VENTURA COUNTY APCD
AIR TOXICS "HOT SPOTS" PRIORITIZATION PROCEDURE

PURPOSE OF PROCEDURES

Under the Air Toxics "Hot Spots" Program implementing the Air Toxics “Hot Spots” Information and Assessment Act of 1987 (Health and Safety Code §§ 44300 et. seq.), operators of certain facilities are required to prepare a comprehensive inventory of their releases of air toxics. Based on the air toxics emissions inventories, the Ventura Air Quality Control District (District) is required to "prioritize" facilities for health risk assessment. Facilities are categorized as high, intermediate, or low priority. High priority facilities are required to prepare health risk assessments. If the health risk assessment shows that there is a "significant risk" to the public due to air toxics emissions from a facility, the facility operator is required to notify the public of the results of the health risk assessment. Operators of facilities posing a “significant risk” are required to reduce the risk to a level of less than significant.

The District is required by state law to consider the following factors in setting priorities:

- Quantity of toxic air contaminants released
- Potency and toxicity of materials released
- Proximity of the facility to sensitive receptors
- Any other factors found by the District to indicate that the facility may pose a significant health risk to the public

PRIORITIZATION PROCEDURE

The procedure used by the District to prioritize facilities consists of up to three steps. These are: 1) the emissions and potency procedure, 2) review of past health risk assessment, and 3) review of current health risk assessment.

Emissions and Potency Procedure

The emissions and potency procedure is used as the first step in all prioritizations. The emissions and potency procedure is outlined in the Air Toxics "Hot Spots" Program Facility Prioritization Guidelines, prepared by the California Air Pollution Control Officers Association (CAPCOA), August 2016. These guidelines were developed by a committee comprised of representatives from regional air districts (including our District), the California Air Resources Board (CARB), and the Cal-EPA Office of Environmental Health Hazard Assessment (OEHHA).

The emissions and potency procedure involves calculation of one or more numerical scores for a facility based on the following factors: emissions, potency or toxicity of compounds emitted, and receptor proximity. The procedure is designed to be straightforward and to be applied consistently to every facility. Moreover, it assures that high risk facilities are ranked high priority.

The emissions and potency portion of the prioritization procedure is used to calculate numerical scores for each facility. Facilities receive one or more scores for potential effects: carcinogenic effects, chronic noncarcinogenic effects, and acute noncarcinogenic effects. Facilities are prioritized based on the highest of the calculated scores.

The emissions and potency score is calculated using emissions data from the air toxics emission inventory report submitted by the facility and toxicity data specified by OEHHA. For pollutants designated as "multipathway" compounds by OEHHA, a factor is used to modify the score. Multipathway compounds are substances that may be emitted to the air and subsequently deposited causing exposure through pathways other than inhalation, such as mother's milk, ingestion of contaminated soil, and dermal adsorption. The score is then modified to account for the distance from the facility to receptors: the more remote the facility, the lower the score. If the nearest receptor is a business, two scores are calculated for carcinogenic effects; one for the workplace receptor and one for the nearest residence. The higher of the two scores is then used.

A detailed description of the calculations used to determine the emissions and potency score is contained in Appendix A.

Facilities with scores less than or equal to 1 are categorized as low priority, and facilities with scores greater than or equal to 10 are categorized as high priority. All other facilities are placed in the intermediate priority category. The basis for these thresholds is stated in Appendix B.

If, based on the emissions and potency procedure, the facility is not high priority, prioritization is complete, and the two additional steps described below are not required.

Review of Prior Health Risk Assessment

Emission inventories are required to be updated every four years. Based on updated emissions inventories, facilities are again prioritized for health risk assessment. For the second and subsequent rounds of prioritization, the District uses an additional procedure in order to reduce the burden on affected facilities. To eliminate unnecessary health risk assessments, the District considers the results of any previous health risk assessments in determining the need for updated health risk assessments.

