Air Resources Board and
California Air Pollution Control Officers Association

Risk Management Guidance for Stationary Sources of Air Toxics

Discussion Draft

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California Environmental Protection Agency
Air Resources Board

CAPCOA
CALIFORNIA AIR POLLUTION CONTROL OFFICERS ASSOCIATION

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I. Introduction

A. What is the purpose of this document?

This discussion draft document is intended to seek public comment on proposed guidance that California's 35 local Air Pollution Control Districts and Air Quality Management Districts (Districts) may elect to use for incorporating the Office of Environmental Health Hazard Assessment's (OEHHA) new health risk assessment methodology into their stationary source permitting and Assembly Bill (AB) 2588 (Stats. 1987) Air Toxics Hot Spots programs. This document is a product of the California Air Resources Board (ARB/Board) and California Air Pollution Control Officers Association (CAPCOA). When approved, it will supersede ARB's Risk Management Guidelines for New and Modified Sources of Toxic Air Pollutants (1993).

This document provides guidance on managing potential cancer and noncancer health risks from sources subject to these programs. In addition, this document conveys ARB's work plan for evaluating the Board's Air Toxics Program in light of the new risk assessment methodology and provides the updated Risk Management Policy for Inhalation Risk Assessments which replaces ARB's Interim Risk Management Policy for Inhalation-based Residential Cancer Risk (2003).

B. Why are we proposing this document?

We are proposing this document in response to OEHHA's work revising the risk assessment methodology that was triggered by the passage of the Children's Health Protection Act of 1999 (SB 25, Stats. 1999) requiring OEHHA to ensure infants and children are explicitly addressed in assessing risk. In the last decade, advances in science have shown that early-life exposures to air toxics contribute to an increased lifetime risk of developing cancer, or other adverse health effects, compared to exposures that occur in adulthood. The new risk assessment methodology addresses this greater sensitivity and incorporates the most recent data on childhood and adult exposure to air toxics.

The complete methodology is contained in the *Air Toxics Hot Spots Program Risk Assessment Guidelines: Guidance Manual for the Preparation of Health Risk Assessments*[a] (February 2015) and referred to in this document as the OEHHA Manual.

For some sources, use of the new OEHHA Manual will result in higher estimated potential cancer risk than would have been calculated with the 2003 OEHHA risk assessment methodology for the same level of emissions and conditions. The new residential potential inhalation cancer risk from the new OEHHA methodology may be approximately 1.5 to 3 times higher than was estimated using the 2003 methodology. In addition to this 1.5 to 3 times increase with inhalation-only assessments, there may also

[a] Office of Environmental Health Hazard Assessment, California Environmental Protection Agency. Sacramento, CA. (February 2015); http://www.oehha.ca.gov/air/hot_spots/hotspots2015.html

be additional increases in potential cancer risk estimates when risk assessments include multiple pathways of exposure (e.g., ingestion of soil or crops, dermal exposure, etc.).

The use of the new and recommended United States Environmental Protection Agency (U.S. EPA) air dispersion model (AERMOD) may also change the estimated potential health risk. As of December 9, 2006, U.S. EPA replaced the Industrial Source Complex Model (ISCST3) with AERMOD as the preferred/recommended air dispersion model[b]. In general, for many sources of toxic emissions, AERMOD may tend to result in higher predicted concentrations when comparing AERMOD results to ISCST3 modeling results. Because of the variety of scenarios, the exact change in modeled concentrations is difficult to estimate.

Increases, or decreases, in modeled concentrations from AERMOD will vary based on many factors. Some of the factors contributing to the change in concentrations may include the release parameters of the emissions source (e.g., source type, stack height, stack gas exit velocity and temperature, terrain variations, building downwash), different characterizations of meteorological data, different minimum wind speeds allowed by the model, and the proximity of the exposed receptor(s). Therefore, the total change in estimated potential cancer risk from these changes, even with the same level of emissions in the air, will depend on several factors, including, but not limited to, where and how the pollutants are released, the proximity to people, the toxic substance emitted, as well as the exposure assumptions.

In general, the higher estimated risks mean that new or modified sources of toxics may need additional emissions control. For existing sources, even though they meet existing rules and regulations, additional emissions control may be needed since the higher estimated risk might now exceed the District's risk reduction levels for Hot Spots requirements. Therefore, ARB and Districts are reevaluating their programs to determine if adjustments need to be made to permitting, source-specific regulations, or Hot Spot programs. This document is intended to help Districts with their reevaluation process and to communicate ARB and Districts' plans, priorities, and policies regarding implementation of the new OEHHA risk assessment methodology.

C. What are the significant risk communication issues resulting from use of the new OEHHA Manual?

One significant area of focus is how best to communicate what impact these methodology changes will have on health risk estimates, what those new risk estimates mean, and how best to manage sources and programs in a reasonable and health protective manner. The procedures in the new OEHHA Manual will typically result in a higher estimated cancer risk from a facility even though they use control technology and are actually maintaining or reducing its emissions. As a result, it is a challenge to communicate the new information in a way that ensures the public's right to know but

[b] Information on AERMOD can be found on U.S. EPA's website at http://www.epa.gov/ttn/scram/dispersion_prefrec.htm.

does not imply that the facility has changed its operations or emissions in a way that negatively affects public health.

This document outlines ARB and District plans going forward and provides information on communicating the new risk assessment results to the public and risk managers.

D. What is California's Air Toxics Program and what progress have we made?

Over the last 25 years, California has successfully reduced statewide emissions and related health impacts from exposures to air toxics by approximately 75 percent[c]. During this same period the economy[d] as measured by the California Gross Domestic Product grew by 83 percent and the number of residents[e] and vehicles[f] increased by approximately 9 million and 8 million, respectively. On the next page, Figure I-1 illustrates these changes. Several programs at both the State and District levels, along with investments by industry in cleaner operations and technology, and input by the public and environmental community, are the reasons for this success.

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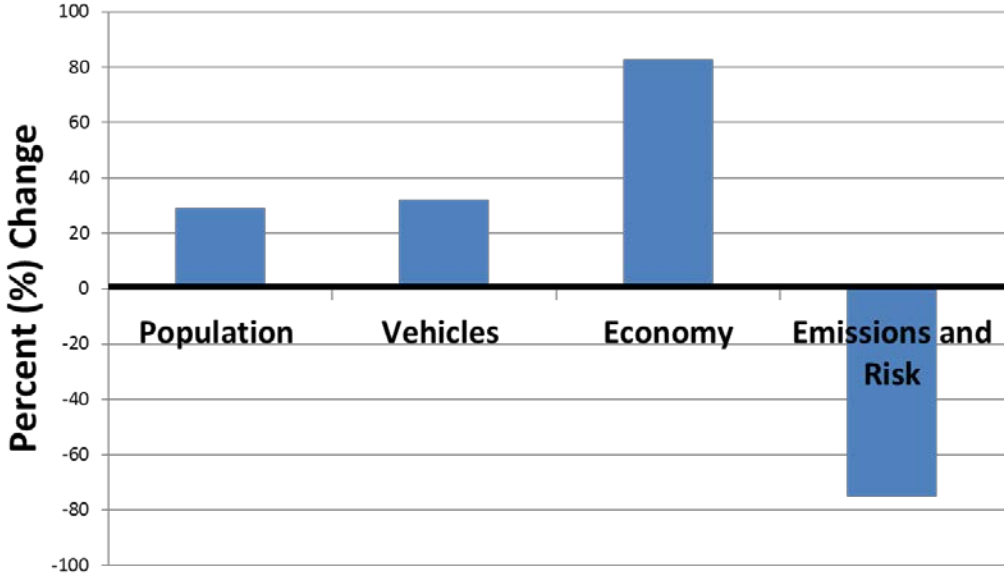
[c] Data for the top twelve monitored substances was obtained from ARB's iADAM website (http://www.arb.ca.gov/adam/toxics/toxics.html). NOx surrogate method was used to determine the Diesel PM estimate (http://www.arb.ca.gov/regact/2010/truckbus10/truckbus10.htm), updated with 2012 emissions.

[d] 1. U.S. Department of Commerce: Bureau of Economic Analysis, California GDP data from 1997-2013, http://www.bea.gov/iTable/iTable.cfm?reqid=70&step=1&isuri=1&acrdn=1#reqid=70&step=10&isuri=1&7003=900&7035=-1&7004=naics&7005=-1&7006=06000&7036=-1&7001=1900&7002=1&7090=70&7007=-1&7093=levels
2. California Department of Finance: California GDP data from 1990–1997, http://www.dof.ca.gov/html/FS_DATA/STAT-ABS/Toc_xls.htm
3. 2014 California real growth rate: http://www.usgovernmentspending.com/state_spend_gdp_population

[e] California Department of Finance: http://www.dof.ca.gov/research/demographic/reports/estimates/e-7/view.php

[f] California Department of Motor Vehicles: Budget and Fiscal Analysis Branch, (916) 657-8008, https://www.dmv.ca.gov/portal/wcm/connect/5aa16cd3-39a5-402f-9453-0d353706cc9a/official.pdf?MOD=AJPERES

Figure I-1: Emission Reductions versus Growth since 1990



Key programs that contributed to these reductions include the Toxic Air Contaminant Identification and Control Program, the Air Toxics Hot Spot Information and Assessment Act, the Children's Environmental Protection Act, and District Programs for Toxics.

Toxic Air Contaminant Identification and Control Program (AB 1807, Stats. 1983)

The AB 1807 program is comprised of two regulatory elements. The first element identifies toxic substances and provides health effects information used in health risk assessments. OEHHA and ARB develop a proposal for identification of a specific compound or group of compounds as toxic air contaminants. Following review and approval by the Scientific Review Panel and public hearings, the Board considers the proposal and may formally adopt it. ARB has identified over 200 compounds as toxic air contaminants through a combination of the State process and incorporation of the U.S. EPA Hazardous Air Pollutants into the California list.

In the second element, ARB staff develops proposals to manage those potential risks with statewide emission control regulations called Airborne Toxic Control Measures (ATCMs). ATCMs decrease public exposure through process changes, best available control devices, and/or product reformulation in consideration of cost and health risk. These program requirements are developed in a public process that involves input from the Districts, industry, the environmental community, and the public. The Board holds a public hearing and considers adoption of the proposed regulation. Each District must implement the statewide regulations applicable to stationary sources or adopt its own equally or more health-protective alternative. Appendix F lists ARB's adopted statewide regulations for air toxics.

