.00
BUILDLEN D4          33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN D4          29.05    24.91    20.00    24.91    29.05    32.32
BUILDLEN D4          34.60    35.84    35.98    35.03    33.02    30.00
```

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BUILDLEN D4           33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN D4           29.05    24.91    20.00    24.91    29.05    32.32
BUILDLEN D4           34.60    35.84    35.98    35.03    33.02    30.00
XBADJ    D4          -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
XBADJ    D4          -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
XBADJ    D4          -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
XBADJ    D4          -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
XBADJ    D4          -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
XBADJ    D4          -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
YBADJ    D4            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    D4            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    D4            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    D4            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    D4            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    D4            0.00     0.00     0.00     0.00     0.00     0.00

BUILDHGT D5            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT D5            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT D5            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT D5            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT D5            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT D5            4.00     4.00     4.00     4.00     4.00     4.00
BUILDWID D5           24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID D5           35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID D5           35.84    34.60    32.32    29.05    24.91    20.00
BUILDWID D5           24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID D5           35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID D5           35.84    34.60    32.32    29.05    24.91    20.00
BUILDLEN D5           33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN D5           29.05    24.91    20.00    24.91    29.05    32.32
BUILDLEN D5           34.60    35.84    35.98    35.03    33.02    30.00
BUILDLEN D5           33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN D5           29.05    24.91    20.00    24.91    29.05    32.32
BUILDLEN D5           34.60    35.84    35.98    35.03    33.02    30.00
XBADJ    D5          -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
XBADJ    D5          -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
XBADJ    D5          -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
XBADJ    D5          -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
XBADJ    D5          -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
XBADJ    D5          -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
YBADJ    D5            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    D5            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    D5            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    D5            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    D5            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    D5            0.00     0.00     0.00     0.00     0.00     0.00

BUILDHGT N1            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT N1            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT N1            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT N1            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT N1            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT N1            4.00     4.00     4.00     4.00     4.00     4.00
BUILDWID N1           24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID N1           35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID N1           35.84    34.60    32.32    29.05    24.91    20.00
BUILDWID N1           24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID N1           35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID N1           35.84    34.60    32.32    29.05    24.91    20.00
BUILDLEN N1           33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN N1           29.05    24.91    20.00    24.91    29.05    32.32
BUILDLEN N1           34.60    35.84    35.98    35.03    33.02    30.00
BUILDLEN N1           33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN N1           29.05    24.91    20.00    24.91    29.05    32.32
BUILDLEN N1           34.60    35.84    35.98    35.03    33.02    30.00
XBADJ    N1          -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
XBADJ    N1          -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
XBADJ    N1          -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
XBADJ    N1          -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
XBADJ    N1          -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
XBADJ    N1          -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
YBADJ    N1            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    N1            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    N1            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    N1            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    N1            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    N1            0.00     0.00     0.00     0.00     0.00     0.00

BUILDHGT N2            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT N2            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT N2            4.00     4.00     4.00     4.00     4.00     4.00
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BUILDHGT N2            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT N2            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT N2            4.00     4.00     4.00     4.00     4.00     4.00
BUILDWID N2           24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID N2           35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID N2           35.84    34.60    32.32    29.05    24.91    20.00
BUILDWID N2           24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID N2           35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID N2           35.84    34.60    32.32    29.05    24.91    20.00
BUILDLEN N2           33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN N2           29.05    24.91    20.00    24.91    29.05    32.32
BUILDLEN N2           34.60    35.84    35.98    35.03    33.02    30.00
BUILDLEN N2           33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN N2           29.05    24.91    20.00    24.91    29.05    32.32
BUILDLEN N2           34.60    35.84    35.98    35.03    33.02    30.00
XBADJ    N2          -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
XBADJ    N2          -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
XBADJ    N2          -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
XBADJ    N2          -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
XBADJ    N2          -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
XBADJ    N2          -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
YBADJ    N2            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    N2            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    N2            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    N2            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    N2            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    N2            0.00     0.00     0.00     0.00     0.00     0.00

BUILDHGT N3            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT N3            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT N3            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT N3            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT N3            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT N3            4.00     4.00     4.00     4.00     4.00     4.00
BUILDWID N3           24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID N3           35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID N3           35.84    34.60    32.32    29.05    24.91    20.00
BUILDWID N3           24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID N3           35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID N3           35.84    34.60    32.32    29.05    24.91    20.00
BUILDLEN N3           33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN N3           29.05    24.91    20.00    24.91    29.05    32.32
BUILDLEN N3           34.60    35.84    35.98    35.03    33.02    30.00
BUILDLEN N3           33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN N3           29.05    24.91    20.00    24.91    29.05    32.32
BUILDLEN N3           34.60    35.84    35.98    35.03    33.02    30.00
XBADJ    N3          -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
XBADJ    N3          -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
XBADJ    N3          -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
XBADJ    N3          -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
XBADJ    N3          -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
XBADJ    N3          -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
YBADJ    N3            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    N3            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    N3            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    N3            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    N3            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    N3            0.00     0.00     0.00     0.00     0.00     0.00

BUILDHGT N4            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT N4            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT N4            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT N4            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT N4            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT N4            4.00     4.00     4.00     4.00     4.00     4.00
BUILDWID N4           24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID N4           35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID N4           35.84    34.60    32.32    29.05    24.91    20.00
BUILDWID N4           24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID N4           35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID N4           35.84    34.60    32.32    29.05    24.91    20.00
BUILDLEN N4           33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN N4           29.05    24.91    20.00    24.91    29.05    32.32
BUILDLEN N4           34.60    35.84    35.98    35.03    33.02    30.00
BUILDLEN N4           33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN N4           29.05    24.91    20.00    24.91    29.05    32.32
BUILDLEN N4           34.60    35.84    35.98    35.03    33.02    30.00
XBADJ    N4          -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
XBADJ    N4          -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
XBADJ    N4          -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
XBADJ    N4          -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
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XBADJ    N4          -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
XBADJ    N4          -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
YBADJ    N4            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    N4            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    N4            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    N4            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    N4            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    N4            0.00     0.00     0.00     0.00     0.00     0.00

BUILDHGT N5            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT N5            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT N5            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT N5            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT N5            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT N5            4.00     4.00     4.00     4.00     4.00     4.00
BUILDWID N5           24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID N5           35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID N5           35.84    34.60    32.32    29.05    24.91    20.00
BUILDWID N5           24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID N5           35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID N5           35.84    34.60    32.32    29.05    24.91    20.00
BUILDLEN N5           33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN N5           29.05    24.91    20.00    24.91    29.05    32.32
BUILDLEN N5           34.60    35.84    35.98    35.03    33.02    30.00
BUILDLEN N5           33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN N5           29.05    24.91    20.00    24.91    29.05    32.32
BUILDLEN N5           34.60    35.84    35.98    35.03    33.02    30.00
XBADJ    N5          -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
XBADJ    N5          -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
XBADJ    N5          -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
XBADJ    N5          -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
XBADJ    N5          -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
XBADJ    N5          -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
YBADJ    N5            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    N5            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    N5            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    N5            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    N5            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    N5            0.00     0.00     0.00     0.00     0.00     0.00

BUILDHGT B1            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT B1            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT B1            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT B1            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT B1            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT B1            4.00     4.00     4.00     4.00     4.00     4.00
BUILDWID B1           24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID B1           35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID B1           35.84    34.60    32.32    29.05    24.91    20.00
BUILDWID B1           24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID B1           35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID B1           35.84    34.60    32.32    29.05    24.91    20.00
BUILDLEN B1           33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN B1           29.05    24.91    20.00    24.91    29.05    32.32
BUILDLEN B1           34.60    35.84    35.98    35.03    33.02    30.00
BUILDLEN B1           33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN B1           29.05    24.91    20.00    24.91    29.05    32.32
BUILDLEN B1           34.60    35.84    35.98    35.03    33.02    30.00
XBADJ    B1          -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
XBADJ    B1          -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
XBADJ    B1          -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
XBADJ    B1          -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
XBADJ    B1          -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
XBADJ    B1          -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
YBADJ    B1            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    B1            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    B1            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    B1            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    B1            0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    B1            0.00     0.00     0.00     0.00     0.00     0.00

BUILDHGT B2            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT B2            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT B2            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT B2            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT B2            4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT B2            4.00     4.00     4.00     4.00     4.00     4.00
BUILDWID B2           24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID B2           35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID B2           35.84    34.60    32.32    29.05    24.91    20.00
BUILDWID B2           24.91    29.05    32.32    34.60    35.84    35.98
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BUILDWID B2              35.03     33.02     30.00     33.02     35.03     35.98
BUILDWID B2              35.84     34.60     32.32     29.05     24.91     20.00
BUILDLEN B2              33.02     35.03     35.98     35.84     34.60     32.32
BUILDLEN B2              29.05     24.91     20.00     24.91     29.05     32.32
BUILDLEN B2              34.60     35.84     35.98     35.03     33.02     30.00
BUILDLEN B2              33.02     35.03     35.98     35.84     34.60     32.32
BUILDLEN B2              29.05     24.91     20.00     24.91     29.05     32.32
BUILDLEN B2              34.60     35.84     35.98     35.03     33.02     30.00
XBADJ    B2             -16.51    -17.52    -17.99    -17.92    -17.30    -16.16
XBADJ    B2             -14.53    -12.45    -10.00    -12.45    -14.53    -16.16
XBADJ    B2             -17.30    -17.92    -17.99    -17.52    -16.51    -15.00
XBADJ    B2             -16.51    -17.52    -17.99    -17.92    -17.30    -16.16
XBADJ    B2             -14.53    -12.45    -10.00    -12.45    -14.53    -16.16
XBADJ    B2             -17.30    -17.92    -17.99    -17.52    -16.51    -15.00
YBADJ    B2               0.00      0.00      0.00      0.00      0.00      0.00
YBADJ    B2               0.00      0.00      0.00      0.00      0.00      0.00
YBADJ    B2               0.00      0.00      0.00      0.00      0.00      0.00
YBADJ    B2               0.00      0.00      0.00      0.00      0.00      0.00
YBADJ    B2               0.00      0.00      0.00      0.00      0.00      0.00
YBADJ    B2               0.00      0.00      0.00      0.00      0.00      0.00

BUILDHGT B3               4.00      4.00      4.00      4.00      4.00      4.00
BUILDHGT B3               4.00      4.00      4.00      4.00      4.00      4.00
BUILDHGT B3               4.00      4.00      4.00      4.00      4.00      4.00
BUILDHGT B3               4.00      4.00      4.00      4.00      4.00      4.00
BUILDHGT B3               4.00      4.00      4.00      4.00      4.00      4.00
BUILDHGT B3               4.00      4.00      4.00      4.00      4.00      4.00
BUILDWID B3              24.91     29.05     32.32     34.60     35.84     35.98
BUILDWID B3              35.03     33.02     30.00     33.02     35.03     35.98
BUILDWID B3              35.84     34.60     32.32     29.05     24.91     20.00
BUILDWID B3              24.91     29.05     32.32     34.60     35.84     35.98
BUILDWID B3              35.03     33.02     30.00     33.02     35.03     35.98
BUILDWID B3              35.84     34.60     32.32     29.05     24.91     20.00
BUILDLEN B3              33.02     35.03     35.98     35.84     34.60     32.32
BUILDLEN B3              29.05     24.91     20.00     24.91     29.05     32.32
BUILDLEN B3              34.60     35.84     35.98     35.03     33.02     30.00
BUILDLEN B3              33.02     35.03     35.98     35.84     34.60     32.32
BUILDLEN B3              29.05     24.91     20.00     24.91     29.05     32.32
BUILDLEN B3              34.60     35.84     35.98     35.03     33.02     30.00
XBADJ    B3             -16.51    -17.52    -17.99    -17.92    -17.30    -16.16
XBADJ    B3             -14.53    -12.45    -10.00    -12.45    -14.53    -16.16
XBADJ    B3             -17.30    -17.92    -17.99    -17.52    -16.51    -15.00
XBADJ    B3             -16.51    -17.52    -17.99    -17.92    -17.30    -16.16
XBADJ    B3             -14.53    -12.45    -10.00    -12.45    -14.53    -16.16
XBADJ    B3             -17.30    -17.92    -17.99    -17.52    -16.51    -15.00
YBADJ    B3               0.00      0.00      0.00      0.00      0.00      0.00
YBADJ    B3               0.00      0.00      0.00      0.00      0.00      0.00
YBADJ    B3               0.00      0.00      0.00      0.00      0.00      0.00
YBADJ    B3               0.00      0.00      0.00      0.00      0.00      0.00
YBADJ    B3               0.00      0.00      0.00      0.00      0.00      0.00
YBADJ    B3               0.00      0.00      0.00      0.00      0.00      0.00

BUILDHGT B4               4.00      4.00      4.00      4.00      4.00      4.00
BUILDHGT B4               4.00      4.00      4.00      4.00      4.00      4.00
BUILDHGT B4               4.00      4.00      4.00      4.00      4.00      4.00
BUILDHGT B4               4.00      4.00      4.00      4.00      4.00      4.00
BUILDHGT B4               4.00      4.00      4.00      4.00      4.00      4.00
BUILDHGT B4               4.00      4.00      4.00      4.00      4.00      4.00
BUILDWID B4              24.91     29.05     32.32     34.60     35.84     35.98
BUILDWID B4              35.03     33.02     30.00     33.02     35.03     35.98
BUILDWID B4              35.84     34.60     32.32     29.05     24.91     20.00
BUILDWID B4              24.91     29.05     32.32     34.60     35.84     35.98
BUILDWID B4              35.03     33.02     30.00     33.02     35.03     35.98
BUILDWID B4              35.84     34.60     32.32     29.05     24.91     20.00
BUILDLEN B4              33.02     35.03     35.98     35.84     34.60     32.32
BUILDLEN B4              29.05     24.91     20.00     24.91     29.05     32.32
BUILDLEN B4              34.60     35.84     35.98     35.03     33.02     30.00
BUILDLEN B4              33.02     35.03     35.98     35.84     34.60     32.32
BUILDLEN B4              29.05     24.91     20.00     24.91     29.05     32.32
BUILDLEN B4              34.60     35.84     35.98     35.03     33.02     30.00
XBADJ    B4             -16.51    -17.52    -17.99    -17.92    -17.30    -16.16
XBADJ    B4             -14.53    -12.45    -10.00    -12.45    -14.53    -16.16
XBADJ    B4             -17.30    -17.92    -17.99    -17.52    -16.51    -15.00
XBADJ    B4             -16.51    -17.52    -17.99    -17.92    -17.30    -16.16
XBADJ    B4             -14.53    -12.45    -10.00    -12.45    -14.53    -16.16
XBADJ    B4             -17.30    -17.92    -17.99    -17.52    -16.51    -15.00
YBADJ    B4               0.00      0.00      0.00      0.00      0.00      0.00
YBADJ    B4               0.00      0.00      0.00      0.00      0.00      0.00
YBADJ    B4               0.00      0.00      0.00      0.00      0.00      0.00
YBADJ    B4               0.00      0.00      0.00      0.00      0.00      0.00
YBADJ    B4               0.00      0.00      0.00      0.00      0.00      0.00
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YBADJ    B4             0.00     0.00     0.00     0.00     0.00     0.00

BUILDHGT B5             4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT B5             4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT B5             4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT B5             4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT B5             4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT B5             4.00     4.00     4.00     4.00     4.00     4.00
BUILDWID B5            24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID B5            35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID B5            35.84    34.60    32.32    29.05    24.91    20.00
BUILDWID B5            24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID B5            35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID B5            35.84    34.60    32.32    29.05    24.91    20.00
BUILDLEN B5            33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN B5            29.05    24.91    20.00    24.91    29.05    32.32
BUILDLEN B5            34.60    35.84    35.98    35.03    33.02    30.00
BUILDLEN B5            33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN B5            29.05    24.91    20.00    24.91    29.05    32.32
BUILDLEN B5            34.60    35.84    35.98    35.03    33.02    30.00
XBADJ    B5           -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
XBADJ    B5           -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
XBADJ    B5           -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
XBADJ    B5           -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
XBADJ    B5           -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
XBADJ    B5           -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
YBADJ    B5             0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    B5             0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    B5             0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    B5             0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    B5             0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    B5             0.00     0.00     0.00     0.00     0.00     0.00

BUILDHGT B6             4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT B6             4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT B6             4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT B6             4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT B6             4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT B6             4.00     4.00     4.00     4.00     4.00     4.00
BUILDWID B6            24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID B6            35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID B6            35.84    34.60    32.32    29.05    24.91    20.00
BUILDWID B6            24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID B6            35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID B6            35.84    34.60    32.32    29.05    24.91    20.00
BUILDLEN B6            33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN B6            29.05    24.91    20.00    24.91    29.05    32.32
BUILDLEN B6            34.60    35.84    35.98    35.03    33.02    30.00
BUILDLEN B6            33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN B6            29.05    24.91    20.00    24.91    29.05    32.32
BUILDLEN B6            34.60    35.84    35.98    35.03    33.02    30.00
XBADJ    B6           -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
XBADJ    B6           -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
XBADJ    B6           -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
XBADJ    B6           -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
XBADJ    B6           -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
XBADJ    B6           -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
YBADJ    B6             0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    B6             0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    B6             0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    B6             0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    B6             0.00     0.00     0.00     0.00     0.00     0.00
YBADJ    B6             0.00     0.00     0.00     0.00     0.00     0.00

BUILDHGT B7             4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT B7             4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT B7             4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT B7             4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT B7             4.00     4.00     4.00     4.00     4.00     4.00
BUILDHGT B7             4.00     4.00     4.00     4.00     4.00     4.00
BUILDWID B7            24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID B7            35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID B7            35.84    34.60    32.32    29.05    24.91    20.00
BUILDWID B7            24.91    29.05    32.32    34.60    35.84    35.98
BUILDWID B7            35.03    33.02    30.00    33.02    35.03    35.98
BUILDWID B7            35.84    34.60    32.32    29.05    24.91    20.00
BUILDLEN B7            33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN B7            29.05    24.91    20.00    24.91    29.05    32.32
BUILDLEN B7            34.60    35.84    35.98    35.03    33.02    30.00
BUILDLEN B7            33.02    35.03    35.98    35.84    34.60    32.32
BUILDLEN B7            29.05    24.91    20.00    24.91    29.05    32.32
```

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   BUILDLEN B7              34.60    35.84    35.98    35.03    33.02    30.00
   XBADJ    B7             -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
   XBADJ    B7             -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
   XBADJ    B7             -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
   XBADJ    B7             -16.51   -17.52   -17.99   -17.92   -17.30   -16.16
   XBADJ    B7             -14.53   -12.45   -10.00   -12.45   -14.53   -16.16
   XBADJ    B7             -17.30   -17.92   -17.99   -17.52   -16.51   -15.00
   YBADJ    B7               0.00     0.00     0.00     0.00     0.00     0.00
   YBADJ    B7               0.00     0.00     0.00     0.00     0.00     0.00
   YBADJ    B7               0.00     0.00     0.00     0.00     0.00     0.00
   YBADJ    B7               0.00     0.00     0.00     0.00     0.00     0.00
   YBADJ    B7               0.00     0.00     0.00     0.00     0.00     0.00
   YBADJ    B7               0.00     0.00     0.00     0.00     0.00     0.00

   URBANSRC D1
   URBANSRC D2
   URBANSRC D3
   URBANSRC D4
   URBANSRC D5
   URBANSRC N1
   URBANSRC N2
   URBANSRC N3
   URBANSRC N4
   URBANSRC N5
   URBANSRC B1
   URBANSRC B2
   URBANSRC B3
   URBANSRC B4
   URBANSRC B5
   URBANSRC B6
   URBANSRC B7

SO EMISFACT  D1-D5  HROFDY  8*0.0   8*1.0   8*0.0
SO EMISFACT  N1-N5  HROFDY  8*0.0   8*1.0   8*0.0
SO EMISFACT  B1-B7  HROFDY  8*0.0   8*1.0   8*0.0

   SRCGROUP  D1  D1
   SRCGROUP  D2  D2
   SRCGROUP  D3  D3
   SRCGROUP  D4  D4
   SRCGROUP  D5  D5
   SRCGROUP  N1  N1
   SRCGROUP  N2  N2
   SRCGROUP  N3  N3
   SRCGROUP  N4  N4
   SRCGROUP  N5  N5
   SRCGROUP  B1  B1
   SRCGROUP  B2  B2
   SRCGROUP  B3  B3
   SRCGROUP  B4  B4
   SRCGROUP  B5  B5
   SRCGROUP  B6  B6
   SRCGROUP  B7  B7

SO FINISHED

RE STARTING
   GRIDPOLR POL1 STA
                ORIG     0.0     0.0
                DIST  25 50 75 100 200 300 500 1000
                GDIR     36     10.0     10.0
   GRIDPOLR POL1 END
RE FINISHED

ME STARTING
   SURFFILE ANAH8.SFC
   PROFFILE ANAH8.PFL
   SURFDATA 0 2006
   UAIRDATA 3190 2006
   PROFBASE 0.0 METERS
ME FINISHED

OU STARTING
   RECTABLE  1       FIRST
   RECTABLE  ALLAVE  FIRST
   PLOTFILE   1 D1 FIRST AM1T1D1.TXT
   PLOTFILE   PERIOD D1 AM1T2D1.TXT
   PLOTFILE   1 D2 FIRST AM1T1D2.TXT
   PLOTFILE   PERIOD D2 AM1T2D2.TXT
   PLOTFILE   1 D3 FIRST AM1T1D3.TXT
   PLOTFILE   PERIOD D3 AM1T2D3.TXT
```

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   PLOTFILE   1 D4 FIRST AM1T1D4.TXT
   PLOTFILE   PERIOD D4 AM1T2D4.TXT
   PLOTFILE   1 D5 FIRST AM1T1D5.TXT
   PLOTFILE   PERIOD D5 AM1T2D5.TXT
   PLOTFILE   1 N1 FIRST AM1T1N1.TXT
   PLOTFILE   PERIOD N1 AM1T2N1.TXT
   PLOTFILE   1 N2 FIRST AM1T1N2.TXT
   PLOTFILE   PERIOD N2 AM1T2N2.TXT
   PLOTFILE   1 N3 FIRST AM1T1N3.TXT
   PLOTFILE   PERIOD N3 AM1T2N3.TXT
   PLOTFILE   1 N4 FIRST AM1T1N4.TXT
   PLOTFILE   PERIOD N4 AM1T2N4.TXT
   PLOTFILE   1 N5 FIRST AM1T1N5.TXT
   PLOTFILE   PERIOD N5 AM1T2N5.TXT
   PLOTFILE   1 B1 FIRST AM1T1B1.TXT
   PLOTFILE   PERIOD B1 AM1T2B1.TXT
   PLOTFILE   1 B2 FIRST AM1T1B2.TXT
   PLOTFILE   PERIOD B2 AM1T2B2.TXT
   PLOTFILE   1 B3 FIRST AM1T1B3.TXT
   PLOTFILE   PERIOD B3 AM1T2B3.TXT
   PLOTFILE   1 B4 FIRST AM1T1B4.TXT
   PLOTFILE   PERIOD B4 AM1T2B4.TXT
   PLOTFILE   1 B5 FIRST AM1T1B5.TXT
   PLOTFILE   PERIOD B5 AM1T2B5.TXT
   PLOTFILE   1 B6 FIRST AM1T1B6.TXT
   PLOTFILE   PERIOD B6 AM1T2B6.TXT
   PLOTFILE   1 B7 FIRST AM1T1B7.TXT
   PLOTFILE   PERIOD B7 AM1T2B7.TXT
OU FINISHED
```

Results

Figure 2 shows the source receptor areas (SRA) within the South Coast Air Basin and Table 3 lists the appropriate meteorological station to use for each SRA.

Figure 2: Source/Receptor Areas

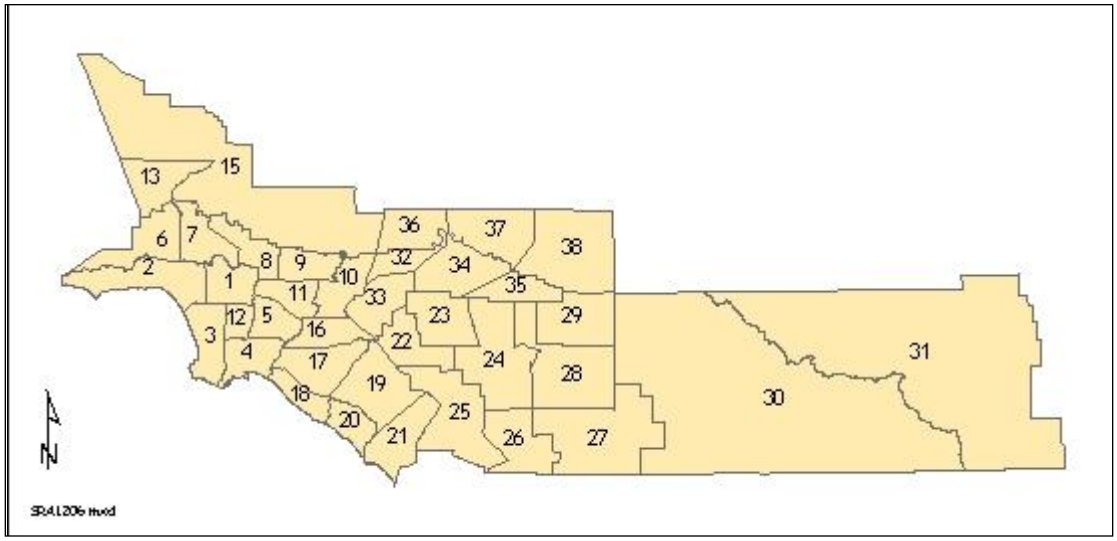

Table 3: Meteorological Stations for Each Source/Receptor Area.

Meteorological Station	Source/ Receptor Area	Meteorological Station	Source/ Receptor Area
Anaheim	17	Compton/Lynwood	12
Azusa	8, 9	Mission Viejo	19, 21
Banning	29	Perris	24, 28
Burbank	7	Palm Springs	30, 31
Central LA	1	Pico Rivera	5, 11
Crestline	37	Pomona	10
Costa Mesa	18, 20	Redlands	35, 38
Fontana	34	Reseda	6
Indio	30	Riverside	22, 23
La Habra	16	Santa Clarita	13, 15
Lake Elsinore	25, 26, 27	San Bernardino	34
LAX	3	Upland	32, 33, 36
Long Beach	4	West LA	2

The following tables have been numbered to match the tables within Permit Application Attachment "M" for the Risk Assessment Procedures for Rules 1401 & 212.