If the updated facility score based on the emissions and potency procedure is in the high priority category, the facility is re-categorized as intermediate priority if all of the following conditions are met:

1. The facility's most recent AB 2588 health risk assessment did not show the facility to be a significant risk;

2. Emissions from the facility either have not changed or have decreased;

3. Emissions of newly listed compounds from the facility will not increase calculated health risks; and

4. Release, receptor, exposure, or health effects data have not changed such that health risk of the facility might increase. Health effects data includes any changes to risk calculations recommended by OEHHA.

Review of Current Health Risk Assessment

If the facility score based on the emissions and potency procedure, or the combination of the emissions and potency procedure and review of the past health risk assessment, is in the high priority range, the facility may be re-categorized as intermediate priority based on the results of the required health risk assessment after OEHHA review and District approval.

Because the prioritization procedure is conservative, some facilities that are categorized as high priority are later determined to be below the District's significant risk threshold based on the results of a health risk assessment. Removing these facilities from the high priority category acknowledges that these facilities have demonstrated that they are not a "hot spot".

If, based on the results of the health risk assessment, the District determines that the facility may pose a significant risk; the facility will remain in the high priority category.

LACK OF DATA

Any facility that has not yet submitted an approved emission inventory report to the District will initially be placed in the intermediate priority category. When the report is approved, the facility's priority will be redetermined. These facilities will be subject to enforcement action for failure to submit reports in a timely manner.

APPENDIX A

EMISSIONS AND POTENCY PROCEDURE SCORE CALCULATION

Under the emissions and potency procedure, facilities receive one or more numerical scores: potential carcinogenic effect, potential chronic noncarcinogenic effect, and potential acute noncarcinogenic effect.

The unit risk factors, reference exposure levels, and multipathway identifications to be used are contained in the current version of the CAPCOA Air Toxics "Hot Spots" Program Risk Assessment Guidelines.

Carcinogenic Effects Score

For facilities that emit carcinogenic compounds, a facility score is calculated for carcinogenic effects according to the following equation:

$$TS = (\sum E_c P_c NI_c)(RP)(WEF)7.7x10^3$$

Where:

TS = total facility score (carcinogenic effects)
c = specific carcinogenic substance
E_c = emissions of compound c, lbs/yr
P_c = unit risk factor for compound c
NI_c= non-inhalation exposure adjustment factor for compound c
NI = 10 for compounds identified by OEHHA as multipathway pollutants
NI = 1 for all other compounds
RP = receptor proximity adjustment factor (Table I)
WEF = workplace exposure factor (0.5 for workplace receptors, 1 for residential receptors)
$7.7x10^3$ = normalization factor (Appendix B)

Noncarcinogenic Effects

For facilities that emit compounds which have non-cancer health effects, facility scores are calculated for chronic and acute noncancer effects according to the following equation:

$$TS^* = (\sum E_t NI_t/P_t)(RP)(NF)$$

Where:

TS* = total facility score (chronic or acute non-carcinogenic effects)
t = specific toxic substance
E_t = emissions of compound t, lbs/hr (average or maximum)
NI_t = non-inhalation exposure adjustment factor for compound t
NI = 10 for chronic exposure to compounds identified by OEHHA as multipathway pollutants
NI = 1 for all other compounds and all acute exposures
P_t = acceptable exposure level of t, $\mu g/m^3$
RP = receptor proximity adjustment factor (Table I)
NF = normalization factor (Appendix B)
NF = 150 for chronic exposure
NF = 1500 for acute exposure

Receptor Proximity Factors

Table I
Receptor Proximity Adjustment Factors

Receptor Proximity (R, meters)	RP (dimensionless)
0<R<100	1
100<R<250	0.25
250<R<500	0.04
500<R<1000	0.011
1000<R<1500	0.003
1500<R<2000	0.002
R>2000	0.001

The receptor proximity factor is used to reduce a facility's score if there are no receptors or potential receptors nearby.

The receptor proximity factor is based on the distance from the facility to the nearest receptor. A receptor may be a residence, school, day care center, hospital, or workplace; or an area zoned for these uses. The receptor proximity is determined by taking the distance from the facility's nearest emitting source to the nearest receptor. If the nearest receptor is a workplace, the distance to the nearest residential receptor location must also be determined. Where adequate information on the receptor proximity is not available, a receptor proximity factor of 1 will be used.