ARB's suite of statewide control measures for mobile and stationary sources require cleaner fuels, improved technology, or changes in operating practices to address toxics including, but not limited to: diesel particulate from engines, lead in gasoline, benzene at gas stations, hexavalent chromium in plating operations, formaldehyde in wood products, and perchloroethylene in dry cleaning operations. Because of this program and associated State and District regulations, sources of air toxics in California typically have the highest level of technological control installed to reduce emissions. These requirements often set the stage for subsequent U.S. EPA rulemaking on national standards for sources of air toxics.

Air Toxics Hot Spots Information and Assessment Act: (AB 2588, Stats. 1987; SB 1731, Stats. 1992)

This public right-to-know program is primarily managed by the Districts, with contributions from OEHHA and ARB. The program requires facilities that emit one or more of the listed toxic substances to report emissions data to the District, and depending on those emission levels, conduct facility health risk assessments, notify the public of risk results, and/or develop and implement facility-specific risk reduction plans.

Children's Environmental Protection Act: (SB 25, Stats. 1999)

SB 25 focuses on reducing children's exposure to air pollutants, including toxic air contaminants or air toxics. The Act establishes a number of specific requirements for ARB. The requirements for ARB include a review of California's State Ambient Air Quality Standards, an evaluation of the statewide ambient air monitoring network, and a review of the air toxics that have been prioritized by OEHHA to determine if the existing regulations are protective of children's health. SB 25 also requires that ARB, in conjunction with Districts, perform supplemental air monitoring in six communities to help assess the adequacy of the statewide routine monitoring network.

To date, ARB has evaluated the statewide monitoring network, conducted special monitoring studies in six communities in California, worked with OEHHA on the review of the California Ambient Air Quality Standards, and prioritized air toxics to determine if they are sufficient to protect infants and children. ARB also evaluated the ATCMs associated with the prioritized air toxics to determine if they were sufficient to protect infants and children. ARB found that the ATCMs still utilized the best available control technology and therefore were protective of children's health at that time.

OEHHA was also required to make sure the risk assessment methods used for AB 2588 and permitting were protective of children. Those risk assessment methods and the OEHHA Manual were released on March 6, 2015.

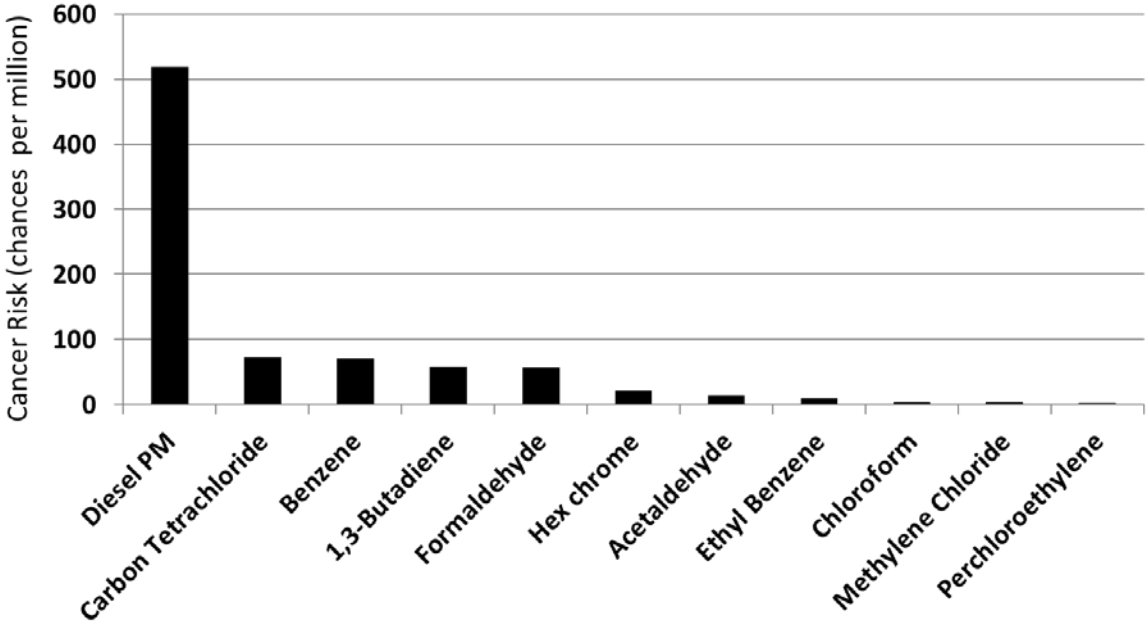
District Programs for Toxics

Districts have adopted and implemented new source review rules that reduce toxic emissions from new and modified equipment. Permits cannot be issued unless potential health risks are below specific thresholds. In many cases, best available control technology for toxics is required before a permit can be issued. Districts also implement statewide toxic control measures and have compiled inventories of emissions from tens of thousands of facilities, reviewed facility-specific health risk assessment and risk reduction plans, required reduction of toxic emissions through permit review, evaluated community wide impacts from air toxics, and provided information to meet local needs and community right-to-know provisions. In addition, some Districts have adopted rules to reduce toxic emissions from equipment or industries that are not included in the AB 1807 process.

E. What are the primary sources of air toxics in California?

Today, the emissions from combustion of fuel in motor vehicles and off-road equipment are the primary source of air toxics risk in California. Particulate matter (PM) from diesel-fueled engines is a toxic air contaminant and diesel PM accounts for approximately 60 percent of the current estimated inhalation cancer risk for background ambient air. Some examples of sources that contribute to higher potential health impacts from mobile diesel PM include freight hubs, like ports, rail yards and distribution centers. Because diesel PM cannot be directly measured in the ambient air, we use surrogate compounds and the emission inventory to estimate the ambient concentration. Both the combustion and evaporation of gasoline used in vehicles, lawn and garden equipment, recreational watercraft, etc. produce other prevalent air toxics. Examples of stationary sources that may pose increased health risks to nearby residents include: metal finishing/manufacturing, chrome plating facilities, various product manufacturing (e.g., food, chemical, material, and etc.), stationary diesel engines, and refineries. On the following page, Figure I-2, shows the relative inhalation cancer risk from the top ten monitored substances and estimated diesel PM concentrations.

Figure I-2: Relative Statewide Inhalation Cancer Risk from Air Toxics



Uses risk methodology from 2015 OEHHA Manual, the 95/80 daily breathing rate, and 70-year exposure duration. Percentages are rounded. Statewide ambient monitoring data for the top ten monitored substances with the highest potential inhalation cancer risk (2013 data for hexavalent chromium and 2014 for others) was obtained from ARB's iADAM website (http://www.arb.ca.gov/adam/toxics/toxics.html). ARB used the NOx surrogate method to determine the Diesel PM estimate (http://www.arb.ca.gov/regact/2010/truckbus10/truckbus10.htm), updated with 2012 emissions.

F. What is the ambient background cancer risk from air toxics in California?

Using the 2015 OEHHA Manual, the most current estimated statewide average ambient background potential inhalation cancer risk is approximately 850 chances per million for the top twelve monitored substances, plus diesel PM. On the next page, Figure I-3 shows the reduction in inhalation cancer risk from monitored air toxics and estimated diesel PM concentrations since 1990. Also on the next page, Table I-1 illustrates the range of ambient cancer risk for both the top twelve monitored air toxics, plus estimated diesel PM levels, in the most heavily-populated air basins. Figure I-3 and Table I-1 follow similar trends. Comparing reductions in the air basins between 1990 and current estimates show that both ambient monitored toxics and diesel PM have decreased substantially at approximately 78 and 69 percent, respectively. One reason why the diesel PM reduction percentage is slightly below the ambient toxics is because the State's program to accelerate the cleanup of the legacy diesel fleet began implementation in the mid 2000's; the control program for the other monitored air toxics began nearly 20 years earlier. In future years, we anticipate diesel PM emissions will decrease further.

Figure I-3: Statewide Ambient Cancer Risk Estimates (chances per million)[g]

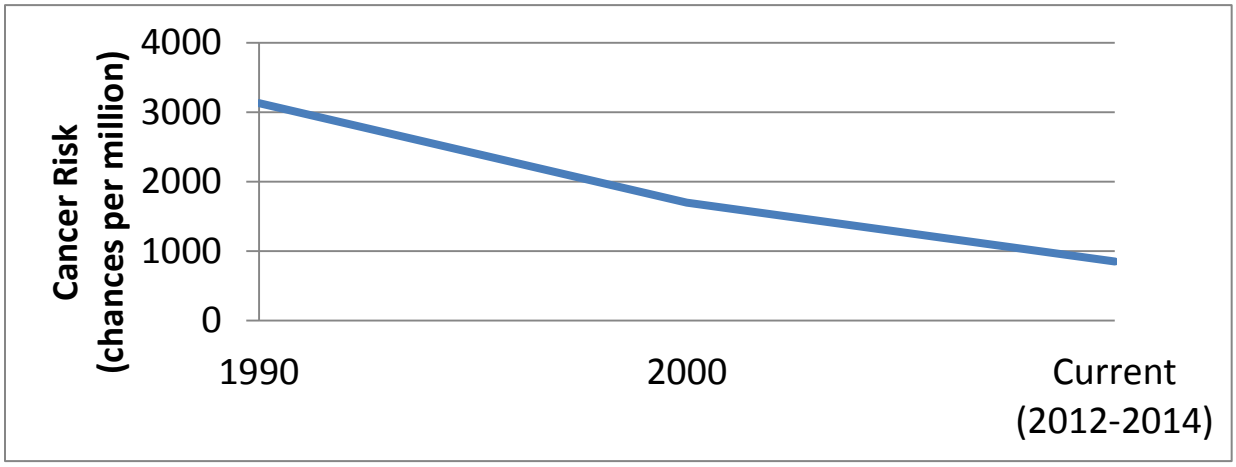


Table I-1: Regional Ambient Cancer Risk Estimates (chances per million)[g]

Air Basin	Baseline			Current		
	1990 Ambient	1990 Diesel PM	Total	2014 Ambient	2012 Diesel PM	Total
Sacramento Valley	1150	1680	2830	270	410	680
San Diego	1200	1410	2610	250	550	800
San Francisco Bay Area	1210	1270	2480	280	520	800
San Joaquin Valley	1350	2510	3860	320	790	1110
South Coast	1800	2960	4760	400	800	1200

Some factors that may contribute to higher basin cancer risk estimates include increased industry and commerce, weather and wind patterns, and regional topography; especially in inland valleys where pollution can be trapped by mountains. These monitored concentrations and associated cancer risk estimates represent background

[g] Notes for Figure I-3 and Table I-1: Uses risk methodology from 2015 OEHHA Manual, the 95/80 daily breathing rate, and 70-year exposure duration. Data is rounded. Ambient monitoring data for the top twelve monitored substances with the highest inhalation cancer risk was obtained from ARB's iADAM website (http://www.arb.ca.gov/adam/toxics/toxics.html). Where 2014 ambient data is not available, used 2012 or 2013 data. ARB used the NOx surrogate method to determine the Diesel PM estimate (http://www.arb.ca.gov/regact/2010/truckbus10/truckbus10.htm), updated with 2012 emissions. No 2012 data available for San Francisco Bay Area diesel PM, used 2011 data.