Table 2.11
Dispersion Factors (χ/Q)
for Natural Gas Boilers
Operating 12 Hours per Day or Less

Natural Gas Boiler Rating 0 to 4.9 MMBTU/hr

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([μg/m^3]/[ton/year])

Rating (MMBTU/hr)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
0 to 4.9	Anaheim	19.45	5.00	3.06	1.92	0.45	0.18	0.06	0.02
0 to 4.9	Azusa	14.24	4.45	2.79	1.77	0.42	0.16	0.06	0.01
0 to 4.9	Banning	14.79	4.63	3.05	2.06	0.57	0.23	0.08	0.02
0 to 4.9	Burbank	12.06	3.41	2.04	1.25	0.28	0.11	0.04	0.01
0 to 4.9	Central LA	15.37	3.93	2.37	1.48	0.35	0.14	0.05	0.01
0 to 4.9	Compton	13.44	3.82	2.34	1.46	0.35	0.13	0.05	0.01
0 to 4.9	Costa Mesa	11.23	3.89	2.46	1.54	0.36	0.14	0.05	0.01
0 to 4.9	Crestline	10.79	3.33	2.06	1.28	0.30	0.12	0.04	0.01
0 to 4.9	Fontana	16.80	4.91	3.15	2.04	0.51	0.20	0.07	0.02
0 to 4.9	Indio	8.84	2.98	1.88	1.19	0.29	0.12	0.04	0.01
0 to 4.9	La Habra	13.36	4.10	2.48	1.53	0.35	0.14	0.05	0.01
0 to 4.9	Lake Elsinore	9.25	3.24	2.08	1.32	0.31	0.12	0.04	0.01
0 to 4.9	LAX	22.89	5.92	3.76	2.46	0.63	0.25	0.08	0.02
0 to 4.9	Long Beach	10.78	3.04	1.83	1.13	0.27	0.10	0.04	0.01
0 to 4.9	Lynwood	14.10	4.20	2.61	1.65	0.39	0.15	0.05	0.01
0 to 4.9	Mission Viejo	10.10	3.21	2.03	1.27	0.30	0.12	0.04	0.01
0 to 4.9	Palm Springs	8.32	2.63	1.60	1.01	0.25	0.10	0.03	0.01
0 to 4.9	Perris	8.42	2.79	1.79	1.17	0.30	0.12	0.04	0.01
0 to 4.9	Pico Rivera	15.61	4.20	2.58	1.62	0.39	0.16	0.05	0.01
0 to 4.9	Pomona	13.12	3.99	2.41	1.48	0.34	0.13	0.05	0.01
0 to 4.9	Redlands	10.94	4.09	2.55	1.58	0.36	0.14	0.05	0.01
0 to 4.9	Reseda	5.99	2.45	1.45	0.87	0.19	0.08	0.03	0.01
0 to 4.9	Riverside	13.67	4.21	2.69	1.73	0.42	0.16	0.06	0.01
0 to 4.9	San Bernardino	12.15	3.79	2.34	1.48	0.36	0.14	0.05	0.01
0 to 4.9	Santa Clarita	12.15	3.44	2.18	1.43	0.37	0.15	0.06	0.01
0 to 4.9	Upland	15.43	4.68	2.99	1.92	0.47	0.18	0.06	0.02
0 to 4.9	West LA	15.74	4.37	2.64	1.62	0.37	0.15	0.05	0.01

Table 2.12
Dispersion Factors (χ/Q)
for Natural Gas Boilers
Operating 12 Hours per Day or Less

Natural Gas Boiler Rating 5 to 9.9 MMBTU/hr

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([μg/m^3]/[ton/year])

Rating (MMBTU/hr)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
5 to 9.9	Anaheim	12.35	3.51	2.29	1.56	0.41	0.16	0.06	0.02
5 to 9.9	Azusa	7.76	2.83	1.93	1.35	0.37	0.15	0.05	0.01
5 to 9.9	Banning	11.43	3.66	2.49	1.79	0.53	0.22	0.08	0.02
5 to 9.9	Burbank	7.12	2.34	1.51	1.00	0.25	0.10	0.04	0.01
5 to 9.9	Central LA	10.41	2.91	1.86	1.25	0.32	0.13	0.04	0.01
5 to 9.9	Compton	8.06	2.62	1.74	1.18	0.31	0.12	0.04	0.01
5 to 9.9	Costa Mesa	5.62	2.37	1.64	1.15	0.31	0.13	0.05	0.01
5 to 9.9	Crestline	5.95	2.13	1.43	0.98	0.26	0.11	0.04	0.01
5 to 9.9	Fontana	10.83	3.39	2.31	1.64	0.46	0.19	0.07	0.02
5 to 9.9	Indio	5.34	1.94	1.35	0.94	0.26	0.11	0.04	0.01
5 to 9.9	La Habra	7.11	2.58	1.71	1.16	0.30	0.12	0.05	0.01
5 to 9.9	Lake Elsinore	4.66	1.80	1.29	0.93	0.27	0.11	0.04	0.01
5 to 9.9	LAX	16.06	4.44	2.95	2.08	0.58	0.23	0.08	0.02
5 to 9.9	Long Beach	6.26	2.09	1.36	0.90	0.24	0.09	0.03	0.01
5 to 9.9	Lynwood	8.13	2.78	1.86	1.29	0.35	0.14	0.05	0.01
5 to 9.9	Mission Viejo	5.40	1.97	1.36	0.95	0.26	0.11	0.04	0.01
5 to 9.9	Palm Springs	5.74	1.84	1.22	0.83	0.22	0.09	0.03	0.01
5 to 9.9	Perris	5.71	1.94	1.32	0.94	0.27	0.11	0.04	0.01
5 to 9.9	Pico Rivera	10.07	2.99	1.94	1.32	0.35	0.14	0.05	0.01
5 to 9.9	Pomona	7.57	2.63	1.72	1.16	0.30	0.12	0.04	0.01
5 to 9.9	Redlands	5.08	2.31	1.62	1.14	0.31	0.13	0.05	0.01
5 to 9.9	Reseda	3.43	1.41	0.93	0.62	0.17	0.07	0.03	0.01
5 to 9.9	Riverside	7.93	2.75	1.91	1.35	0.37	0.15	0.06	0.01
5 to 9.9	San Bernardino	7.32	2.49	1.67	1.15	0.32	0.13	0.05	0.01
5 to 9.9	Santa Clarita	9.63	2.78	1.82	1.26	0.35	0.15	0.05	0.01
5 to 9.9	Upland	8.96	3.05	2.11	1.50	0.41	0.17	0.06	0.02
5 to 9.9	West LA	9.73	3.04	1.96	1.31	0.34	0.14	0.05	0.01

Table 2.13
Dispersion Factors (χ/Q)
for Natural Gas Boilers
Operating 12 Hours per Day or Less

Natural Gas Boiler Rating 10 to 19.9 MMBTU/hr

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([μg/m^3]/[ton/year])

Rating (MMBTU/hr)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
10 to 19.9	Anaheim	8.71	2.66	1.81	1.26	0.37	0.16	0.06	0.02
10 to 19.9	Azusa	4.89	1.96	1.40	1.01	0.32	0.14	0.05	0.01
10 to 19.9	Banning	9.24	3.07	2.12	1.53	0.49	0.20	0.07	0.02
10 to 19.9	Burbank	4.65	1.70	1.15	0.78	0.22	0.09	0.03	0.01
10 to 19.9	Central LA	7.74	2.31	1.53	1.05	0.29	0.12	0.04	0.01
10 to 19.9	Compton	5.65	2.00	1.38	0.95	0.28	0.12	0.04	0.01
10 to 19.9	Costa Mesa	3.20	1.52	1.13	0.82	0.27	0.12	0.04	0.01
10 to 19.9	Crestline	3.82	1.47	1.05	0.74	0.23	0.10	0.04	0.01
10 to 19.9	Fontana	7.85	2.57	1.80	1.30	0.41	0.18	0.07	0.02
10 to 19.9	Indio	3.69	1.41	1.01	0.74	0.23	0.10	0.04	0.01
10 to 19.9	La Habra	4.38	1.75	1.23	0.86	0.26	0.12	0.04	0.01
10 to 19.9	Lake Elsinore	2.90	1.18	0.89	0.67	0.23	0.10	0.04	0.01
10 to 19.9	LAX	12.32	3.62	2.45	1.74	0.53	0.22	0.08	0.02
10 to 19.9	Long Beach	3.94	1.51	1.03	0.71	0.21	0.09	0.03	0.01
10 to 19.9	Lynwood	5.47	2.06	1.43	1.02	0.31	0.13	0.05	0.01
10 to 19.9	Mission Viejo	3.18	1.30	0.96	0.69	0.22	0.10	0.04	0.01
10 to 19.9	Palm Springs	4.47	1.45	1.00	0.70	0.21	0.09	0.03	0.01
10 to 19.9	Perris	4.41	1.53	1.06	0.77	0.25	0.11	0.04	0.01
10 to 19.9	Pico Rivera	7.20	2.28	1.53	1.06	0.31	0.13	0.05	0.01
10 to 19.9	Pomona	5.03	1.91	1.30	0.90	0.27	0.12	0.04	0.01
10 to 19.9	Redlands	2.85	1.46	1.10	0.81	0.27	0.12	0.05	0.01
10 to 19.9	Reseda	2.56	1.10	0.75	0.52	0.15	0.07	0.03	0.01
10 to 19.9	Riverside	5.32	1.99	1.44	1.05	0.33	0.14	0.05	0.01
10 to 19.9	San Bernardino	5.08	1.82	1.27	0.91	0.28	0.12	0.05	0.01
10 to 19.9	Santa Clarita	7.96	2.39	1.59	1.11	0.33	0.14	0.05	0.01
10 to 19.9	Upland	5.96	2.19	1.58	1.15	0.36	0.16	0.06	0.02
10 to 19.9	West LA	6.64	2.28	1.53	1.04	0.30	0.13	0.05	0.01

Table 2.14
Dispersion Factors (χ/Q)
for Natural Gas Boilers
Operating 12 Hours per Day or Less

Natural Gas Boiler Rating 20 to 29.9 MMBTU/hr

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([μg/m^3]/[ton/year])

Rating (MMBTU/hr)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
20 to 29.9	Anaheim	4.70	1.65	1.26	0.92	0.31	0.14	0.05	0.01
20 to 29.9	Azusa	1.87	0.90	0.77	0.61	0.24	0.12	0.05	0.01
20 to 29.9	Banning	5.42	1.89	1.48	1.12	0.42	0.19	0.07	0.02
20 to 29.9	Burbank	2.06	0.91	0.71	0.53	0.18	0.08	0.03	0.01
20 to 29.9	Central LA	4.34	1.47	1.10	0.79	0.25	0.11	0.04	0.01
20 to 29.9	Compton	2.52	1.05	0.84	0.63	0.22	0.10	0.04	0.01
20 to 29.9	Costa Mesa	0.99	0.59	0.55	0.46	0.20	0.10	0.04	0.01
20 to 29.9	Crestline	1.76	0.78	0.65	0.50	0.19	0.09	0.04	0.01
20 to 29.9	Fontana	4.20	1.52	1.20	0.91	0.34	0.16	0.06	0.02
20 to 29.9	Indio	1.88	0.80	0.65	0.51	0.19	0.09	0.04	0.01
20 to 29.9	La Habra	1.84	0.87	0.72	0.56	0.21	0.10	0.04	0.01
20 to 29.9	Lake Elsinore	1.38	0.64	0.55	0.45	0.19	0.09	0.04	0.01
20 to 29.9	LAX	7.06	2.36	1.77	1.29	0.45	0.20	0.07	0.02
20 to 29.9	Long Beach	1.00	0.62	0.56	0.43	0.16	0.08	0.03	0.01
20 to 29.9	Lynwood	2.27	1.03	0.84	0.64	0.24	0.12	0.05	0.01
20 to 29.9	Mission Viejo	1.06	0.56	0.51	0.42	0.18	0.09	0.04	0.01
20 to 29.9	Palm Springs	2.79	0.98	0.74	0.54	0.18	0.08	0.03	0.01
20 to 29.9	Perris	2.60	0.99	0.76	0.57	0.21	0.10	0.04	0.01
20 to 29.9	Pico Rivera	3.62	1.32	1.01	0.75	0.26	0.12	0.05	0.01
20 to 29.9	Pomona	2.39	1.02	0.81	0.60	0.22	0.10	0.04	0.01
20 to 29.9	Redlands	0.90	0.60	0.57	0.47	0.21	0.11	0.04	0.01
20 to 29.9	Reseda	1.20	0.65	0.50	0.37	0.13	0.06	0.02	0.01
20 to 29.9	Riverside	2.25	0.96	0.82	0.65	0.26	0.13	0.05	0.01
20 to 29.9	San Bernardino	2.68	1.07	0.85	0.64	0.24	0.11	0.04	0.01
20 to 29.9	Santa Clarita	4.78	1.62	1.18	0.86	0.29	0.13	0.05	0.01
20 to 29.9	Upland	2.55	1.08	0.91	0.72	0.29	0.14	0.05	0.02
20 to 29.9	West LA	2.93	1.17	0.93	0.69	0.25	0.12	0.05	0.01

Table 2.15
Dispersion Factors (χ/Q)
for Natural Gas Boilers
Operating 12 Hours per Day or Less

Natural Gas Boiler Rating 30 to 49.9 MMBTU/hr

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([μg/m^3]/[ton/year])

Rating (MMBTU/hr)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
30 to 49.9	Anaheim	2.71	1.03	0.86	0.68	0.26	0.13	0.05	0.01
30 to 49.9	Azusa	0.83	0.50	0.49	0.43	0.20	0.11	0.04	0.01
30 to 49.9	Banning	4.09	1.42	1.14	0.90	0.36	0.17	0.07	0.02
30 to 49.9	Burbank	1.01	0.53	0.47	0.38	0.15	0.08	0.03	0.01
30 to 49.9	Central LA	2.88	1.03	0.83	0.63	0.22	0.10	0.04	0.01
30 to 49.9	Compton	1.42	0.66	0.59	0.47	0.19	0.09	0.04	0.01
30 to 49.9	Costa Mesa	0.35	0.31	0.34	0.32	0.17	0.09	0.04	0.01
30 to 49.9	Crestline	0.99	0.48	0.44	0.37	0.16	0.08	0.03	0.01
30 to 49.9	Fontana	2.67	1.00	0.85	0.69	0.29	0.14	0.06	0.02
30 to 49.9	Indio	1.11	0.50	0.44	0.37	0.16	0.08	0.03	0.01
30 to 49.9	La Habra	0.83	0.48	0.46	0.39	0.18	0.09	0.04	0.01
30 to 49.9	Lake Elsinore	0.70	0.38	0.36	0.31	0.15	0.08	0.03	0.01
30 to 49.9	LAX	4.60	1.61	1.29	1.00	0.38	0.18	0.07	0.02
30 to 49.9	Long Beach	0.39	0.36	0.37	0.32	0.14	0.07	0.03	0.01
30 to 49.9	Lynwood	1.07	0.59	0.54	0.45	0.20	0.10	0.04	0.01
30 to 49.9	Mission Viejo	0.40	0.30	0.31	0.29	0.15	0.08	0.03	0.01
30 to 49.9	Palm Springs	2.10	0.74	0.58	0.44	0.16	0.07	0.03	0.01
30 to 49.9	Perris	1.86	0.72	0.57	0.45	0.18	0.09	0.04	0.01
30 to 49.9	Pico Rivera	2.24	0.87	0.72	0.57	0.22	0.11	0.04	0.01
30 to 49.9	Pomona	1.35	0.63	0.55	0.44	0.18	0.09	0.04	0.01
30 to 49.9	Redlands	0.39	0.35	0.37	0.34	0.18	0.10	0.04	0.01
30 to 49.9	Reseda	0.76	0.46	0.38	0.29	0.11	0.06	0.02	0.01
30 to 49.9	Riverside	1.14	0.55	0.53	0.46	0.22	0.11	0.05	0.01
30 to 49.9	San Bernardino	1.61	0.68	0.58	0.47	0.20	0.10	0.04	0.01
30 to 49.9	Santa Clarita	3.66	1.28	0.97	0.73	0.25	0.12	0.05	0.01
30 to 49.9	Upland	1.24	0.59	0.57	0.50	0.23	0.12	0.05	0.01
30 to 49.9	West LA	1.50	0.68	0.61	0.49	0.21	0.11	0.04	0.01

Table 2.16
Dispersion Factors (χ/Q)
for Natural Gas Boilers
Operating 12 Hours per Day or Less

Natural Gas Boiler Rating 50 to 149.9 MMBTU/hr

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([μg/m^3]/[ton/year])

Rating (MMBTU/hr)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
50 to 149.9	Anaheim	0.03	0.11	0.19	0.24	0.18	0.11	0.05	0.01
50 to 149.9	Azusa	0.04	0.14	0.20	0.22	0.15	0.09	0.04	0.01
50 to 149.9	Banning	0.01	0.02	0.08	0.16	0.20	0.13	0.06	0.02
50 to 149.9	Burbank	0.03	0.13	0.18	0.19	0.12	0.07	0.03	0.01
50 to 149.9	Central LA	0.02	0.10	0.17	0.21	0.15	0.09	0.04	0.01
50 to 149.9	Compton	0.04	0.12	0.19	0.21	0.14	0.08	0.04	0.01
50 to 149.9	Costa Mesa	0.05	0.12	0.16	0.18	0.13	0.08	0.04	0.01
50 to 149.9	Crestline	0.04	0.10	0.16	0.17	0.12	0.07	0.03	0.01
50 to 149.9	Fontana	0.02	0.08	0.15	0.20	0.18	0.12	0.05	0.02
50 to 149.9	Indio	0.04	0.09	0.13	0.15	0.11	0.07	0.03	0.01
50 to 149.9	La Habra	0.06	0.14	0.19	0.20	0.14	0.08	0.04	0.01
50 to 149.9	Lake Elsinore	0.04	0.10	0.13	0.14	0.11	0.07	0.03	0.01
50 to 149.9	LAX	0.01	0.09	0.19	0.26	0.23	0.14	0.06	0.02
50 to 149.9	Long Beach	0.03	0.11	0.16	0.17	0.11	0.06	0.03	0.01
50 to 149.9	Lynwood	0.10	0.18	0.22	0.23	0.15	0.09	0.04	0.01
50 to 149.9	Mission Viejo	0.03	0.10	0.14	0.16	0.11	0.07	0.03	0.01
50 to 149.9	Palm Springs	0.07	0.12	0.16	0.17	0.11	0.06	0.03	0.01
50 to 149.9	Perris	0.06	0.10	0.12	0.14	0.11	0.07	0.03	0.01
50 to 149.9	Pico Rivera	0.02	0.11	0.18	0.21	0.15	0.09	0.04	0.01
50 to 149.9	Pomona	0.09	0.16	0.20	0.21	0.14	0.08	0.04	0.01
50 to 149.9	Redlands	0.07	0.14	0.18	0.20	0.14	0.08	0.04	0.01
50 to 149.9	Reseda	0.12	0.18	0.18	0.16	0.09	0.05	0.02	0.01
50 to 149.9	Riverside	0.04	0.10	0.16	0.20	0.16	0.10	0.04	0.01
50 to 149.9	San Bernardino	0.08	0.13	0.17	0.19	0.14	0.08	0.04	0.01
50 to 149.9	Santa Clarita	0.04	0.07	0.12	0.18	0.16	0.10	0.04	0.01
50 to 149.9	Upland	0.03	0.10	0.17	0.21	0.17	0.10	0.05	0.01
50 to 149.9	West LA	0.03	0.13	0.20	0.22	0.16	0.09	0.04	0.01

Table 2.17
Dispersion Factors (χ/Q)
for Natural Gas Boilers
Operating 12 Hours per Day or Less

Natural Gas Boiler Rating 150 to 200 MMBTU/hr

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([μg/m^3]/[ton/year])

Rating (MMBTU/hr)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
150 to 200	Anaheim	0.01	0.04	0.08	0.12	0.12	0.08	0.04	0.01
150 to 200	Azusa	0.02	0.07	0.10	0.12	0.10	0.07	0.03	0.01
150 to 200	Banning	0.00	0.01	0.03	0.06	0.12	0.10	0.05	0.02
150 to 200	Burbank	0.01	0.06	0.09	0.10	0.08	0.05	0.02	0.01
150 to 200	Central LA	0.01	0.05	0.08	0.10	0.10	0.07	0.03	0.01
150 to 200	Compton	0.02	0.05	0.08	0.10	0.10	0.06	0.03	0.01
150 to 200	Costa Mesa	0.02	0.05	0.08	0.09	0.09	0.06	0.03	0.01
150 to 200	Crestline	0.02	0.05	0.07	0.09	0.08	0.05	0.03	0.01
150 to 200	Fontana	0.01	0.04	0.07	0.09	0.12	0.08	0.04	0.01
150 to 200	Indio	0.02	0.04	0.06	0.08	0.07	0.05	0.03	0.01
150 to 200	La Habra	0.03	0.06	0.09	0.10	0.09	0.06	0.03	0.01
150 to 200	Lake Elsinore	0.02	0.05	0.07	0.08	0.07	0.05	0.02	0.01
150 to 200	LAX	0.01	0.04	0.09	0.13	0.15	0.11	0.05	0.02
150 to 200	Long Beach	0.01	0.05	0.08	0.09	0.07	0.05	0.02	0.01
150 to 200	Lynwood	0.04	0.08	0.11	0.12	0.10	0.07	0.03	0.01
150 to 200	Mission Viejo	0.01	0.04	0.07	0.08	0.07	0.05	0.02	0.01
150 to 200	Palm Springs	0.03	0.06	0.07	0.08	0.08	0.05	0.02	0.01
150 to 200	Perris	0.03	0.05	0.06	0.07	0.07	0.05	0.03	0.01
150 to 200	Pico Rivera	0.01	0.05	0.09	0.11	0.10	0.07	0.03	0.01
150 to 200	Pomona	0.04	0.08	0.10	0.11	0.09	0.06	0.03	0.01
150 to 200	Redlands	0.03	0.07	0.09	0.10	0.09	0.06	0.03	0.01
150 to 200	Reseda	0.05	0.09	0.10	0.09	0.06	0.04	0.02	0.01
150 to 200	Riverside	0.02	0.04	0.07	0.10	0.10	0.07	0.04	0.01
150 to 200	San Bernardino	0.03	0.06	0.08	0.09	0.09	0.06	0.03	0.01
150 to 200	Santa Clarita	0.02	0.04	0.05	0.07	0.11	0.08	0.04	0.01
150 to 200	Upland	0.01	0.04	0.07	0.10	0.11	0.08	0.04	0.01
150 to 200	West LA	0.01	0.06	0.10	0.12	0.11	0.07	0.03	0.01

Table 3.11
Dispersion Factors (χ/Q)
for Natural Gas Boilers
Operating More than 12 Hours per Day

Natural Gas Boiler Rating 0 to 4.9 MMBTU/hr

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([μg/m^3]/[ton/year])

Rating (MMBTU/hr)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
0 to 4.9	Anaheim	12.59	3.18	2.09	1.49	0.59	0.35	0.18	0.07
0 to 4.9	Azusa	10.78	2.95	2.08	1.55	0.68	0.38	0.19	0.08
0 to 4.9	Banning	17.84	5.35	3.78	2.84	1.14	0.60	0.30	0.12
0 to 4.9	Burbank	12.48	3.00	2.05	1.52	0.66	0.36	0.18	0.07
0 to 4.9	Central LA	10.39	2.50	1.69	1.24	0.55	0.30	0.15	0.06
0 to 4.9	Compton	9.04	2.39	1.68	1.26	0.62	0.37	0.19	0.08
0 to 4.9	Costa Mesa	5.49	1.80	1.23	0.87	0.42	0.29	0.16	0.07
0 to 4.9	Crestline	8.01	2.23	1.46	1.03	0.44	0.27	0.16	0.06
0 to 4.9	Fontana	14.09	3.90	2.70	1.99	0.80	0.45	0.24	0.10
0 to 4.9	Indio	14.83	4.24	2.91	2.17	0.90	0.51	0.27	0.11
0 to 4.9	La Habra	7.07	2.04	1.32	0.91	0.43	0.28	0.15	0.06
0 to 4.9	Lake Elsinore	5.38	1.70	1.16	0.81	0.41	0.30	0.18	0.08
0 to 4.9	LAX	14.33	3.69	2.50	1.80	0.70	0.38	0.19	0.07
0 to 4.9	Long Beach	6.98	2.12	1.57	1.23	0.63	0.37	0.20	0.08
0 to 4.9	Lynwood	9.10	2.47	1.71	1.26	0.60	0.37	0.20	0.08
0 to 4.9	Mission Viejo	6.03	1.69	1.13	0.80	0.38	0.26	0.15	0.06
0 to 4.9	Palm Springs	14.03	3.59	2.41	1.77	0.75	0.44	0.23	0.09
0 to 4.9	Perris	7.08	2.14	1.46	1.07	0.48	0.31	0.18	0.07
0 to 4.9	Pico Rivera	12.15	3.07	2.02	1.45	0.57	0.33	0.17	0.07
0 to 4.9	Pomona	8.33	2.31	1.55	1.12	0.58	0.38	0.22	0.09
0 to 4.9	Redlands	6.18	2.14	1.47	1.05	0.48	0.41	0.28	0.12
0 to 4.9	Reseda	3.67	1.17	0.76	0.53	0.32	0.24	0.14	0.06
0 to 4.9	Riverside	9.01	2.53	1.76	1.28	0.56	0.34	0.19	0.07
0 to 4.9	San Bernardino	11.16	3.10	2.09	1.54	0.68	0.41	0.23	0.09
0 to 4.9	Santa Clarita	9.34	2.44	1.61	1.16	0.48	0.30	0.17	0.07
0 to 4.9	Upland	11.03	3.04	2.12	1.55	0.67	0.41	0.26	0.11
0 to 4.9	West LA	7.88	2.13	1.37	0.94	0.40	0.26	0.15	0.06

Table 3.12
Dispersion Factors (X/Q)
for Natural Gas Boilers
Operating More than 12 Hours per Day

Natural Gas Boiler Rating 5 to 9.9 MMBTU/hr

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([$\mu g/m^3$]/[ton/year])

Rating (MMBTU/hr)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
5 to 9.9	Anaheim	6.90	1.85	1.19	0.86	0.28	0.15	0.11	0.06
5 to 9.9	Azusa	5.37	1.58	1.08	0.82	0.31	0.17	0.12	0.06
5 to 9.9	Banning	12.66	3.68	2.44	1.88	0.77	0.39	0.22	0.10
5 to 9.9	Burbank	6.60	1.63	1.04	0.78	0.31	0.17	0.12	0.06
5 to 9.9	Central LA	6.49	1.62	1.07	0.79	0.28	0.14	0.10	0.05
5 to 9.9	Compton	4.64	1.35	0.93	0.69	0.27	0.16	0.12	0.07
5 to 9.9	Costa Mesa	2.51	1.00	0.70	0.52	0.18	0.12	0.09	0.05
5 to 9.9	Crestline	4.46	1.31	0.83	0.61	0.22	0.12	0.09	0.05
5 to 9.9	Fontana	8.38	2.33	1.55	1.16	0.43	0.22	0.15	0.08
5 to 9.9	Indio	9.22	2.58	1.68	1.27	0.51	0.26	0.18	0.09
5 to 9.9	La Habra	3.52	1.17	0.77	0.55	0.19	0.12	0.09	0.04
5 to 9.9	Lake Elsinore	2.69	0.90	0.63	0.47	0.17	0.09	0.09	0.06
5 to 9.9	LAX	9.07	2.39	1.57	1.16	0.40	0.19	0.12	0.06
5 to 9.9	Long Beach	3.24	1.11	0.78	0.60	0.25	0.15	0.12	0.07
5 to 9.9	Lynwood	4.73	1.41	0.96	0.71	0.26	0.15	0.12	0.06
5 to 9.9	Mission Viejo	2.68	0.88	0.60	0.43	0.14	0.09	0.08	0.04
5 to 9.9	Palm Springs	9.03	2.25	1.46	1.09	0.42	0.22	0.15	0.07
5 to 9.9	Perris	4.26	1.30	0.85	0.63	0.23	0.13	0.10	0.05
5 to 9.9	Pico Rivera	6.98	1.83	1.15	0.84	0.29	0.15	0.11	0.05
5 to 9.9	Pomona	4.39	1.34	0.87	0.63	0.22	0.14	0.13	0.07
5 to 9.9	Redlands	2.71	1.10	0.78	0.58	0.21	0.13	0.14	0.09
5 to 9.9	Reseda	2.28	0.75	0.49	0.35	0.12	0.08	0.08	0.05
5 to 9.9	Riverside	4.70	1.43	0.99	0.74	0.26	0.14	0.11	0.06
5 to 9.9	San Bernardino	6.35	1.79	1.16	0.85	0.32	0.18	0.13	0.07
5 to 9.9	Santa Clarita	6.20	1.67	1.06	0.77	0.26	0.14	0.10	0.05
5 to 9.9	Upland	5.98	1.73	1.18	0.89	0.33	0.17	0.13	0.08
5 to 9.9	West LA	4.35	1.32	0.85	0.60	0.19	0.11	0.08	0.05

Table 3.13
Dispersion Factors (X/Q)
for Natural Gas Boilers
Operating More than 12 Hours per Day

Natural Gas Boiler Rating 10 to 19.9 MMBTU/hr

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([$\mu g/m^3$]/[ton/year])

Rating (MMBTU/hr)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
10 to 19.9	Anaheim	4.75	1.35	0.89	0.63	0.22	0.10	0.07	0.04
10 to 19.9	Azusa	3.20	1.04	0.73	0.54	0.21	0.10	0.07	0.05
10 to 19.9	Banning	9.68	2.87	1.86	1.35	0.58	0.29	0.17	0.09
10 to 19.9	Burbank	4.21	1.11	0.71	0.50	0.21	0.10	0.07	0.05
10 to 19.9	Central LA	4.63	1.23	0.83	0.59	0.22	0.11	0.06	0.04
10 to 19.9	Compton	3.00	0.96	0.67	0.49	0.18	0.10	0.07	0.05
10 to 19.9	Costa Mesa	1.38	0.63	0.47	0.35	0.13	0.08	0.06	0.04
10 to 19.9	Crestline	3.02	0.91	0.60	0.42	0.16	0.09	0.06	0.04
10 to 19.9	Fontana	5.92	1.69	1.12	0.82	0.31	0.15	0.10	0.06
10 to 19.9	Indio	6.91	1.94	1.22	0.88	0.37	0.19	0.12	0.07
10 to 19.9	La Habra	2.13	0.78	0.54	0.39	0.14	0.08	0.05	0.03
10 to 19.9	Lake Elsinore	1.70	0.60	0.43	0.33	0.13	0.06	0.05	0.04
10 to 19.9	LAX	6.65	1.83	1.21	0.87	0.31	0.14	0.08	0.05
10 to 19.9	Long Beach	1.93	0.77	0.56	0.41	0.16	0.09	0.07	0.05
10 to 19.9	Lynwood	2.97	0.99	0.69	0.50	0.19	0.10	0.07	0.05
10 to 19.9	Mission Viejo	1.50	0.56	0.40	0.29	0.10	0.06	0.05	0.03
10 to 19.9	Palm Springs	6.96	1.75	1.13	0.82	0.33	0.17	0.10	0.06
10 to 19.9	Perris	3.18	0.99	0.65	0.47	0.18	0.09	0.06	0.04
10 to 19.9	Pico Rivera	4.84	1.34	0.85	0.60	0.22	0.10	0.07	0.04
10 to 19.9	Pomona	2.82	0.94	0.63	0.45	0.16	0.08	0.07	0.05
10 to 19.9	Redlands	1.46	0.68	0.51	0.39	0.15	0.08	0.08	0.07
10 to 19.9	Reseda	1.67	0.57	0.38	0.27	0.10	0.05	0.04	0.03
10 to 19.9	Riverside	3.01	0.98	0.70	0.52	0.19	0.10	0.07	0.04
10 to 19.9	San Bernardino	4.51	1.30	0.85	0.61	0.23	0.12	0.08	0.06
10 to 19.9	Santa Clarita	4.81	1.34	0.85	0.60	0.21	0.10	0.06	0.04
10 to 19.9	Upland	3.81	1.18	0.82	0.61	0.23	0.12	0.08	0.06
10 to 19.9	West LA	2.86	0.95	0.64	0.44	0.15	0.08	0.05	0.04

Table 3.14
Dispersion Factors (X/Q)
for Natural Gas Boilers
Operating More than 12 Hours per Day

Natural Gas Boiler Rating 20 to 29.9 MMBTU/hr

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([$\mu g/m^3$]/[ton/year])

