BAY AREA AIR QUALITY MANAGEMENT DISTRICT

BAAQMD

Air Toxics NSR Program

Health Risk Assessment (HRA) Guidelines

January 2016

BAY AREA AIR QUALITY MANAGEMENT DISTRICT
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BAAQMD Air Toxics NSR Program

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1. INTRODUCTION

This document describes the Bay Area Air Quality Management District's guidelines for conducting health risk assessments. Any health risk assessment (HRA) that is required pursuant to Regulation 2 Permits, Rule 1 General Requirements or Rule 5 New Source Review of Toxic Air Contaminants shall be conducted in accordance with these Air District HRA Guidelines.

In accordance with Regulation 2-5-402, the Air District HRA Guidelines generally conform to the Health Risk Assessment Guidelines adopted by Cal/EPA's Office of Environmental Health Hazard Assessment (OEHHA) for use in the Air Toxics Hot Spots Program. In addition, these guidelines are in accordance with State "Risk Management Guidance for Stationary Sources of Air Toxics" developed by the California Air Resources Board (ARB) and the California Air Pollution Control Officers Association (CAPCOA). The Air District will periodically update these Air District HRA Guidelines to clarify procedures or incorporate other revisions to regulatory guidelines.

2. PROCEDURES

The procedures described below constitute the Regulation 2-5-603 Health Risk Assessment Procedures. All HRAs shall be completed by following the procedures described in the OEHHA Health Risk Assessment Guidelines for the Air Toxics Hot Spots Program adopted by OEHHA on March 6, 2015 and using the recommended breathing rates described in the ARB/CAPCOA Risk Management Guidance for Stationary Sources of Air Toxics adopted by ARB on July 23, 2015.

The OEHHA HRA Guidelines contain several sections which identify (a) the overall methodology, (b) the exposure assessment assumptions and procedures, and (c) the health effects data (cancer potency factors and reference exposure levels).

A summary of OEHHA's HRA Guidelines and an index of the relevant documents are located at:

http://www.oehha.ca.gov/air/hot_spots/index.html

OEHHA's risk assessment methodology (February 2015) is located at:

http://www.oehha.ca.gov/air/risk_assess/index.html

The exposure assessment and stochastic technical support document (August 2012) is located at:

http://www.oehha.ca.gov/air/exposure_assess/index.html

The Technical Support Document for Cancer Potency Factors: Methodologies for Derivation, Listing of Available Values, and Adjustments to Allow for Early Life Stage Exposures (May 2009) is located at:

http://www.oehha.ca.gov/air/hot_spots/tsd052909.html

The Technical Support Document for the Derivation of Noncancer Reference Exposure Levels (June 2008) is located at:

http://www.oehha.ca.gov/air/hot_spots/rels_dec2008.html

The ARB/CAPCOA Risk Management Guidance for Stationary Sources of Air Toxics (July 23, 2015) provides guidance on managing potential health risks from sources subject to California air toxics programs and updates the Risk Management Policy for Inhalation Risk Assessments. It is located at:

http://www.arb.ca.gov/toxics/rma/rmaguideline.htm

Sections 2.1 through 2.6 below clarify and highlight some of the exposure assessment procedures including exposure assumptions (e.g., breathing rate and exposure duration), health effect values, and calculation procedures to be used for conducting Air District HRAs.

2.1 Clarifications of Exposure Assessment Procedures

This section clarifies and highlights some of the exposure assessment procedures that should be followed when conducting an Air District HRA.

2.1.1 Breathing Rate

On July 23, 2015, ARB adopted "Risk Management Guidance for Stationary Sources of Air Toxics", which includes an updated Risk Management Policy for Inhalation Risk Assessments. For the HRA methodology used in the Air Toxics NSR Program, the Air District has conformed with these State guidelines and adopted the exposure assessment recommendations made by ARB and CAPCOA. The policy considers the new science while providing a reasonable estimate of potential cancer risk for use in risk assessments for risk management

decisions. This policy recommends using a combination of the 95th percentile and 80th percentile daily breathing rates as the minimum exposure inputs for risk management decisions. Specifically, the policy recommends using the 95th percentile rate for age groups less than 2 years old and the 80th percentile rate for age groups that are greater than or equal to 2 years old.