Non-inhalation Adjustment Factor

For pollutants identified by OEHHA as multipathway pollutants, the score for that pollutant is multiplied by a non-inhalation exposure adjustment factor of 10. This factor is to account for the additional exposure to air releases of the pollutants through pathways such as dermal exposure, soil ingestion, mother's milk, surface water ingestion, and food uptake and ingestion. This factor is based on results of multipathway risk assessments which have shown that exposure through non-inhalation pathways may be much greater than inhalation exposure. Factors of just over 1 to several orders of magnitude have been calculated. Ten was chosen as a reasonable mid-range value. The multipathway pollutants identified by OEHHA are listed in the current version of the CAPCOA Air Toxics "Hot Spots" Program Risk Assessment Guidelines.

Workplace Adjustment Factor

For receptors identified as workplaces, the carcinogen score for the facility is multiplied by a workplace exposure factor. This factor is to account for the decreased exposure of offsite workers compared to residents. Early life exposures are not an issue for workplace receptors. Using worst case workplace exposure assumptions, compared to residential exposure, it was determined that workplace exposure will be half or less than residential exposure. Worse case worker exposure occurs when the emitting facility operates the same hours as the exposed worker (e.g., 8 hr/d, 5 d/wk). Note that the workplace adjustment factor does not apply if there is an onsite daycare center or other presence of infants or children. The workplace adjustment factor applies only to the carcinogen score. Based on information from OEHHA, exposure time adjustments should not be used for noncarcinogens.

APPENDIX B

BASIS FOR EMISSIONS AND POTENCY THRESHOLDS

The following is an explanation of the basis for the numerical thresholds of 10 and 1 for high and low priority, respectively. It is not possible to determine health risk from a facility based on the calculated score using the prioritization procedure. Only upon completion of a comprehensive risk assessment will the risks posed by facilities be adequately characterized. However, using a conservative modeling scenario, the **maximum** risk associated with a certain score can be determined. Under this approach, facilities that do not significantly impact receptors may be identified as high priority. Facilities ranked as low priority can be considered insignificant risk facilities.

The thresholds were developed by first developing a relationship between the emission rate and the resulting maximum ambient concentration. A worst case "risk" can be determined based on the ambient concentration and data on the toxicity of the compounds in question. By using the relationship between emissions and concentration and the relationship between concentration and risk, a score based on emissions and toxicity of a compound was determined that corresponds to a specific level of risk.

The normalization factor is used to relate the emission rates, ambient concentration, toxicity, and risk.

Cancer Normalization Factor

The cancer normalization factor was developed to incorporate OEHHA's new guidance and updated dispersion model (AERMOD). Specifically, modeling was conducted using EPA's preferred model AERMOD with 20 meteorological stations, a receptor grid from 25 meters to ~3020 meters (~500,000 receptors), and 44 sources (diesel engines, natural gas engines, boilers, and steam generators). An analysis was conducted to: 1) calculate risk using the 2015 OEHHA guidance, 2) determine the sum of the products of the emissions and unit risk factors for each pollutant, 3) calculate a normalization factor for each modeled source receptor combination, and 4) determine the normalization factor that represents the 95 percentile (7,700) of all the normalization values generated.

The analysis included the calculations for a 30-year risk period since this option is recommended by OEHHA in calculating residential cancer risk. However, to be conservative, the final cancer normalization factor selection is based on the 70-year cancer risk scenario since it ensures that 95% of the evaluated sources (including both 70-year and 30-year periods and the engines and boilers evaluated) are captured.

Emissions were calculated for each type of equipment using standard air toxics emission factors. Typical stack data (height, diameter, temperature, flow rate) was determined for each based on the size of the equipment.

The emissions of each compound, in pounds per year, were multiplied by the applicable unit risk factor from OEHHA. The sum of this product was determined for all emitted compounds.