Rating (MMBTU/hr)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
20 to 29.9	Anaheim	2.23	0.75	0.57	0.41	0.15	0.07	0.04	0.03
20 to 29.9	Azusa	1.18	0.42	0.36	0.28	0.12	0.07	0.04	0.03
20 to 29.9	Banning	4.86	1.49	1.07	0.79	0.35	0.19	0.11	0.07
20 to 29.9	Burbank	1.42	0.48	0.36	0.26	0.10	0.06	0.04	0.03
20 to 29.9	Central LA	2.24	0.70	0.53	0.39	0.15	0.08	0.04	0.03
20 to 29.9	Compton	1.15	0.45	0.37	0.28	0.11	0.06	0.04	0.03
20 to 29.9	Costa Mesa	0.39	0.24	0.22	0.19	0.09	0.06	0.04	0.02
20 to 29.9	Crestline	1.34	0.46	0.34	0.26	0.11	0.06	0.04	0.02
20 to 29.9	Fontana	2.87	0.91	0.67	0.50	0.20	0.10	0.06	0.04
20 to 29.9	Indio	3.61	1.09	0.73	0.52	0.22	0.12	0.07	0.05
20 to 29.9	La Habra	0.79	0.36	0.30	0.23	0.10	0.05	0.03	0.02
20 to 29.9	Lake Elsinore	0.72	0.30	0.25	0.20	0.09	0.05	0.02	0.03
20 to 29.9	LAX	3.46	1.09	0.80	0.59	0.22	0.10	0.05	0.03
20 to 29.9	Long Beach	0.48	0.29	0.26	0.21	0.10	0.06	0.04	0.04
20 to 29.9	Lynwood	1.06	0.45	0.37	0.29	0.12	0.06	0.04	0.03
20 to 29.9	Mission Viejo	0.43	0.22	0.20	0.17	0.07	0.04	0.02	0.02
20 to 29.9	Palm Springs	3.94	1.06	0.74	0.54	0.23	0.12	0.07	0.04
20 to 29.9	Perris	1.64	0.57	0.41	0.30	0.12	0.06	0.04	0.03
20 to 29.9	Pico Rivera	2.13	0.70	0.51	0.37	0.14	0.07	0.04	0.03
20 to 29.9	Pomona	1.23	0.48	0.37	0.28	0.11	0.06	0.04	0.03
20 to 29.9	Redlands	0.40	0.25	0.24	0.20	0.10	0.06	0.04	0.04
20 to 29.9	Reseda	0.71	0.31	0.23	0.17	0.07	0.04	0.03	0.02
20 to 29.9	Riverside	1.17	0.45	0.38	0.30	0.13	0.07	0.04	0.03
20 to 29.9	San Bernardino	2.13	0.70	0.51	0.37	0.15	0.08	0.05	0.04
20 to 29.9	Santa Clarita	2.50	0.80	0.57	0.41	0.15	0.08	0.04	0.03
20 to 29.9	Upland	1.43	0.54	0.44	0.34	0.15	0.08	0.05	0.04
20 to 29.9	West LA	1.18	0.47	0.37	0.28	0.11	0.06	0.03	0.02

Table 3.15
Dispersion Factors (X/Q)
for Natural Gas Boilers
Operating More than 12 Hours per Day

Natural Gas Boiler Rating 30 to 49.9 MMBTU/hr

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([$\mu g/m^3$]/[ton/year])

Rating (MMBTU/hr)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
30 to 49.9	Anaheim	1.20	0.45	0.37	0.29	0.12	0.06	0.03	0.02
30 to 49.9	Azusa	0.63	0.22	0.21	0.19	0.09	0.05	0.03	0.02
30 to 49.9	Banning	3.39	1.04	0.77	0.58	0.25	0.14	0.09	0.05
30 to 49.9	Burbank	0.61	0.26	0.22	0.17	0.07	0.04	0.02	0.02
30 to 49.9	Central LA	1.40	0.47	0.38	0.29	0.12	0.06	0.03	0.02
30 to 49.9	Compton	0.62	0.28	0.25	0.20	0.09	0.05	0.03	0.02
30 to 49.9	Costa Mesa	0.16	0.13	0.14	0.13	0.07	0.05	0.03	0.02
30 to 49.9	Crestline	0.75	0.28	0.23	0.18	0.08	0.05	0.03	0.02
30 to 49.9	Fontana	1.74	0.58	0.46	0.36	0.15	0.08	0.04	0.03
30 to 49.9	Indio	2.48	0.76	0.52	0.38	0.15	0.09	0.05	0.04
30 to 49.9	La Habra	0.36	0.20	0.19	0.16	0.08	0.04	0.03	0.02
30 to 49.9	Lake Elsinore	0.34	0.17	0.15	0.13	0.07	0.04	0.02	0.02
30 to 49.9	LAX	2.12	0.71	0.56	0.43	0.17	0.08	0.04	0.02
30 to 49.9	Long Beach	0.20	0.16	0.17	0.15	0.08	0.04	0.03	0.02
30 to 49.9	Lynwood	0.47	0.25	0.23	0.19	0.09	0.05	0.03	0.02
30 to 49.9	Mission Viejo	0.16	0.12	0.13	0.11	0.06	0.03	0.02	0.01
30 to 49.9	Palm Springs	2.89	0.79	0.57	0.43	0.18	0.10	0.05	0.03
30 to 49.9	Perris	1.11	0.40	0.30	0.23	0.09	0.05	0.03	0.02
30 to 49.9	Pico Rivera	1.21	0.43	0.34	0.27	0.10	0.05	0.03	0.02
30 to 49.9	Pomona	0.66	0.29	0.24	0.20	0.08	0.05	0.03	0.02
30 to 49.9	Redlands	0.17	0.15	0.15	0.14	0.08	0.05	0.03	0.03
30 to 49.9	Reseda	0.44	0.21	0.17	0.13	0.06	0.03	0.02	0.01
30 to 49.9	Riverside	0.59	0.25	0.24	0.21	0.10	0.06	0.03	0.02
30 to 49.9	San Bernardino	1.28	0.44	0.34	0.27	0.11	0.06	0.03	0.03
30 to 49.9	Santa Clarita	1.80	0.60	0.45	0.33	0.12	0.06	0.03	0.02
30 to 49.9	Upland	0.67	0.28	0.26	0.23	0.11	0.06	0.03	0.02
30 to 49.9	West LA	0.58	0.27	0.24	0.20	0.09	0.05	0.02	0.01

Table 3.16
Dispersion Factors (X/Q)
for Natural Gas Boilers
Operating More than 12 Hours per Day

Natural Gas Boiler Rating 50 to 149.9 MMBTU/hr

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([$\mu g/m^3$]/[ton/year])

Rating (MMBTU/hr)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
50 to 149.9	Anaheim	0.01	0.05	0.08	0.10	0.07	0.05	0.02	0.01
50 to 149.9	Azusa	0.02	0.06	0.08	0.09	0.07	0.04	0.02	0.01
50 to 149.9	Banning	0.00	0.01	0.04	0.07	0.10	0.08	0.05	0.03
50 to 149.9	Burbank	0.02	0.05	0.07	0.08	0.05	0.03	0.02	0.01
50 to 149.9	Central LA	0.01	0.04	0.07	0.08	0.07	0.04	0.02	0.01
50 to 149.9	Compton	0.02	0.05	0.08	0.09	0.06	0.04	0.02	0.01
50 to 149.9	Costa Mesa	0.03	0.05	0.07	0.07	0.06	0.04	0.02	0.01
50 to 149.9	Crestline	0.02	0.05	0.07	0.07	0.05	0.03	0.02	0.01
50 to 149.9	Fontana	0.01	0.04	0.06	0.08	0.08	0.05	0.03	0.02
50 to 149.9	Indio	0.02	0.04	0.06	0.07	0.06	0.05	0.03	0.02
50 to 149.9	La Habra	0.03	0.06	0.07	0.08	0.06	0.04	0.02	0.01
50 to 149.9	Lake Elsinore	0.02	0.04	0.05	0.06	0.04	0.03	0.02	0.01
50 to 149.9	LAX	0.01	0.04	0.08	0.10	0.09	0.06	0.03	0.01
50 to 149.9	Long Beach	0.01	0.05	0.06	0.07	0.05	0.03	0.02	0.01
50 to 149.9	Lynwood	0.04	0.07	0.09	0.09	0.07	0.04	0.02	0.01
50 to 149.9	Mission Viejo	0.01	0.04	0.06	0.06	0.05	0.03	0.01	0.01
50 to 149.9	Palm Springs	0.03	0.05	0.08	0.09	0.09	0.06	0.04	0.02
50 to 149.9	Perris	0.03	0.05	0.05	0.06	0.05	0.04	0.02	0.01
50 to 149.9	Pico Rivera	0.01	0.05	0.07	0.08	0.06	0.04	0.02	0.01
50 to 149.9	Pomona	0.04	0.07	0.08	0.09	0.06	0.04	0.02	0.01
50 to 149.9	Redlands	0.04	0.06	0.08	0.08	0.06	0.04	0.02	0.02
50 to 149.9	Reseda	0.05	0.08	0.07	0.07	0.04	0.03	0.01	0.01
50 to 149.9	Riverside	0.02	0.04	0.07	0.08	0.07	0.04	0.02	0.01
50 to 149.9	San Bernardino	0.04	0.06	0.07	0.08	0.06	0.04	0.02	0.02
50 to 149.9	Santa Clarita	0.02	0.04	0.05	0.07	0.07	0.05	0.02	0.01
50 to 149.9	Upland	0.02	0.04	0.07	0.08	0.07	0.05	0.03	0.01
50 to 149.9	West LA	0.02	0.05	0.08	0.09	0.06	0.04	0.02	0.01

Table 3.17
Dispersion Factors (X/Q)
for Natural Gas Boilers
Operating More than 12 Hours per Day

Natural Gas Boiler Rating 150 to 200 MMBTU/hr

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([$\mu g/m^3$]/[ton/year])

Rating (MMBTU/hr)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
150 to 200	Anaheim	0.01	0.02	0.03	0.05	0.05	0.03	0.02	0.01
150 to 200	Azusa	0.01	0.03	0.04	0.05	0.04	0.03	0.02	0.01
150 to 200	Banning	0.00	0.01	0.02	0.03	0.06	0.05	0.03	0.02
150 to 200	Burbank	0.01	0.03	0.04	0.04	0.03	0.02	0.01	0.01
150 to 200	Central LA	0.00	0.02	0.03	0.04	0.04	0.03	0.02	0.01
150 to 200	Compton	0.01	0.02	0.03	0.04	0.04	0.03	0.02	0.01
150 to 200	Costa Mesa	0.01	0.02	0.03	0.04	0.04	0.03	0.02	0.01
150 to 200	Crestline	0.01	0.02	0.03	0.04	0.03	0.02	0.01	0.01
150 to 200	Fontana	0.01	0.02	0.03	0.04	0.05	0.04	0.02	0.01
150 to 200	Indio	0.01	0.02	0.03	0.03	0.03	0.03	0.02	0.01
150 to 200	La Habra	0.01	0.03	0.04	0.04	0.04	0.03	0.01	0.01
150 to 200	Lake Elsinore	0.01	0.02	0.03	0.03	0.03	0.02	0.01	0.01
150 to 200	LAX	0.00	0.02	0.04	0.05	0.06	0.04	0.02	0.01
150 to 200	Long Beach	0.00	0.02	0.03	0.04	0.03	0.02	0.01	0.01
150 to 200	Lynwood	0.02	0.03	0.04	0.05	0.04	0.03	0.02	0.01
150 to 200	Mission Viejo	0.01	0.02	0.03	0.03	0.03	0.02	0.01	0.01
150 to 200	Palm Springs	0.01	0.02	0.03	0.04	0.05	0.04	0.03	0.02
150 to 200	Perris	0.01	0.02	0.03	0.03	0.03	0.03	0.01	0.01
150 to 200	Pico Rivera	0.00	0.02	0.04	0.04	0.04	0.03	0.01	0.01
150 to 200	Pomona	0.02	0.03	0.04	0.05	0.04	0.03	0.01	0.01
150 to 200	Redlands	0.01	0.03	0.04	0.04	0.04	0.03	0.02	0.01
150 to 200	Reseda	0.02	0.04	0.04	0.04	0.03	0.02	0.01	0.01
150 to 200	Riverside	0.01	0.02	0.03	0.04	0.04	0.03	0.02	0.01
150 to 200	San Bernardino	0.02	0.03	0.03	0.04	0.04	0.03	0.02	0.01
150 to 200	Santa Clarita	0.01	0.02	0.02	0.03	0.04	0.03	0.02	0.01
150 to 200	Upland	0.01	0.02	0.03	0.04	0.05	0.03	0.02	0.01
150 to 200	West LA	0.01	0.03	0.04	0.05	0.04	0.03	0.02	0.01

Table 6.11
Dispersion Factors (χ/Q)
for Natural Gas Boilers
for Acute Hazard Index

All Operating Conditions χ/Q Values ([μg/m^3]/[lb/hr])

Rating (MMBTU/hr)	Downwind Distance (meters)							
	25	**50**	**75**	**100**	**200**	**300**	**500**	**1,000**
0 to 4.9	292.13	83.85	69.00	59.08	29.68	16.23	9.32	4.81
5 to 9.9	181.53	51.33	38.71	33.11	15.95	6.38	4.81	3.57
10 to 19.9	146.73	42.57	31.10	25.08	11.87	5.48	2.87	2.61
20 to 29.9	100.18	30.81	23.71	18.54	8.86	4.30	2.36	1.55
30 to 49.9	85.19	26.20	20.19	15.95	6.78	3.73	2.08	1.02
50 to 149.9	6.08	3.84	4.68	4.64	3.31	2.37	1.50	0.76
150 to 200	3.18	2.13	3.08	3.07	2.44	1.80	1.10	0.56

Table 2.21
Dispersion Factors (χ/Q)
for Natural Gas ICEs
Operating 12 Hours per Day or Less

Natural Gas ICE Rating 50 to 74.9 BHP

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([μg/m^3]/[ton/year])

Rating (BHP)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
50 to 74.9	Anaheim	40.29	9.05	4.79	2.80	0.57	0.20	0.06	0.02
50 to 74.9	Azusa	33.21	8.18	4.39	2.57	0.52	0.18	0.06	0.01
50 to 74.9	Banning	38.67	9.35	5.03	3.02	0.70	0.26	0.08	0.02
50 to 74.9	Burbank	27.20	6.15	3.14	1.78	0.34	0.12	0.04	0.01
50 to 74.9	Central LA	33.50	7.40	3.78	2.17	0.44	0.15	0.05	0.01
50 to 74.9	Compton	31.40	7.16	3.76	2.19	0.45	0.15	0.05	0.01
50 to 74.9	Costa Mesa	26.76	7.11	3.80	2.19	0.43	0.15	0.05	0.01
50 to 74.9	Crestline	25.75	6.27	3.25	1.84	0.36	0.13	0.04	0.01
50 to 74.9	Fontana	37.28	9.07	4.93	2.94	0.63	0.23	0.07	0.02
50 to 74.9	Indio	20.15	5.36	2.82	1.63	0.34	0.13	0.04	0.01
50 to 74.9	La Habra	29.75	7.44	3.87	2.20	0.42	0.15	0.05	0.01
50 to 74.9	Lake Elsinore	21.82	6.07	3.27	1.90	0.38	0.14	0.04	0.01
50 to 74.9	LAX	49.81	10.82	5.88	3.56	0.79	0.28	0.09	0.02
50 to 74.9	Long Beach	24.49	5.57	2.92	1.68	0.34	0.11	0.04	0.01
50 to 74.9	Lynwood	32.66	7.76	4.13	2.43	0.50	0.17	0.06	0.01
50 to 74.9	Mission Viejo	24.81	6.12	3.22	1.83	0.35	0.13	0.04	0.01
50 to 74.9	Palm Springs	18.86	4.72	2.44	1.43	0.30	0.11	0.03	0.01
50 to 74.9	Perris	19.26	5.17	2.76	1.63	0.36	0.13	0.04	0.01
50 to 74.9	Pico Rivera	35.00	7.70	4.05	2.33	0.47	0.17	0.06	0.01
50 to 74.9	Pomona	28.90	7.21	3.74	2.13	0.41	0.15	0.05	0.01
50 to 74.9	Redlands	27.45	7.62	4.00	2.26	0.44	0.16	0.05	0.01
50 to 74.9	Reseda	15.93	4.68	2.33	1.28	0.23	0.08	0.03	0.01
50 to 74.9	Riverside	32.21	7.77	4.22	2.50	0.52	0.18	0.06	0.02
50 to 74.9	San Bernardino	27.02	6.86	3.62	2.10	0.43	0.15	0.05	0.01
50 to 74.9	Santa Clarita	29.54	6.80	3.58	2.13	0.45	0.17	0.06	0.01
50 to 74.9	Upland	35.80	8.71	4.71	2.78	0.58	0.20	0.07	0.02
50 to 74.9	West LA	35.98	8.00	4.12	2.32	0.45	0.16	0.05	0.01

Table 2.22
Dispersion Factors (χ/Q)
for Natural Gas ICEs
Operating 12 Hours per Day or Less

Natural Gas ICE Rating 75 to 149.9 BHP

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([μg/m^3]/[ton/year])

Rating (BHP)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
75 to 149.9	Anaheim	27.31	7.08	4.11	2.51	0.54	0.19	0.06	0.02
75 to 149.9	Azusa	20.63	6.03	3.64	2.25	0.48	0.17	0.06	0.01
75 to 149.9	Banning	28.58	7.64	4.42	2.77	0.67	0.25	0.08	0.02
75 to 149.9	Burbank	18.08	4.75	2.68	1.59	0.32	0.11	0.04	0.01
75 to 149.9	Central LA	23.51	5.92	3.31	1.97	0.41	0.14	0.05	0.01
75 to 149.9	Compton	20.66	5.49	3.19	1.94	0.42	0.14	0.05	0.01
75 to 149.9	Costa Mesa	15.84	5.11	3.12	1.91	0.40	0.14	0.05	0.01
75 to 149.9	Crestline	16.22	4.65	2.68	1.60	0.33	0.12	0.04	0.01
75 to 149.9	Fontana	25.22	6.93	4.16	2.61	0.59	0.22	0.07	0.02
75 to 149.9	Indio	12.86	3.98	2.34	1.43	0.32	0.12	0.04	0.01
75 to 149.9	La Habra	18.26	5.47	3.19	1.91	0.39	0.14	0.05	0.01
75 to 149.9	Lake Elsinore	12.79	4.20	2.56	1.58	0.35	0.13	0.04	0.01
75 to 149.9	LAX	35.20	8.58	5.08	3.21	0.75	0.27	0.09	0.02
75 to 149.9	Long Beach	16.07	4.27	2.43	1.47	0.32	0.11	0.04	0.01
75 to 149.9	Lynwood	20.44	5.70	3.40	2.11	0.46	0.16	0.05	0.01
75 to 149.9	Mission Viejo	15.37	4.47	2.64	1.59	0.33	0.12	0.04	0.01
75 to 149.9	Palm Springs	12.73	3.63	2.04	1.25	0.28	0.10	0.03	0.01
75 to 149.9	Perris	13.18	3.92	2.30	1.43	0.34	0.13	0.04	0.01
75 to 149.9	Pico Rivera	24.04	6.03	3.47	2.09	0.44	0.16	0.05	0.01
75 to 149.9	Pomona	18.46	5.39	3.12	1.87	0.38	0.14	0.05	0.01
75 to 149.9	Redlands	15.53	5.31	3.20	1.94	0.40	0.15	0.05	0.01
75 to 149.9	Reseda	8.79	3.06	1.73	1.01	0.21	0.08	0.03	0.01
75 to 149.9	Riverside	20.30	5.74	3.49	2.19	0.49	0.18	0.06	0.02
75 to 149.9	San Bernardino	17.20	5.06	2.97	1.82	0.40	0.15	0.05	0.01
75 to 149.9	Santa Clarita	22.35	5.61	3.15	1.95	0.44	0.16	0.06	0.01
75 to 149.9	Upland	22.84	6.42	3.91	2.44	0.54	0.19	0.07	0.02
75 to 149.9	West LA	24.12	6.19	3.51	2.08	0.42	0.16	0.05	0.01

Table 2.23
Dispersion Factors (χ/Q)
for Natural Gas ICEs
Operating 12 Hours per Day or Less

Natural Gas ICE Rating 150 to 249.9 BHP

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([μg/m^3]/[ton/year])

Rating (BHP)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
150 to 249.9	Anaheim	15.44	4.56	2.82	1.92	0.47	0.17	0.06	0.02
150 to 249.9	Azusa	10.29	3.48	2.27	1.59	0.41	0.15	0.05	0.01
150 to 249.9	Banning	19.58	5.46	3.27	2.24	0.61	0.23	0.08	0.02
150 to 249.9	Burbank	9.61	3.01	1.81	1.19	0.27	0.10	0.03	0.01
150 to 249.9	Central LA	14.53	4.06	2.40	1.57	0.37	0.13	0.04	0.01
150 to 249.9	Compton	11.56	3.48	2.17	1.46	0.36	0.13	0.04	0.01
150 to 249.9	Costa Mesa	7.21	2.81	1.88	1.32	0.33	0.13	0.05	0.01
150 to 249.9	Crestline	8.01	2.74	1.70	1.14	0.28	0.11	0.04	0.01
150 to 249.9	Fontana	14.98	4.42	2.79	1.96	0.51	0.19	0.07	0.02
150 to 249.9	Indio	6.91	2.39	1.52	1.05	0.27	0.11	0.04	0.01
150 to 249.9	La Habra	8.86	3.16	1.99	1.35	0.32	0.12	0.04	0.01
150 to 249.9	Lake Elsinore	5.83	2.13	1.43	1.02	0.28	0.11	0.04	0.01
150 to 249.9	LAX	22.40	5.91	3.65	2.54	0.67	0.24	0.08	0.02
150 to 249.9	Long Beach	8.47	2.75	1.67	1.09	0.27	0.10	0.03	0.01
150 to 249.9	Lynwood	10.64	3.41	2.20	1.53	0.39	0.14	0.05	0.01
150 to 249.9	Mission Viejo	7.36	2.52	1.61	1.10	0.27	0.11	0.04	0.01
150 to 249.9	Palm Springs	7.92	2.38	1.44	0.96	0.24	0.09	0.03	0.01
150 to 249.9	Perris	8.11	2.54	1.57	1.08	0.29	0.12	0.04	0.01
150 to 249.9	Pico Rivera	14.02	4.00	2.41	1.60	0.38	0.14	0.05	0.01
150 to 249.9	Pomona	9.57	3.26	2.03	1.36	0.32	0.12	0.04	0.01
150 to 249.9	Redlands	6.64	2.72	1.82	1.29	0.33	0.13	0.05	0.01
150 to 249.9	Reseda	5.01	1.71	1.04	0.69	0.17	0.07	0.02	0.01
150 to 249.9	Riverside	10.68	3.40	2.24	1.59	0.42	0.16	0.06	0.01
150 to 249.9	San Bernardino	9.41	3.07	1.93	1.33	0.34	0.13	0.05	0.01
150 to 249.9	Santa Clarita	15.90	4.23	2.45	1.62	0.40	0.15	0.05	0.01
150 to 249.9	Upland	12.09	3.82	2.49	1.77	0.46	0.17	0.06	0.02
150 to 249.9	West LA	13.12	3.98	2.40	1.58	0.36	0.14	0.05	0.01

Table 2.24
Dispersion Factors (χ/Q)
for Natural Gas ICEs
Operating 12 Hours per Day or Less

Natural Gas ICE Rating 250 to 999.9 BHP

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([μg/m^3]/[ton/year])

Rating (BHP)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
250 to 999.9	Anaheim	8.73	2.83	1.91	1.30	0.38	0.15	0.05	0.01
250 to 999.9	Azusa	5.03	1.99	1.43	1.00	0.31	0.13	0.05	0.01
250 to 999.9	Banning	12.24	3.70	2.37	1.62	0.52	0.20	0.07	0.02
250 to 999.9	Burbank	5.01	1.77	1.18	0.78	0.21	0.08	0.03	0.01
250 to 999.9	Central LA	8.67	2.62	1.69	1.12	0.31	0.11	0.04	0.01
250 to 999.9	Compton	6.25	2.15	1.47	1.00	0.29	0.11	0.04	0.01
250 to 999.9	Costa Mesa	3.20	1.50	1.12	0.80	0.26	0.11	0.04	0.01
250 to 999.9	Crestline	4.03	1.54	1.05	0.72	0.22	0.09	0.03	0.01
250 to 999.9	Fontana	8.73	2.77	1.88	1.31	0.42	0.17	0.06	0.02
250 to 999.9	Indio	3.81	1.41	0.98	0.69	0.22	0.09	0.03	0.01
250 to 999.9	La Habra	4.32	1.75	1.22	0.84	0.25	0.11	0.04	0.01
250 to 999.9	Lake Elsinore	2.93	1.15	0.85	0.62	0.22	0.09	0.04	0.01
250 to 999.9	LAX	13.74	3.96	2.62	1.81	0.56	0.22	0.08	0.02
250 to 999.9	Long Beach	4.22	1.62	1.09	0.72	0.22	0.08	0.03	0.01
250 to 999.9	Lynwood	5.58	2.08	1.46	1.02	0.31	0.12	0.05	0.01
250 to 999.9	Mission Viejo	3.49	1.35	0.96	0.67	0.21	0.09	0.04	0.01
250 to 999.9	Palm Springs	5.01	1.56	1.02	0.69	0.20	0.08	0.03	0.01
250 to 999.9	Perris	5.04	1.65	1.09	0.76	0.24	0.10	0.04	0.01
250 to 999.9	Pico Rivera	8.05	2.52	1.64	1.09	0.31	0.13	0.05	0.01
250 to 999.9	Pomona	5.07	1.95	1.33	0.90	0.26	0.10	0.04	0.01
250 to 999.9	Redlands	2.86	1.41	1.07	0.77	0.25	0.11	0.04	0.01
250 to 999.9	Reseda	2.95	1.10	0.72	0.49	0.14	0.06	0.02	0.01
250 to 999.9	Riverside	5.58	2.02	1.45	1.03	0.33	0.14	0.05	0.01
250 to 999.9	San Bernardino	5.29	1.85	1.27	0.88	0.27	0.11	0.04	0.01
250 to 999.9	Santa Clarita	10.48	3.01	1.85	1.23	0.34	0.14	0.05	0.01
250 to 999.9	Upland	6.27	2.24	1.61	1.14	0.36	0.15	0.05	0.01
250 to 999.9	West LA	7.08	2.45	1.61	1.06	0.29	0.12	0.05	0.01

Table 2.25
Dispersion Factors (χ/Q)
for Natural Gas ICEs
Operating 12 Hours per Day or Less

Natural Gas ICE Rating > 1,000 BHP

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([μg/m^3]/[ton/year])

Rating (BHP)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
> 1,000	Anaheim	1.18	0.51	0.47	0.41	0.18	0.10	0.04	0.01
> 1,000	Azusa	0.42	0.29	0.29	0.27	0.14	0.08	0.04	0.01
> 1,000	Banning	3.47	1.14	0.90	0.73	0.29	0.14	0.06	0.02
> 1,000	Burbank	0.43	0.27	0.26	0.22	0.11	0.06	0.02	0.01
> 1,000	Central LA	1.82	0.68	0.57	0.46	0.17	0.08	0.03	0.01
> 1,000	Compton	0.95	0.43	0.40	0.33	0.14	0.07	0.03	0.01
> 1,000	Costa Mesa	0.22	0.19	0.21	0.20	0.12	0.07	0.03	0.01
> 1,000	Crestline	0.53	0.28	0.26	0.23	0.11	0.06	0.03	0.01
> 1,000	Fontana	1.71	0.64	0.55	0.47	0.21	0.11	0.05	0.01
> 1,000	Indio	0.65	0.29	0.26	0.23	0.11	0.06	0.03	0.01
> 1,000	La Habra	0.39	0.25	0.25	0.23	0.12	0.07	0.03	0.01
> 1,000	Lake Elsinore	0.37	0.21	0.21	0.19	0.10	0.06	0.03	0.01
> 1,000	LAX	2.90	1.02	0.87	0.72	0.29	0.15	0.06	0.02
> 1,000	Long Beach	0.35	0.25	0.25	0.22	0.10	0.06	0.02	0.01
> 1,000	Lynwood	0.58	0.34	0.32	0.28	0.14	0.08	0.04	0.01
> 1,000	Mission Viejo	0.21	0.17	0.19	0.17	0.10	0.06	0.03	0.01
> 1,000	Palm Springs	1.49	0.52	0.41	0.32	0.12	0.06	0.02	0.01
> 1,000	Perris	1.27	0.48	0.39	0.31	0.13	0.07	0.03	0.01
> 1,000	Pico Rivera	1.37	0.56	0.48	0.39	0.16	0.09	0.04	0.01
> 1,000	Pomona	0.65	0.34	0.32	0.27	0.13	0.07	0.03	0.01
> 1,000	Redlands	0.22	0.21	0.22	0.21	0.12	0.07	0.03	0.01
> 1,000	Reseda	0.65	0.32	0.26	0.21	0.08	0.04	0.02	0.01
> 1,000	Riverside	0.65	0.32	0.32	0.29	0.16	0.09	0.04	0.01
> 1,000	San Bernardino	0.93	0.40	0.36	0.30	0.14	0.08	0.03	0.01
> 1,000	Santa Clarita	3.40	1.14	0.83	0.63	0.21	0.10	0.04	0.01
> 1,000	Upland	0.67	0.34	0.34	0.31	0.17	0.09	0.04	0.01
> 1,000	West LA	0.71	0.37	0.35	0.31	0.15	0.08	0.04	0.01

Table 3.21
Dispersion Factors (χ/Q)
for Natural Gas ICEs
Operating More Than 12 Hours per Day