To assess potential inhalation exposure to offsite workers, OEHHA recommends assuming a breathing rate of 230 L/kg-8 hours. This value represents the 95th percentile 8-hour breathing rate based on moderate activity of 16-70 years-old age range.

To assess exposure to children at schools and daycare facilities, OEHHA recommends using the 95th percentile moderate intensity breathing rates from Table 5.8 of OEHHA's HRA Guidelines. As a default, the Air District recommends using the breathing rate for 2<16 years (520 L/kg-8 hours) for children at schools. For a more refined analysis, the Air District will allow the use of breathing rates for other age ranges that are tailored to the ages of the children in the specific school under evaluation.

2.1.2 Exposure Frequency

Based on OEHHA recommendations, the Air District will estimate cancer risk to residential receptors assuming exposure occurs 24 hours per day for 350 days per year. For a worker receptor, exposure is assumed to occur 250 days per year. However, for some professions (e.g., teachers) a different schedule may be more appropriate. For children at school sites, exposure is assumed to occur 180 days (or 36 weeks) per year.

2.1.3 Exposure Duration

Based on OEHHA recommendations, the Air District will estimate cancer risk to residential receptors based on a 30-year exposure duration. Although 9-year and 70-year exposure scenarios may be presented for information purposes, risk management decisions will be made based on 30-year exposure duration for residential receptors.

For worker receptors, risk management decisions will be made based on OEHHA's recommended exposure duration of 25 years.

As a default, cancer risk estimates for children at school sites will be calculated based on a 9 year exposure duration, such as for a K-8 school. However, this exposure duration may be refined based on the specific school under evaluation (i.e. 6 years for a K-5 elementary school, 4 years for a 9-12 high school, or 3 years for a 6-8 middle school). For any analyses using an alternative to the 9-year default duration for school children, the breathing rate assumptions must also be adjusted in accordance with the ages of the children in the school.

2.2 Health Effects Values

Chemical-specific health effects values have been consolidated and are presented in the Air District's Permit Handbook Trigger Level Table for use in conducting HRAs. The Air District has added the 8-hour reference exposure levels (RELs) adopted by OEHHA to this table. The Air District will periodically update this table to include OEHHA's revisions to health effects values.

2.3 Cancer Risk Calculations

In accordance with OEHHA's 2015 HRA Guidelines, cancer risk estimates should incorporate age sensitivity factors (ASFs) and fraction of time at home (FAH) adjustment factors. Air District HRAs should follow OEHHA's recommended cancer risk calculation procedures as presented in Section 8.2 of OEHHA's 2015 HRA Guidelines.

For residential exposures, the cancer risk calculations should include the most sensitive age groups: from third trimester of pregnancy to 30 years of age for a 30-year exposure duration. For worker receptors, assume working begins at age 16 years.

2.3.1 Fraction of Time at Home (FAH)

For the initial cancer risk estimate, assume the fraction of time at home factors are equal to one (FAH = 1.0) for the following age bins: 3rd trimester to < 2 years and 2 to < 16 years. Use this initial analysis to assess if there are any schools within cancer risk isopleths of one in a million or greater. If there are no schools within one in a million or greater cancer risk isopleths, the cancer risk analysis may be refined by using the FAH factors for these age bins identified in Table 8.4 of the 2015 OEHHA Guidelines:

- FAH = 0.85 for age bin: 3rd trimester to < 2 years;
- FAH = 0.72 for age bin: 2 to < 16 years;
- FAH = 0.73 for age bin: 16 to 70 years.

2.3.2 Short Term Projects

In the 2015 HRA Guidelines, OEHHA recommends using actual project duration for short term projects, but cautions that the risk manager should consider a lower cancer risk threshold for very short term projects, because a higher exposure over a short period of time may pose a greater risk than the same total exposure spread over a much longer period of time. To ensure that short-term projects do not result in unanticipated higher cancer impacts due to short-duration high-exposure rates, the Air District recommends that the cancer risk be evaluated assuming that the average daily dose for short-term exposure lasts a minimum of three years for projects lasting three years or less. For residential exposures, the cancer risk calculations should include the most sensitive age

groups (beginning with the third trimester of pregnancy) and should use the 95th percentile breathing rates. The Air District recommends following OEHHA guidelines for other aspects of short term projects. In summary, the Air District recommends:

- use of actual emission rates over a minimum 3-year duration for cancer risk assessments involving projects lasting 3 years or less, and
- use of actual project duration for cancer risk assessments on projects lasting longer than 3 years.