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concentrations from a select number of locations. It is important to note that depending on many factors, exposures may actually be lower. However, exposures and potential risk may also be higher than the ambient background risk in areas near emission sources (i.e., living near a freeway, freight hub, or large stationary source).

G. What will be done in the future to further reduce air toxic emissions?

Adopted State, local, and federal programs will continue to reduce the ambient health risk statewide, driven by the sharp decline in diesel PM after 2012 due to ARB's Statewide Truck and Bus Regulation. The California Sustainable Freight Strategy, plus other mobile source controls needed for the upcoming 2016 State Implementation Plans, will further cut emissions of diesel PM and other vehicle pollutants. The State's climate goals are also propelling the development and introduction of zero-emission technology and renewable energy in all sectors that will have co-benefits for air toxics and public health.

For stationary sources of air toxics, the Districts and ARB will be assessing the effectiveness of existing regulations and the need for changes. This effort, combined with the use of the new OEHHA Manual to estimate health risk, will strengthen the combined permitting, Hot Spots, and control programs for air toxics in California.

II. Overview

A. What are the key objectives that guided the development of this document?

The following key objectives guided the development of this document:

1. Address the new health science by increasing overall public health protection by requiring additional sources to install best available control technology, and by pursuing further opportunities to reduce risk from the highest risk source categories, considering technical feasibility and cost.
2. Recognize that California Districts currently have mature risk management programs and each District has the discretion under State law to establish its own risk management policies, except where ARB's statewide ATCMs set the minimum requirements.
3. Sustain continued operation of facilities that provide essential goods and public services.
4. Ensure that future program changes will not result in less health protective program requirements relative to rules or programs in place prior to the 2015 OEHHA Manual.
5. Support public participation and access to information.

B. How was this document developed and what is the public process?

This document was developed in an ongoing joint effort between ARB and CAPCOA. We met twice with a CAPCOA/ARB/Industry/Environmental Task Force and also participated in meetings convened by industry groups. This discussion draft is being released for public review and comment. It will also be the focus of discussion at two public workshops in June 2015. Then ARB staff and a CAPCOA representative will present a proposed version to the ARB Board at its July 2015 meeting for approval.

C. What are the key changes to OEHHA's risk assessment methodology?

The new OEHHA Manual is built on a foundation of three public and peer-reviewed risk assessment guideline documents, finalized in 2008, 2009, and 2012. These three documents focused on noncancer risk, cancer risk, and exposure assessment, respectively. The OEHHA Manual summarizes the information in all three of these peer-reviewed documents, and provides information on how to put all of the information together into a unified risk assessment. This fourth public and peer-reviewed document, the OEHHA Manual, was released on March 6, 2015.

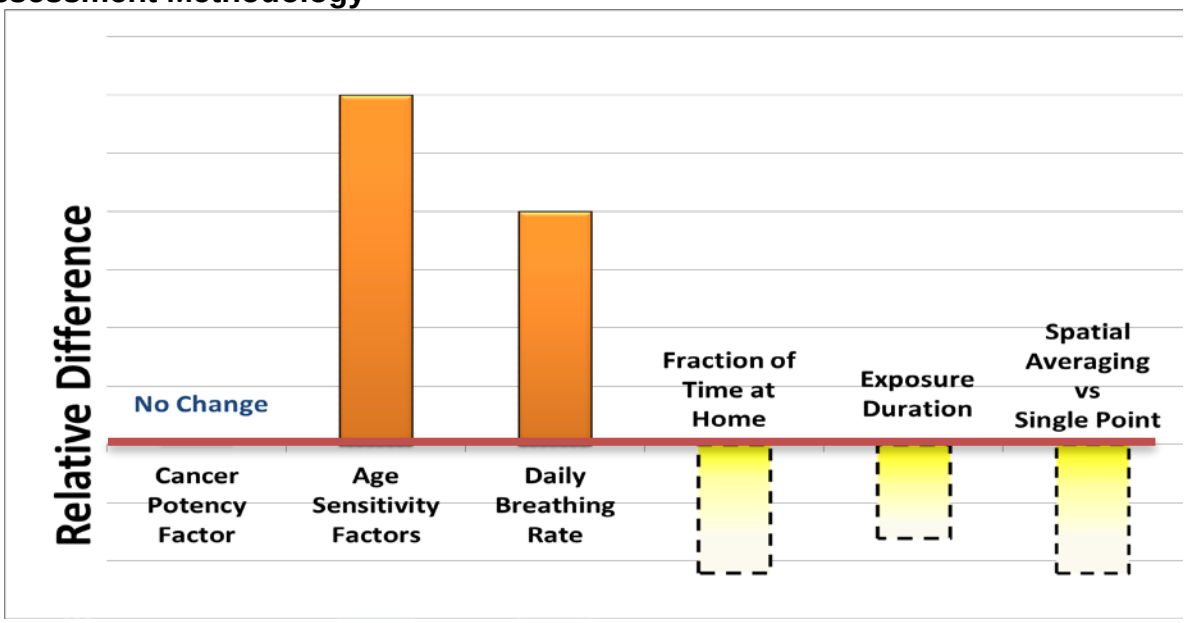
The OEHHA Manual and the three underlying foundational documents are designed to improve estimates of potential lifetime cancer and noncancer risks from air toxics by refining exposure data for individuals of all ages, and with adjustments based on new science about the increased childhood sensitivity to air toxics. Similarly, the latest

U.S. EPA risk assessment process also considers the increased susceptibility of infants and children to toxic chemicals.

As mentioned previously, OEHHA's new risk methodology contains changes that when compared to OEHHA's (prior) 2003 risk assessment methodology may increase some potential cancer risk estimates. A short description of some key inputs is presented below. See the OEHHA Manual at http://www.oehha.ca.gov/air/hot_spots/hotspots2015.html for detailed information and discussion on these inputs.

Figure II-1 illustrates that some new refinements in the OEHHA Manual will increase potential risk estimates and some inputs will decrease risk estimates. This figure also generally indicates the relative difference each input may have on the potential cancer risk for a residential location when compared to its use in the 2003 risk methodology (shown as the centerline). The first column shows that no changes have been made to the way cancer potency factors were developed under the 2003 risk methodology; therefore, cancer potency factors remain unchanged. The next two bars on the figure, age-sensitivity factors and the updated daily breathing rates by age range, are the two inputs that may increase cancer risk estimates in the 2015 methodology. The potential change in inhalation cancer risk at a residential location from these two inputs may be between 2 and 3 times the 2003 inhalation risk estimates. In most situations, the last three inputs in the figure, fraction of time at home, shortening the exposure duration, and spatial averaging, will decrease the potential inhalation cancer risk estimates.

Figure II-1: Comparison of Six Key Inputs Using the 2003 and 2015 OEHHA Risk Assessment Methodology



The center line of this figure represents the 2003 methodology and the shaded bars represent the relative contribution each input may potentially account for in a residential cancer risk calculation for the inhalation pathway using the new 2015 OEHHA risk methodology.

The actual impacts of these inputs in a risk assessment will vary based on site-specific and scenario-specific conditions. These adjustments will typically not offset the impacts of each other due to the way each of these factors are weighted in the 2015 methodology.

1. Age Sensitivity Factors (ASF)

Studies have shown that young animals are more sensitive than adult animals to exposure to many carcinogens (OEHHA, 2009). Therefore, OEHHA developed age sensitivity factors (ASFs) to take into account the increased sensitivity to carcinogens during early-in-life exposures. The 2003 risk methodology did not provide for any adjustment to account for the increases in sensitivity at the early stages of life. The revised cancer risk methodology takes into account ASFs by age groups. The ASFs utilized in the new OEHHA Manual provide a 10-fold multiplier in sensitivity for the third trimester and infants less than age 2, a 3-fold increase in sensitivity for children ages 2 to 16 years old, and a sensitivity factor of 1 for ages 16 and older.

2. Age-specific Exposure Factors by Exposure Pathway (e.g., Daily Breathing Rates)

OEHHA developed exposure factors (e.g., daily breathing rates) for six age groups including the last trimester to birth, birth to < 2, 2 to < 9[h], 2 to < 16[i], 16 to < 30, and 16 to 70 years. These age bins allow for more refined exposure information to be used when estimating exposure and the potential for developing cancer over a lifetime.

Under the 2003 Tier 1[j] risk assessment methodology, the estimated cancer risk assumes the exposed individual either breathes or ingests toxics at a single composite rate for the entire exposure duration (e.g., 70 years). As part of OEHHA's effort to revise its Health Risk Assessment (HRA) methodology, OEHHA has disaggregated this singular rate exposure methodology. The new disaggregated methodology allows for exposure rates and sensitivity to be evaluated by age groups.

OEHHA's Technical Support Document for Cancer Potency Factors (OEHHA, 2009) recommends that health impacts be calculated by age groups specifically for the third trimester to birth, ages 0 to <2, ages 2 to <9, ages 2 to <16, ages 16 to <30, and ages 16 to 70. The estimated risk for each age group is summed to estimate

[h] The 2 to <9 age bin is used for exposure scenarios ending at age 9.
[i] The 2 to <16 age bin is used for exposure scenarios ending between ages 16 through 70 years.
[j] The tiered approach to risk assessment is explained in the OEHHA Manual http://www.oehha.ca.gov/air/hot_spots/hotspots2015.html and consists of four tiers. Tier 1 uses point estimates supplied by OEHHA for calculating potential health risk in the risk assessment. Tier 2 uses user-defined site-specific point estimates for calculating potential risk. Tier 3 presents a range of risks using distributions of exposure supplied by OEHHA. Tier 4 presents a range of risks using user-defined site-specific exposure information.

the potential cancer risk for the exposure duration of interest (e.g., 30-year analysis for the maximum exposed individual resident (MEIR) would sum the contributions from the last trimester, 0 to 2 years, 2 to <16 years, and 16 to <30 year age bins).