Natural Gas ICE Rating 50 to 74.9 BHP

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([μg/m^3]/[ton/year])

Rating (BHP)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
50 to 74.9	Anaheim	27.98	8.27	5.36	3.96	1.41	0.57	0.21	0.07
50 to 74.9	Azusa	26.00	8.04	5.60	4.27	1.61	0.62	0.21	0.07
50 to 74.9	Banning	44.67	13.52	8.61	6.07	2.18	0.94	0.36	0.12
50 to 74.9	Burbank	26.88	8.25	5.56	4.19	1.48	0.54	0.18	0.06
50 to 74.9	Central LA	24.03	7.22	4.84	3.64	1.26	0.45	0.15	0.05
50 to 74.9	Compton	23.38	6.91	5.09	4.10	1.64	0.61	0.20	0.07
50 to 74.9	Costa Mesa	14.34	4.42	3.08	2.40	1.02	0.48	0.20	0.07
50 to 74.9	Crestline	18.37	5.54	3.58	2.63	1.00	0.46	0.19	0.07
50 to 74.9	Fontana	31.64	9.78	6.48	4.78	1.80	0.77	0.29	0.10
50 to 74.9	Indio	32.25	10.57	6.96	5.11	1.95	0.84	0.33	0.11
50 to 74.9	La Habra	16.70	4.85	3.23	2.48	0.99	0.46	0.19	0.07
50 to 74.9	Lake Elsinore	13.01	4.88	3.59	2.90	1.29	0.58	0.24	0.08
50 to 74.9	LAX	31.62	8.62	5.60	4.10	1.49	0.62	0.23	0.08
50 to 74.9	Long Beach	20.14	6.90	5.22	4.28	1.74	0.62	0.20	0.07
50 to 74.9	Lynwood	22.12	6.49	4.63	3.63	1.47	0.60	0.22	0.08
50 to 74.9	Mission Viejo	17.44	5.23	3.54	2.71	1.14	0.50	0.20	0.07
50 to 74.9	Palm Springs	30.66	9.41	6.13	4.52	1.60	0.64	0.24	0.08
50 to 74.9	Perris	16.92	5.55	3.76	2.87	1.19	0.56	0.24	0.08
50 to 74.9	Pico Rivera	27.98	7.89	5.11	3.70	1.29	0.52	0.20	0.07
50 to 74.9	Pomona	19.82	6.02	4.41	3.58	1.57	0.63	0.23	0.08
50 to 74.9	Redlands	16.34	5.28	3.61	2.89	1.67	0.78	0.32	0.12
50 to 74.9	Reseda	9.73	3.27	2.55	2.17	0.97	0.43	0.17	0.06
50 to 74.9	Riverside	22.31	6.53	4.47	3.41	1.36	0.59	0.23	0.08
50 to 74.9	San Bernardino	24.70	8.03	5.34	4.01	1.57	0.69	0.28	0.10
50 to 74.9	Santa Clarita	23.23	6.39	4.16	3.08	1.30	0.55	0.21	0.07
50 to 74.9	Upland	26.12	7.72	5.25	4.22	1.77	0.74	0.31	0.11
50 to 74.9	West LA	18.92	5.02	3.22	2.39	1.03	0.45	0.18	0.06

Table 3.22
Dispersion Factors (χ/Q)
for Natural Gas ICEs
Operating More Than 12 Hours per Day

Natural Gas ICE Rating 75 to 149.9 BHP

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([μg/m^3]/[ton/year])

Rating (BHP)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
75 to 149.9	Anaheim	17.43	5.01	3.21	2.27	0.85	0.41	0.19	0.07
75 to 149.9	Azusa	15.57	4.59	3.19	2.39	0.99	0.46	0.20	0.08
75 to 149.9	Banning	32.03	9.58	6.26	4.49	1.72	0.80	0.34	0.12
75 to 149.9	Burbank	16.98	4.93	3.33	2.47	0.99	0.43	0.18	0.07
75 to 149.9	Central LA	16.20	4.24	2.90	2.21	0.88	0.37	0.15	0.06
75 to 149.9	Compton	13.93	3.83	2.65	2.00	0.90	0.43	0.19	0.08
75 to 149.9	Costa Mesa	7.82	2.52	1.68	1.19	0.53	0.31	0.16	0.06
75 to 149.9	Crestline	11.63	3.54	2.24	1.56	0.60	0.31	0.16	0.07
75 to 149.9	Fontana	20.70	6.23	4.16	3.02	1.18	0.57	0.26	0.10
75 to 149.9	Indio	21.58	7.01	4.68	3.42	1.36	0.65	0.29	0.11
75 to 149.9	La Habra	9.74	2.91	1.85	1.29	0.53	0.30	0.15	0.06
75 to 149.9	Lake Elsinore	7.50	2.40	1.59	1.20	0.60	0.35	0.19	0.08
75 to 149.9	LAX	21.36	5.76	3.73	2.65	0.99	0.46	0.20	0.08
75 to 149.9	Long Beach	11.43	3.54	2.55	2.01	0.96	0.45	0.20	0.08
75 to 149.9	Lynwood	13.15	3.70	2.52	1.86	0.81	0.41	0.20	0.08
75 to 149.9	Mission Viejo	9.49	2.77	1.79	1.27	0.54	0.31	0.16	0.06
75 to 149.9	Palm Springs	20.50	6.07	3.92	2.83	1.06	0.49	0.22	0.09
75 to 149.9	Perris	10.68	3.37	2.20	1.58	0.67	0.37	0.19	0.07
75 to 149.9	Pico Rivera	18.22	4.97	3.19	2.26	0.84	0.40	0.18	0.07
75 to 149.9	Pomona	11.86	3.45	2.29	1.69	0.83	0.44	0.22	0.09
75 to 149.9	Redlands	9.00	3.01	2.03	1.46	0.63	0.43	0.28	0.12
75 to 149.9	Reseda	5.90	1.78	1.11	0.77	0.40	0.26	0.14	0.06
75 to 149.9	Riverside	13.30	3.81	2.58	1.88	0.77	0.40	0.19	0.07
75 to 149.9	San Bernardino	15.60	4.88	3.20	2.34	0.96	0.48	0.23	0.09
75 to 149.9	Santa Clarita	16.08	4.29	2.63	1.85	0.71	0.37	0.18	0.07
75 to 149.9	Upland	16.23	4.63	3.13	2.29	0.99	0.49	0.27	0.11
75 to 149.9	West LA	11.88	3.20	1.97	1.31	0.50	0.27	0.15	0.06

Table 3.23
Dispersion Factors (χ/Q)
for Natural Gas ICEs
Operating More Than 12 Hours per Day

Natural Gas ICE Rating 150 to 249.9 BHP

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([μg/m^3]/[ton/year])

Rating (BHP)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
150 to 249.9	Anaheim	8.91	2.64	1.59	1.16	0.40	0.18	0.11	0.05
150 to 249.9	Azusa	7.03	2.10	1.37	1.04	0.40	0.19	0.12	0.06
150 to 249.9	Banning	20.47	5.78	3.45	2.56	1.05	0.52	0.25	0.10
150 to 249.9	Burbank	8.41	2.41	1.43	1.07	0.44	0.20	0.11	0.06
150 to 249.9	Central LA	9.23	2.39	1.47	1.07	0.40	0.18	0.10	0.05
150 to 249.9	Compton	6.68	1.89	1.22	0.91	0.35	0.17	0.11	0.06
150 to 249.9	Costa Mesa	3.26	1.21	0.81	0.60	0.21	0.11	0.08	0.04
150 to 249.9	Crestline	5.97	1.88	1.12	0.81	0.29	0.14	0.08	0.04
150 to 249.9	Fontana	11.47	3.34	2.05	1.52	0.56	0.26	0.15	0.08
150 to 249.9	Indio	12.59	3.92	2.36	1.77	0.70	0.33	0.18	0.09
150 to 249.9	La Habra	4.50	1.49	0.93	0.66	0.21	0.11	0.08	0.04
150 to 249.9	Lake Elsinore	3.44	1.13	0.74	0.55	0.20	0.11	0.08	0.05
150 to 249.9	LAX	12.44	3.32	2.03	1.48	0.50	0.23	0.12	0.06
150 to 249.9	Long Beach	4.96	1.57	1.03	0.79	0.34	0.17	0.12	0.06
150 to 249.9	Lynwood	6.16	1.83	1.18	0.88	0.32	0.16	0.11	0.06
150 to 249.9	Mission Viejo	3.88	1.21	0.75	0.54	0.18	0.10	0.07	0.04
150 to 249.9	Palm Springs	12.51	3.53	2.10	1.55	0.58	0.25	0.14	0.07
150 to 249.9	Perris	6.07	1.88	1.14	0.83	0.30	0.15	0.10	0.05
150 to 249.9	Pico Rivera	9.74	2.69	1.57	1.14	0.40	0.18	0.11	0.05
150 to 249.9	Pomona	5.58	1.75	1.08	0.78	0.26	0.15	0.11	0.07
150 to 249.9	Redlands	3.59	1.34	0.90	0.68	0.24	0.13	0.12	0.08
150 to 249.9	Reseda	3.34	1.01	0.61	0.43	0.14	0.07	0.07	0.04
150 to 249.9	Riverside	6.33	1.87	1.22	0.91	0.32	0.16	0.10	0.05
150 to 249.9	San Bernardino	8.40	2.53	1.52	1.13	0.44	0.21	0.13	0.07
150 to 249.9	Santa Clarita	9.98	2.65	1.51	1.06	0.34	0.16	0.10	0.05
150 to 249.9	Upland	7.96	2.29	1.46	1.11	0.41	0.20	0.13	0.08
150 to 249.9	West LA	5.94	1.77	1.07	0.74	0.22	0.11	0.07	0.04

Table 3.24
Dispersion Factors (χ/Q)
for Natural Gas ICEs
Operating More Than 12 Hours per Day

Natural Gas ICE Rating 250 to 999.9 BHP

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([μg/m^3]/[ton/year])

Rating (BHP)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
250 to 999.9	Anaheim	4.77	1.49	0.96	0.65	0.22	0.10	0.05	0.03
250 to 999.9	Azusa	3.36	1.10	0.77	0.54	0.21	0.10	0.05	0.04
250 to 999.9	Banning	12.33	3.53	2.13	1.43	0.62	0.32	0.17	0.08
250 to 999.9	Burbank	4.34	1.27	0.78	0.52	0.21	0.10	0.05	0.04
250 to 999.9	Central LA	5.18	1.41	0.93	0.64	0.23	0.10	0.05	0.03
250 to 999.9	Compton	3.28	1.05	0.72	0.51	0.19	0.09	0.05	0.04
250 to 999.9	Costa Mesa	1.41	0.63	0.47	0.34	0.13	0.06	0.04	0.03
250 to 999.9	Crestline	3.21	1.03	0.65	0.44	0.16	0.08	0.04	0.03
250 to 999.9	Fontana	6.56	1.93	1.23	0.84	0.32	0.15	0.08	0.05
250 to 999.9	Indio	7.67	2.32	1.39	0.93	0.39	0.19	0.10	0.06
250 to 999.9	La Habra	2.15	0.79	0.54	0.37	0.13	0.06	0.04	0.03
250 to 999.9	Lake Elsinore	1.74	0.60	0.42	0.31	0.12	0.06	0.03	0.03
250 to 999.9	LAX	7.32	2.05	1.31	0.90	0.32	0.13	0.07	0.04
250 to 999.9	Long Beach	2.20	0.82	0.59	0.42	0.17	0.08	0.05	0.04
250 to 999.9	Lynwood	3.06	1.03	0.72	0.51	0.18	0.08	0.05	0.04
250 to 999.9	Mission Viejo	1.68	0.59	0.41	0.29	0.10	0.05	0.03	0.02
250 to 999.9	Palm Springs	7.89	2.15	1.31	0.90	0.36	0.16	0.08	0.05
250 to 999.9	Perris	3.57	1.12	0.70	0.47	0.17	0.08	0.05	0.03
250 to 999.9	Pico Rivera	5.30	1.53	0.93	0.62	0.22	0.09	0.05	0.03
250 to 999.9	Pomona	2.88	0.99	0.66	0.45	0.15	0.07	0.05	0.04
250 to 999.9	Redlands	1.51	0.67	0.50	0.37	0.14	0.07	0.05	0.05
250 to 999.9	Reseda	1.94	0.61	0.39	0.26	0.09	0.05	0.03	0.02
250 to 999.9	Riverside	3.20	1.03	0.72	0.52	0.19	0.09	0.05	0.03
250 to 999.9	San Bernardino	4.75	1.44	0.90	0.61	0.23	0.11	0.06	0.04
250 to 999.9	Santa Clarita	6.15	1.70	1.01	0.67	0.22	0.10	0.05	0.03
250 to 999.9	Upland	4.02	1.25	0.86	0.61	0.23	0.11	0.06	0.04
250 to 999.9	West LA	3.03	1.02	0.67	0.45	0.14	0.06	0.03	0.03

Table 3.25
Dispersion Factors (χ/Q)
for Natural Gas ICEs
Operating More Than 12 Hours per Day

Natural Gas ICE Rating > 1,000 BHP

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([μg/m^3]/[ton/year])

Rating (BHP)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
> 1,000	Anaheim	0.48	0.21	0.19	0.17	0.08	0.04	0.02	0.01
> 1,000	Azusa	0.34	0.12	0.12	0.11	0.06	0.04	0.02	0.01
> 1,000	Banning	2.80	0.83	0.59	0.45	0.18	0.11	0.06	0.03
> 1,000	Burbank	0.25	0.13	0.12	0.10	0.05	0.03	0.02	0.01
> 1,000	Central LA	0.90	0.31	0.26	0.21	0.09	0.05	0.02	0.01
> 1,000	Compton	0.41	0.18	0.17	0.14	0.07	0.04	0.02	0.01
> 1,000	Costa Mesa	0.11	0.08	0.08	0.08	0.05	0.03	0.02	0.01
> 1,000	Crestline	0.41	0.16	0.13	0.11	0.05	0.03	0.02	0.01
> 1,000	Fontana	1.09	0.36	0.29	0.24	0.11	0.06	0.03	0.02
> 1,000	Indio	1.67	0.52	0.35	0.26	0.10	0.06	0.04	0.02
> 1,000	La Habra	0.17	0.11	0.10	0.09	0.05	0.03	0.02	0.01
> 1,000	Lake Elsinore	0.17	0.09	0.09	0.08	0.04	0.03	0.01	0.01
> 1,000	LAX	1.29	0.43	0.36	0.30	0.13	0.06	0.03	0.01
> 1,000	Long Beach	0.18	0.12	0.12	0.10	0.05	0.03	0.02	0.01
> 1,000	Lynwood	0.25	0.14	0.13	0.12	0.06	0.04	0.02	0.01
> 1,000	Mission Viejo	0.09	0.07	0.07	0.07	0.04	0.03	0.01	0.01
> 1,000	Palm Springs	2.03	0.57	0.41	0.31	0.13	0.07	0.04	0.02
> 1,000	Perris	0.72	0.26	0.19	0.15	0.06	0.04	0.02	0.01
> 1,000	Pico Rivera	0.67	0.26	0.21	0.17	0.07	0.04	0.02	0.01
> 1,000	Pomona	0.30	0.15	0.14	0.12	0.06	0.03	0.02	0.01
> 1,000	Redlands	0.10	0.09	0.09	0.09	0.05	0.03	0.02	0.02
> 1,000	Reseda	0.37	0.15	0.12	0.09	0.04	0.02	0.01	0.01
> 1,000	Riverside	0.33	0.15	0.14	0.13	0.07	0.04	0.02	0.01
> 1,000	San Bernardino	0.71	0.25	0.21	0.17	0.08	0.04	0.02	0.01
> 1,000	Santa Clarita	1.60	0.52	0.37	0.28	0.10	0.05	0.03	0.01
> 1,000	Upland	0.35	0.15	0.15	0.14	0.07	0.04	0.02	0.01
> 1,000	West LA	0.27	0.14	0.13	0.12	0.06	0.03	0.02	0.01

Table 6.21
Dispersion Factors (χ/Q)
for Natural Gas ICEs
for Acute Hazard Index

All Operating Conditions χ/Q Values ([$\mu g/m^3$]/[lb/hr])

Rating (BHP)	Downwind Distance (meters)							
	25	**50**	**75**	**100**	**200**	**300**	**500**	**1,000**
50 to 74.9	558.90	228.36	182.22	152.76	73.10	30.68	12.54	5.35
75 to 149.9	392.20	153.94	125.57	105.40	50.44	22.35	9.71	4.80
150 to 249.9	281.14	85.26	60.25	51.99	25.47	9.27	4.74	3.36
250 to 999.9	193.22	54.00	37.73	27.66	11.86	6.43	3.13	1.91
> 1,000	80.72	25.42	18.44	14.10	5.27	3.36	1.92	0.87

Table 2.31
Dispersion Factors (X/Q)
for Diesel ICEs
Operating 12 Hours per Day or Less

Diesel ICE Rating 50 to 174.9 BHP

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([$\mu g/m^3$]/[ton/year])

Rating (BHP)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
50 to 174.9	Anaheim	25.17	8.13	4.84	2.99	0.61	0.19	0.06	0.02
50 to 174.9	Azusa	18.42	6.32	3.96	2.49	0.52	0.17	0.05	0.01
50 to 174.9	Banning	27.44	7.84	4.66	2.96	0.71	0.25	0.08	0.02
50 to 174.9	Burbank	17.44	5.47	3.13	1.86	0.35	0.11	0.03	0.01
50 to 174.9	Central LA	22.15	7.03	4.00	2.40	0.48	0.14	0.04	0.01
50 to 174.9	Compton	18.88	6.34	3.80	2.35	0.49	0.15	0.04	0.01
50 to 174.9	Costa Mesa	14.14	5.24	3.33	2.06	0.42	0.14	0.05	0.01
50 to 174.9	Crestline	15.35	5.07	2.97	1.78	0.35	0.12	0.04	0.01
50 to 174.9	Fontana	23.51	7.09	4.38	2.78	0.62	0.22	0.07	0.02
50 to 174.9	Indio	11.98	3.98	2.40	1.49	0.33	0.12	0.04	0.01
50 to 174.9	La Habra	16.66	6.11	3.66	2.21	0.42	0.14	0.04	0.01
50 to 174.9	Lake Elsinore	11.80	4.15	2.61	1.64	0.35	0.13	0.04	0.01
50 to 174.9	LAX	32.85	8.89	5.41	3.46	0.80	0.27	0.09	0.02
50 to 174.9	Long Beach	15.30	4.84	2.80	1.70	0.35	0.11	0.03	0.01
50 to 174.9	Lynwood	18.12	6.16	3.82	2.41	0.51	0.16	0.05	0.01
50 to 174.9	Mission Viejo	14.38	4.59	2.78	1.68	0.33	0.12	0.04	0.01
50 to 174.9	Palm Springs	11.59	3.79	2.20	1.36	0.30	0.10	0.03	0.01
50 to 174.9	Perris	12.40	3.93	2.36	1.49	0.34	0.13	0.04	0.01
50 to 174.9	Pico Rivera	22.72	6.57	3.85	2.32	0.47	0.16	0.05	0.01
50 to 174.9	Pomona	16.77	6.00	3.57	2.16	0.42	0.13	0.04	0.01
50 to 174.9	Redlands	13.68	5.29	3.33	2.05	0.42	0.14	0.05	0.01
50 to 174.9	Reseda	7.82	3.13	1.84	1.08	0.21	0.07	0.03	0.01
50 to 174.9	Riverside	18.25	5.88	3.72	2.37	0.52	0.18	0.06	0.02
50 to 174.9	San Bernardino	15.83	5.21	3.15	1.96	0.42	0.15	0.05	0.01
50 to 174.9	Santa Clarita	21.69	5.97	3.41	2.12	0.46	0.16	0.06	0.01
50 to 174.9	Upland	20.72	6.73	4.24	2.68	0.57	0.19	0.06	0.02
50 to 174.9	West LA	22.63	6.93	4.02	2.38	0.45	0.15	0.05	0.01

Table 2.32
Dispersion Factors (X/Q)
for Diesel ICEs
Operating 12 Hours per Day or Less

Diesel ICE Rating 175 to 299.9 BHP

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([$\mu g/m^3$]/[ton/year])

Rating (BHP)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
175 to 299.9	Anaheim	20.49	6.83	4.25	2.73	0.58	0.18	0.06	0.02
175 to 299.9	Azusa	14.27	5.02	3.31	2.19	0.49	0.16	0.05	0.01
175 to 299.9	Banning	23.38	6.77	4.15	2.73	0.68	0.24	0.08	0.02
175 to 299.9	Burbank	13.67	4.56	2.73	1.69	0.33	0.10	0.03	0.01
175 to 299.9	Central LA	18.49	6.03	3.56	2.21	0.45	0.14	0.04	0.01
175 to 299.9	Compton	15.03	5.21	3.26	2.08	0.45	0.14	0.04	0.01
175 to 299.9	Costa Mesa	10.56	4.08	2.74	1.79	0.38	0.13	0.05	0.01
175 to 299.9	Crestline	11.60	4.06	2.50	1.58	0.33	0.11	0.04	0.01
175 to 299.9	Fontana	19.05	5.86	3.77	2.51	0.59	0.21	0.07	0.02
175 to 299.9	Indio	9.24	3.18	2.03	1.32	0.31	0.11	0.04	0.01
175 to 299.9	La Habra	13.01	4.93	3.11	1.98	0.40	0.13	0.04	0.01
175 to 299.9	Lake Elsinore	8.71	3.13	2.11	1.42	0.33	0.12	0.04	0.01
175 to 299.9	LAX	27.11	7.55	4.75	3.16	0.76	0.26	0.09	0.02
175 to 299.9	Long Beach	11.85	4.00	2.41	1.49	0.32	0.10	0.03	0.01
175 to 299.9	Lynwood	14.39	5.00	3.26	2.15	0.48	0.15	0.05	0.01
175 to 299.9	Mission Viejo	10.68	3.55	2.25	1.43	0.30	0.11	0.04	0.01
175 to 299.9	Palm Springs	9.74	3.20	1.93	1.24	0.28	0.10	0.03	0.01
175 to 299.9	Perris	10.08	3.25	2.02	1.33	0.33	0.12	0.04	0.01
175 to 299.9	Pico Rivera	18.31	5.50	3.33	2.09	0.44	0.15	0.05	0.01
175 to 299.9	Pomona	13.26	4.90	3.05	1.93	0.39	0.12	0.04	0.01
175 to 299.9	Redlands	10.07	3.97	2.65	1.73	0.38	0.13	0.05	0.01
175 to 299.9	Reseda	6.27	2.26	1.43	0.89	0.19	0.07	0.02	0.01
175 to 299.9	Riverside	14.32	4.68	3.12	2.09	0.49	0.17	0.06	0.02
175 to 299.9	San Bernardino	12.55	4.25	2.70	1.76	0.39	0.14	0.05	0.01
175 to 299.9	Santa Clarita	18.94	5.30	3.09	1.97	0.44	0.16	0.06	0.01
175 to 299.9	Upland	16.22	5.39	3.57	2.37	0.54	0.18	0.06	0.02
175 to 299.9	West LA	17.69	5.69	3.44	2.13	0.42	0.14	0.05	0.01

Table 2.33
Dispersion Factors (X/Q)
for Diesel ICEs
Operating 12 Hours per Day or Less

Diesel ICE Rating 300 to 399.9 BHP

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([$\mu g/m^3$]/[ton/year])

Rating (BHP)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
300 to 399.9	Anaheim	14.25	5.23	3.24	2.21	0.51	0.16	0.05	0.01
300 to 399.9	Azusa	9.36	3.72	2.43	1.72	0.42	0.14	0.05	0.01
300 to 399.9	Banning	17.29	5.41	3.29	2.30	0.63	0.23	0.08	0.02
300 to 399.9	Burbank	9.31	3.47	2.06	1.35	0.28	0.09	0.03	0.01
300 to 399.9	Central LA	13.43	4.80	2.83	1.86	0.41	0.12	0.04	0.01
300 to 399.9	Compton	10.52	3.99	2.50	1.71	0.41	0.12	0.04	0.01
300 to 399.9	Costa Mesa	6.71	2.96	1.97	1.39	0.34	0.12	0.04	0.01
300 to 399.9	Crestline	7.60	2.95	1.80	1.20	0.28	0.10	0.03	0.01
300 to 399.9	Fontana	13.50	4.48	2.84	2.01	0.53	0.19	0.06	0.02
300 to 399.9	Indio	6.33	2.33	1.49	1.04	0.27	0.10	0.04	0.01
300 to 399.9	La Habra	8.29	3.53	2.22	1.50	0.33	0.11	0.04	0.01
300 to 399.9	Lake Elsinore	5.39	2.08	1.39	1.01	0.28	0.10	0.04	0.01
300 to 399.9	LAX	19.98	6.01	3.75	2.64	0.70	0.24	0.08	0.02
300 to 399.9	Long Beach	8.11	3.10	1.87	1.22	0.29	0.09	0.03	0.01
300 to 399.9	Lynwood	9.59	3.72	2.41	1.70	0.42	0.13	0.05	0.01
300 to 399.9	Mission Viejo	6.92	2.55	1.62	1.11	0.26	0.10	0.04	0.01
300 to 399.9	Palm Springs	7.03	2.45	1.49	1.00	0.25	0.09	0.03	0.01
300 to 399.9	Perris	7.31	2.48	1.54	1.07	0.29	0.11	0.04	0.01
300 to 399.9	Pico Rivera	13.01	4.30	2.58	1.71	0.39	0.13	0.05	0.01
300 to 399.9	Pomona	8.82	3.64	2.26	1.52	0.34	0.11	0.04	0.01
300 to 399.9	Redlands	6.06	2.78	1.87	1.33	0.33	0.12	0.04	0.01
300 to 399.9	Reseda	4.33	1.65	1.01	0.68	0.16	0.06	0.02	0.01
300 to 399.9	Riverside	9.56	3.49	2.31	1.66	0.43	0.15	0.05	0.01
300 to 399.9	San Bernardino	8.58	3.13	1.98	1.37	0.34	0.12	0.04	0.01
300 to 399.9	Santa Clarita	14.36	4.36	2.55	1.71	0.41	0.15	0.05	0.01
300 to 399.9	Upland	10.94	4.02	2.64	1.89	0.47	0.16	0.06	0.02
300 to 399.9	West LA	12.30	4.41	2.65	1.74	0.37	0.13	0.04	0.01

Table 2.34
Dispersion Factors (X/Q)
for Diesel ICEs
Operating 12 Hours per Day or Less

Diesel ICE Rating 400 to 599.9 BHP

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([$\mu g/m^3$]/[ton/year])

Rating (BHP)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
400 to 599.9	Anaheim	9.93	3.83	2.50	1.68	0.44	0.14	0.05	0.01
400 to 599.9	Azusa	5.89	2.49	1.74	1.21	0.35	0.12	0.04	0.01
400 to 599.9	Banning	13.42	4.36	2.77	1.89	0.58	0.21	0.07	0.02
400 to 599.9	Burbank	6.12	2.40	1.52	0.98	0.23	0.07	0.03	0.01
400 to 599.9	Central LA	9.84	3.70	2.31	1.51	0.37	0.11	0.03	0.01
400 to 599.9	Compton	7.25	2.95	1.96	1.32	0.35	0.11	0.04	0.01
400 to 599.9	Costa Mesa	3.91	1.83	1.32	0.92	0.27	0.10	0.04	0.01
400 to 599.9	Crestline	4.78	1.94	1.25	0.82	0.22	0.08	0.03	0.01
400 to 599.9	Fontana	9.70	3.34	2.22	1.54	0.46	0.17	0.06	0.02
400 to 599.9	Indio	4.33	1.65	1.11	0.77	0.23	0.09	0.03	0.01
400 to 599.9	La Habra	5.13	2.26	1.51	1.01	0.26	0.09	0.03	0.01
400 to 599.9	Lake Elsinore	3.38	1.32	0.94	0.68	0.23	0.09	0.04	0.01
400 to 599.9	LAX	14.98	4.77	3.11	2.14	0.63	0.22	0.08	0.02
400 to 599.9	Long Beach	5.21	2.18	1.40	0.91	0.25	0.08	0.03	0.01
400 to 599.9	Lynwood	6.46	2.67	1.84	1.27	0.36	0.12	0.04	0.01
400 to 599.9	Mission Viejo	4.24	1.65	1.11	0.76	0.21	0.09	0.03	0.01
400 to 599.9	Palm Springs	5.33	1.92	1.20	0.81	0.22	0.08	0.03	0.01
400 to 599.9	Perris	5.50	1.92	1.23	0.85	0.26	0.10	0.04	0.01
400 to 599.9	Pico Rivera	9.29	3.22	2.02	1.31	0.33	0.12	0.04	0.01
400 to 599.9	Pomona	5.87	2.53	1.67	1.10	0.28	0.09	0.03	0.01
400 to 599.9	Redlands	3.42	1.66	1.21	0.86	0.26	0.10	0.04	0.01
400 to 599.9	Reseda	3.19	1.27	0.81	0.54	0.14	0.05	0.02	0.01
400 to 599.9	Riverside	6.40	2.46	1.73	1.22	0.37	0.13	0.05	0.01
400 to 599.9	San Bernardino	5.91	2.22	1.48	1.01	0.29	0.11	0.04	0.01
400 to 599.9	Santa Clarita	11.43	3.67	2.22	1.46	0.38	0.14	0.05	0.01
400 to 599.9	Upland	7.24	2.81	1.96	1.37	0.40	0.14	0.05	0.01
400 to 599.9	West LA	8.40	3.23	2.04	1.31	0.31	0.11	0.04	0.01

Table 4.35
Dispersion Factors (X/Q)
for Diesel ICEs
Operating 12 Hours per Day or Less