2.4 Noncancer Health Impacts

In accordance with OEHHA's 2015 HRA Guidelines, noncancer health impacts should be calculated using the hazard index approach. Air District HRAs should follow OEHHA's recommended calculation procedures for noncancer health impacts, as presented in Section 8.3 of OEHHA's 2015 HRA Guidelines.

Regarding Section 8.3.5 of OEHHA's 2015 HRA Guidelines, the Air District does not require inclusion of the contribution of background criteria pollutants to respiratory health effects for Air District HRAs.

2.5 Spatial Averaging

Typically, HRA results for an individual receptor have been based on air dispersion modeling results at a single point or location. In the 2015 OEHHA Guidelines (Section 4.7.3), OEHHA provides a refinement option that takes into account that people move around within their property or workplace and do not normally remain at a single fixed point for the entire exposure duration. This spatial averaging refinement may be used for any chronic analysis in an Air District HRA. Spatial averaging is not appropriate for an acute analysis.

After the points of interest have been identified by the air dispersion modeling analysis, the ground level air concentration for each maximum impact point may be refined by using the arithmetic mean of the receptor concentrations identified within a spatial average grid instead of the single maximum impact point concentration. The modeler shall generally center the spatial average grid around the maximum impact point, but the modeler shall also consider facility boundaries, possible receptor locations, and predominant wind direction. This grid shall be of an appropriate shape, shall be no larger than 400 square meters, and shall have a receptor spacing within the grid of no more than 5 meters. Grid shape, size, and location are subject to Air District approval.

2.6 Stochastic Risk Assessment

For a stochastic, multipathway risk assessment, the potential cancer risk should be reported for the full distribution of exposure from all exposure pathways included in the risk assessment. For risk management decisions, the potential cancer risk from a stochastic, multipathway risk assessment should be based on the 95th percentile cancer risk.

3. Assessment of Acrolein Emissions

ARB has issued advisories regarding acrolein emissions data determined using ARB Method 430 (M430): http://www.arb.ca.gov/ei/acrolein.htm. The ARB advisories state that acrolein emissions data determined using ARB Method 430 are suspect and should be flagged as non-quantitative. Although acrolein emission factor data is available for several types of stationary combustion sources, this data was developed based on source tests that utilized ARB Method 430 or equally inaccurate test methods; therefore, the validity of this acrolein emission factor data is suspect. In addition, the tools the Air District needs to implement and enforce acrolein emission limits are not available due to the lack of an ARB approved acrolein test method for stationary sources.

In consideration of this information, the Air District has determined that acrolein emissions may be included in Air District HRAs for screening or informational purposes, but the Air District will exclude acrolein emissions from the final HRA results on which risk management decisions will be based.

References

1 *"Air Toxics Hot Spots Program Risk Assessment Guidelines; Guidance Manual for Preparation of Health Risk Assessments, ", OEHHA, February 2015*

2 *"Air Toxics Hot Spots Program Risk Assessment Guidelines; Technical Support Document for Exposure Assessment and Stochastic Analysis", OEHHA, August 2012*

3 *"Air Toxics Hot Spots Program Risk Assessment Guideline; Technical Support Document for Cancer Potency Factors: Methodologies for derivation, listing of available values, and adjustments to allow for early life stage exposures", OEHHA, May, 2009.*

4 *"Air Toxics Hot Spots Program Risk Assessment Guidelines; Technical Support Document for the Derivation of Noncancer Reference Exposure Levels", OEHHA, June 2008.*

5 *"Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values", California Air Resources Board, updated May 13, 2015.*

6 *"Risk Management Guidance for Stationary Sources of Air Toxics", Air Resources Board and California Air Pollution Control Officers Association, July 23, 2015.*