3. Fraction of Time at Home[k]

In the 2003 risk assessment methodology, people were assumed to be at their home for 24 hours a day. In the 2015 Risk Assessment Guidance, OEHHA and ARB evaluated information from activity pattern databases to estimate the fraction of time at home (FAH) during the day (OEHHA, 2012). This information can be used to adjust exposure duration and cancer risk from a specific facility's emissions based on the assumption that a person is not present at home continuously for 24 hours and therefore exposure to a facility's emissions is not occurring when a person is away from their home. In general, the FAH factors are age-specific and are 0.85 (85%) for ages less than 2 years, 0.72 (72%) for ages 2 to <16 years, and 0.73 (73%) for ages 16 to 70 years.

4. Exposure Duration

For a Tier 1 health risk assessment (HRA), OEHHA has decreased the exposure duration currently being used for estimating cancer risk at the maximum exposed individual resident (MEIR) from 70 years to 30 years. This is based on studies showing that 30 years is a reasonable estimate of the 90th to 95th percentile of residency duration in the population. Additionally, OEHHA recommends using the 9 and 70-year exposure duration to represent the potential impacts over the range of residency periods. The exposure duration for population-wide impacts continues to be 70 years. The worker exposure duration is now 25 years instead of 40 years. Note, under a Tier 2 HRA, risk assessors can use other exposure durations with proper justification and documentation. For example, short-term projects (e.g., construction projects) can now be evaluated for as short a duration as 6 months.

5. Spatial Averaging of Concentrations

OEHHA's revised guidance provides an option to spatially average dispersion modeling results for determining a project's potential health risk. Spatial averaging is a technique used to estimate the overall impact at a given location (e.g., home, business, etc.) by averaging the modeled concentrations over a discrete area (e.g., an area 20 meters by 20 meters – about the size of an urban residential lot) instead of using a single point to determine potential cancer and chronic noncancer health impacts. This approach provides a more reasonable estimate of exposure because it recognizes that a person actually spends time at various locations on their property. Spatial averaging will generally, result in lower estimated concentrations and risk than non-spatial averaging techniques.

[k] The FAH for ages less than 16 years is 1.0 if a school is located within the one chance per million risk contour.

D. Will potential cancer risk estimates increase under the new risk assessment methodology and if so, by how much?

Yes, in some situations when evaluating residential impacts, the potential inhalation cancer risk estimates for the same level of emissions may be 1.5 to 3 times higher than under the 2003 risk assessment methodology. In addition to this 1.5 to 3 times increase with inhalation-only assessments, there may also be additional increases in potential cancer risk estimates when risk assessments include multiple pathways of exposure (e.g., ingestion of soil or crops, dermal exposure, etc.).

Potential inhalation cancer risk estimates at other locations (e.g., offsite workers) may stay about the same as was estimated using the 2003 risk assessment methodology. Multipathway risk estimates for workers (e.g., ingestion of soil and dermal exposure) may result in increases to the potential health risk.

The use of the new and recommended U.S. EPA air dispersion model (AERMOD) may also change the estimated potential health risk. In general for many sources of toxic emissions, AERMOD may tend to result in higher predicted concentrations when comparing AERMOD results to ISCST3 modeling results. Because of the variety of scenarios, the exact change in modeled concentrations is difficult to estimate. Increases, or decreases, in modeled concentrations from AERMOD will vary based on many factors described in Section 1B. The degree to which these additional factors change the estimated risk is dependent upon the type and number of substances used in multiple exposure pathway assessments and the source specific modeling factors used.

E. What are the implications of these changes to OEHHA's risk assessment methodology on District toxic new source review permitting programs?

In short, potentially more equipment or processes at facilities may require Toxic Best Available Control Technology (TBACT) to reduce emissions and the associated health risk. Some new and modified facilities, even when using TBACT, may have difficulty obtaining permit approval under the risk action levels currently used by most Districts. Potentially more existing facilities may have to notify the public of the risk assessment results and some facilities will have to develop risk reduction plans and implement practices to reduce their facility's emissions and potential cancer risk. Districts may need to reevaluate their toxics programs to address these issues including the possibility of changing the current risk action levels. Contact the local District for further information.

F. What are the implications of these changes on District Hot Spots programs for existing sources?

As mentioned previously, additional facilities may be required to conduct a health risk assessment, do public notification, and/or prepare and implement risk reduction audit and plans. There may be potential issues if all equipment and processes are using TBACT or best available retrofit control technology (BARCT) and options are limited for reducing emissions to below the individual District's programmatic thresholds. Contact the local District for further information on the implications to their Hot Spots program.

G. How do the proposed guidelines for stationary sources of air toxics contained in this document compare to ARB's 1993 Risk Management Guidelines?

The 1993 Risk Management Guidelines addressed permitting actions only; while this 2015 joint ARB/CAPCOA document covers general guidance for permitting of new and modified sources of air toxics and the programmatic requirements of the AB 2588 Hot Spots Program. The specific recommendations are briefly discussed in Sections IV and V below and in greater detail in Appendices B and C. In addition, this document provides an updated risk management policy for risk assessments using the inhalation pathway (Section VI and Appendix D).

H. Must Districts implement these guidelines?

No, Districts are not required to implement these guidelines. State law gives each District the authority and discretion to establish its own risk management policies, except where ARB's statewide ATCMs set the minimum requirements. These guidelines are intended to assist Districts in reviewing and updating their permitting and Hot Spots programs.

III. Background and Communication

This section contains descriptions of key risk assessment and risk management terms associated with California's Air Toxics Program. You can also contact your local District for more information http://www.arb.ca.gov/capcoa/roster.htm.

A. What is a health risk assessment?

Generically, risk is the probability of an adverse outcome from any situation or action. A health risk assessment is an analysis or report that describes the type and quantity of pollutants a person may be exposed to and estimates the potential cancer or noncancer health risk from the predicted exposures using mathematical models that are intended to be protective of the public's health.

B. What is the health risk from air toxics?

The risk from air toxics is the possibility or estimated probability of adverse health effects (e.g., illness, injury, or disease) from a person's exposure to toxic air pollutants.

C. What are toxic air contaminants?

AB 1807 defines a "toxic air contaminant" as an air pollutant which may cause or contribute to an increase in mortality or an increase in serious illness, or which may pose a present or potential hazard to human health (Health and Safety Code (HSC) section 39655a).

D. What are the potential health impacts from exposure to air toxics?

Adverse health impacts from exposures to toxic air pollutants can include a range of potential responses such as developing cancer, or noncancer-related impacts such as irritation of the eyes, nose, and lungs; developmental effects; and effects on the organs (for example, lungs, heart, liver, kidneys, brain, and nervous system).

E. What do individual cancer risk estimates mean?

Cancer risk estimates are exactly that -- *an estimate* of the chance a person exposed to a toxic pollutant may have of developing cancer from that exposure. Cancer risk estimates do not mean, and should not be interpreted to mean, that a person *will* develop cancer from estimated exposures to toxic air pollutants. Cancer risk estimates are based on assumptions of long-term exposure activities and estimated annual concentrations that may, or may not, vary in real time for the location or person under evaluation. Results are best used as an informational tool for education, and technology implementation. Cancer risk is typically expressed as the chance of an individual developing cancer if a million people were exposed continously for a specified duration (e.g., 30 or 70 years) to the toxic emissions being evaluated.

F. What do noncancer hazard indices mean?

Noncancer hazard indices are an indicator of potential noncancer health effects (e.g., eye or respiratory irritation, reproductive, or developmental effects, etc). They are the ratio of the estimated concentration of a specific pollutant compared to the reference exposure level for that pollutant. A pollutant's reference exposure level identifies the potential threshold level for some type of pollutant-specific toxic effect.

Noncancer hazard indices can be expressed for one substance as a hazard quotient or as a hazard index when there are multiple substances emitted that affect the same target organ (e.g., lung, eye, etc.). Hazard indices can be evaluated for acute periods (e.g., one-hour) and for chronic (long-term) exposures (e.g., annual average). Hazard indices less than one are typically not of concern because they are below the reference exposure level. It is important to note that hazard indices above one do not necessarily mean there is certainty for an adverse effect; rather, it indicates there may be the potential for adverse effects that warrant further investigation.

G. How are risk assessment results used?

Two uses of risk assessments are:

1. To inform ARB, Districts, and the public of the potential health impacts and exposures that may be associated with sources of toxic emissions.

2. To provide ARB, Districts, the public, and sources of toxic emissions with information on the potential health impacts and their causes so those estimated impacts can be prioritized and decisions can be made about the need for further mitigation. Mitigation might include use of air pollution control technology, changes in work practices and procedures, or changes in manufacturing processes.

H. What is risk management?

Risk management is a decision making process where information about potential health risk, control options for reducing emissions and the associated risk, and the costs of control are evaluated to determine what level of action is appropriate to protect public health.

I. How are risk assessment and risk management handled in California?

These two elements are handled separately in California programs. Risk assessment includes the characterization or evaluation of potential health impacts from exposure to toxic substances in the environment. This work is handled by different agencies depending on the program; however, OEHHA is the cornerstone of risk assessment activities. OEHHA creates the risk assessment guidelines and develops cancer and noncancer health factors used for risk assessment. The Legislature specifically

identified OEHHA as the state agency for developing health risk assessment guidance pursuant to the AB 2588 Air Toxics Hot Spots Program (HSC section 44360(2)).

Districts, ARB, sources emitting toxic substances, and other entities use the OEHHA risk assessment guidelines to estimate potential cancer and noncancer risk associated with a particular action or program. This is called risk characterization. Some examples of risk characterization activities include: identifying toxic air contaminants, conducting health risk assessments under the AB 2588 Air Toxics Hot Spots program and in District permit programs, for California Environmental Quality Act (CEQA) analyses, and for use in special studies, such as environmental justice or goods movement evaluations. Examples of communication activities include the public notification (right-to-know requirements) of the Hot Spots Program, the presentation of air toxics monitoring trends, and CEQA disclosures of potential impacts.

Risk management activities cover actions to minimize emissions and risk. Through a public process with stakeholders, the Districts and/or ARB (depending on the specific program) evaluate and define the appropriate level of control to protect public health. Consistent with the direction in State law, this decision includes consideration of potential health risk, technical feasibility of control options, the cost of control, and other factors. Examples of risk management activities include: District permitting programs, the implementation of risk reduction requirements under the Hot Spots program, and the development of statewide airborne toxic control measures and District rules.

In both major elements of the air toxics program, ARB and Districts work together to evaluate emissions of air toxics and health impacts while implementing programs to reduce emissions and exposure.