Diesel ICE Rating 600 to 1,149 BHP

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([$\mu g/m^3$]/[ton/year])

Rating (BHP)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
600 to 1,149	Anaheim	3.17	1.21	0.95	0.73	0.25	0.11	0.04	0.01
600 to 1,149	Azusa	1.29	0.61	0.53	0.43	0.18	0.09	0.04	0.01
600 to 1,149	Banning	5.76	1.92	1.41	1.08	0.39	0.17	0.06	0.02
600 to 1,149	Burbank	1.23	0.57	0.46	0.35	0.13	0.06	0.02	0.01
600 to 1,149	Central LA	3.56	1.28	0.97	0.72	0.22	0.09	0.03	0.01
600 to 1,149	Compton	2.14	0.85	0.68	0.52	0.18	0.08	0.03	0.01
600 to 1,149	Costa Mesa	0.57	0.35	0.33	0.28	0.14	0.08	0.03	0.01
600 to 1,149	Crestline	1.22	0.54	0.43	0.34	0.13	0.07	0.03	0.01
600 to 1,149	Fontana	3.41	1.22	0.95	0.75	0.28	0.13	0.05	0.01
600 to 1,149	Indio	1.24	0.53	0.43	0.35	0.14	0.07	0.03	0.01
600 to 1,149	La Habra	1.05	0.50	0.43	0.34	0.14	0.07	0.03	0.01
600 to 1,149	Lake Elsinore	0.91	0.41	0.35	0.29	0.13	0.07	0.03	0.01
600 to 1,149	LAX	5.83	1.98	1.50	1.15	0.40	0.17	0.07	0.02
600 to 1,149	Long Beach	0.96	0.52	0.45	0.36	0.13	0.06	0.02	0.01
600 to 1,149	Lynwood	1.58	0.70	0.58	0.47	0.19	0.09	0.04	0.01
600 to 1,149	Mission Viejo	0.69	0.35	0.31	0.26	0.12	0.06	0.03	0.01
600 to 1,149	Palm Springs	2.36	0.83	0.60	0.45	0.15	0.06	0.03	0.01
600 to 1,149	Perris	2.19	0.82	0.60	0.46	0.17	0.08	0.03	0.01
600 to 1,149	Pico Rivera	2.90	1.08	0.80	0.61	0.21	0.09	0.04	0.01
600 to 1,149	Pomona	1.55	0.68	0.55	0.43	0.16	0.08	0.03	0.01
600 to 1,149	Redlands	0.63	0.37	0.35	0.30	0.14	0.08	0.04	0.01
600 to 1,149	Reseda	1.19	0.52	0.38	0.28	0.09	0.04	0.02	0.01
600 to 1,149	Riverside	1.68	0.68	0.58	0.48	0.20	0.10	0.04	0.01
600 to 1,149	San Bernardino	1.93	0.76	0.60	0.47	0.18	0.09	0.04	0.01
600 to 1,149	Santa Clarita	5.31	1.81	1.23	0.89	0.27	0.11	0.04	0.01
600 to 1,149	Upland	1.87	0.76	0.65	0.53	0.22	0.11	0.04	0.01
600 to 1,149	West LA	1.98	0.82	0.65	0.50	0.18	0.09	0.04	0.01

Table 3.31
Dispersion Factors (X/Q)
for Diesel ICEs
Operating More Than 12 Hours per Day

Diesel ICE Rating 50 to 174.9 BHP

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([$\mu g/m^3$]/[ton/year])

Rating (BHP)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
50 to 174.9	Anaheim	16.34	5.76	3.73	2.64	0.88	0.38	0.17	0.07
50 to 174.9	Azusa	14.25	4.87	3.45	2.60	1.03	0.44	0.19	0.08
50 to 174.9	Banning	30.23	9.60	6.37	4.62	1.77	0.80	0.33	0.12
50 to 174.9	Burbank	15.86	5.66	3.84	2.86	1.07	0.42	0.17	0.07
50 to 174.9	Central LA	15.17	4.87	3.33	2.55	0.98	0.38	0.14	0.06
50 to 174.9	Compton	12.91	4.34	3.05	2.30	0.95	0.41	0.18	0.07
50 to 174.9	Costa Mesa	7.14	2.57	1.76	1.25	0.50	0.27	0.15	0.06
50 to 174.9	Crestline	11.03	3.90	2.50	1.74	0.61	0.29	0.14	0.06
50 to 174.9	Fontana	19.46	6.43	4.36	3.18	1.20	0.54	0.24	0.10
50 to 174.9	Indio	20.40	7.24	4.89	3.60	1.39	0.63	0.28	0.11
50 to 174.9	La Habra	9.02	3.24	2.09	1.43	0.52	0.27	0.14	0.06
50 to 174.9	Lake Elsinore	6.95	2.40	1.62	1.23	0.55	0.31	0.17	0.08
50 to 174.9	LAX	19.93	5.92	3.91	2.80	1.00	0.44	0.19	0.07
50 to 174.9	Long Beach	10.74	3.86	2.84	2.24	1.01	0.43	0.18	0.08
50 to 174.9	Lynwood	11.90	4.02	2.80	2.07	0.82	0.39	0.18	0.08
50 to 174.9	Mission Viejo	9.09	2.87	1.87	1.32	0.50	0.27	0.14	0.06
50 to 174.9	Palm Springs	19.45	6.90	4.51	3.27	1.14	0.47	0.20	0.08
50 to 174.9	Perris	10.07	3.45	2.28	1.64	0.64	0.33	0.17	0.07
50 to 174.9	Pico Rivera	17.36	5.40	3.50	2.47	0.86	0.38	0.17	0.07
50 to 174.9	Pomona	10.95	3.82	2.57	1.86	0.84	0.41	0.20	0.09
50 to 174.9	Redlands	8.13	3.03	2.11	1.52	0.61	0.36	0.25	0.12
50 to 174.9	Reseda	5.46	1.85	1.18	0.82	0.35	0.22	0.13	0.06
50 to 174.9	Riverside	12.27	3.96	2.74	2.00	0.77	0.37	0.18	0.07
50 to 174.9	San Bernardino	14.65	5.16	3.44	2.52	0.97	0.45	0.22	0.09
50 to 174.9	Santa Clarita	15.56	4.54	2.80	1.96	0.69	0.34	0.17	0.07
50 to 174.9	Upland	14.90	4.85	3.35	2.47	0.99	0.46	0.24	0.11
50 to 174.9	West LA	11.21	3.54	2.21	1.46	0.48	0.24	0.14	0.06

Table 3.32
Dispersion Factors (X/Q)
for Diesel ICEs
Operating More Than 12 Hours per Day

Diesel ICE Rating 175 to 299.9 BHP

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([$\mu g/m^3$]/[ton/year])

Rating (BHP)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
175 to 299.9	Anaheim	13.01	4.47	2.87	2.06	0.68	0.28	0.14	0.06
175 to 299.9	Azusa	10.80	3.57	2.49	1.90	0.76	0.33	0.15	0.07
175 to 299.9	Banning	25.23	7.71	5.01	3.68	1.46	0.68	0.30	0.11
175 to 299.9	Burbank	12.36	4.26	2.79	2.10	0.82	0.32	0.14	0.06
175 to 299.9	Central LA	12.15	3.84	2.48	1.83	0.74	0.29	0.12	0.05
175 to 299.9	Compton	9.77	3.23	2.22	1.67	0.67	0.29	0.14	0.07
175 to 299.9	Costa Mesa	5.24	1.90	1.32	0.94	0.33	0.18	0.11	0.05
175 to 299.9	Crestline	8.54	3.01	1.91	1.36	0.46	0.21	0.11	0.05
175 to 299.9	Fontana	15.68	5.01	3.33	2.47	0.93	0.41	0.20	0.09
175 to 299.9	Indio	16.79	5.75	3.79	2.84	1.11	0.50	0.23	0.10
175 to 299.9	La Habra	6.96	2.50	1.63	1.13	0.37	0.18	0.10	0.05
175 to 299.9	Lake Elsinore	5.29	1.78	1.22	0.89	0.38	0.20	0.12	0.06
175 to 299.9	LAX	16.18	4.72	3.08	2.23	0.79	0.34	0.16	0.07
175 to 299.9	Long Beach	7.86	2.74	1.95	1.53	0.70	0.31	0.15	0.07
175 to 299.9	Lynwood	9.15	3.03	2.09	1.56	0.60	0.27	0.14	0.07
175 to 299.9	Mission Viejo	6.47	1.98	1.26	0.90	0.34	0.17	0.10	0.05
175 to 299.9	Palm Springs	16.25	5.52	3.54	2.60	0.92	0.36	0.17	0.08
175 to 299.9	Perris	8.17	2.72	1.77	1.29	0.48	0.24	0.13	0.06
175 to 299.9	Pico Rivera	13.67	4.18	2.64	1.91	0.65	0.28	0.14	0.06
175 to 299.9	Pomona	8.32	2.92	1.92	1.37	0.51	0.26	0.15	0.08
175 to 299.9	Redlands	5.91	2.17	1.51	1.11	0.42	0.21	0.18	0.10
175 to 299.9	Reseda	4.37	1.45	0.91	0.63	0.21	0.13	0.10	0.05
175 to 299.9	Riverside	9.43	2.97	2.04	1.51	0.57	0.26	0.14	0.06
175 to 299.9	San Bernardino	11.72	3.97	2.59	1.93	0.73	0.33	0.17	0.08
175 to 299.9	Santa Clarita	12.97	3.70	2.22	1.56	0.53	0.24	0.13	0.06
175 to 299.9	Upland	11.46	3.63	2.48	1.85	0.70	0.33	0.17	0.09
175 to 299.9	West LA	8.55	2.75	1.72	1.17	0.35	0.16	0.10	0.05

Table 3.33
Dispersion Factors (X/Q)
for Diesel ICEs
Operating More Than 12 Hours per Day

Diesel ICE Rating 300 to 399.9 BHP

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([$\mu g/m^3$]/[ton/year])

Rating (BHP)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
300 to 399.9	Anaheim	8.09	2.98	1.79	1.27	0.38	0.15	0.08	0.05
300 to 399.9	Azusa	6.60	2.36	1.51	1.15	0.42	0.17	0.09	0.05
300 to 399.9	Banning	18.55	5.84	3.46	2.56	1.06	0.50	0.24	0.10
300 to 399.9	Burbank	7.87	2.86	1.68	1.23	0.46	0.18	0.09	0.05
300 to 399.9	Central LA	8.60	2.85	1.74	1.25	0.41	0.16	0.08	0.04
300 to 399.9	Compton	6.20	2.23	1.42	1.06	0.38	0.15	0.08	0.05
300 to 399.9	Costa Mesa	3.09	1.29	0.86	0.64	0.20	0.10	0.06	0.04
300 to 399.9	Crestline	5.64	2.08	1.22	0.86	0.29	0.12	0.07	0.04
300 to 399.9	Fontana	10.53	3.52	2.14	1.58	0.57	0.24	0.13	0.07
300 to 399.9	Indio	11.59	4.08	2.43	1.80	0.71	0.31	0.16	0.08
300 to 399.9	La Habra	4.21	1.67	1.04	0.73	0.22	0.10	0.06	0.04
300 to 399.9	Lake Elsinore	3.18	1.13	0.73	0.55	0.19	0.08	0.06	0.04
300 to 399.9	LAX	11.30	3.47	2.11	1.54	0.52	0.21	0.11	0.05
300 to 399.9	Long Beach	4.71	1.80	1.17	0.90	0.37	0.15	0.09	0.06
300 to 399.9	Lynwood	5.71	2.06	1.33	0.99	0.34	0.14	0.08	0.05
300 to 399.9	Mission Viejo	3.67	1.26	0.76	0.54	0.15	0.07	0.06	0.04
300 to 399.9	Palm Springs	11.37	3.96	2.36	1.73	0.62	0.23	0.11	0.06
300 to 399.9	Perris	5.46	1.88	1.12	0.82	0.28	0.13	0.08	0.05
300 to 399.9	Pico Rivera	9.15	2.93	1.69	1.20	0.39	0.16	0.09	0.05
300 to 399.9	Pomona	5.23	1.99	1.23	0.87	0.26	0.12	0.09	0.06
300 to 399.9	Redlands	3.40	1.42	0.95	0.71	0.24	0.11	0.09	0.07
300 to 399.9	Reseda	2.99	1.05	0.63	0.45	0.13	0.06	0.05	0.04
300 to 399.9	Riverside	5.83	2.00	1.29	0.97	0.33	0.14	0.08	0.05
300 to 399.9	San Bernardino	7.65	2.67	1.59	1.16	0.41	0.18	0.11	0.06
300 to 399.9	Santa Clarita	9.06	2.76	1.57	1.09	0.34	0.15	0.08	0.04
300 to 399.9	Upland	7.44	2.52	1.59	1.19	0.42	0.18	0.10	0.07
300 to 399.9	West LA	5.55	1.96	1.18	0.80	0.21	0.09	0.05	0.04

Table 3.34
Dispersion Factors (X/Q)
for Diesel ICEs
Operating More Than 12 Hours per Day

Diesel ICE Rating 400 to 599.9 BHP

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([$\mu g/m^3$]/[ton/year])

Rating (BHP)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
400 to 599.9	Anaheim	5.70	2.18	1.36	0.91	0.29	0.10	0.05	0.03
400 to 599.9	Azusa	4.20	1.55	1.05	0.74	0.28	0.11	0.06	0.04
400 to 599.9	Banning	13.98	4.43	2.67	1.79	0.78	0.38	0.19	0.08
400 to 599.9	Burbank	5.48	2.03	1.21	0.80	0.31	0.12	0.06	0.04
400 to 599.9	Central LA	6.15	2.13	1.36	0.92	0.31	0.11	0.05	0.03
400 to 599.9	Compton	3.99	1.53	1.02	0.71	0.25	0.10	0.05	0.04
400 to 599.9	Costa Mesa	1.78	0.79	0.56	0.40	0.14	0.06	0.04	0.03
400 to 599.9	Crestline	3.86	1.45	0.87	0.58	0.21	0.09	0.05	0.03
400 to 599.9	Fontana	7.64	2.58	1.61	1.10	0.42	0.17	0.08	0.05
400 to 599.9	Indio	8.80	3.09	1.84	1.23	0.51	0.23	0.11	0.06
400 to 599.9	La Habra	2.65	1.08	0.71	0.47	0.15	0.06	0.04	0.03
400 to 599.9	Lake Elsinore	2.10	0.75	0.51	0.36	0.14	0.06	0.03	0.03
400 to 599.9	LAX	8.33	2.64	1.67	1.14	0.40	0.16	0.07	0.04
400 to 599.9	Long Beach	2.89	1.19	0.82	0.58	0.23	0.09	0.05	0.04
400 to 599.9	Lynwood	3.74	1.43	0.97	0.68	0.24	0.09	0.05	0.04
400 to 599.9	Mission Viejo	2.14	0.75	0.49	0.33	0.11	0.05	0.03	0.02
400 to 599.9	Palm Springs	8.82	3.11	1.87	1.27	0.48	0.19	0.08	0.05
400 to 599.9	Perris	4.07	1.44	0.88	0.59	0.21	0.09	0.05	0.03
400 to 599.9	Pico Rivera	6.42	2.16	1.28	0.84	0.28	0.11	0.05	0.03
400 to 599.9	Pomona	3.48	1.38	0.89	0.60	0.19	0.07	0.05	0.04
400 to 599.9	Redlands	1.91	0.83	0.60	0.43	0.15	0.07	0.05	0.05
400 to 599.9	Reseda	2.19	0.78	0.48	0.32	0.10	0.04	0.03	0.02
400 to 599.9	Riverside	3.87	1.37	0.93	0.66	0.24	0.10	0.05	0.03
400 to 599.9	San Bernardino	5.56	1.96	1.20	0.80	0.30	0.12	0.07	0.04
400 to 599.9	Santa Clarita	6.95	2.19	1.27	0.83	0.26	0.11	0.06	0.03
400 to 599.9	Upland	4.87	1.71	1.14	0.80	0.29	0.12	0.06	0.04
400 to 599.9	West LA	3.68	1.39	0.87	0.56	0.16	0.06	0.03	0.03

Table 3.35
Dispersion Factors (X/Q)
for Diesel ICEs
Operating More Than 12 Hours per Day

Diesel ICE Rating 600 to 1,149 BHP

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([$\mu g/m^3$]/[ton/year])

Rating (BHP)	Location	Downwind Distance (meters)							
		25	50	75	100	200	300	500	1,000
600 to 1,149	Anaheim	1.40	0.53	0.41	0.31	0.11	0.05	0.03	0.02
600 to 1,149	Azusa	0.76	0.29	0.24	0.20	0.09	0.05	0.02	0.02
600 to 1,149	Banning	5.22	1.62	1.06	0.77	0.32	0.19	0.10	0.05
600 to 1,149	Burbank	0.77	0.30	0.23	0.17	0.07	0.04	0.02	0.02
600 to 1,149	Central LA	1.90	0.64	0.49	0.37	0.13	0.06	0.03	0.01
600 to 1,149	Compton	0.98	0.37	0.30	0.24	0.09	0.05	0.03	0.02
600 to 1,149	Costa Mesa	0.27	0.15	0.14	0.12	0.06	0.04	0.02	0.01
600 to 1,149	Crestline	0.90	0.34	0.24	0.18	0.08	0.04	0.02	0.01
600 to 1,149	Fontana	2.20	0.75	0.54	0.41	0.16	0.08	0.04	0.02
600 to 1,149	Indio	2.88	1.00	0.63	0.45	0.17	0.10	0.06	0.03
600 to 1,149	La Habra	0.47	0.22	0.18	0.14	0.06	0.04	0.02	0.01
600 to 1,149	Lake Elsinore	0.46	0.19	0.16	0.13	0.06	0.03	0.02	0.01
600 to 1,149	LAX	2.73	0.90	0.67	0.51	0.18	0.08	0.04	0.02
600 to 1,149	Long Beach	0.55	0.26	0.23	0.18	0.08	0.04	0.02	0.02
600 to 1,149	Lynwood	0.73	0.31	0.26	0.21	0.09	0.05	0.02	0.02
600 to 1,149	Mission Viejo	0.28	0.14	0.12	0.10	0.05	0.03	0.02	0.01
600 to 1,149	Palm Springs	3.28	1.02	0.69	0.51	0.20	0.10	0.05	0.03
600 to 1,149	Perris	1.29	0.46	0.32	0.24	0.09	0.05	0.02	0.02
600 to 1,149	Pico Rivera	1.55	0.55	0.39	0.29	0.10	0.05	0.02	0.01
600 to 1,149	Pomona	0.76	0.31	0.25	0.19	0.07	0.04	0.02	0.02
600 to 1,149	Redlands	0.28	0.16	0.15	0.13	0.07	0.04	0.02	0.02
600 to 1,149	Reseda	0.72	0.27	0.19	0.14	0.05	0.03	0.02	0.01
600 to 1,149	Riverside	0.86	0.33	0.27	0.22	0.10	0.05	0.03	0.02
600 to 1,149	San Bernardino	1.50	0.53	0.38	0.29	0.11	0.06	0.03	0.02
600 to 1,149	Santa Clarita	2.69	0.89	0.59	0.42	0.14	0.07	0.03	0.02
600 to 1,149	Upland	1.03	0.39	0.32	0.26	0.11	0.06	0.03	0.02
600 to 1,149	West LA	0.76	0.32	0.25	0.20	0.07	0.04	0.02	0.01

Table 6.31
Dispersion Factors (χ/Q)
for Diesel ICEs
for Acute Hazard Index

All Operating Conditions χ/Q Values ([μg/m^3]/[lb/hr])

Rating (BHP)	Downwind Distance (meters)							
	25	**50**	**75**	**100**	**200**	**300**	**500**	**1,000**
50 to 174.9	318.31	132.73	103.23	88.20	41.49	16.33	6.95	4.09
175 to 299.9	249.82	100.51	66.01	55.34	27.05	9.36	4.17	2.96
300 to 399.9	208.60	72.20	48.27	35.75	18.22	7.63	3.58	2.01
400 to 599.9	370.47	168.04	134.78	113.29	53.36	22.07	8.91	4.63
600 to 1,149	110.56	35.42	25.31	19.18	7.78	4.82	2.54	1.13

APPENDIX VIII

TIER 2 SCREENING TABLES FOR CREMATORIUMS FOR USE IN RULE 1401

Introduction

The purpose of this report is to document the methods used by SCAQMD staff to estimate cancer risks from the industry-wide source category of crematoriums. The methods are consistent with SCAQMD's risk assessment procedures for Rule 1401 and were used to update the Rule 1401 Tier 2 screening tables using AERMOD for crematoriums ONLY.

Emission Inventory Methods

For emission rates associated with crematoriums, please contact the appropriate SCAQMD Engineering staff (http://www.aqmd.gov/contact/permitting-staff).

Exposure Modeling Methods

Air quality modeling was performed using AERMOD (American Meteorological Society/U.S. EPA Regulatory Model). As of December 9, 2006, U.S. EPA promulgated AERMOD as a replacement for ISCST3 (Industrial Source Complex – Short Term, Version 3) as the recommended dispersion model. AERMOD is a steady-state plume model that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrain.

AERMOD (version 14134) was executed using the urban option, which is SCAQMD policy for all permitting in its jurisdiction. The U.S. EPA regulatory default options, with the exception of the FLAT terrain option, were implemented and the SCAQMD AERMOD-ready meteorological data was used. The County populations used are based on the 2008 estimates from the U.S. Census Bureau. The Los Angeles County population was 9,862,049; Orange County population was 3,010,759; Riverside County population was 2,100,516; and San Bernardino County population was 2,015,355. SCAQMD's meteorological data is updated on a tri-annual basis and the population estimates will also be updated at that time.

For screening purposes, flat terrain was assumed. Although this is appropriate for most projects within the South Coast Air Basin, it is important to note that if complex terrain is present, the screening tables are not appropriate to be used and project-specific modeling using the elevated terrain option is recommended.

Based on information from SCAQMD Engineering staff, the stack was modeled as a point source with the following stack parameters – 19-ft stack height, 5.8 m/s exit velocity, 1300ºF exit temperature, and 13-ft building height. Due to the sensitivity to building downwash effects, there are three different building sizes analyzed.

Modeling was performed at 27 SCAQMD meteorological stations shown in Figure 1. The locations of each of the sites are given in Table 1. The data are available on the SCAQMD website (http://www.aqmd.gov/home/library/air-quality-data-studies/meteorological-data/data-

for-aermod). A polar receptor grid is assumed at ten degree azimuth increments at the following downwind distances: 25, 50, 75, 100, 200, 300, 500, and 1000 meters.

The peak model-predicted impacts at each downwind distance over the 36 azimuth angles for each meteorological station were used to develop the attached tables.

A sample AERMOD model input file is provided in Exhibit 1.

Figure 1: Meteorological Monitoring Stations in the South Coast Air Basin

Table 1: Locations of Meteorological Stations and Elevations

Station name	UTM Coordinates (km)		Lat./Long. Coordinates		Elevation
	Easting	Northing	Latitude	Longitude	(m)
Anaheim	413.14	3743.57	33:49:50	117:56:19	41
Azusa	414.81	3777.47	34:08:11	117:55:26	182
Banning	513.10	3753.19	33:55:15	116:51:30	660
Burbank	378.62	3782.24	34:10:33	118:19:01	175
Central LA	386.79	3770.00	34:03:59	118:13:36	87
Compton	388.59	3751.88	33:54:05	118:12:18	22
Costa Mesa	414.16	3726.19	33:40:26	117:55:33	20
Crestline	474.62	3788.76	34:14:29	117:16:32	1387
Fontana	454.62	3773.19	34:06:01	117:29:31	367
Indio	572.67	3729.90	33:42:30	116:12:57	-4
La Habra	411.98	3754.08	33:55:31	117:57:08	82
Lake Elsinore	469.33	3726.13	33:40:35	117:19:51	406
LAX	367.83	3757.80	33:57:15	118:25:49	42
Long Beach	389.99	3743.04	33:49:25	118:11:19	30
Lynwood	388.07	3754.73	33:55:44	118:12:39	29
Mission Viejo	437.39	3721.17	33:37:49	117:40:30	170
Palm Springs	542.46	3745.73	33:51:10	116:32:28	171
Perris	478.91	3738.58	33:47:20	117:13:40	442
Pico Rivera	401.31	3763.61	34:00:37	118:04:07	58
Pomona	430.78	3769.61	34:04:00	117:45:00	270
Redlands	486.36	3768.50	34:03:32	117:08:52	481
Reseda	358.76	3785.11	34:11:57	118:31:58	228
Riverside	461.64	3762.10	34:00:02	117:24:55	250
San Bernardino	474.76	3773.82	34:06:24	117:16:25	305
Santa Clarita	359.48	3805.52	34:23:00	118:31:42	375
Upland	441.96	3773.66	34:06:14	117:37:45	379
West LA	365.54	3768.52	34:03:02	118:27:24	97

Exhibit 1: Sample AERMOD Model Input File for Crematoriums

```
CO STARTING
   TITLEONE Modeling for R1401 Risk Assessment Procedures - Crematoriums
   TITLETWO Continuous Operation
   MODELOPT CONC FLAT
   AVERTIME 1   PERIOD
   POLLUTID Any
   RUNORNOT RUN
   URBANOPT 3010759 ORC
CO FINISHED

SO STARTING
   LOCATION P1 POINT     0.0    0.0    0.0
   LOCATION P2 POINT     0.0    0.0    0.0
   LOCATION P3 POINT     0.0    0.0    0.0

** Point Source      Q      RelHgt   Temp     Vel       Dia
**               ---------  ------  ------  ------    ------
   SRCPARAM P1     0.0865    5.791  977.59    5.8      0.508
   SRCPARAM P2     0.0865    5.791  977.59    5.8      0.508
   SRCPARAM P3     0.0865    5.791  977.59    5.8      0.508

SO BUILDHGT P1    3.96     3.96     3.96     3.96     3.96     3.96
SO BUILDHGT P1    3.96     3.96     3.96     3.96     3.96     3.96
SO BUILDHGT P1    3.96     3.96     3.96     3.96     3.96     3.96
SO BUILDHGT P1    3.96     3.96     3.96     3.96     3.96     3.96
SO BUILDHGT P1    3.96     3.96     3.96     3.96     3.96     3.96
SO BUILDHGT P1    3.96     3.96     3.96     3.96     3.96     3.96
SO BUILDWID P1   24.97    27.62    29.44    30.36    30.36    29.44
SO BUILDWID P1   27.62    24.97    21.55    24.97    27.62    29.44
SO BUILDWID P1   30.36    30.36    29.44    27.62    24.97    21.55
SO BUILDWID P1   24.97    27.62    29.44    30.36    30.36    29.44
SO BUILDWID P1   27.62    24.97    21.55    24.97    27.62    29.44
SO BUILDWID P1   30.36    30.36    29.44    27.62    24.97    21.55
SO BUILDLEN P1   24.97    27.62    29.44    30.36    30.36    29.44
SO BUILDLEN P1   27.62    24.97    21.55    24.97    27.62    29.44
SO BUILDLEN P1   30.36    30.36    29.44    27.62    24.97    21.55
SO BUILDLEN P1   24.97    27.62    29.44    30.36    30.36    29.44
SO BUILDLEN P1   27.62    24.97    21.55    24.97    27.62    29.44
SO BUILDLEN P1   30.36    30.36    29.44    27.62    24.97    21.55
SO XBADJ    P1  -12.48   -13.81   -14.72   -15.18   -15.18   -14.72
SO XBADJ    P1  -13.81   -12.48   -10.78   -12.48   -13.81   -14.72
SO XBADJ    P1  -15.18   -15.18   -14.72   -13.81   -12.48   -10.78
SO XBADJ    P1  -12.48   -13.81   -14.72   -15.18   -15.18   -14.72
SO XBADJ    P1  -13.81   -12.48   -10.78   -12.48   -13.81   -14.72
SO XBADJ    P1  -15.18   -15.18   -14.72   -13.81   -12.48   -10.78
SO YBADJ    P1    0.00     0.00     0.00     0.00     0.00     0.00
SO YBADJ    P1    0.00     0.00     0.00     0.00     0.00     0.00
SO YBADJ    P1    0.00     0.00     0.00     0.00     0.00     0.00
SO YBADJ    P1    0.00     0.00     0.00     0.00     0.00     0.00
SO YBADJ    P1    0.00     0.00     0.00     0.00     0.00     0.00
SO YBADJ    P1    0.00     0.00     0.00     0.00     0.00     0.00

SO BUILDHGT P2    3.96     3.96     3.96     3.96     3.96     3.96
SO BUILDHGT P2    3.96     3.96     3.96     3.96     3.96     3.96
SO BUILDHGT P2    3.96     3.96     3.96     3.96     3.96     3.96
SO BUILDHGT P2    3.96     3.96     3.96     3.96     3.96     3.96
SO BUILDHGT P2    3.96     3.96     3.96     3.96     3.96     3.96
SO BUILDHGT P2    3.96     3.96     3.96     3.96     3.96     3.96
SO BUILDWID P2   35.31    39.07    41.64    42.94    42.94    41.64
SO BUILDWID P2   39.07    35.31    30.48    35.31    39.07    41.64
SO BUILDWID P2   42.94    42.94    41.64    39.07    35.31    30.48
SO BUILDWID P2   35.31    39.07    41.64    42.94    42.94    41.64
SO BUILDWID P2   39.07    35.31    30.48    35.31    39.07    41.64
SO BUILDWID P2   42.94    42.94    41.64    39.07    35.31    30.48
SO BUILDLEN P2   35.31    39.07    41.64    42.94    42.94    41.64
SO BUILDLEN P2   39.07    35.31    30.48    35.31    39.07    41.64
SO BUILDLEN P2   42.94    42.94    41.64    39.07    35.31    30.48
SO BUILDLEN P2   35.31    39.07    41.64    42.94    42.94    41.64
SO BUILDLEN P2   39.07    35.31    30.48    35.31    39.07    41.64
SO BUILDLEN P2   42.94    42.94    41.64    39.07    35.31    30.48
SO XBADJ    P2  -17.65   -19.53   -20.82   -21.47   -21.47   -20.82
SO XBADJ    P2  -19.53   -17.65   -15.24   -17.65   -19.53   -20.82
SO XBADJ    P2  -21.47   -21.47   -20.82   -19.53   -17.65   -15.24
SO XBADJ    P2  -17.65   -19.53   -20.82   -21.47   -21.47   -20.82
SO XBADJ    P2  -19.53   -17.65   -15.24   -17.65   -19.53   -20.82
SO XBADJ    P2  -21.47   -21.47   -20.82   -19.53   -17.65   -15.24
```

