



# Senior Flexonics

## Ketema Aerospace & Electronics Division Facility

**Location:** 790 Greenfield Drive, El Cajon, CA 92021

**Facility Contact:** Richard Whaley

**Facility Description:** Ketema fabricates various metal parts which are used in applications such as jet and rocket engines. Operations considered in the health risk assessment include metal coating, metal deposition, precision welding, degreasing, and abrasive blasting.

### Health Risk Assessment Summary

**Year:** 1994  
**Cancer Risk:** 4.5 in a million  
**Chronic Index:** 0.02  
**Acute Index:** 4.24

### Pollutants of Concern

**Cancer Risk:** Hexavalent chromium ([ARB compound summary](#), [EPA hazard summary](#))  
**Acute Non-cancer Risk:** Nickel (endpoint = immune system)  
([ARB compound summary](#), [EPA hazard summary](#))

Air Toxics  
'Hot Spots'  
Program

## 1994 Health Risk Assessment Summary for the Ketema Aerospace and Electronics Division Facility

790 Greenfield Drive, El Cajon, California

### 1.0 Executive Summary

This health risk assessment (HRA) estimates potential public health risks for the Ketema Aerospace and Electronics (A&E) Division facility located at the 790 Greenfield Drive in El Cajon, California. It was prepared in accordance with requirements of the California Air Toxics "Hot Spots" Information and Assessment Act and is based on estimated facility emissions for the 1994 calendar year. Potential cancer as well as non-cancer offsite health impacts were evaluated. The results of the HRA will be used to evaluate the applicability of public notification and risk mitigation requirements specified in San Diego Air Pollution Control District Rule 1210.

### 1.1 Description of the Facility and Emissions

The Ketema A&E Division facility is located at 790 Greenfield Drive in El Cajon. The facility is located on a 20 acre site and consists of 15 building with an approximate total of 240,000 square feet under roof. The facility fabricates various metal parts which are used in applications such as jet and rocket engines. Metal coating, metal deposition,

precision welding, degreasing and abrasive blasting operations at the facility emit a variety of toxic air contaminants which were quantified by the District for the 1994 calendar year. The facility has been located at it’s current locations since about 1968. A map that shows the facility location is provided as Figure 1. Figure 2 provides a more detailed view of the facility including facility boundary and emission source locations.

## 1.2 Health Risk Assessment Procedure

This refined health risk assessment evaluates cancer risk and non-cancer chronic and acute health hazard indices for the point of maximum impact as well as residential, occupational and sensitive receptors. The HRA was prepared in accordance with the California Air Pollution Control Officers Association (CAPCOA) Air Toxics “Hot Spots” Program (Revised 1992) Risk Assessment Guidelines, and the Guidelines for Preparing Health Risk Assessments in Accordance with the Requirements of the Air Toxics “Hot Spots” information and Assessment Act, San Diego County Air Pollution Control District, December 16, 1997.

Adverse health effects are reported as “excess lifetime cancer risk”, “population excess cancer burden”, or as a “total hazard index”. Excess lifetime cancer risk is the maximum estimated increased risk of cancer at a specific location following chronic exposure to a chemical suspected of being a human carcinogen, and is expressed as the probability of a person contracting cancer over a lifetime (70 years) of exposure to



Figure 1 – Facility Location



Figure 2 – Facility Diagram

chemical emissions. Population excess cancer burden is an estimate of the increased number of cancer cases as a result of exposure to emitted substances.

Non-cancer risk is based on the aggregate health impact of toxic air contaminant emissions on specific organs or systems in the body. The potential for health impacts is called hazard indices (HI) and is calculated as the ratio of the estimated exposure to a particular hazardous air pollutant to the reference exposure level (REL) for that compound. The REL is generally the level at (or below) which no adverse health impacts are expected. The sum of the hazard indices is called the total hazard index (THI) and is an indication of the likelihood of experiencing chronic or acute (non-cancer) health effects. A total hazard index of less than one (1.0) is not likely to result in adverse health effects to exposed persons in the population including sensitive individuals. With a THI above one, there is a greater potential that adverse health impacts may result.

Excess individual lifetime cancer risk and total hazard indices were quantified at the point of maximum impact (PMI), and for the maximum exposed individual (MEI). The MEI risk is calculated for both the maximum exposed individual resident (MEIR) and the maximum exposed individual worker in an occupational setting (MEIO). In addition, risks are calculated for sensitive receptors in the study area (if any) and the population excess cancer burden is calculated within the zone of impact (ZOI) of the facility.

The PMI represents the maximum estimated risk value at any offsite receptor location including locations at which human exposure would not be expected. For example, a PMI could occur in a vacant field adjacent to the facility even though there may be no (long term) human exposure at that point. Although the estimated risk values are calculated for the PMI, they are not used to determine public notification or risk reduction requirements. The MEIR and MEIO represent the maximum estimated risk value at any offsite receptor location at which people could be exposed at their residence (MEIR) or place of work (MEIO).