IV. Permitting New and Modified Sources Guidance

Districts have the primary authority for permitting stationary sources that emit air pollutants. Each District has the authority to maintain individual policies, rules, or procedures. This guidance is intended to assist Districts should they elect to make changes to their stationary source permitting program to implement the new OEHHA Manual. ARB and CAPCOA jointly developed the permitting guidance presented in Appendix B. The guidance is intended to assist Districts that may decide to revise the TBACT levels, permitting process, or risk-action levels used for administering their programs. Table IV-1 provides a summary of the recommended permitting guidance.

Table IV-1: ARB/CAPCOA Recommended Permitting Risk-Action Levels

Action	Cancer Risk-Action Level (chances per million)	Noncancer Risk-Action Level Hazard Index[1]
Require TBACT[2]	>1	>1
Permit Approval	10 to 25	≤1
Source-Specific Approval/Denial	Less than or greater than permit approval levels based on source-specific considerations	Less than or greater than permit approval level based on source-specific considerations

1. Ratio of estimated concentration of a specific pollutant compared to the reference exposure level for that pollutant.
2. TBACT is Toxics Best Available Control Technology

V. Hot Spots Guidance

ARB, CAPCOA, and individual Districts are evaluating how the OEHHA Manual will impact the regulations, policies, thresholds, and programmatic requirements of the Hot Spots Program. Appendix C provides general guidance the Districts may use when considering the changes to the prioritization, notification, and risk reduction audit and plan thresholds. Table V-1 provides a summary of the key programmatic requirements, the actions associated with them, and the recommended guidance for AB 2588 Hot Spots risk action threshold levels.

Section VII and Appendix E provide information outlining ARB's plans for addressing the toxics program, the AB 2588 emission inventory and the fee regulations, and the development and release of the Hot Spots Analysis and Reporting Program (HARP) software. See the following links for programmatic information related to the AB 2588 Program: AB 2588 link is http://www.arb.ca.gov/ab2588/ab2588.htm; the HARP software can be found at http://www.arb.ca.gov/toxics/harp/harp.htm; and the risk management webpage is http://www.arb.ca.gov/toxics/toxics.htm.

Table V-1: ARB/CAPCOA Recommended AB 2588 Hot Spots Risk-Action Levels

AB 2588 Program Requirements	Cancer Risk Action Level (chances per million)	Noncancer Risk Action Level – Hazard Index[1]
Prioritization	Update CAPCOA Prioritization Score Procedure/Guideline	Update CAPCOA Prioritization Score Procedure/Guideline
Notification	To Be Determined by Districts	To Be Determined by Districts
Risk Reduction Audit and Plan	To Be Determined by Districts and Not to Exceed 100	To Be Determined by Districts and Not to Exceed 10

1. Ratio of estimated concentration of a specific pollutant compared to the reference exposure level for that pollutant.

VI. Risk Management Policy for Inhalation Risk Assessments

ARB and CAPCOA's purpose is to establish a policy that considers the new science in risk assessment while providing a reasonable estimate of potential cancer risk for risk management decisions. In doing so, ARB and CAPCOA are recommending the policy for inhalation-based risk assessments found in Appendix D. The individual Districts have the authority to decide how, or if, they will use this recommended policy in their programs. This policy will supersede ARB's Interim Risk Management Policy for Inhalation-based Residential Cancer Risk (2003) and considers the new exposure information in the OEHHA Manual. See Appendix D for further information.

VII. Planned Risk Management Activities

ARB and CAPCOA are working closely together to develop comprehensive plans for incorporating the new OEHHA Manual into State and local air toxics programs. Part of this effort includes developing risk communication information (see Section III) to assist in explaining to the public what the changes to the risk assessment methodology are and what they mean. As CAPCOA and ARB pursue the activities listed below, we will continue to work in an open public process with industry, the environmental community, and public to determine the best way to protect public health in consideration of health risk and cost, consistent with State law.

A. District Actions

1. CAPCOA and its member Districts are updating the prioritization methods/guidelines under the Air Toxics Hot Spots Information and Assessment Act (Hot Spots Program). Under AB 2588, prioritization methods are used by Districts to determine which facilities will complete a health risk assessment. These methods consider factors such as the quantity of emissions, the cancer or noncancer health factor associated with each emitted substance, and the proximity of the nearest residence or business. When complete, any changes will be incorporated into ARB's Hotspots Analysis and Reporting Program (HARP) software.

2. The Districts are considering the following steps:

   a) Evaluate the risk management methodologies and potential impacts to their programs and brief their Boards as appropriate.
   b) Individually evaluate their current programs such as public notification policies, toxics rules, and permitting programs to determine if changes are warranted.
   c) Work with stakeholders through a public process if changes are needed to district rules, policies, or guidelines.

B. Air Resources Board Actions

ARB staff plans to evaluate its air toxics-related guidelines, regulations, policies, and procedures to identify any actions needed to incorporate the new science outlined in the OEHHA Manual. ARB staff has developed a multiyear work plan to guide this effort. See Appendices E and F for more detail. Key elements include:

1. Provide risk communication and outreach to interested stakeholders.

2. Release the HARP software concurrent with the OEHHA Manual (completed March 6, 2015).

3. Develop updates to the existing ARB guidance to the air districts for toxics permitting, AB 2588 Hot Spots, and inhalation risk assessments (presented in this document).

4. Evaluate and update as necessary the Hot Spots Emission Inventory Criteria and Guidelines and the Fee Rule.

5. In coordination with CAPCOA, develop Industrywide Guidelines for sources that support critical goods and services where their emissions may result in cancer risk estimates above District thresholds (e.g., emergency standby diesel engines, gasoline dispensing facilities).

6. Review existing statewide ARB regulations that include risk-based provisions to ensure they remain health protective (e.g., chrome plating).

7. Prioritize and screen existing ATCMs and other toxics-related regulations to determine which may merit reevaluation in the future.

8. For sources covered by the subset of ATCMs and regulations identified in 7, reevaluate best available control technology, in consideration of cost and risk.

9. Update the Land Use Handbook.

Table VII-1: Anticipated ARB Near-Term Actions

Board Consideration or Staff Completion	ARB Action
2015	• HARP Release and Training • Joint ARB/CAPCOA Risk Management Guidelines for Stationary Source of Air Toxics (Permitting, AB2588, and Inhalation Risk Assessments)
2016	• Amendments to Chrome Plating ATCM • Amendments to Portable Diesel Engine ATCM • Industrywide Guideline for Gasoline Dispensing Facilities • Industrywide Guideline for Emergency Standby Diesel Engines • Amendments to Hot Spots Emission Inventory Criteria and Guidelines • Amendments to Hot Spots Fee Regulation • Update to Land Use Handbook
2017	• Report on screening of existing ATCMs

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Appendix I: References

Appendix A

Applicable State Air Toxics Legislation

The legislation and Health and Safety Code (HSC) sections listed below can be found at http://www.leginfo.ca.gov/cgi-bin/calawquery?codesection=hsc.

District Permitting (HSC sections 42300-42317, 42320-42323, 42330-42339)

AB 2588 (Stats. 1987); SB 1731 (Stats. 1992). Air Toxics "Hot Spots" Information and Assessment Act (HSC sections 44300-44394)

AB 1807 (Stats. 1983). Toxic Air Contaminant Identification and Control Program (HSC sections 39650-39675)

SB 25 (Stats. 1999). Children's Environmental Health Protection Act (HSC sections 39606, 39617.5, 39660, 39669.5, and 40451)

Appendix B

Guidance for Permitting New and Modified Sources

Air Pollution Control and Air Quality Management Districts (Districts) have the primary authority for permitting sources that emit air pollutants. Each District has the authority to maintain individual policies, rules, or procedures. This guidance is intended to assist Districts should they elect to make changes to their stationary source permitting program to implement the Office of Environmental Health Hazard Assessment's (OEHHA) new health risk assessment methodology. The guidance presented here is intended to assist Districts that may decide to revise the levels associated with the use of toxics best available control technology (TBACT), their permitting process, or trigger/threshold levels used for administering their programs. Contact the local Districts for updates on their individual schedules, opportunities for public review of their products and programs, and the status of their process.

Air Resources Board (ARB) developed the following guidance in a joint effort with the California Air Pollution Control Officers Association (CAPCOA). These concepts were discussed with a task force including ARB, CAPCOA, industry, and environmental representatives.

1. Districts may elect to establish a TBACT requirement at a cancer risk of > 1 chance per million and/or a noncancer Hazard Index (HI) > 1.

2. Permit approvable if the risk is below the District's permitting risk threshold(s) except as noted below. Recommended permitting risk threshold(s): cancer risk at 10 to 25 chances per million, HI $\leq$ 1.

3. Districts may elect to establish a single permitting risk threshold for all sources or different permitting risk thresholds for certain sources or categories of sources based on criteria established by the District.

4. Permit denial if the risk exceeds the District's permitting risk threshold(s) except as noted below.

5. There may be situations where permit approval above the permitting risk threshold is appropriate. Factors considered could include, but are not limited to: source using TBACT, source performs critical functions, significant portion of operation due to readiness testing or emergency use, or other District-specific considerations.

6. There may be situations where permit denial below the permitting risk threshold is appropriate. Factors considered could include, but are not limited to: approval would result in the source exceeding the District's Hot Spots Risk Reduction Audit and Plan levels, exceeding other District-specific trigger levels, or other District-specific considerations.

Appendix C

Guidance for AB 2588 Hot Spots Program

The Air Resources Board (ARB), California Air Pollution Control Officers Association (CAPCOA), and the individual Districts are continuing to evaluate how the Office of Environmental Health Hazard Assessment (OEHHA) Guidance Manual will impact the regulations, policies, thresholds, and programmatic requirements of the Air Toxics Hot Spots Program (AB 2588).

ARB developed the following guidance in a joint effort with CAPCOA. The concepts were discussed with a task force including ARB, CAPCOA, industry, and environmental representatives. The guidance below provides Districts with recommendations they may use when implementing the requirements of the AB 2588 Program. This includes prioritization, notification, and risk reduction audit and plan thresholds for AB 2588.

See Appendix H for a table containing the 2014 District Thresholds for AB 2588 requirements. Contact the local Districts for updates on their individual schedules, opportunities for public review of their products and programs, and the status of their process.