The new OEHHA methodology and new dispersion modeling (AERMOD) was used to calculate the facility risk for both 70-year and 30-year exposure periods. The 95th percentile breathing rates were used for this evaluation. For the dispersion modeling, concentrations were calculated for 25 meter grid spacing for each emissions unit size/capacity and using meteorological data from 20 met stations. The maximum concentration values for each distance from the 20 met data runs were selected to run the risk calculation comparison. Both Rural and Urban options were evaluated. Risk is reported as x in a million population. The risk was multiplied by 1,000,000 to normalize the risk. This puts the potential risk on a convenient scale and is referred to as the normalized risk.

For each emission unit, the calculated normalized risk was divided by the sum of the products of the emissions and unit risk factors. The result is the "normalization factor" that relates the risk to the emissions and potency.

For example, for a 100 HP diesel engine at 200 meters from the receptor, the emissions were estimated as 0.0022 lb/yr of diesel particulate matter. The unit risk factor for diesel particulate matter is 3×10^{-4} $(\mu/m^3)^{-1}$. The product of the emissions and the unit risk factor is 6.6×10^{-7}. The 70-year cancer risk using the 2015 OEHHA guidance was calculated to be 2.07718×10^{-9} at 200 meters, or 0.00207718 in a million. Dividing the normalized risk by the emissions and unit risk factor gives the new normalization factor: $0.00207718/6.6 \times 10^{-7}=3140$.

After computing the normalization factor for each of the combinations described above, the range of normalization factors was reviewed. Since selecting the maximum would be overly conservative and resulting prioritization score would signify every source a high priority, the derived normalization factor based on the 95th percentile value, which would include 95% of the evaluated sources, was considered for both the 70-year and 30-year evaluation period. This evaluation focused on diesel IC engines and boilers. After considering the results, the new normalization factor of 7700 was selected as it represented the threshold where at least 95% of the evaluated sources would theoretically have a risk greater than 1 in a million.

Noncancer Normalization Factors

The noncancer normalization factors were developed a number of years ago, using older OEHHA guidelines. CARB performed conservative modeling using ISCST and PTPLU dispersion models. An emission rate of one pound per hour was modeled under various release scenarios, along with 49 combinations of wind speed and stability. The peak one-hour concentration at the maximum impacted receptor was determined. The highest modeled peak one-hour concentration was 1,458 $\mu g/m^3$. This peak concentration occurred approximately 50 m downwind of a release at a height of 1 m for D stability and a wind speed of 0.5 m/s.

The peak one-hour concentration of μ/m^3 was multiplied by a CARB scaling factor of 0.1 to estimate a peak annual average concentration of 145.8 $\mu g/m^3$. The annual average concentration varies linearly with the emission rate. Based on this result, it was determined that an emission rate of approximately 60 lb/yr would result in an annual average concentration of less than 1 μ/m^3. That is, under most circumstances and emission rate of 60 lb/yr would result in an annual average concentration of less than 1 $\mu g/m^3$ at a distance of 50 m or more from the release.

With CARB's calculated relationship between emission rate and concentration, a minimum score (threshold) associated with a specific level of risk can be determined. Facilities with lower scores than the threshold are expected to result in lower risks than the level from which the threshold was derived. Facilities with higher scores do not necessarily result in higher risks, however, because of the very conservative modeling scenario used.

Scores and normalization factors can be identified for non-carcinogens based on the relationship between emission rate and the peak annual concentration for chronic health effects and the peak one hour concentration for acute health effects based on chronic and acute noncancer "reference exposure levels" developed by OEHHA.

For non-cancer health affects (acute and chronic) normalization factors, the analysis did not indicate a significant change to those currently used and therefore, no changes to the non-cancer normalization factors were proposed.

For the conservative modeling scenario used, a score of 10 approximately translates to a risk of 10 in a million for carcinogens and the acceptable exposure level for non-carcinogens. However, facilities with considerably lower risks may also receive scores of 10 or more and be designated as high priority.

The low priority threshold of 1 corresponds to a risk of one in a million for carcinogens and a tenth of the reference exposure level for non-carcinogens, based on the conservative modeling scenario. Facilities that have scores greater than 1 may actually result in risks considerably less than 1 in a million. Because of the conservative nature of the modeling scenario facilities with scores less than 1 are not expected to result in risks greater than 10 in a million for carcinogens and the reference exposure level for non-carcinogens.