### 1.3 Summary of Health Risk Assessment Results

Table 1 summarized the cancer risks at the point of maximum impact (PMI) as well as the maximum exposed individual resident (MEIR) and the maximum exposed individual in an occupation setting (MEIO).

**Table 1 – Summary of Estimated Excess Cancer Risk**

<b>Maximum Individual Cancer Risk</b>	<b>Risk Value</b>	<b>Receptor Location (UTM Coordinates - East, North)</b>
PMI	4.50 in one million	On east side of facility (504639, 3630748)
MEIR	4.50 in one million	On east side of facility (504639, 3630748)
MEIO	0.98 in one million	On west side of facility (504326, 3630798)

The maximum estimated cancer risk at an occupied receptor due to emissions from this facility is 4.5 in one million at the MEIR. The MEIR occurs east of the facility near the facility property line. The maximum estimated risk an occupational location (MEIO) is 0.98 in one million and is located west of the facility. A map showing the PMI, MEIR, MEIO and sensitive receptors (if any) is presented as Figure 3. The estimated risk value at the MEIO and MEIR (based on 1994 emissions) do not exceed the cancer risk public notification level (10 in one million) specified in District Rule 1210

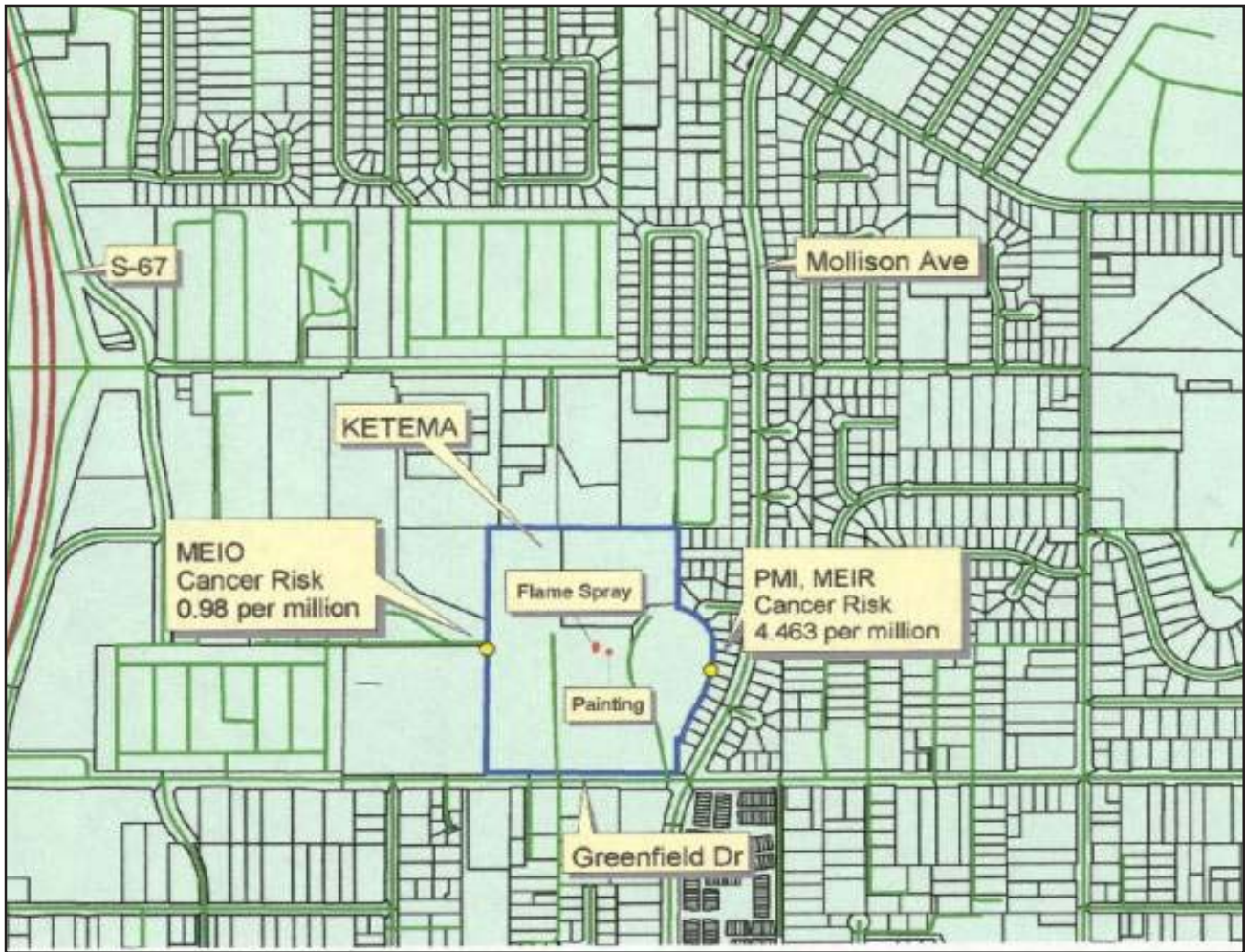


Figure 3 – Estimated Cancer Risk – PMI, MEIR, MEIO and Sensitive Receptors

Table 2 summarizes the estimated cancer burden. Five census tracts were evaluated. Cancer burden (for both residents and workers) was calculated for each census tract. Estimated cancer burden (0.017) is significantly less than the cancer burden public notification level (1.0) specified in District Rule 1210.