A. Prioritization

Revise the 1990 CAPCOA Prioritization Guidelines by updating the prioritization normalization factor to account for changes in the OEHHA Guidance Manual and the use of AERMOD. The normalization factor is used to make prioritization scores easier to interpret by converting them from an exponent to a whole number. The scores are compared against the prioritization score threshold values listed in Appendix G to determine which facilities will complete a health risk assessment. The normalization factor is used in conjunction with factors such as the quantity of emissions, the cancer or noncancer health factor associated with each emitted substance, and the proximity of the nearest residence or business to complete the prioritization requirements of AB 2588.

1. CAPCOA is developing prioritization normalization factors.

2. ARB will incorporate the updated prioritization normalization factors into the HARP software.

3. Districts may or may not elect to adjust their prioritization threshold levels.

B. Public Notification

Districts may or may not establish new threshold levels and/or different notification criteria with a more rigorous notification process for sources of toxics that are of most

concern/interest to the District and public at large and a less rigorous notification process for other sources triggering notification.

1. Districts determine the appropriate risk notification threshold level(s).

2. Districts may identify sources or category of sources that would be subject to rigorous source-specific notification. Examples of rigorous outreach to the affected communities could include: notification letters to facility neighbors, use of social media, newspaper(s), public meeting(s), or other District-specific approaches.

3. Districts may identify sources or category of sources that would be subject to less rigorous notification requirements. Example of general outreach to affected communities could include: notice via website, social media, newspaper(s), regional meeting(s) covering multiple sources or source categories, or other District-specific approaches.

C. Risk Reduction Audit and Plan

Districts may or may not elect to adjust their risk reductions audit and plan levels.

1. Districts determine the appropriate risk reduction audit and plan level.

2. Recommend Risk Reduction Audit and Plan trigger level not exceed 100 chances per million, Hazard Index of 10.

Appendix D

Risk Management Policy for Risk Assessments Using the Inhalation Pathway

The Air Resources Board's (ARB) and California Air Pollution Control Officers Association's (CAPCOA) purpose is to establish a policy that considers the new science while providing a reasonable estimate of potential cancer risk for use in risk assessments for risk management decisions. The individual Districts have the authority to decide how, or if, they will use this recommended policy in their programs. This policy supersedes ARB's Interim Risk Management Policy for Inhalation-based Residential Cancer Risk (2003) and considers the new exposure information in the Office of Environmental Health Hazard Assessment (OEHHA) Guidance Manual (OEHHA Manual).

The following guidance was developed in a joint effort with CAPCOA and was discussed with a task force including ARB, CAPCOA, industry, and environmental representatives.

A. Risk Management – 95/80 Daily Breathing Rates

Use a combination of the 95th percentile/80th percentile daily breathing rates as the minimum exposure inputs for risk management decisions.

1. When calculating potential cancer risk for the breathing or inhalation pathway), use the 95th percentile daily breathing rate (DBR) for age groups less than 2 years old and the 80th percentile DBR for age groups that are greater than 2 years old.

2. These are the minimum DBRs that are recommended for use in risk management decisions (e.g., notification, permitting, CEQA) where a single risk value is used for risk management decision making for residential locations.

3. Districts can use other percentages (e.g., the (Tier 1) 95th percentile DBRs from the OEHHA Manual in their risk management decisions.

B. Why do ARB and CAPCOA support the use of the 95/80 daily breathing rate policy for carcinogenic health risk assessments and risk management decisions at residential locations?

1. This policy considers the new science in risk assessment while providing a reasonable estimate of potential cancer risk for use in risk assessments for risk management decisions.

2. This approach continues the health protective policy that has been in place since 2003 of using the 80th percentile DBR for residential locations as the minimum breathing rate in health risk assessments used for risk management decisions.

3. New exposure information in the OEHHA Manual redefines the 2003 risk management policy. The Manual presents age-specific breathing rates that better represent potential intake rates for children and persons of all ages. The proposed policy uses the 95th percentile DBR for the most sensitive age groups (i.e., last trimester to birth and ages 0 to 2 years old) and uses the 80th percentile DBR for all other age groups (i.e., greater than age 2). OEHHA determined that age groups less than 2 years are the most sensitive and susceptible to the effects of carcinogens, leading to greater potential risk for cancer over their lifetime. Age groups less than age 2 are assigned an age sensitivity factor of 10 (OEHHA, 2009 and 2015).

4. Potential cancer risk estimates using the 95/80 DBRs are sufficiently health protective. The proposed 95/80 DBR policy results in higher potential cancer risk estimates than the 2003 risk management policy.
   i. Approximately 2.3X increased inhalation cancer risk for a 30-year exposure duration for residential locations.
   ii. Up to approximately 2.8X increased inhalation cancer risk for a 70-year exposure duration for residential locations. *Note – these factors do not include any differences from air dispersion modeling.*

5. The proposed 95/80 DBR policy follows the model for the OEHHA derived approach to risk assessment which uses the high-end point estimate of exposure for the two driving exposure pathways and the average point-estimates for the remaining exposure pathways (OEHHA, 2015). The proposed 95/80 DBR policy follows this same concept by not using only high-end assumptions. The 95/80 DBR policy uses the high-end DBRs for the most sensitive age groups and uses the 80th percentile DBRs for the remaining age groups. Both methods are intended to reduce conservatism by not using only high-end assumptions, yet remaining health protective.

6. Resulting health estimates are reasonable and protective especially for sources using toxics best available control technology (TBACT). TBACT is currently recommended for permit units with an estimated cancer risk greater than a one chance per million (Appendix B).

7. The use of the alternative breathing rates by the risk assessor is acceptable under the Tier 2 analysis outlined in the OEHHA Manual. The risk management policy (and reasons listed herein) would be the justification for allowing the use of the 80th percentile DBR for ages greater than 2. Furthermore, since the 80th percentile DBR is supplied in the OEHHA Manual,

we propose to use the 80th percentile in 95/80 DBR policy and treat those analyses as a Tier 1 assessment.

C. <u>What receptor locations and types of analyses does the 95/80 DBR policy apply to?</u>

This policy continues to apply to cancer risk estimates for residential locations using point-estimates of exposure for the inhalation pathway. It can be applied to evaluations for individuals or used for population-wide risk information (e.g., ambient background measurements). It can be used for the inhalation pathway when evaluating multiple exposure pathway (multipathway) cancer risk. The policy may also be used in conjunction with spatial averaging at the approval of the District or reviewing authority.

D. <u>Why are workers not included in the 95/80 DBR Policy?</u>

This is a policy decision that is supported by the following points.

1. In the past, workers were not included in 2003 Interim Risk Management Policy because future work on age sensitivity was not anticipated to impact workers. This held true since there are no sensitivity factors for workers in the OEHHA Manual.

2. In the OEHHA Manual, workers now have a range of updated exposure estimates at the mean and 95th percentile DBRs versus a single value in the 2003 guidelines. These current estimates are set at a moderate intensity activity level.

3. There is no eight-hour 80th percentile DBR provided in the OEHHA Manual for workers.

4. The OEHHA Manual allows for the use of eight-hour DBRs based on other (less strenuous) activities. This allows the use of different DBRs for workers with proper justification. This type of information is not presented for residents in the OEHHA Manual; therefore, we are recommending the 95/80 DBR policy for residents while worker assessments can use the activity-based exposure information provided in the OEHHA Manual (see Table 5.8).

5. Since the OEHHA Manual contains eight-hour worker activity-based breathing rates for other worksite scenarios, the DBRs for “Sedentary and Passive” and “Light-Intensity” can be used with proper justification in a Tier 1 risk assessment at the discretion of the local District or reviewing authority.

E. Why is the 95/80 DBR Policy only used for the inhalation pathway and not used for the ingestion or dermal exposure pathways?

1. This is a policy decision to continue the 2003 policy focusing on the inhalation pathway; excluding exposure adjustments for the ingestion and dermal pathways since those are handled by the derived approach to risk assessment.

2. It is appropriate to evaluate non-inhalation pathways using the derived approach risk methodology outlined in the OEHHA Manual. The derived approach was created in 2003 for multipathway exposure scenarios. This approach is health protective and addresses concerns over compounding conservatism. The derived approach uses the high-end point-estimate for the two driving exposure pathways and uses the mean point-estimate for any non-driving exposure pathways in a multipathway cancer risk assessment.

Appendix E

Air Resources Board Risk Management Work Plan

ARB staff plans to evaluate its air toxics-related guidelines, regulations, policies, and procedures to identify any actions needed to incorporate the new science outlined in the OEHHA Manual. ARB staff has developed a multiyear work plan to guide this effort. Key elements include:

1. Provide risk communication and outreach to interested stakeholders.
2. Release the HARP software concurrent with the OEHHA Manual (completed March 6, 2015).
3. Develop updates to the existing ARB guidance to the Districts for toxics permitting, AB 2588 Hot Spots, and inhalation risk assessments (presented in this document).
4. Evaluate and update as necessary the Hot Spots Emission Inventory Criteria and Guidelines and the Fee Rule.
5. In coordination with CAPCOA, develop Industrywide Guidelines for sources that support critical goods and services where their emissions may result in cancer risk estimates above District thresholds (e.g., emergency standby diesel engines, gasoline dispensing facilities).
6. Review existing statewide ARB regulations that include risk-based provisions to ensure they remain health protective (e.g., chrome plating).
7. Prioritize and screen existing ATCMs and other toxics-related regulations to determine which may merit reevaluation in the future.
8. For sources covered by the subset of ATCMs and regulations identified in 7, reevaluate best available control technology, in consideration of cost and risk.
9. Update the Land Use Handbook.

Each of these elements is discussed in this Appendix. Based on input from CAPCOA and interested stakeholders, ARB staff has defined the near-term actions needed to incorporate the new OEHHA Manual. Those near-term actions are listed in Table E-1 below. Other actions will be prioritized and scheduled for subsequent years (2018 and beyond).

Table E-1: Anticipated ARB Near-Term Actions

Board Consideration or Staff Completion	ARB Action
2015	• HARP Release and Training • Joint ARB/CAPCOA Risk Management Guidelines for Stationary Source of Air Toxics (Permitting, AB2588, and Inhalation Risk Assessments)
2016	• Amendments to Chrome Plating ATCM • Amendments to Portable Diesel Engine ATCM • Industrywide Guideline for Gasoline Dispensing Facilities • Industrywide Guideline for Emergency Standby Diesel Engines • Amendments to Hot Spots Emission Inventory Criteria and Guidelines • Amendments to Hot Spots Fee Regulation • Update to Land Use Handbook
2017	• Report on screening of existing ATCMs

Work Plan Elements

1. Risk Communication

Section III contains information for risk communication by providing descriptions of key risk assessment and risk management terms. You can also contact your local District for more information http://www.arb.ca.gov/capcoa/roster.htm.