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SO YBADJ    P2    0.00     0.00     0.00     0.00     0.00     0.00
SO YBADJ    P2    0.00     0.00     0.00     0.00     0.00     0.00
SO YBADJ    P2    0.00     0.00     0.00     0.00     0.00     0.00
SO YBADJ    P2    0.00     0.00     0.00     0.00     0.00     0.00
SO YBADJ    P2    0.00     0.00     0.00     0.00     0.00     0.00
SO YBADJ    P2    0.00     0.00     0.00     0.00     0.00     0.00

SO BUILDHGT P3    3.96     3.96     3.96     3.96     3.96     3.96
SO BUILDHGT P3    3.96     3.96     3.96     3.96     3.96     3.96
SO BUILDHGT P3    3.96     3.96     3.96     3.96     3.96     3.96
SO BUILDHGT P3    3.96     3.96     3.96     3.96     3.96     3.96
SO BUILDHGT P3    3.96     3.96     3.96     3.96     3.96     3.96
SO BUILDHGT P3    3.96     3.96     3.96     3.96     3.96     3.96
SO BUILDWID P3   43.25    47.85    50.99    52.59    52.59    50.99
SO BUILDWID P3   47.85    43.25    37.33    43.25    47.85    50.99
SO BUILDWID P3   52.59    52.59    50.99    47.85    43.25    37.33
SO BUILDWID P3   43.25    47.85    50.99    52.59    52.59    50.99
SO BUILDWID P3   47.85    43.25    37.33    43.25    47.85    50.99
SO BUILDWID P3   52.59    52.59    50.99    47.85    43.25    37.33
SO BUILDLEN P3   43.25    47.85    50.99    52.59    52.59    50.99
SO BUILDLEN P3   47.85    43.25    37.33    43.25    47.85    50.99
SO BUILDLEN P3   52.59    52.59    50.99    47.85    43.25    37.33
SO BUILDLEN P3   43.25    47.85    50.99    52.59    52.59    50.99
SO BUILDLEN P3   47.85    43.25    37.33    43.25    47.85    50.99
SO BUILDLEN P3   52.59    52.59    50.99    47.85    43.25    37.33
SO XBADJ    P3  -21.62   -23.92   -25.50   -26.30   -26.30   -25.50
SO XBADJ    P3  -23.92   -21.62   -18.67   -21.62   -23.92   -25.50
SO XBADJ    P3  -26.30   -26.30   -25.50   -23.92   -21.62   -18.67
SO XBADJ    P3  -21.62   -23.92   -25.50   -26.30   -26.30   -25.50
SO XBADJ    P3  -23.92   -21.62   -18.67   -21.62   -23.92   -25.50
SO XBADJ    P3  -26.30   -26.30   -25.50   -23.92   -21.62   -18.67
SO YBADJ    P3    0.00     0.00     0.00     0.00     0.00     0.00
SO YBADJ    P3    0.00     0.00     0.00     0.00     0.00     0.00
SO YBADJ    P3    0.00     0.00     0.00     0.00     0.00     0.00
SO YBADJ    P3    0.00     0.00     0.00     0.00     0.00     0.00
SO YBADJ    P3    0.00     0.00     0.00     0.00     0.00     0.00
SO YBADJ    P3    0.00     0.00     0.00     0.00     0.00     0.00

   URBANSRC P1
   URBANSRC P2
   URBANSRC P3

   SRCGROUP  P1  P1
   SRCGROUP  P2  P2
   SRCGROUP  P3  P3

SO SRCGROUP  ALL

SO FINISHED

RE STARTING
   GRIDPOLR POL1 STA
                ORIG     0.0     0.0
                DIST  25 50 75 100 200 300 500 1000
                GDIR     36     10.0     10.0
   GRIDPOLR POL1 END
RE FINISHED

ME STARTING
   SURFFILE ANAH8.SFC
   PROFFILE ANAH8.PFL
   SURFDATA 0    2006
   UAIRDATA 3190 2006
   PROFBASE 0    METERS
ME FINISHED