2. Hot Spots Analysis and Reporting (HARP) Software

The intent of the HARP software is to provide a software program consistent with the revised OEHHA Manual that addresses the requirements of the AB 2588 Program. The use of consistent risk assessment methods and report presentation has many benefits, such as expediting the preparation and review of health risk assessments (HRAs), minimizing revision and resubmission of HRAs, allowing a format for facility comparisons, and cost-effective implementation of HRAs and the Hot Spots Program. Risk assessments prepared with the HARP software may be used for permitting new or modified stationary sources, California Environmental Quality Act (CEQA) analyses, public notification, risk reduction, and other requirements of the Hot Spots Program. The use of uniform procedures allows comparison of risks from different facilities and helps to prioritize programmatic needs. ARB released the updated HARP software on March 6, 2015 concurrent with the OEHHA Manual and the software can be found on the HARP webpage at: http://www.arb.ca.gov/toxics/harp/harp.htm.

3. Update Existing Risk Management Guidance

This document includes joint ARB/CAPCOA recommended updates to the existing ARB guidance to the Districts for toxics permitting, AB 2588 Hot Spots, and inhalation risk assessments.

4. Hot Spots Emission Inventory Criteria and Guidelines/Fee Rules

ARB staff will evaluate, and update as necessary, the Hot Spots Emission Inventory Criteria and Guidelines (Inventory Guidelines) and the Fee Rule in 2016. The Inventory Guidelines are used for preparing emission inventory plans and reports to develop site-specific inventories of air emissions of toxic substances. The Inventory Guidelines do the following:

A. specify which facilities are subject to air toxics emission inventory reporting and update reporting;
B. specify information a facility operator must include in a facility's air toxics emission inventory plan and inventory report;
C. identify specific classes of facilities that emit less than ten tons per year of criteria pollutants that are subject to the Hot Spots program and specify their emission inventory reporting requirements;
D. specify source testing requirements, acceptable emission estimation methods, and the reporting formats to be used;
E. establish groups of the substances to be inventoried;
F. designate facilities into levels for purposes of update reporting, based on prioritization scores, risk assessment results, or de minimis thresholds;
G. exempt "low level" facilities from further update reporting unless specified reinstatement criteria are met, and specify the update reporting requirements for other facilities;
H. specify information a facility operator must include in a facility's update to the facility emission inventory; and
I. include provisions for integrating Hot Spots reporting with other District programs if specified criteria are met.

The Inventory Guidelines will need to be amended to reference the changes in risk calculation methodologies in the OEHHA Manual. See http://www.arb.ca.gov/ab2588/2588guid.htm for more information on the Inventory Guidelines.

The Hot Spots program also provides for the establishment of fees to pay for the cost of implementing and administering the Air Toxics Hot Spots Program. The Air Toxics Hot Spots Fee Regulation will be reviewed to determine whether or not it may need to be amended to reflect the changes to the OEHHA Guidance Manual since the fee tables are based on some risk categories as well as program stages. The Districts with jurisdiction over facilities meeting the criteria set forth in the regulation annually collect

the fees, which recover anticipated costs incurred by OEHHA to implement its responsibilities under AB 2588.

The fees paid by an individual facility might change with a regulatory amendment, but the total fees collected for the State are capped and cannot increase. According to Health and Safety Code Section 44380(e), the annual air toxics program revenues for ARB and OEHHA shall not exceed $1,350,000, the current fee collection level. ARB passes all of these funds through to OEHHA to support its risk assessment work. See http://www.arb.ca.gov/ab2588/2588fees.htm for more information on the Fee Regulation.

5. Develop Industrywide Guidelines for High Priority Source Categories

In coordination with CAPCOA, ARB staff will develop Industrywide Guidelines for the highest priority sources that support critical goods and services where their emissions may result in cancer risk estimates using the new OEHHA Manual that are above District thresholds. These Guidelines include industrywide health risk assessments and technology reviews. The top two priorities are emergency standby diesel engines and gasoline dispensing facilities, with industrywide guidelines planned for completion in 2016.

Industrywide guidelines create uniform procedures and recommendations for efficiently addressing source categories that have numerous facilities. For example, there are approximately 10,000 retail service stations in California. Approximately 90 percent of these have gasoline throughputs of less than 3 million gallons per year (or 250,000 gallons per month). Over 95 percent of these stations have Toxic Best Available Control Technology (TBACT) vapor controls and are currently permitted to operate using this equipment. The combination of their numbers and their uniformity due to state-of-the-art controls make these gasoline facilities a very good candidate for an industrywide assessment.

A second example is stationary diesel engines that perform critical back-up power functions at many facilities or for infrastructure projects (e.g., hospitals, water pumps, etc.). These diesel engines are required to perform safety maintenance testing for compliance with federal, State, and local rules and regulations to ensure readiness in times of crisis. Although operation of these engines in an emergency is typically exempt from regulation, the emissions from the mandated safety testing alone may result in cancer risks under the new OEHHA Manual that are above District thresholds. These sources will be evaluated to determine how this may be addressed in consideration of their critical purpose.

6. Focus on the Existing Statewide Regulations that include Risk-Based Provisions to Ensure they Remain Health Protective

ARB, in its initial stages of the work plan, will also address the existing statewide regulations that include risk-based provisions to ensure they remain health protective, in

consideration of technology, cost, and potential health impacts. The top priority is chrome plating; ARB staff plans to present amendments to the Board for consideration in 2016.

7. Screen Other Existing ARB Regulations for Air Toxics

ARB will screen and prioritize existing statewide toxics-related regulations (see Appendix F) to determine which may merit full reevaluation in the future. The prioritization process will involve determining which ATCMs and regulations will need reevaluation and potential action within the next few years, and those that can be addressed later in this process.

The screening assessment will consider factors such as:

A. Estimated emissions and number of sources that operate in California.
B. Current level of control and how recently the category was evaluated (i.e., age of the last regulation/ATCM).
C. Is the ATCM/regulation based on a cancer risk or distance buffer?
D. Location of sources (i.e., near populated areas or rural).
E. Level of potential residual risk (e.g., cancer and/or noncancer health impacts) under the existing regulation using the new OEHHA Manual.
F. Are the facilities or sources similar in configuration; thereby, making them a potential candidate for industrywide evaluations?
G. Are there District and/or stakeholder issues or concerns with the source category?

ARB staff expects to begin the screening assessments in 2016 and report to the Board in 2017 with findings and any recommendations for further action. These recommendations could include full reevaluation of the source category to determine whether the existing regulation is sufficient to protect public health or should be modified.

8. Reevaluation of Existing ATCMs/Regulations

Based on the staff recommendations from the screening assessment and Board direction, ARB staff and the Districts will begin the process in 2017 of reevaluating a subset of the source categories covered by existing regulations to ensure that they continue to utilize toxics best available control technology, in consideration of cost and potential health risk. If amendments are needed, ARB, with input from the Districts, industry, environmental, and other interested stakeholders, will follow the regulatory process.

In 2015-2017, ARB staff will focus on the source categories and regulations already on the schedule for industrywide guidelines or amendments, as shown in Table E-1. After that, ARB staff will perform the reevaluations and develop any needed regulatory amendments for other source categories and regulations over a multi-year period.

9. Update the Land Use Handbook

ARB will update the Land Use Handbook (Handbook) to reflect the changes made in the OEHHA Manual. The Handbook is a tool for local land use decision makers to inform their evaluation when they consider siting sensitive land uses (like housing, schools, and medical facilities) near existing sources of air pollution. ARB's primary goal in developing this document is to provide information that will enable better siting decisions to protect California's children and other vulnerable populations. Sensitive land uses deserve special attention because children, pregnant women, the elderly, and those with existing health problems are especially vulnerable to the noncancer effects of air pollution. The plan is to begin updating the Handbook in 2016. See http://www.arb.ca.gov/ch/aqhandbook-fix.htm for more information on the existing Handbook.

Appendix F

List of Existing ARB Regulations for Air Toxics

Table F-1: Statewide ARB Air Toxics Regulations for Stationary Sources

Source Category Addressed by Regulation	California Code of Regulations
Benzene at Gas Stations	(17 CCR 93101)
Thermal Spraying	(17 CCR, 93101.5)
Chrome Plating	(17 CCR 93102 - 93102.16)
Chrome Cooling Towers	(17 CCR 93103)
Dioxins from Medical Waste Incinerators	(17 CCR 93104)
Asbestos from Construction Activities	(17 CCR 93105)
Asbestos from Surfacing Activities	(17 CCR 93106)
Non-Ferrous Metal Melting	(17 CCR 93107)
Ethylene Oxide Sterilizers and Aerators	(17 CCR 93108; 93108.5)
Perchloroethylene Dry Cleaning	(17 CCR 93109 et seq.)
Automotive Maintenance and Repair Activities	(17 CCR 93111)
Automotive Coatings	(17 CCR 93112)
Outdoor Residential Waste Burning	(17 CCR 93113)
California Diesel Fuel Regulations	(17 CCR 93114)
Stationary Diesel Engines	(17 CCR 93115 et seq.)
Portable Diesel Engines	(17 CCR 93116 et seq.)
Onboard Incineration on Ships	(17 CCR 93119)
Formaldehyde in Composite Wood Products	(17 CCR 93120 et seq.)