OU STARTING
   RECTABLE  1       FIRST
   RECTABLE  ALLAVE  FIRST
   PLOTFILE  1       P1  FIRST  BM1T1P1.TXT
   PLOTFILE  PERIOD  P1         BM1T2P1.TXT
   PLOTFILE  1       P2  FIRST  BM1T1P2.TXT
   PLOTFILE  PERIOD  P2         BM1T2P2.TXT
   PLOTFILE  1       P3  FIRST  BM1T1P3.TXT
   PLOTFILE  PERIOD  P3         BM1T2P3.TXT
OU FINISHED
```

Results

Figure 2 shows the source receptor areas (SRA) within the South Coast Air Basin and Table 2 lists the appropriate meteorological station to use for each SRA.

Figure 2: Source/Receptor Areas

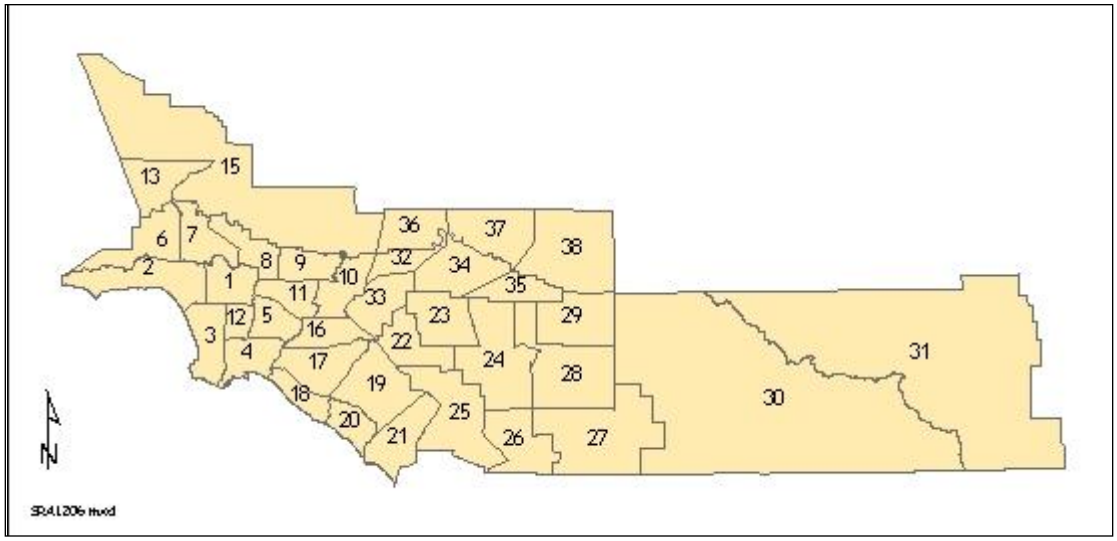

Table 2: Meteorological Stations for Each Source/Receptor Area.

Meteorological Station	Source/ Receptor Area	Meteorological Station	Source/ Receptor Area
Anaheim	17	Compton/Lynwood	12
Azusa	8, 9	Mission Viejo	19, 21
Banning	29	Perris	24, 28
Burbank	7	Palm Springs	30, 31
Central LA	1	Pico Rivera	5, 11
Crestline	37	Pomona	10
Costa Mesa	18, 20	Redlands	35, 38
Fontana	34	Reseda	6
Indio	30	Riverside	22, 23
La Habra	16	Santa Clarita	13, 15
Lake Elsinore	25, 26, 27	San Bernardino	34
LAX	3	Upland	32, 33, 36
Long Beach	4	West LA	2

The following tables have been numbered to be consistent with the tables within Permit Application Attachment "M" for the Risk Assessment Procedures for Rules 1401 & 212.

Table 4.41
Dispersion Factors (χ/Q)
for Crematoriums
Operating 12 Hours per Day or Less

Building Area ≥ 5,000 to 10,000 ft^2, Stack Height ≤ 19 ft*

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([μg/m^3]/[ton/year])

Source Dimensions*		Location	Downwind Distance (meters)							
Area (ft^2)	Ht (ft)		25	50	75	100	200	300	500	1,000
≥ 5,000 to 10,000	19	Anaheim	10.50	3.45	2.22	1.49	0.40	0.16	0.06	0.01
≥ 5,000 to 10,000	19	Azusa	6.74	2.71	1.79	1.23	0.34	0.13	0.05	0.01
≥ 5,000 to 10,000	19	Banning	17.63	4.78	2.77	1.84	0.51	0.21	0.08	0.02
≥ 5,000 to 10,000	19	Burbank	5.85	2.29	1.44	0.93	0.23	0.09	0.03	0.01
≥ 5,000 to 10,000	19	Central LA	11.56	3.19	1.92	1.23	0.31	0.12	0.04	0.01
≥ 5,000 to 10,000	19	Compton	8.55	2.77	1.73	1.14	0.29	0.11	0.04	0.01
≥ 5,000 to 10,000	19	Costa Mesa	4.30	2.18	1.49	1.01	0.28	0.12	0.04	0.01
≥ 5,000 to 10,000	19	Crestline	4.86	2.08	1.37	0.91	0.25	0.10	0.04	0.01
≥ 5,000 to 10,000	19	Fontana	11.50	3.49	2.25	1.54	0.44	0.18	0.06	0.02
≥ 5,000 to 10,000	19	Indio	4.64	1.79	1.21	0.85	0.24	0.10	0.04	0.01
≥ 5,000 to 10,000	19	La Habra	5.59	2.42	1.58	1.05	0.28	0.11	0.04	0.01
≥ 5,000 to 10,000	19	Lake Elsinore	3.70	1.60	1.13	0.81	0.25	0.10	0.04	0.01
≥ 5,000 to 10,000	19	LAX	17.61	4.71	2.96	2.02	0.57	0.22	0.08	0.02
≥ 5,000 to 10,000	19	Long Beach	4.63	2.00	1.30	0.85	0.21	0.09	0.03	0.01
≥ 5,000 to 10,000	19	Lynwood	7.19	2.68	1.75	1.19	0.32	0.13	0.05	0.01
≥ 5,000 to 10,000	19	Mission Viejo	3.54	1.79	1.24	0.85	0.24	0.10	0.04	0.01
≥ 5,000 to 10,000	19	Palm Springs	6.80	1.93	1.20	0.80	0.21	0.09	0.03	0.01
≥ 5,000 to 10,000	19	Perris	6.54	2.00	1.28	0.89	0.26	0.11	0.04	0.01
≥ 5,000 to 10,000	19	Pico Rivera	9.12	3.02	1.91	1.28	0.34	0.13	0.05	0.01
≥ 5,000 to 10,000	19	Pomona	6.51	2.52	1.61	1.06	0.28	0.11	0.04	0.01
≥ 5,000 to 10,000	19	Redlands	4.14	2.14	1.46	1.00	0.28	0.12	0.05	0.01
≥ 5,000 to 10,000	19	Reseda	3.16	1.38	0.87	0.58	0.16	0.06	0.02	0.01
≥ 5,000 to 10,000	19	Riverside	7.30	2.67	1.79	1.24	0.35	0.14	0.05	0.01
≥ 5,000 to 10,000	19	San Bernardino	6.78	2.38	1.55	1.06	0.30	0.12	0.05	0.01
≥ 5,000 to 10,000	19	Santa Clarita	13.56	3.61	2.10	1.37	0.36	0.14	0.05	0.01
≥ 5,000 to 10,000	19	Upland	8.17	2.97	1.98	1.37	0.38	0.15	0.06	0.02
≥ 5,000 to 10,000	19	West LA	7.54	2.94	1.89	1.25	0.32	0.13	0.05	0.01

*Note: Facilities with building dimensions outside the ranges in Tables 4 must perform Tier 3 or 4 dispersion modeling

Table 4.42
Dispersion Factors (χ/Q)
for Crematoriums
Operating 12 Hours per Day or Less

Building Area > 10,000 to 15,000 ft^2, Stack Height ≤ 19 ft*

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([μg/m^3]/[ton/year])

Source Dimensions*		Location	Downwind Distance (meters)							
Area (ft^2)	Ht (ft)		25	50	75	100	200	300	500	1,000
> 10,000 to 15,000	19	Anaheim	13.48	3.86	2.42	1.61	0.42	0.16	0.06	0.01
> 10,000 to 15,000	19	Azusa	9.33	3.05	1.98	1.35	0.36	0.14	0.05	0.01
> 10,000 to 15,000	19	Banning	20.22	5.06	2.93	1.92	0.54	0.21	0.08	0.02
> 10,000 to 15,000	19	Burbank	8.10	2.49	1.57	1.02	0.25	0.09	0.03	0.01
> 10,000 to 15,000	19	Central LA	13.51	3.43	2.06	1.33	0.33	0.12	0.04	0.01
> 10,000 to 15,000	19	Compton	11.03	2.97	1.85	1.23	0.32	0.12	0.04	0.01
> 10,000 to 15,000	19	Costa Mesa	6.95	2.47	1.65	1.12	0.30	0.12	0.04	0.01
> 10,000 to 15,000	19	Crestline	7.03	2.28	1.49	0.99	0.26	0.10	0.04	0.01
> 10,000 to 15,000	19	Fontana	13.42	3.88	2.43	1.66	0.46	0.18	0.06	0.02
> 10,000 to 15,000	19	Indio	6.01	2.01	1.32	0.91	0.26	0.10	0.04	0.01
> 10,000 to 15,000	19	La Habra	7.96	2.69	1.73	1.15	0.30	0.12	0.04	0.01
> 10,000 to 15,000	19	Lake Elsinore	5.02	1.81	1.23	0.87	0.26	0.10	0.04	0.01
> 10,000 to 15,000	19	LAX	19.42	5.18	3.18	2.15	0.60	0.23	0.08	0.02
> 10,000 to 15,000	19	Long Beach	7.57	2.19	1.42	0.94	0.24	0.09	0.03	0.01
> 10,000 to 15,000	19	Lynwood	9.58	2.95	1.90	1.29	0.35	0.13	0.05	0.01
> 10,000 to 15,000	19	Mission Viejo	5.84	2.04	1.38	0.95	0.26	0.10	0.04	0.01
> 10,000 to 15,000	19	Palm Springs	7.10	2.01	1.25	0.83	0.22	0.09	0.03	0.01
> 10,000 to 15,000	19	Perris	7.43	2.19	1.37	0.94	0.27	0.11	0.04	0.01
> 10,000 to 15,000	19	Pico Rivera	12.06	3.38	2.09	1.40	0.37	0.14	0.05	0.01
> 10,000 to 15,000	19	Pomona	8.87	2.80	1.76	1.16	0.30	0.11	0.04	0.01
> 10,000 to 15,000	19	Redlands	6.41	2.40	1.61	1.11	0.30	0.12	0.05	0.01
> 10,000 to 15,000	19	Reseda	4.64	1.43	0.91	0.61	0.17	0.07	0.02	0.01
> 10,000 to 15,000	19	Riverside	9.55	2.96	1.94	1.34	0.37	0.14	0.05	0.01
> 10,000 to 15,000	19	San Bernardino	8.39	2.63	1.68	1.13	0.31	0.12	0.05	0.01
> 10,000 to 15,000	19	Santa Clarita	15.32	3.73	2.20	1.44	0.39	0.15	0.05	0.01
> 10,000 to 15,000	19	Upland	10.99	3.34	2.17	1.49	0.41	0.16	0.06	0.02
> 10,000 to 15,000	19	West LA	10.77	3.30	2.08	1.38	0.35	0.13	0.05	0.01

*Note: Facilities with building dimensions outside the ranges in Tables 4 must perform Tier 3 or 4 dispersion modeling

Table 4.43
Dispersion Factors (χ/Q)
for Crematoriums
Operating 12 Hours per Day or Less

Building Area > 15,000 ft^2, Stack Height ≤ 19 ft*

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([μg/m^3]/[ton/year])

Source Dimensions*		Location	Downwind Distance (meters)							
Area (ft^2)	Ht (ft)		25	50	75	100	200	300	500	1,000
> 15,000	19	Anaheim	14.87	4.07	2.53	1.68	0.43	0.16	0.06	0.01
> 15,000	19	Azusa	10.86	3.31	2.08	1.41	0.37	0.14	0.05	0.01
> 15,000	19	Banning	19.64	5.16	2.99	1.97	0.55	0.21	0.08	0.02
> 15,000	19	Burbank	9.91	2.67	1.65	1.07	0.26	0.09	0.03	0.01
> 15,000	19	Central LA	14.61	3.59	2.13	1.38	0.33	0.12	0.04	0.01
> 15,000	19	Compton	12.16	3.15	1.92	1.27	0.33	0.12	0.04	0.01
> 15,000	19	Costa Mesa	8.67	2.75	1.74	1.19	0.31	0.12	0.04	0.01
> 15,000	19	Crestline	8.49	2.43	1.55	1.03	0.27	0.10	0.04	0.01
> 15,000	19	Fontana	14.08	4.06	2.52	1.71	0.47	0.18	0.06	0.02
> 15,000	19	Indio	6.74	2.12	1.38	0.94	0.26	0.10	0.04	0.01
> 15,000	19	La Habra	9.51	2.88	1.82	1.21	0.30	0.12	0.04	0.01
> 15,000	19	Lake Elsinore	5.83	1.93	1.29	0.90	0.26	0.10	0.04	0.01
> 15,000	19	LAX	19.46	5.36	3.26	2.20	0.61	0.23	0.08	0.02
> 15,000	19	Long Beach	8.79	2.42	1.49	0.99	0.25	0.09	0.03	0.01
> 15,000	19	Lynwood	10.86	3.16	1.98	1.34	0.36	0.13	0.05	0.01
> 15,000	19	Mission Viejo	7.38	2.28	1.45	1.00	0.27	0.10	0.04	0.01
> 15,000	19	Palm Springs	7.28	2.04	1.26	0.84	0.22	0.09	0.03	0.01
> 15,000	19	Perris	7.77	2.27	1.41	0.96	0.27	0.11	0.04	0.01
> 15,000	19	Pico Rivera	13.57	3.65	2.19	1.46	0.38	0.14	0.05	0.01
> 15,000	19	Pomona	10.19	3.04	1.85	1.22	0.30	0.12	0.04	0.01
> 15,000	19	Redlands	7.82	2.66	1.70	1.16	0.31	0.12	0.05	0.01
> 15,000	19	Reseda	4.99	1.48	0.93	0.62	0.17	0.07	0.02	0.01
> 15,000	19	Riverside	10.70	3.17	2.02	1.39	0.38	0.15	0.05	0.01
> 15,000	19	San Bernardino	9.23	2.77	1.75	1.17	0.32	0.12	0.05	0.01
> 15,000	19	Santa Clarita	14.93	3.77	2.22	1.46	0.39	0.15	0.05	0.01
> 15,000	19	Upland	12.30	3.63	2.28	1.56	0.42	0.16	0.06	0.02
> 15,000	19	West LA	12.48	3.60	2.19	1.45	0.36	0.14	0.05	0.01

*Note: Facilities with building dimensions outside the ranges in Tables 4 must perform Tier 3 or 4 dispersion modeling

Table 5.41
Dispersion Factors (χ/Q)
for Crematoriums
Operating More Than 12 Hours per Day

Building Area ≥ 5,000 to 10,000 ft^2, Stack Height ≤ 19 ft*

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([μg/m^3]/[ton/year])

Source Dimensions*		Location	Downwind Distance (meters)							
Area (ft^2)	Ht (ft)		25	50	75	100	200	300	500	1,000
≥ 5,000 to 10,000	19	Anaheim	10.50	3.45	2.22	1.49	0.40	0.16	0.06	0.01
≥ 5,000 to 10,000	19	Azusa	6.74	2.71	1.79	1.23	0.34	0.13	0.05	0.01
≥ 5,000 to 10,000	19	Banning	17.63	4.78	2.77	1.84	0.51	0.21	0.08	0.02
≥ 5,000 to 10,000	19	Burbank	5.85	2.29	1.44	0.93	0.23	0.09	0.03	0.01
≥ 5,000 to 10,000	19	Central LA	11.56	3.19	1.92	1.23	0.31	0.12	0.04	0.01
≥ 5,000 to 10,000	19	Compton	8.55	2.77	1.73	1.14	0.29	0.11	0.04	0.01
≥ 5,000 to 10,000	19	Costa Mesa	4.30	2.18	1.49	1.01	0.28	0.12	0.04	0.01
≥ 5,000 to 10,000	19	Crestline	4.86	2.08	1.37	0.91	0.25	0.10	0.04	0.01
≥ 5,000 to 10,000	19	Fontana	11.50	3.49	2.25	1.54	0.44	0.18	0.06	0.02
≥ 5,000 to 10,000	19	Indio	4.64	1.79	1.21	0.85	0.24	0.10	0.04	0.01
≥ 5,000 to 10,000	19	La Habra	5.59	2.42	1.58	1.05	0.28	0.11	0.04	0.01
≥ 5,000 to 10,000	19	Lake Elsinore	3.70	1.60	1.13	0.81	0.25	0.10	0.04	0.01
≥ 5,000 to 10,000	19	LAX	17.61	4.71	2.96	2.02	0.57	0.22	0.08	0.02
≥ 5,000 to 10,000	19	Long Beach	4.63	2.00	1.30	0.85	0.21	0.09	0.03	0.01
≥ 5,000 to 10,000	19	Lynwood	7.19	2.68	1.75	1.19	0.32	0.13	0.05	0.01
≥ 5,000 to 10,000	19	Mission Viejo	3.54	1.79	1.24	0.85	0.24	0.10	0.04	0.01
≥ 5,000 to 10,000	19	Palm Springs	6.80	1.93	1.20	0.80	0.21	0.09	0.03	0.01
≥ 5,000 to 10,000	19	Perris	6.54	2.00	1.28	0.89	0.26	0.11	0.04	0.01
≥ 5,000 to 10,000	19	Pico Rivera	9.12	3.02	1.91	1.28	0.34	0.13	0.05	0.01
≥ 5,000 to 10,000	19	Pomona	6.51	2.52	1.61	1.06	0.28	0.11	0.04	0.01
≥ 5,000 to 10,000	19	Redlands	4.14	2.14	1.46	1.00	0.28	0.12	0.05	0.01
≥ 5,000 to 10,000	19	Reseda	3.16	1.38	0.87	0.58	0.16	0.06	0.02	0.01
≥ 5,000 to 10,000	19	Riverside	7.30	2.67	1.79	1.24	0.35	0.14	0.05	0.01
≥ 5,000 to 10,000	19	San Bernardino	6.78	2.38	1.55	1.06	0.30	0.12	0.05	0.01
≥ 5,000 to 10,000	19	Santa Clarita	13.56	3.61	2.10	1.37	0.36	0.14	0.05	0.01
≥ 5,000 to 10,000	19	Upland	8.17	2.97	1.98	1.37	0.38	0.15	0.06	0.02
≥ 5,000 to 10,000	19	West LA	7.54	2.94	1.89	1.25	0.32	0.13	0.05	0.01

*Note: Facilities with building dimensions outside the ranges in Tables 5 must perform Tier 3 or 4 dispersion modeling

Table 5.42
Dispersion Factors (χ/Q)
for Crematoriums
Operating More Than 12 Hours per Day

Building Area > 10,000 to 15,000 ft^2, Stack Height ≤ 19 ft*

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([μg/m^3]/[ton/year])

Source Dimensions*		Location	Downwind Distance (meters)							
Area (ft^2)	Ht (ft)		25	50	75	100	200	300	500	1,000
> 10,000 to 15,000	19	Anaheim	13.48	3.86	2.42	1.61	0.42	0.16	0.06	0.01
> 10,000 to 15,000	19	Azusa	9.33	3.05	1.98	1.35	0.36	0.14	0.05	0.01
> 10,000 to 15,000	19	Banning	20.22	5.06	2.93	1.92	0.54	0.21	0.08	0.02
> 10,000 to 15,000	19	Burbank	8.10	2.49	1.57	1.02	0.25	0.09	0.03	0.01
> 10,000 to 15,000	19	Central LA	13.51	3.43	2.06	1.33	0.33	0.12	0.04	0.01
> 10,000 to 15,000	19	Compton	11.03	2.97	1.85	1.23	0.32	0.12	0.04	0.01
> 10,000 to 15,000	19	Costa Mesa	6.95	2.47	1.65	1.12	0.30	0.12	0.04	0.01
> 10,000 to 15,000	19	Crestline	7.03	2.28	1.49	0.99	0.26	0.10	0.04	0.01
> 10,000 to 15,000	19	Fontana	13.42	3.88	2.43	1.66	0.46	0.18	0.06	0.02
> 10,000 to 15,000	19	Indio	6.01	2.01	1.32	0.91	0.26	0.10	0.04	0.01
> 10,000 to 15,000	19	La Habra	7.96	2.69	1.73	1.15	0.30	0.12	0.04	0.01
> 10,000 to 15,000	19	Lake Elsinore	5.02	1.81	1.23	0.87	0.26	0.10	0.04	0.01
> 10,000 to 15,000	19	LAX	19.42	5.18	3.18	2.15	0.60	0.23	0.08	0.02
> 10,000 to 15,000	19	Long Beach	7.57	2.19	1.42	0.94	0.24	0.09	0.03	0.01
> 10,000 to 15,000	19	Lynwood	9.58	2.95	1.90	1.29	0.35	0.13	0.05	0.01
> 10,000 to 15,000	19	Mission Viejo	5.84	2.04	1.38	0.95	0.26	0.10	0.04	0.01
> 10,000 to 15,000	19	Palm Springs	7.10	2.01	1.25	0.83	0.22	0.09	0.03	0.01
> 10,000 to 15,000	19	Perris	7.43	2.19	1.37	0.94	0.27	0.11	0.04	0.01
> 10,000 to 15,000	19	Pico Rivera	12.06	3.38	2.09	1.40	0.37	0.14	0.05	0.01
> 10,000 to 15,000	19	Pomona	8.87	2.80	1.76	1.16	0.30	0.11	0.04	0.01
> 10,000 to 15,000	19	Redlands	6.41	2.40	1.61	1.11	0.30	0.12	0.05	0.01
> 10,000 to 15,000	19	Reseda	4.64	1.43	0.91	0.61	0.17	0.07	0.02	0.01
> 10,000 to 15,000	19	Riverside	9.55	2.96	1.94	1.34	0.37	0.14	0.05	0.01
> 10,000 to 15,000	19	San Bernardino	8.39	2.63	1.68	1.13	0.31	0.12	0.05	0.01
> 10,000 to 15,000	19	Santa Clarita	15.32	3.73	2.20	1.44	0.39	0.15	0.05	0.01
> 10,000 to 15,000	19	Upland	10.99	3.34	2.17	1.49	0.41	0.16	0.06	0.02
> 10,000 to 15,000	19	West LA	10.77	3.30	2.08	1.38	0.35	0.13	0.05	0.01

*Note: Facilities with building dimensions outside the ranges in Tables 5 must perform Tier 3 or 4 dispersion modeling

Table 5.43
Dispersion Factors (χ/Q)
for Crematoriums
Operating More Than 12 Hours per Day

Building Area > 15,000 ft^2, Stack Height ≤ 19 ft*

Carcinogenic, Chronic and Chronic 8-Hour χ/Q Values ([μg/m^3]/[ton/year])

Source Dimensions*		Location	Downwind Distance (meters)							
Area (ft^2)	Ht (ft)		25	50	75	100	200	300	500	1,000
> 15,000	19	Anaheim	14.87	4.07	2.53	1.68	0.43	0.16	0.06	0.01
> 15,000	19	Azusa	10.86	3.31	2.08	1.41	0.37	0.14	0.05	0.01
> 15,000	19	Banning	19.64	5.16	2.99	1.97	0.55	0.21	0.08	0.02
> 15,000	19	Burbank	9.91	2.67	1.65	1.07	0.26	0.09	0.03	0.01
> 15,000	19	Central LA	14.61	3.59	2.13	1.38	0.33	0.12	0.04	0.01
> 15,000	19	Compton	12.16	3.15	1.92	1.27	0.33	0.12	0.04	0.01
> 15,000	19	Costa Mesa	8.67	2.75	1.74	1.19	0.31	0.12	0.04	0.01
> 15,000	19	Crestline	8.49	2.43	1.55	1.03	0.27	0.10	0.04	0.01
> 15,000	19	Fontana	14.08	4.06	2.52	1.71	0.47	0.18	0.06	0.02
> 15,000	19	Indio	6.74	2.12	1.38	0.94	0.26	0.10	0.04	0.01
> 15,000	19	La Habra	9.51	2.88	1.82	1.21	0.30	0.12	0.04	0.01
> 15,000	19	Lake Elsinore	5.83	1.93	1.29	0.90	0.26	0.10	0.04	0.01
> 15,000	19	LAX	19.46	5.36	3.26	2.20	0.61	0.23	0.08	0.02
> 15,000	19	Long Beach	8.79	2.42	1.49	0.99	0.25	0.09	0.03	0.01
> 15,000	19	Lynwood	10.86	3.16	1.98	1.34	0.36	0.13	0.05	0.01
> 15,000	19	Mission Viejo	7.38	2.28	1.45	1.00	0.27	0.10	0.04	0.01
> 15,000	19	Palm Springs	7.28	2.04	1.26	0.84	0.22	0.09	0.03	0.01
> 15,000	19	Perris	7.77	2.27	1.41	0.96	0.27	0.11	0.04	0.01
> 15,000	19	Pico Rivera	13.57	3.65	2.19	1.46	0.38	0.14	0.05	0.01
> 15,000	19	Pomona	10.19	3.04	1.85	1.22	0.30	0.12	0.04	0.01
> 15,000	19	Redlands	7.82	2.66	1.70	1.16	0.31	0.12	0.05	0.01
> 15,000	19	Reseda	4.99	1.48	0.93	0.62	0.17	0.07	0.02	0.01
> 15,000	19	Riverside	10.70	3.17	2.02	1.39	0.38	0.15	0.05	0.01
> 15,000	19	San Bernardino	9.23	2.77	1.75	1.17	0.32	0.12	0.05	0.01
> 15,000	19	Santa Clarita	14.93	3.77	2.22	1.46	0.39	0.15	0.05	0.01
> 15,000	19	Upland	12.30	3.63	2.28	1.56	0.42	0.16	0.06	0.02
> 15,000	19	West LA	12.48	3.60	2.19	1.45	0.36	0.14	0.05	0.01

*Note: Facilities with building dimensions outside the ranges in Tables 5 must perform Tier 3 or 4 dispersion modeling

Table 6.41
Dispersion Factors (χ/Q)
For Crematoriums
for Acute Hazard Index

All Operating Conditions χ/Q Values ([μg/m^3]/[lb/hr])

Building Area (ft)	Downwind Distance (meters)							
	25	**50**	**75**	**100**	**200**	**300**	**500**	**1,000**
≥ 5,000 to 10,000	815.20	207.53	136.57	99.22	39.06	18.35	9.23	4.96
> 10,000 to 15,000	777.72	201.21	133.26	99.04	41.36	18.92	9.24	4.96
> 15,000	687.14	193.36	131.64	99.25	41.15	19.00	9.24	4.96

*Note: Facilities with building dimensions outside these ranges must perform Tier 3 or 4 dispersion modeling

APPENDIX IX

TIER 2 SCREENING TABLES FOR SHORT-TERM PROJECTS FOR USE IN RULE 1401

Introduction

When performing a Tier 2 analysis for short-term projects (such as portable equipment, air pollution control equipment used for soil remediation projects, etc), the combined exposure factor and appropriate multi-pathway factor needs to be determined based on the duration of the project. The instructions on how to conduct a Tier 2 analysis are included in "Risk Assessment Procedures for Rules 1401, 1401.1, and 212, Version 8.0".

When conducting a Tier 2 analysis for short-term projects, you may also use the following equation using a **default exposure value (CEF):**

$$\mathbf{MICR_{(R,ST)} = CP \times Q_{tpy} \times \chi/Q \times CEF_{(R,ST)} \times MP_{(R,ST)} \times 10^{-6} \times MWAF}$$

$$\mathbf{MICR_{(W,ST)} = CP \times Q_{tpy} \times \chi/Q \times CEF_{(W,ST)} \times MP_{(W,ST)} \times WAF \times 10^{-6} \times MWAF}$$

Term	Description	Where to Find
Q_{tpy}	Maximum emission rate (tons/yr)	Emission estimate specific to permit unit
χ/Q	Concentration at a receptor distance / Emission Rate [$(\mu g/m^3)/(tons/yr)$]	Tables 2.1 thru 5.6
MWAF	Molecular Weight Adjustment Factor	Table 8.1
CP	Cancer Potency $(mg/kg\text{-}day)^{-1}$	Table 8.1
MP	Multipathway Factor (if applicable)	Table 8.11
CEF	Combined Exposure Factor	Tables 9.11 thru 9.32
WAF	Worker Adjustment Factor	Table 10.1
10^{-6}	Micrograms to milligrams conversion, liters to cubic meters conversion	not applicable

Please note that SCAQMD Engineering staff (http://www.aqmd.gov/contact/permitting-staff) should be consulted prior to the use of these exposure factors to determine if these factors are appropriate for the air quality permit application. Permit conditions limiting the duration of the use of equipment consistent with the analysis will be imposed, and information regarding the project duration will need to be well documented for the short-term projects.

Since these short-term calculations are only meant for projects with limits on the operating duration, these short-term cancer risk assessments can be thought of as being the equivalent to a 30-year cancer risk estimate and the appropriate thresholds would still apply (i.e. for a 5-year project, the maximum emissions during the 5-year period would be assessed on the more

sensitive population, from the third trimester to age 5, after which the project's emissions would drop to 0 for the remaining 25 years to get the 30-year equivalent cancer risk estimate).

Table 8.11 - Multi-Pathway Factors for Short-Term Projects

		9 Year		5 Year		2 Year	
		Residential	**Worker**	**Residential**	**Worker**	**Residential**	**Worker**
POLID	POLABBREV	MP Ratio	MP Ratio	MP Ratio	MP Ratio	MP Ratio	MP Ratio
42397648	1,6-DiNPyrene	28.21	6.34	33.72	6.34	35.81	6.34
42397659	1,8-DiNPyrene	28.21	6.34	33.72	6.34	35.81	6.34
57653857	1-3,6-8HxCDD	16.00	7.27	39.91	7.27	46.38	7.27
57117449	1-3,6-8HxCDF	16.00	7.27	26.80	7.27	29.99	7.27
40321764	1-3,7,8PeCDD	16.00	7.27	39.91	7.27	46.38	7.27
57117416	1-3,7,8PeCDF	16.00	7.27	26.80	7.27	29.99	7.27
19408743	1-3,7-9HxCDD	16.00	7.27	39.91	7.27	46.38	7.27
72918219	1-3,7-9HxCDF	16.00	7.27	26.80	7.27	29.99	7.27
35822469	1-4,6-8HpCDD	16.00	7.27	39.91	7.27	46.38	7.27
67562394	1-4,6-8HpCDF	16.00	7.27	26.80	7.27	29.99	7.27
39227286	1-4,7,8HxCDD	16.00	7.27	39.91	7.27	46.38	7.27
70648269	1-4,7,8HxCDF	16.00	7.27	26.80	7.27	29.99	7.27
55673897	1-4,7-9HpCDF	16.00	7.27	26.80	7.27	29.99	7.27
3268879	1-8OctaCDD	16.00	7.27	39.91	7.27	46.38	7.27
39001020	1-8OctaCDF	16.00	7.27	26.80	7.27	29.99	7.27
5522430	1-Nitropyrene	28.21	6.34	33.72	6.34	35.81	6.34
1746016	2,3,7,8-TCDD	16.00	7.27	39.91	7.27	46.38	7.27
51207319	2,3,7,8-TCDF	16.00	7.27	26.80	7.27	29.99	7.27
60851345	2-4,6-8HxCDF	16.00	7.27	26.80	7.27	29.99	7.27
57117314	2-4,7,8PeCDF	16.00	7.27	26.80	7.27	29.99	7.27
607578	2-Nitrofluorene	28.21	6.34	33.72	6.34	35.81	6.34
56495	3-MeCholanthren	9.64	2.42	11.40	2.42	12.04	2.42
101779	4,4'-MeDianilin	9.79	2.41	9.52	2.41	9.20	2.41
57835924	4-Nitropyrene	28.21	6.34	33.72	6.34	35.81	6.34
3697243	5-MeChrysene	28.21	6.34	33.72	6.34	35.81	6.34
602879	5-NitroaceNapht	9.64	2.42	11.40	2.42	12.04	2.42
7496028	6-Nitrochrysene	28.21	6.34	33.72	6.34	35.81	6.34
57976	7,12-DB[a]anthr	9.64	2.42	11.40	2.42	12.04	2.42
194592	7H-D[c,g]carb	28.21	6.34	33.72	6.34	35.81	6.34
319846	alphaHexClCycHx	7.33	1.24	7.11	1.24	6.85	1.24

Table 8.11 - Multi-Pathway Factors for Short-Term Projects (continued)

		9 Year		5 Year		2 Year	
		Residential	Worker	Residential	Worker	Residential	Worker
POLID	POLABBREV	MP Ratio	MP Ratio	MP Ratio	MP Ratio	MP Ratio	MP Ratio
7440382	Arsenic	12.68	4.33	12.52	4.33	12.33	4.33
1016	As cmpd(inorg)	12.68	4.33	12.52	4.33	12.33	4.33
56553	B[a]anthracene	28.21	6.34	33.72	6.34	35.81	6.34
50328	B[a]P	28.21	6.34	33.72	6.34	35.81	6.34
205992	B[b]fluoranthen	28.21	6.34	33.72	6.34	35.81	6.34
205823	B[j]fluoranthen	28.21	6.34	33.72	6.34	35.81	6.34
207089	B[k]fluoranthen	28.21	6.34	33.72	6.34	35.81	6.34
10294403	Barium Chromate	1.78	1.02	1.75	1.02	1.73	1.02
319857	betaHexClCycHx	7.33	1.24	7.11	1.24	6.85	1.24
13765190	CalciumChromate	1.78	1.02	1.75	1.02	1.73	1.02
1333820	ChromiumTriOxid	1.78	1.02	1.75	1.02	1.73	1.02
218019	Chrysene	28.21	6.34	33.72	6.34	35.81	6.34
18540299	Cr(VI)	1.78	1.02	1.75	1.02	1.73	1.02
192654	D[a,e]pyrene	28.21	6.34	33.72	6.34	35.81	6.34
226368	D[a,h]acridine	28.21	6.34	33.72	6.34	35.81	6.34
53703	D[a,h]anthracen	9.64	2.42	11.40	2.42	12.04	2.42
189640	D[a,h]pyrene	28.21	6.34	33.72	6.34	35.81	6.34
189559	D[a,i]pyrene	28.21	6.34	33.72	6.34	35.81	6.34
224420	D[a,j]acridine	28.21	6.34	33.72	6.34	35.81	6.34
191300	D[a,l]pyrene	28.21	6.34	33.72	6.34	35.81	6.34
117817	Di2-EthHxPhthal	7.12	1.05	6.88	1.05	6.59	1.05
1080	DiBenFurans(Cl)	16.00	7.27	26.80	7.27	29.99	7.27
1086	Dioxins-w/o	16.00	7.27	39.91	7.27	46.38	7.27
608731	HexClCycHexanes	7.33	1.24	7.11	1.24	6.85	1.24
193395	In[1,2,3-cd]pyr	28.21	6.34	33.72	6.34	35.81	6.34
7439921	Lead	14.81	5.62	15.11	5.62	15.22	5.63
301042	Lead Acetate	14.81	5.62	15.11	5.62	15.22	5.63
7758976	Lead Chromate	1.78	1.02	1.75	1.02	1.73	1.02
1128	Lead cmp(inorg)	14.81	5.62	15.11	5.62	15.22	5.63
7446277	Lead Phosphate	14.81	5.62	15.12	5.62	15.22	5.62
1335326	Lead Subacetate	14.81	5.62	15.11	5.62	15.22	5.62
58899	Lindane	7.33	1.24	7.11	1.24	6.85	1.24
1151	PAHs-w/o	28.21	6.34	33.72	6.34	35.81	6.34

Table 8.11 - Multi-Pathway Factors for Short-Term Projects (continued)

		9 Year		5 Year		2 Year	
		Residential	**Worker**	**Residential**	**Worker**	**Residential**	**Worker**
POLID	POLABBREV	MP Ratio	MP Ratio	MP Ratio	MP Ratio	MP Ratio	MP Ratio
32598144	PCB 105	24.80	12.57	40.63	12.57	45.53	12.57
74472370	PCB 114	24.80	12.57	40.63	12.57	45.53	12.57
31508006	PCB 118	24.80	12.57	40.63	12.57	45.53	12.57
65510443	PCB 123	24.80	12.57	40.63	12.57	45.53	12.57
57465288	PCB 126	24.80	12.57	40.63	12.57	45.53	12.57
38380084	PCB 156	24.80	12.57	40.63	12.57	45.53	12.57
69782907	PCB 157	24.80	12.57	40.63	12.57	45.53	12.57
52663726	PCB 167	24.80	12.57	40.63	12.57	45.53	12.57
32774166	PCB 169	24.80	12.57	40.63	12.57	45.53	12.57
39635319	PCB 189	24.80	12.57	40.63	12.57	45.53	12.57
32598133	PCB 77	24.80	12.57	40.63	12.57	45.53	12.57
70362504	PCB 81	24.80	12.57	40.63	12.57	45.53	12.57
1336363	PCBs	24.80	12.57	24.55	12.57	24.25	12.57
10588019	SodiumDichromat	1.78	1.02	1.75	1.02	1.73	1.02
7789062	StrontiumChrom	1.78	1.02	1.75	1.02	1.73	1.02

Short-Term Projects – 2 years or Less in Duration

Table 9.11

Residential Short-Term (2-year) Combined Exposure Factor (CEF)

Age	Breathing Rate (L/kg-day)	Age Specific Factor	Exposure Duration (years)	Fraction of Time at Home	Exposure Frequency (350 days/year)	$CEF_{R,ST2}$
-0.25 to 0	361	10	0.25	1	0.96	310.99
0 to 2	1,090	10	2	1	0.96	

Table 9.12

Worker Short-Term (2-year) Combined Exposure Factor (CEF)

Age	Breathing Rate (L/kg-day)	Age Specific Factor	Exposure Duration (years)	Exposure Frequency (250 days/year)	$CEF_{W,ST2}$
16 - 41	230	1	2	0.68	4.50

Short-Term Projects – 5 years or Less in Duration

Table 9.21

Residential Short-Term (5-year) Combined Exposure Factor (CEF)

Age	Breathing Rate (L/kg-day)	Age Specific Factor	Exposure Duration (years)	Fraction of Time at Home	Exposure Frequency (350 days/year)	$CEF_{R,ST5}$
-0.25 to 0	361	10	0.25	1	0.96	440.65
0 to 2	1,090	10	2	1	0.96	
2 to 5	631	3	5	1	0.96	

Table 9.22

Worker Short-Term (5-year) Combined Exposure Factor (CEF)

Age	Breathing Rate (L/kg-day)	Age Specific Factor	Exposure Duration (years)	Exposure Frequency (250 days/year)	$CEF_{W,ST5}$
16 - 41	230	1	5	0.68	11.25

Short-Term Projects – 9 years or Less in Duration

Table 9.31

Residential Short-Term (9-year) Combined Exposure Factor (CEF)

Age	Breathing Rate (L/kg-day)	Age Specific Factor	Exposure Duration (years)	Fraction of Time at Home	Exposure Frequency (350 days/year)	$CEF_{R,ST9}$
-0.25 to 0	361	10	0.25	1	0.96	492.51
0 to 2	1,090	10	2	1	0.96	
2 to 9	631	3	7	1	0.96	

Table 9.32

Worker Short-Term (9-year) Combined Exposure Factor (CEF)

Age	Breathing Rate (L/kg-day)	Age Specific Factor	Exposure Duration (years)	Exposure Frequency (250 days/year)	$CEF_{W,ST9}$
16 - 41	230	1	9	0.68	20.25

APPENDIX X

TIER 2 SCREENING TABLES FOR GASOLINE TRANSFER AND DISPENSING FACILITIES FOR USE IN RULE 1401

Note: This Appendix is currently in development and Gasoline Transfer and Dispensing Facilities should continue to use Risk Assessment Procedures for Rules 1401 and 212 and Attachment L, Version 7.0 (July 1, 2005) to evaluate the health risk impacts

Introduction

The purpose of this appendix is to document the methods used by SCAQMD staff to estimate cancer risks from the industry-wide source category of retail gasoline dispensing facilities. The methods are consistent with (1) SCAQMD's risk assessment procedures for Rule 1401 and (2) California Air Pollution Control Officer Association (CAPCOA) risk assessment guidance for gasoline service stations. The methods used to estimate emissions, pollutant concentrations, and cancer risks are covered here. Tables of maximum cancer risks at various locations in the South Coast Air Basin and at various residential and occupational distances are provided. The appendix concludes with an example calculation using the cancer risk tables.

Emission Inventory Methods

Rule 461 currently has annual throughput reporting requirements. It is designed to regulate gasoline vapor emissions from gasoline transfer and dispensing processes which contain volatile organic compounds (VOCs) and TACs such as benzene, ethylbenzene, toluene, xylenes, and naphthalene. The rule was initially adopted in 1976 and has been amended a number of times, most recently on March 7, 2008. Therefore, risk from these facilities can be calculated from the available information.

Emissions from gasoline transfer and dispensing mainly occur during loading, breathing, refueling, and spillage as described below:

Loading – Emissions occur when a fuel tanker truck unloads gasoline to the storage tanks. The storage tank vapors, displaced during loading, are emitted through its vent pipe. A pressure/vacuum valve installed on the tank vent pipe significantly reduces these emissions.

Breathing – Emissions occur through the storage tank vent pipe as a result of temperature and pressure changes in the tank vapor space.

Refueling – Emissions occur during motor vehicle refueling when gasoline vapors escape through the vehicle/nozzle interface.

Spillage – Emissions occur from evaporating gasoline that spills during vehicle refueling.

All retail service stations under SCAQMD jurisdiction have Phase I and II vapor recovery systems to control gasoline emissions. Phase I vapor recovery refers to the collection of gasoline vapors displaced from storage tanks when cargo tank trucks make gasoline deliveries. Phase II vapor recovery systems control the vapors displaced from the vehicle fuel tanks during refueling. In addition, all gasoline is stored underground with valves installed on the tank vent pipes to further control gasoline emissions. Out of the toxic compounds emitted from the gasoline stations, benzene, ethylbenzene, and naphthalene have cancer toxicity values.

The control efficiencies and emission factors for each of the four processes are summarized in Table X-1. The factors given in the table follow the CAPCOA recommended guidelines except that 95 percent control is assumed for Phase II vapor recovery, whereas CAPCOA assumes 90 percent control due to incomplete compliance.

Table X-1. Gasoline and Benzene Emission Factors for Retail Service Stations

Process		Loading	Breathing	Refueling	Spillage
Controlled Gasoline EF (lbs/1,000 gal)		0.42	0.025	0.32	0.24
Control Efficiency		95%	75%	96%	N/A
Benzene	**Weight Percent**	0.30%	0.30%	0.30%	1.00%
	Emission Factor (lbs/1,000 gal)	0.00126	0.000075	0.00096	0.0024
Ethyl benzene	**Weight Percent**	0.118%	0.118%	0.118%	1.640%
	Emission Factor (lbs/1,000 gal)	0.0004956	0.0000295	0.0003776	0.003936
Naphthalene	**Weight Percent**	0.0%	0.0%	0.0%	0.14%
	Emission Factor (lbs/1,000 gal)	0.0	0.0	0.0	0.0003288

Note: Although the gasoline speciation profile is 0.36 wt% for benzene, a value of 0.30 wt% was used to be consistent with CAPCOA

Exposure Modeling Methods

Air quality modeling was performed using an air quality dispersion model, called AERMOD (American Meteorological Society/U.S. EPA Regulatory Model). As of December 9, 2006, U.S. EPA promulgated AERMOD as a replacement for ISCST3 (Industrial Source Complex – Short Term, Version 3) as the recommended dispersion model. AERMOD is a steady-state plume model that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and both simple and complex terrain.

AERMOD was executed using the urban option, which is SCAQMD policy for all permitting in its jurisdiction. The U.S. EPA regulatory defaults options are implemented and the SCAQMD AERMOD-ready meteorological data was used. The County populations used are based on the 2008 estimates from the U.S. Census Bureau. The Los Angeles County population was

9,862,049; Orange County population was 3,010,759; Riverside County population was 2,100,516; and San Bernardino County population was 2,015355.

Emissions from gasoline service stations are non-buoyant and ground-based (or nearly ground-based). In addition, the peak impacts from this type of facility occur in close proximity to the source. Under these circumstances the local terrain is relatively unimportant; therefore flat terrain is assumed in the dispersion modeling.

As mentioned earlier, CAPCOA has developed industry-wide risk assessment guidelines for gasoline service stations (CAPCOA, 1997). These guidelines were developed to promote consistency throughout the State. However, CAPCOA recognized that many of the districts in the State have developed modeling methods and procedures unique to their situations. To address these differences among districts, CAPCOA allows for a district to deviate from the published guidelines as evidenced by the following statement in the industry-wide risk assessment guidelines for gas stations (CAPCOA, 1997):

> *This effort was initiated to provide a cost effective and uniform method for calculating gasoline station emission inventories and risk assessment for the thousands of gasoline stations throughout the State. However, districts may use other emission information and modeling procedures appropriate in their district.*

The modeling performed here followed CAPCOA guidelines unless otherwise noted.

Modeling was performed using AERMOD, which is the U.S. EPA recommended model for dispersion modeling, instead of ISCST3.

Loading and breathing emissions exit the underground storage tank vent pipe and are thus treated as a point source. The height and diameter of the vent are assumed to be 3.66 meters (12 feet) and 0.05 meters (2 inches), respectively.

Refueling and spillage emissions are modeled as volume sources with horizontal dimensions of 13 meters by 13 meters to correspond to the dimensions of the pump islands and a vertical dimension of 5 meters to correspond to the height of the canopy. For refueling, the release height is assumed to be 1 meter to approximate the height of a vehicle fuel tank inlet, whereas spillage emissions are assumed to be released at ground level since nearly all the gasoline from spillage reaches the ground. These dimensions match CAPCOA's recommendations except for the vertical dimension of the volume source; CAPCOA recommends 4 meters. The SCAQMD has been requiring gas station risk assessments for permitting since early 1990s using a vertical dimension of the volume source corresponding to the pump island canopy top. Assuming a 5-meter vertical dimension continues this modeling practice.

According to the CAPCOA guidelines, the effects of building downwash on the calculated cancer risk were determined by using three different scenarios with a 10 meter long by 5 meter

wide, by 4 meter high building. The building downwash algorithms only affect point sources and do not affect volume or area sources. Results of the modeling indicated that the placement of the buildings and their subsequent potential to create downwash have very little effect on the resultant risks from the vent pipes. Thus, it was concluded that it is not necessary to include building downwash when determining the dispersion from the vent pipes. In order to determine the effects of building downwash using AERMOD, a similar analysis was conducted with the same building dimensions using the BPIP computer program. The modeling results showed that building downwash caused the maximum ground level concentrations to more than double. Therefore, building downwash has a significant effect on the maximum concentrations and subsequent cancer risk and cannot be ignored.

The vent pipe, volume sources, and building are assumed to be located at the center of the service station property. Ideally, the locations of the vent pipes, pump islands, and buildings would be determined on a site by site basis. Unfortunately, that level of detail is not feasible for the industry-wide risk assessment presented here due to the large number of facilities.

It is assumed that the gas station described above operates continuously throughout the year. Further, it is assumed that 80 percent of the daily emissions occur equally each hour from 6 a.m. to 8 p.m. and the remaining 20 percent of the daily emissions occur equally each hour from 8 p.m. to 6 a.m.

A sample AERMOD model input file for the generic retail service station described above is given in Exhibit X-1.

Modeling was performed at 26 SCAQMD meteorological stations shown in Figure X-1. The locations of each of the sites are given in Table X-2. The data are available on the SCAQMD website (http://aqmd.gov/smog/metdata/AERMOD.html). A polar receptor grid is assumed at ten degree azimuth increments at the following downwind distances: 20, 25, 30, 40, 50, 60, 70, 80, 90, 100, 125, 150, 175, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, and 1000 meters.

The peak model-predicted impacts at each downwind distance over the 36 azimuth angles are used to develop the screening risk tables for gasoline service stations (see Tables X-4 to X-9).

Figure X-1: Meteorological Monitoring Stations in the South Coast Air Basin

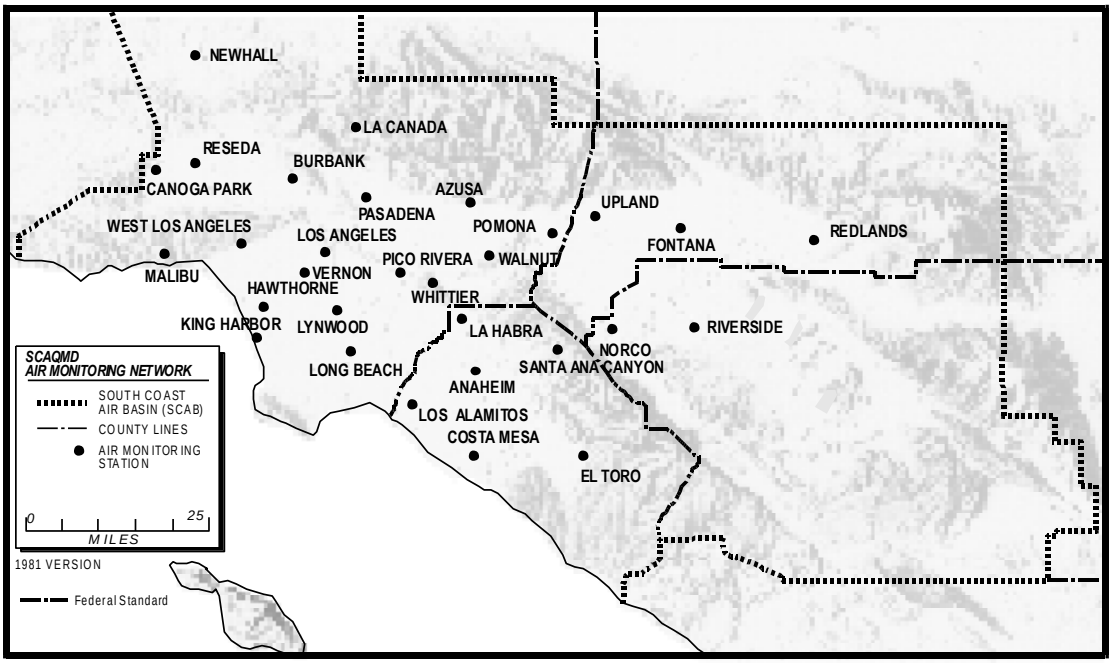

Table X-2: Locations of Meteorological Stations and Elevations

Station name	UTM Coordinates (km)		Lat./Long. Coordinates		Elevation (m)
	Easting	Northing	Latitude	Longitude	
Anaheim	413.14	3743.57	33:49:50	117:56:19	41
Azusa	414.81	3777.47	34:08:11	117:55:26	182
Banning	513.10	3753.19	33:55:15	116:51:30	660
Burbank	378.62	3782.24	34:10:33	118:19:01	175
Central LA	386.79	3770.00	34:03:59	118:13:36	87
Costa Mesa	414.16	3726.19	33:40:26	117:55:33	20
Crestline	474.62	3788.76	34:14:29	117:16:32	1387
Fontana	454.62	3773.19	34:06:01	117:29:31	367
Indio	572.67	3729.90	33:42:30	116:12:57	-4
La Habra	411.98	3754.08	33:55:31	117:57:08	82
Lake Elsinore	469.33	3726.13	33:40:35	117:19:51	406
LAX	367.83	3757.80	33:57:15	118:25:49	42
Long Beach	389.99	3743.04	33:49:25	118:11:19	30
Lynwood	388.07	3754.73	33:55:44	118:12:39	29
Mission Viejo	437.39	3721.17	33:37:49	117:40:30	170
Palm Springs	542.46	3745.73	33:51:10	116:32:28	171
Perris	478.91	3738.58	33:47:20	117:13:40	442
Pico Rivera	401.31	3763.61	34:00:37	118:04:07	58
Pomona	430.78	3769.61	34:04:00	117:45:00	270
Redlands	486.36	3768.50	34:03:32	117:08:52	481
Reseda	358.76	3785.11	34:11:57	118:31:58	228
Riverside	461.64	3762.10	34:00:02	117:24:55	250
San Bernardino	474.76	3773.82	34:06:24	117:16:25	305
Santa Clarita	359.48	3805.52	34:23:00	118:31:42	375
Upland	441.96	3773.66	34:06:14	117:37:45	379
West LA	365.54	3768.52	34:03:02	118:27:24	97

Exhibit X-1: AERMOD Model Input File for a Generic Gasoline Service Station

```
CO STARTING
   TITLEONE SCAQMD R461 SCREEN TABLE PREPARATION
   TITLETWO Template - Underground, 10mX5mX4m building in middle
   MODELOPT CONC
   AVERTIME ANNUAL
   POLLUTID Any
   RUNORNOT RUN
   ERRORFIL ERRORS.OUT
CO URBANOPT 9862049 LAC
CO FINISHED

SO STARTING
   LOCATION P1 POINT     0.0    0.0    0.0
   LOCATION P2 POINT     0.0    0.0    0.0
   LOCATION P3 POINT     0.0    0.0    0.0
   LOCATION P4 POINT     0.0    0.0    0.0

   LOCATION V1 VOLUME    0.0    0.0    0.0
   LOCATION V2 VOLUME    0.0    0.0    0.0
   LOCATION V3 VOLUME    0.0    0.0    0.0
   LOCATION V4 VOLUME    0.0    0.0    0.0
   LOCATION V5 VOLUME    0.0    0.0    0.0

** Point Source     Q        RelHgt   Temp     Vel      Dia
**              ----------  ------  ------  --------  -----
   SRCPARAM P1  1.8123E-05  3.660    291.0  0.00035  0.051
   SRCPARAM P2  1.0787E-06  3.660    289.0  0.00011  0.051
   SRCPARAM P3  7.1283E-06  3.660    291.0  0.00035  0.051
   SRCPARAM P4  4.2431E-07  3.660    289.0  0.00011  0.051