Table F-2: Statewide ARB Air Toxics Regulations for Mobile Sources

Source Category Addressed by Regulation	California Code of Regulations
Solid Waste Collection Vehicles	(13 CCR 2020;13 CCR 2021)
Public Agency and Utility Fleets	(13 CCR 2022)
Statewide Truck and Bus	(13 CCR 2025)
Drayage Trucks	(13 CCR 2027)
Ocean Going Vessel Fuel	(13 CCR 2299.1; 17 CCR 93118)
In-Use Off-Road Diesel Vehicles	(13 CCR 2449)
Transport Refrigeration Units	(13 CCR 2477 and Article 8)
Cargo Handling Equipment at Ports/Railyards	(13 CCR 2479)
School Bus Idling	(13 CCR Chapter 10 § 2480)
Diesel-Fueled Commercial Motor Vehicle Idling	(13 CCR Chapter 10 2485)
Large Spark Ignition Equipment	(13 CCR 2775, 2775.1 and 2775.2)

Appendix G

2014 Permitting Levels for Various District Programs[1,2,3]

Organization	Applicability	TBACT Trigger Level	Approval Level	Approval with Specific Findings	Denial Level
Antelope Valley AQMD	New and Modified Sources	>1/million	≤1/million or ≤10/million w/T-BACT (and) HI ≤1 (and) cancer burden ≤0.5	None	>1/million or >10/million w/T-BACT (or) HI >1 (or) cancer burden >0.5
Bay Area AQMD	New or Modified Sources of TACs	>1/million (and/or) >0.2 Chronic THI	≤10/million (and/or) ≤1 Chronic or Acute THI	None	>10/million (and/or) >1 Chronic or Acute THI
Butte County AQMD	New and Modified Sources	≥1/million	<10/million (and/or) HI ≤1	≥10 to <100/million (or) >1.0 to ≤10 HI	≥100/million (or) >10 HI
Colusa County APCD	New and Modified Sources	≥1/million	<10/million (and/or) HI ≤10	None	>10/million (and/or) >10 Chronic or Acute THI
El Dorado AQMD	New and Modified Sources	>1/million >1 HI	<10/million (and/or) ≤1 HI	≥10/million (or) >1.0 HI	None
Glenn County APCD	New and Modified Sources	≥1/million	<10/million (and/or) HI ≤1	None	≥100/million (or) >10 HI
Great Basin Unified APCD	New and Modified Sources	>1/million (and/or) HI of 1	<10/million	None	≥10/million (and/or) ≥ 1 HI
Imperial County APCD	New and Modified Sources	>1/million	≤1/million or ≤10/million w/T-BACT (and) HI ≤1 (and) cancer burden ≤0.5	None	>1/million or >10/million w/T-BACT (or) HI >1 (or) cancer burden >0.5
Kern County APCD	New and Modified Sources	>1/million (and/or) HI of 1 on permit unit	<10/million	None	≥10/million (and/or) ≥ 1 HI
Lake County APCD	New and Modified Sources	>1/million (and/or) HI of 1 on permit unit	<10/million	10/Million to 20/Million	≥20/million (and/or) ≥ 1 HI
Mojave Desert AQMD	New and Modified Sources	≥ 1/million	≤1/million or ≤10/million w/T-BACT (and) HI ≤1 (and) cancer burden ≤0.5	None	>1/million or >10/million w/T-BACT (or) HI >1 (or) cancer burden >0.5

2014 Permitting Levels for Various District Programs[1,2,3]

Organization	Applicability	TBACT Trigger Level	Approval Level	Approval with Specific Findings	Denial Level
Monterey Bay Unified APCD	New and Modified Sources	None	<10/million (and/or) <Reference Exposure Level (REL)	NA	≥10/million (and/or) ≥REL
Northern Sonoma County APCD	New and Modified Sources	≥1/million HI≥1	None	Would require Board approval	≥100/million HI≥10
Placer County APCD	New and Modified Sources	≥1/million	<10/million (and/or) HI ≤1	None	≥10/million (or) >1 HI
Sacramento Metro AQMD	New and Modified Sources	>1/million	<10/million (and/or) HI of 1	≥10 to <100/million	>100/million
San Diego County APCD	New, Modified, and Relocated Sources	>1/million	<10/million (and/or) <1 HI	≥10 to <100/million	>100/million
San Joaquin Valley APCD	New and Modified Sources	>1/million (and/or) HI of 1 on permit unit	<10/million	≥1/million (and/or) ≥1 HI	≥10/million (and/or) ≥ 1 HI
San Luis Obispo County APCD	New and Modified MAJOR Sources of HAPs	Applicable to all unless exempt or subject to specific MACT standard	NA	NA	NA
	New, Modified and Relocated Sources of Air Emissions of Toxic Substances	≥1.0/million (or) HHI of ≥0.10 on facility	<10.0/million (and) <1.0 Chronic or Acute HI	Included in ATHS Program and simultaneously implement Risk Reduction Audit & Plan	≥10.0/million (or) ≥1.0 Chronic or Acute HI
Santa Barbara County APCD	New and Modified MAJOR Sources of HAPs	Applicable to All	<10/million (and/or) ≤1.0 Chronic (and/or) Acute THI	None	≥10/million (and/or) >1 Chronic (and/or) Acute THI
	New and Modified Minor Sources of HAPs	None	<10/million (and/or) ≤1.0 Chronic (and/or) Acute THI	None	≥10/million (and/or) >1 Chronic (and/or) Acute THI
Shasta County AQMD	New and Modified Sources	> 1/million (or) > 1.0 THI	< 10/million (or) < 1.0 THI	< 100/million (or) < 10 THI	> 100/million (or) > 10 THI

2014 Permitting Levels for Various District Programs[1,2,3]

Organization	Applicability	TBACT Trigger Level	Approval Level	Approval with Specific Findings	Denial Level
South Coast AQMD	New, Relocated and Modified Sources	>1/million	≤1/million or ≤10/million w/T-BACT (and) HI ≤1 (and) cancer burden ≤0.5	None	>1/million or >10/million w/T-BACT (or) HI >1 (or) cancer burden >0.5
	New or Relocated Sources Near Schools	NA – Risk limits based on proximity to any school or school under construction	≤1/million and HI ≤1 if within 500 ft. of school or school under construction (or) if between 500-1000 feet of school or school under construction and no sensitive receptor within 150 feet	None	>1/million or HI >1 if within 500 ft. of school or school under construction (or) if between 500-1000 feet of school or school under construction and no sensitive receptor within 150 feet
Tehama County APCD	New and Modified Sources	≥1/million (or) ≥1 THI	<10/million (and) ≤1 THI	≥10 to <100/million (or) >1 to <10 THI	≥100/million (or) >10 THI
Tuolumne County APCD	None	None	None	None	None
Ventura County APCD	New, Modified, Replacement, or Relocated Unit	None	<10/million (and/or) HI <1	≥10 to ≤100/million (or) >1 to ≤10 THI	>100/million (or) >10 HI
Yolo-Solano AQMD	New and Modified Sources	Cancer risk >1/million (or) HI >1	Cancer <10/million; if HI >1 consult OEHHA	Cancer risk ≥10	>1/million or HI >1, if no T-BACT proposed. >10/million unless specific findings made by APCO

[1] Cancer risk is expressed as chances per million (x/million) and non-cancer impacts as a hazard index (HI), total hazard index (THI), or Reference Exposure Level (REL).
[2] Based on District survey response the following Districts do not have Board adopted rules or policies, or informal written policies and facilities are evaluated on a case by case basis: Amador County APCD, Calaveras County APCD, Feather River AQMD, Lassen County APCD, Mariposa County APCD, Mendocino County AQMD, Modoc County APCD, North Coast, and Siskiyou County APCD.
[3] Based on District survey responses to ARB and CAPCOA as of 5-14-15.
See http://www.arb.ca.gov/toxics/toxics.htm for any updates to these levels.

Appendix H

Table H: 2014 AB 2588 District Prioritization Scores and Risk Threshold Values

District	Prioritization Score threshold						Notification Level		Risk Reduction Audit and Plan	
	Cancer		Noncancer Chronic		Noncancer Acute		Cancer	Non-cancer	Cancer	Non-cancer
	High	Low	High	Low	High	Low				
Amador	≥10	≤1	≥10	≤1	≥10	≤1	≥10	≥1	≥10	≥1
Antelope Valley	10	1	10	1	10	1	10	1	100	10
Bay Area	≥10	<1	≥10	<1	≥10	<1	>10	>1	>100	>10
Butte	≥100	<1	≥100	<1	≥100	<1	10	≥1	none	none
Calaveras	none	none	none	none	none	none	10	none	10	none
Colusa	>10	<1	>10	<1	>10	<1	>10	>1	>10	>1
El Dorado	≥10	<1	≥10	<1	≥10	<1	none	none	none	none
Feather River	100	<1	100	<1	100	<1	10	1	none	none
Great Basin Unified	10	1	10	1	10	1	none	none	none	none
Glenn	10	1	10	1	10	1	10	1	none	none
Imperial	10	1	10	1	10	1	10	1	none	none
Kern	10	<1	10	<1	10	<1	10	1	100	5
Lake	10	1	10	1	10	1	none	none	20	none
Lassen	100	10	100	10	100	10	none	none	none	none
Monterey Bay Unified	≥10	≥10	≥10	≥10	≥10	≥10	>10	>1	>10	>1
Mendocino	10	1	10	1	10	1	10	1	none	none

Table H (cont'd): 2014 AB 2588 District Prioritization Scores and Risk Threshold Values

District	Prioritization Score threshold						Notification Level		Risk Reduction Audit and Plan	
	Cancer		Noncancer Chronic		Noncancer Acute		Cancer	Non-cancer	Cancer	Non-cancer
	High	Low	High	Low	High	Low				
Modoc	none	none	none	none	none	none	none	none	none	none
Mojave	10	1	10	1	10	1	10	1	100	10
Mariposa	none	none	none	none	none	none	none	none	none	none
North Coast Unified	50	10	50	10	50	10	10	1	none	none
Northern Sierra	≥10	≥1 <10	≥10	≥1 <10	≥10	≥1 <10	none	none	none	none
Northern Sonoma	10	1	10	1	10	1	10	1	100	10
Placer	10	1	10	1	10	1	≥10	≥1	≥10	≥1
Sacramento	10	1	10	1	10	1	≥10	≥1	10	>1
San Diego	100	1	10	1	10	1	10	1	100	1
San Joaquin Valley	10	1	10	1	10	1	10	>1	100	>5
San Luis Obispo	≥10	≤1	≥10	≤1	≥10	≤1	>10	>1	>10	>1
Santa Barbara	>10	<1	>10	<1	>10	<1	≥10	>1	≥10	>1
Shasta	100	1	100	1	100	1	10	1	10	1
Siskiyou	>100	<1	>100	<1	>100	<1	10	1	100	5

Table H (cont'd): 2014 AB 2588 District Prioritization Scores and Risk Threshold Values

District	Prioritization Score threshold						Notification Level		Risk Reduction Audit and Plan	
	Cancer		Noncancer Chronic		Noncancer Acute		Cancer	Non-cancer	Cancer	Non-cancer
	High	Low	High	Low	High	Low				
South Coast	10	1	10	1	10	1	≥10	>1 cancer burden ≥0.5	≥25	≥3
Tehama	100	1	100	1	100	1	none	none	none	none
Tuolumne	50	10	50	10	50	10	10	>1	10	>1
Ventura	≥10	≤1	≥10	≤1	≥10	≤1	≥10	≥1	≥10	≥1
Yolo-Solano	10	1	10	1	10	1	10	1	none	none

Last updated March 6, 2015.
See http://www.arb.ca.gov/ab2588/district_levels.htm for any updates to the table.

Appendix I

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