** Volume Source     Q        RelHgt  Syinit  Szinit
**               ----------  ------  ------  ------
   SRCPARAM V1   1.3808E-05    1.00    3.02    2.33
   SRCPARAM V2   3.4520E-05    0.00    3.02    2.33
   SRCPARAM V3   5.4311E-06    1.00    3.02    2.33
   SRCPARAM V4   5.6613E-05    0.00    3.02    2.33
   SRCPARAM V5   4.7292E-06    0.00    3.02    2.33

   BUILDHGT P1           4.00     4.00     4.00     4.00     4.00     4.00
   BUILDHGT P1           4.00     4.00     4.00     4.00     4.00     4.00
   BUILDHGT P1           4.00     4.00     4.00     4.00     4.00     4.00
   BUILDHGT P1           4.00     4.00     4.00     4.00     4.00     4.00
   BUILDHGT P1           4.00     4.00     4.00     4.00     4.00     4.00
   BUILDHGT P1           4.00     4.00     4.00     4.00     4.00     4.00

   BUILDHGT P2           4.00     4.00     4.00     4.00     4.00     4.00
   BUILDHGT P2           4.00     4.00     4.00     4.00     4.00     4.00
   BUILDHGT P2           4.00     4.00     4.00     4.00     4.00     4.00
   BUILDHGT P2           4.00     4.00     4.00     4.00     4.00     4.00
   BUILDHGT P2           4.00     4.00     4.00     4.00     4.00     4.00
   BUILDHGT P2           4.00     4.00     4.00     4.00     4.00     4.00

   BUILDHGT P3           4.00     4.00     4.00     4.00     4.00     4.00
   BUILDHGT P3           4.00     4.00     4.00     4.00     4.00     4.00
   BUILDHGT P3           4.00     4.00     4.00     4.00     4.00     4.00
   BUILDHGT P3           4.00     4.00     4.00     4.00     4.00     4.00
   BUILDHGT P3           4.00     4.00     4.00     4.00     4.00     4.00
   BUILDHGT P3           4.00     4.00     4.00     4.00     4.00     4.00

   BUILDHGT P4           4.00     4.00     4.00     4.00     4.00     4.00
   BUILDHGT P4           4.00     4.00     4.00     4.00     4.00     4.00
   BUILDHGT P4           4.00     4.00     4.00     4.00     4.00     4.00
   BUILDHGT P4           4.00     4.00     4.00     4.00     4.00     4.00
   BUILDHGT P4           4.00     4.00     4.00     4.00     4.00     4.00
```

BUILDHGT	P4	4.00	4.00	4.00	4.00	4.00	4.00
BUILDWID	P1	6.66	8.12	9.33	10.26	10.87	11.16
BUILDWID	P1	11.11	10.72	10.00	10.72	11.11	11.16
BUILDWID	P1	10.87	10.26	9.33	8.12	6.66	5.00
BUILDWID	P1	6.66	8.12	9.33	10.26	10.87	11.16
BUILDWID	P1	11.11	10.72	10.00	10.72	11.11	11.16
BUILDWID	P1	10.87	10.26	9.33	8.12	6.66	5.00
BUILDWID	P2	6.66	8.12	9.33	10.26	10.87	11.16
BUILDWID	P2	11.11	10.72	10.00	10.72	11.11	11.16
BUILDWID	P2	10.87	10.26	9.33	8.12	6.66	5.00
BUILDWID	P2	6.66	8.12	9.33	10.26	10.87	11.16
BUILDWID	P2	11.11	10.72	10.00	10.72	11.11	11.16
BUILDWID	P2	10.87	10.26	9.33	8.12	6.66	5.00
BUILDWID	P3	6.66	8.12	9.33	10.26	10.87	11.16
BUILDWID	P3	11.11	10.72	10.00	10.72	11.11	11.16
BUILDWID	P3	10.87	10.26	9.33	8.12	6.66	5.00
BUILDWID	P3	6.66	8.12	9.33	10.26	10.87	11.16
BUILDWID	P3	11.11	10.72	10.00	10.72	11.11	11.16
BUILDWID	P3	10.87	10.26	9.33	8.12	6.66	5.00
BUILDWID	P4	6.66	8.12	9.33	10.26	10.87	11.16
BUILDWID	P4	11.11	10.72	10.00	10.72	11.11	11.16
BUILDWID	P4	10.87	10.26	9.33	8.12	6.66	5.00
BUILDWID	P4	6.66	8.12	9.33	10.26	10.87	11.16
BUILDWID	P4	11.11	10.72	10.00	10.72	11.11	11.16
BUILDWID	P4	10.87	10.26	9.33	8.12	6.66	5.00
BUILDLEN	P1	10.72	11.11	11.16	10.87	10.26	9.33
BUILDLEN	P1	8.12	6.66	5.00	6.66	8.12	9.33
BUILDLEN	P1	10.26	10.87	11.16	11.11	10.72	10.00
BUILDLEN	P1	10.72	11.11	11.16	10.87	10.26	9.33
BUILDLEN	P1	8.12	6.66	5.00	6.66	8.12	9.33
BUILDLEN	P1	10.26	10.87	11.16	11.11	10.72	10.00
BUILDLEN	P2	10.72	11.11	11.16	10.87	10.26	9.33
BUILDLEN	P2	8.12	6.66	5.00	6.66	8.12	9.33
BUILDLEN	P2	10.26	10.87	11.16	11.11	10.72	10.00
BUILDLEN	P2	10.72	11.11	11.16	10.87	10.26	9.33
BUILDLEN	P2	8.12	6.66	5.00	6.66	8.12	9.33
BUILDLEN	P2	10.26	10.87	11.16	11.11	10.72	10.00
BUILDLEN	P3	10.72	11.11	11.16	10.87	10.26	9.33
BUILDLEN	P3	8.12	6.66	5.00	6.66	8.12	9.33
BUILDLEN	P3	10.26	10.87	11.16	11.11	10.72	10.00
BUILDLEN	P3	10.72	11.11	11.16	10.87	10.26	9.33
BUILDLEN	P3	8.12	6.66	5.00	6.66	8.12	9.33
BUILDLEN	P3	10.26	10.87	11.16	11.11	10.72	10.00
BUILDLEN	P4	10.72	11.11	11.16	10.87	10.26	9.33
BUILDLEN	P4	8.12	6.66	5.00	6.66	8.12	9.33
BUILDLEN	P4	10.26	10.87	11.16	11.11	10.72	10.00
BUILDLEN	P4	10.72	11.11	11.16	10.87	10.26	9.33
BUILDLEN	P4	8.12	6.66	5.00	6.66	8.12	9.33
BUILDLEN	P4	10.26	10.87	11.16	11.11	10.72	10.00
XBADJ	P1	-5.36	-5.55	-5.58	-5.44	-5.13	-4.67
XBADJ	P1	-4.06	-3.33	-2.50	-3.33	-4.06	-4.67
XBADJ	P1	-5.13	-5.44	-5.58	-5.55	-5.36	-5.00
XBADJ	P1	-5.36	-5.55	-5.58	-5.44	-5.13	-4.67
XBADJ	P1	-4.06	-3.33	-2.50	-3.33	-4.06	-4.67
XBADJ	P1	-5.13	-5.44	-5.58	-5.55	-5.36	-5.00
XBADJ	P2	-5.36	-5.55	-5.58	-5.44	-5.13	-4.67
XBADJ	P2	-4.06	-3.33	-2.50	-3.33	-4.06	-4.67
XBADJ	P2	-5.13	-5.44	-5.58	-5.55	-5.36	-5.00
XBADJ	P2	-5.36	-5.55	-5.58	-5.44	-5.13	-4.67

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XBADJ    P3          -5.36    -5.55    -5.58    -5.44    -5.13    -4.67
XBADJ    P3          -4.06    -3.33    -2.50    -3.33    -4.06    -4.67
XBADJ    P3          -5.13    -5.44    -5.58    -5.55    -5.36    -5.00
XBADJ    P3          -5.36    -5.55    -5.58    -5.44    -5.13    -4.67
XBADJ    P3          -4.06    -3.33    -2.50    -3.33    -4.06    -4.67
XBADJ    P3          -5.13    -5.44    -5.58    -5.55    -5.36    -5.00

XBADJ    P4          -5.36    -5.55    -5.58    -5.44    -5.13    -4.67
XBADJ    P4          -4.06    -3.33    -2.50    -3.33    -4.06    -4.67
XBADJ    P4          -5.13    -5.44    -5.58    -5.55    -5.36    -5.00
XBADJ    P4          -5.36    -5.55    -5.58    -5.44    -5.13    -4.67
XBADJ    P4          -4.06    -3.33    -2.50    -3.33    -4.06    -4.67
XBADJ    P4          -5.13    -5.44    -5.58    -5.55    -5.36    -5.00

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URBANSRC P1
URBANSRC P2
URBANSRC P3
URBANSRC P4
URBANSRC V1
URBANSRC V2
URBANSRC V3
URBANSRC V4
URBANSRC V5

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EMISFACT V2 HROFDY 1.371 1.371 1.371 1.371 1.371 1.371
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   SRCGROUP P1 P1
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   SRCGROUP P4 P4
   SRCGROUP V1 V1
   SRCGROUP V2 V2
   SRCGROUP V3 V3
   SRCGROUP V4 V4
   SRCGROUP V5 V5
SO FINISHED

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                DIST 20 25 30 40 50 60 70 75 80 90 100 125 150 175 200 250
                DIST 300 350 400 450 500 600 700 800 900 1000
                GDIR     36     10.0     10.0
   GRIDPOLR POL1 END
RE FINISHED

ME STARTING
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   PROFFILE WSLA.PFL
   SURFDATA 0    2005
   UAIRDATA 3190 2005
   PROFBASE 0    METERS
ME FINISHED

OU STARTING
   RECTABLE  ALLAVE  FIRST
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   PLOTFILE  ANNUAL  P2         UM1P2.TXT
   PLOTFILE  ANNUAL  P3         UM1P3.TXT
   PLOTFILE  ANNUAL  P4         UM1P4.TXT
   PLOTFILE  ANNUAL  V1         UM1V1.TXT
   PLOTFILE  ANNUAL  V2         UM1V2.TXT
   PLOTFILE  ANNUAL  V3         UM1V3.TXT
   PLOTFILE  ANNUAL  V4         UM1V4.TXT
   PLOTFILE  ANNUAL  V5         UM1V5.TXT
OU FINISHED
```

Risk Assessment Methods

The risk assessment methods used in the SCAQMD's *Risk Assessment Procedures for Rule 1401 and 212 (Version 7.0)* are used to calculate the cancer risks from retail gasoline service stations. The cancer risk (CR) is calculated as follows:

$$CR = \text{Cancer Potency (CP)} \bullet \text{Dose-Inhalation (DI)} \bullet \text{Multipathway Factor (MP)}$$

where,

$$DI = C_{air} \bullet DBR \bullet EVF \bullet 10^{-6} \bullet MP$$

$$C_{air} = C_{ann} \bullet AF_{ann}$$

Therefore, the equation for calculating cancer risks is:

$$CR = CP \bullet C_{ann} \bullet AF_{ann} \bullet DBR \bullet EVF \bullet 10^{-6} \bullet MP$$

CP is cancer potency in units of $(mg/kg\text{-}day)^{-1}$. The inhalation cancer potency for benzene is $0.1(mg/kg\text{-}day)^{-1}$, $0.0087(mg/kg\text{-}day)^{-1}$ for ethylbenzene, and $0.12(mg/kg\text{-}day)^{-1}$ for naphthalene. C_{ann} is the model-predicted annual average benzene concentration in $\mu g/m^3$. AF_{ann} is a concentration adjustment factor. It adjusts the model-predicted annual average benzene concentration, which are 24 hrs/day and 7 days/week averages, to an average for the off-site worker exposure period (i.e., 8 hrs/day and 5 days/week). This is necessary because the worker breathing rate of 149 L/kg-day is only applicable to the work-day and work-week exposure. It is assumed that the worker is only exposed while at work. Since the generic gasoline service station is assumed to operate continuously, AF_{ann} is assumed to be 1 for both worker and residential receptors.

DBR is the daily breathing rate in units of L/kg-day. The daily breathing rates for workers and residents are 149 L/kg-day and 302 L/kg-day, respectively. EVF is the exposure value factor, which is assumed to be 0.38 for workers and 0.96 for residents. The multi-pathway adjustment factor (MP) is used for substances that may contribute to risk from exposures other than inhalation. Inhalation is the only pathway into the body for benzene, ethylbenzene, and naphthalene; therefore, the multipathway factor is 1.

Risk Tables

Applying the methods and equations presented above, screening risk tables were developed for a generic retail gasoline service station. The modeled stations are assumed to have Phase I and II vapor recovery with cancer risk calculated for different locations; see Table X-1 for the control efficiencies and emission factors assumed for the modeling.

Cancer risks from a typical gasoline service station can be estimated from the screening tables as follows: First, determine which of the 26 locations in these tables is closest to the gas station or best represents the facility. SCAQMD staff made use of location information that is available in the SCAQMD's permit database. The SCAQMD is broken up into 38 source/receptor areas as shown in Figure X-2. The source/receptor area is provided for each facility in SCAQMD's permit database. As shown in Table X-3, SCAQMD staff assigned one of the 26 meteorological sites to each source receptor area, which was then used to choose a meteorological site for each gasoline dispensing facility.

Next, determine the distance from the service station to the nearest residential and occupational location. Tables X-4 to X-9 provide the maximum cancer risk for a gasoline dispensing station with either underground or aboveground tanks with a one million gallon per year throughput at various residential and occupational distances, respectively. The various meteorological correction factors are also provided to adjust the cancer risk estimates to the SRA where the project is located. Using the above information, pick the cancer risk from the appropriate tables. Lastly, scale the cancer risk by the actual gasoline throughput of the service station. An example of a risk calculation is provided for a hypothetical gasoline service station in a subsequent section.

Figure X-2: Source Receptor Areas

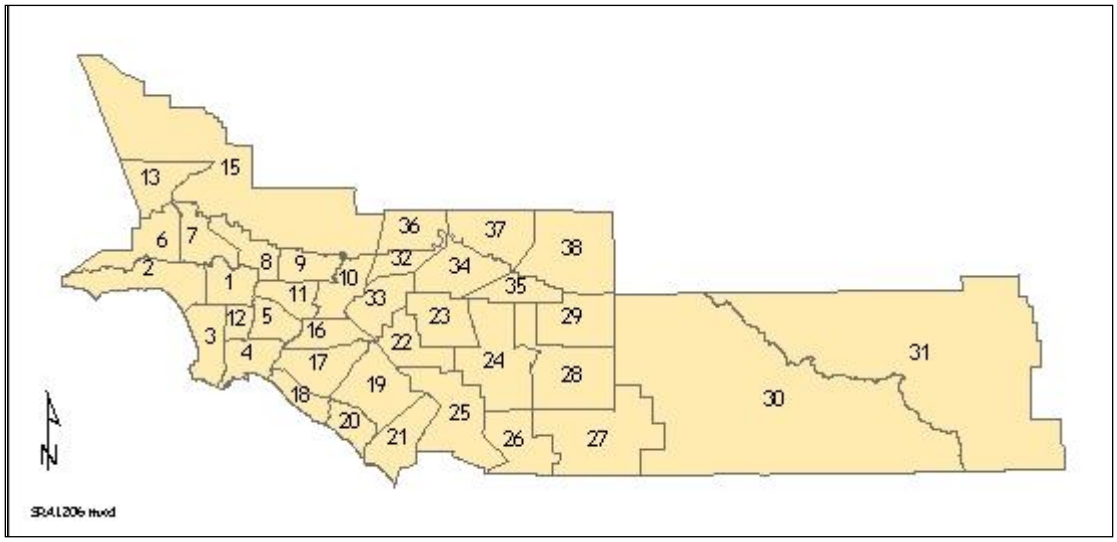


Table X-3: Meteorological Stations for Each Source Receptor Area

Meteorological Station	Source Receptor Area	Meteorological Station	Source Receptor Area
Anaheim	17	Lynwood	12
Azusa	8, 9	Mission Viejo	19, 21
Banning	29	Perris	24, 28
Burbank	7	Palm Springs	30, 31
Central LA	1	Pico Rivera	5, 11
Crestline	37	Pomona	10
Costa Mesa	18, 20	Redlands	35, 38
Fontana	34	Reseda	6
Indio	30	Riverside	22, 23
La Habra	16	Santa Clarita	13, 15
Lake Elsinore	25, 26, 27	San Bernardino	34
LAX	3	Upland	32, 33, 36
Long Beach	4	West LA	2

Table X-4: Residential MICR – Underground Tanks per One Million Gallons of Gasoline

Distance (m)	**20**	**25**	**30**	**40**	**50**	**60**	**70**	**75**	**80**
MICR	5.600	4.000	3.004	1.866	1.278	0.940	0.722	0.636	0.572
Distance (m)	**90**	**100**	**125**	**150**	**175**	**200**	**250**	**300**	**350**
MICR	0.462	0.381	0.248	0.174	0.125	0.095	0.060	0.044	0.034
Distance (m)	**400**	**450**	**500**	**600**	**700**	**800**	**900**	**1000**	-
MICR	0.027	0.022	0.018	0.014	0.011	0.009	0.007	0.006	-

Table X-5: Commercial MICR – Underground Tanks per One Million Gallons of Gasoline

Distance (m)	**20**	**25**	**30**	**40**	**50**	**60**	**70**	**75**	**80**
MICR	1.094	0.781	0.587	0.364	0.250	0.184	0.141	0.124	0.112
Distance (m)	**90**	**100**	**125**	**150**	**175**	**200**	**250**	**300**	**350**
MICR	0.090	0.074	0.049	0.034	0.024	0.018	0.012	0.009	0.007
Distance (m)	**400**	**450**	**500**	**600**	**700**	**800**	**900**	**1000**	-
MICR	0.005	0.004	0.004	0.003	0.002	0.002	0.001	0.001	-

Table X-6: Meteorological Correction Factors (MET) for Underground Tanks by Source Receptor Area (SRA)

SRA	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
MET	0.86	1.00	0.90	1.04	0.80	0.95	0.89	1.04	1.04	1.14	0.08	1.18	0.70
SRA	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**
MET	0.70	0.96	0.91	1.08	0.71	1.08	0.71	0.91	0.91	0.81	0.79	0.79	0.79
SRA	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**-**	**-**
MET	0.81	0.83	1.00	1.00	1.05	1.05	1.06	1.35	1.05	1.01	1.35	-	-

Table X-7: Residential MICR – Aboveground Tanks per One Million Gallons of Gasoline

Distance (m)	**20**	**25**	**30**	**40**	**50**	**60**	**70**	**75**	**80**
MICR	5.440	3.896	2.931	1.823	1.249	0.919	0.706	0.622	0.559
Distance (m)	**90**	**100**	**125**	**150**	**175**	**200**	**250**	**300**	**350**
MICR	0.452	0.372	0.242	0.169	0.120	0.091	0.058	0.044	0.032
Distance (m)	**400**	**450**	**500**	**600**	**700**	**800**	**900**	**1000**	-
MICR	0.026	0.021	0.018	0.013	0.010	0.008	0.007	0.006	-

Table X-8: Commercial MICR – Aboveground Tanks per One Million Gallons of Gasoline

Distance (m)	**20**	**25**	**30**	**40**	**50**	**60**	**70**	**75**	**80**
MICR	1.062	0.761	0.572	0.356	0.244	0.179	0.138	0.121	0.109
Distance (m)	**90**	**100**	**125**	**150**	**175**	**200**	**250**	**300**	**350**
MICR	0.088	0.073	0.047	0.033	0.024	0.018	0.011	0.008	0.006
Distance (m)	**400**	**450**	**500**	**600**	**700**	**800**	**900**	**1000**	-
MICR	0.005	0.004	0.003	0.003	0.002	0.002	0.001	0.001	-

Table X-9: Meteorological Correction Factors (MET) for Aboveground Tanks by Source Receptor Area (SRA)

SRA	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
MET	0.86	1.00	0.90	1.05	0.80	0.95	0.89	1.04	1.04	1.14	0.80	1.18	0.70
SRA	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**
MET	0.70	0.96	0.90	1.08	0.70	1.08	0.70	0.91	0.91	0.81	0.79	0.79	0.79
SRA	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**-**	**-**
MET	0.81	0.83	1.00	1.00	1.04	1.04	1.06	1.36	1.04	1.01	1.36	-	-

Results

Figure X-3 shows the species apportionment and Figure X-4 shows the source apportionment of the calculated cancer risks. Using the results from the West LA meteorological station and at a distance of 20 meters, emissions from spillage account for 48% of the cancer risk, while benzene is the TAC which drives the risk, accounting for 87%. This is consistent with the discussion of the relative toxicity of substances in gasoline found in Appendix I of the CAPCOA document, which shows that benzene is the most important substance driving the risk in the gasoline service stations.

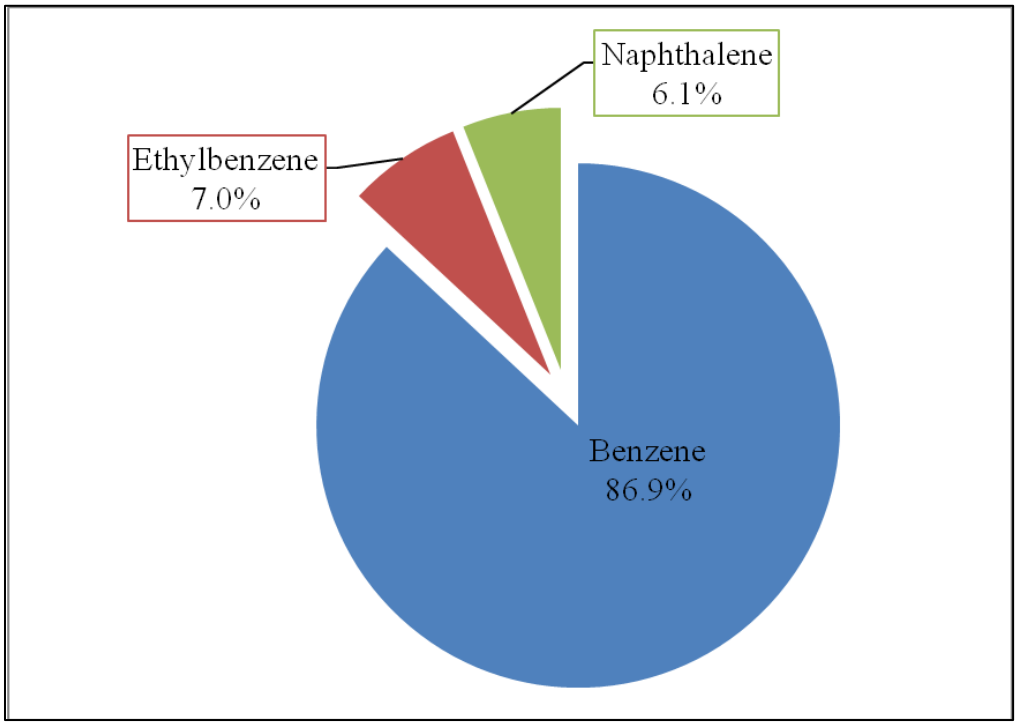
According to the CARB speciation profile of gasoline (both vapor and liquid), SCAQMD reviewed the most recent consolidated table of health values for risk assessments published by OEHHA and found that for non-cancer health effects, the following toxic compounds were analyzed:

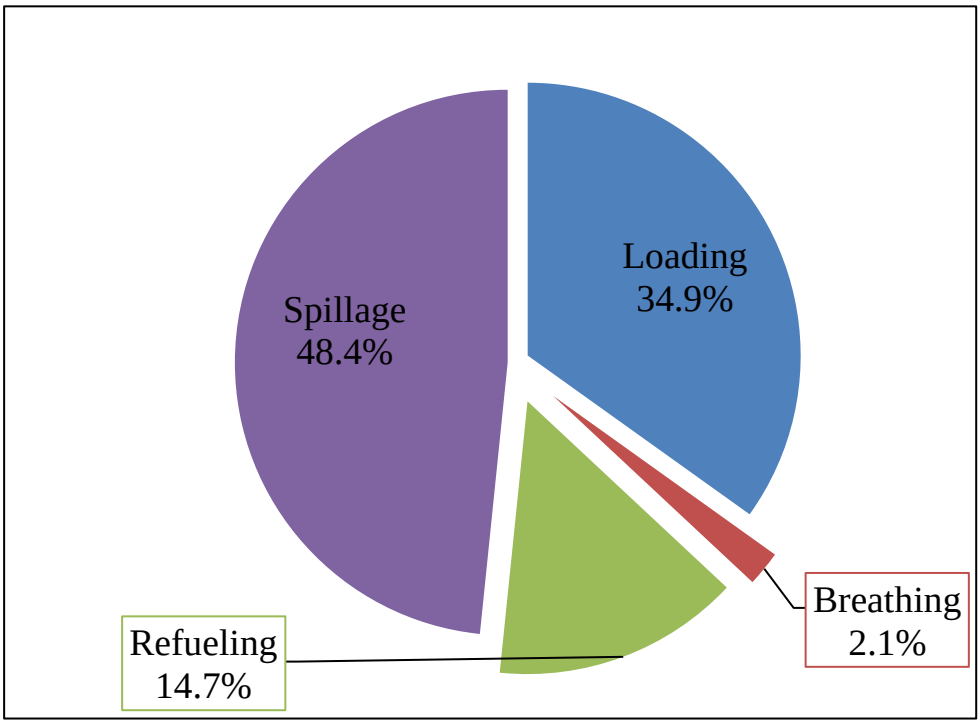
Chronic HI: benzene, ethylbezene, toluene, xylene, naphthalene, n-hexane, and methanol

Acute HI: benzene, toluene, xylene and methanol.

The results show that for the maximum permitted risk of 10 in a million, the Hazard Index for acute and chronic are insignificant (< 0.1). Therefore, the chronic and acute non-cancer health effects need not be calculated, which is consistent with CAPCOA's guidelines.

Figure X-3: Species Apportionment





Example Calculations

The following example demonstrates how the SCAQMD staff plans to assign health risk values for retail gasoline dispensing facilities based on information received and using Tables X-4 through X-9.

The calculation steps are as follows:

1. **Cancer Risk (CR):** The SCAQMD will assign cancer risk values to each retail gasoline dispensing facility based on facility location, process information, and receptor proximity.
   a. *Residential CR:* Use the facility location and the distance to the nearest resident to identify the risk. The residential CRs for retail gasoline dispensing are contained in Tables X-4 and X-7.
   b. *Occupational CR:* Use the facility location and the distance to the nearest worker to identify the risk. The occupational CRs for retail gasoline dispensing are contained in Table X-5 and X-8.
   c. *Maximum Individual CR (MICR):* Select the greater CR between the residential and occupational CRs (as identified above).

Please note the following when calculating risk values for gasoline dispensing facilities:

- The gasoline dispensing risk tables (Tables X-4 through X-9) are based on a gasoline throughput of 1 million (MM) gallons per year (gal/yr). Actual facility throughput should be multiplied by the values contained in the gasoline dispensing risk tables to calculate the appropriate facility risk.
- The SCAQMD maintains 26 meteorological stations as shown in Figure X-2. If there are no meteorological stations in the city of the facility, the closest meteorological station to the facility should be used.
- The gasoline dispensing risk tables (Tables X-4 through X-7) are based on discrete downwind distances, which cover two pages. If the actual downwind distance is not listed in the tables, then linear interpolation between distance cells is acceptable.
- Although gasoline vapors and its TAC constituents (for example, benzene, toluene, and xylene) have non-cancer impacts, **the risks from retail gasoline dispensing facilities are dominated by cancer risk**. Therefore, hazard index for these facilities will not be calculated.

Example: A retail gasoline dispensing facility submits the following information: 15 MM gal/yr gasoline throughput, located in Pomona, nearest residential receptor 250 meters away, and nearest occupational receptor 25 meters away.

In this example the actual downwind distances are in the tables. However, if the actual downwind distances are not in the table, then linear interpolation between distance cells is acceptable to obtain cancer risks for the actual downwind distances.

1. **Cancer Risk (CR):**

   a. *Residential CR:* Using Table X-4, the residential cancer risk is 0.060 in one million (250 meters) for 1 MM gal/yr. According to Table X-3, Pomona is located in SRA 10 with a meteorological correction factor of 1.14. Since the facility's gasoline throughput for this example is 15 MM gal/yr, the corresponding residential cancer risk is 1.03 in one million.

   Residential CR = $\frac{0.060 \text{ in one million}}{(1 \text{ MM gal/yr})} \times (15 \text{ MM gal/yr}) \times 1.14$

Residential CR = 1.03 in one million

   b. *Occupational CR:* Using Table X-5, the occupational cancer risk is 0.781 in one million (25 meters) for 1 MM gal/yr. According to Table X-3, Pomona is located in SRA 10 with a meteorological correction factor of 1.14. Since the facility's gasoline throughput for this example is 15 MM gal/yr, the corresponding occupational cancer risk is 13.36 in one million.

   Occupational CR = $\frac{0.781 \text{ in one million}}{(1 \text{ MM gal/yr})} \times (15 \text{ MM gal/yr}) \times 1.14$

Occupational CR = 13.36 in one million

   c. *MICR:* The MICR for this retail gasoline facility is **13.36** in one million (occupational receptor).

APPENDIX XI

TIER 2 SCREENING TABLES FOR SPRAY BOOTHS FOR USE IN RULE 1401

Note: This Appendix is currently in development and Spray Booths should continue to use Risk Assessment Procedures for Rules 1401 and 212 and Attachment L, Version 7.0 (July 1, 2005) to evaluate the health risk impacts

ATTACHMENTS

PERMIT APPLICATION PACKAGES
INCLUDING TABLES

**(Note: Attachment M,
EFFECTIVE FOR APPLICATIONS DEEMED COMPLETE
ON OR AFTER July 5, 2015)**