Table 2 – Summary of Estimated Cancer Burden

Census Tract	Cancer Risk	Occupational Cancer Risk	Resident Population	Resident Burden	Worker Population	Worker Burden	Total Burden
162.02	9.67E-08	3.19E-08	3,325	3.22 E-04	16,846	5.37E-04	8.59 E-04
163	1.77E-07	5.84E-08	9,811	1.74 E-03	1,864	1.09E-04	1.85 E-03
165.01	1.07E-06	3.54E-07	8,725	9.34 E-03	1,883	6.67E-04	1.00 E-02
165.02	5.59E-07	1.85E-07	6,616	3.70 E-03	1,800	3.33E-04	4.03 E-03
167.01	8.73E-08	2.88E-08	7,466	6.52 E-04	1,183	3.41 E-05	6.86 E-03
<b>Total</b>				<b>1.57 E-02</b>		<b>1.68 E-03</b>	<b>1.74 E-02</b>

**Table 3 – Summary of Estimated Chronic and Acute Non-cancer Health Risks**

Health Risk	Hazard Index (THI)	Receptor Location (UTM Coordinates)	
<b>Chronic</b>	PMI	0.020	East of facility (504639, 3630748)
	MEIR	0.020	East of facility (504639, 3630748)
	MEIO	0.014	West of facility (504326, 3630798)
<b>Acute</b>	PMI	4.24	West of facility (504326, 360751)
	MEIR	2.86	West of facility (504326, 3630922)
	MEIO	4.24	West of facility (504326, 360751)

Table 3 summarizes the estimated chronic and acute non-cancer health risks.

The maximum estimated chronic health hazard index at an occupied receptor due to emissions from this facility is 0.020 at the MEIR. The MEIR is east of the facility near Mollison Avenue. The maximum estimated chronic hazard index at an occupational location (MEIO) is 0.014 and is located west of the facility.

A map showing the PMI, MEIO, MEIR and sensitive receptors in the study area (if any) is presented as Figure 4. The chronic non-cancer total hazard index does not exceed the public notification level and significant risk mitigation level (1.0 THI) specified in District Rule 1210.

The maximum estimated acute health hazard index at an occupied receptor due to emissions from this facility is 4.24 at the MEIO. The MEIO occurs west of the facility. The maximum estimated acute hazard index at a residential location (MEIR) is 2.86 and is located west of the facility.



**Figure 4 – Estimated Chronic Non-cancer THI - PMI, MEIO, MEIR and Sensitive Receptors**

A map showing the PMI, MEIO, MEIR and sensitive receptors in the study area (if any) is presented as Figure 5.

Nickel emissions from a metal deposition operation (source 30630) are the primary contributor to the acute hazard index. The toxic end-point is the immune system. This acute noncancer total hazard index at the MEIO exceeds the public notification level and significant risk mitigation level (1.0 THI) specified in District Rule 1210.

Detailed summaries of all health risk assessment results are presented in Section 5.0 and the supporting tables of this report.



Figure 5 – Estimated Acute Non-cancer THI - PMI, MEIO, MEIR and Sensitive Receptors

## 2.0 Introduction and Background

### 2.1 The Air Toxics “Hot Spots” Program (AB2588)

The California Air Toxics “Hot Spots” Information and Assessment Act (AB2588) was enacted by legislature in 1987 to address public concern over the release of toxic air contaminants into the atmosphere. The law requires facilities that emit toxic substances to provide local air pollution control districts with information that will allow an assessment of air toxic emissions, identification of air toxic “hot spots,” notification of the public exposed to significant health risk, and development of effective strategies for reducing potential risks to public health.

This statewide program is implemented by air districts using guidance developed by the California Air Resources Board (ARB), the state Office of Environmental Health Hazard Assessment (OEHHA), and the California Air Pollution Control Officers Association (CAPCOA). District Rule 1210 (Toxic Air Contaminant Public Health Risks - Public Notification and Risk Reduction) adopted in 1996 specifies the public notification and risk reduction requirements of the program.

The SDAPCD is the local implementing agency for all regulated facilities in San Diego County. The SDAPCD periodically requires facilities to submit information used to achieve the objectives of the program. Program elements include:

- Emission Inventory Plans and Reports – Each four years, the SDAPCD inventories facilities in order to calculate toxic air contaminant emissions from all emission units at the facility. SDAPCD calculates emissions based on data such as material process information, material throughput, and emission estimation techniques developed or approved by the District.
- Health Risk Assessments – Based on facility emissions and the toxicity of those emissions, the SDAPCD prioritizes facilities to determine if a health risk assessment is required. Facilities required to submit health risk assessments must evaluate the quantity and toxicity of the compounds being emitted

from the facility and the level of public exposure to determine the potential for adverse public health impacts. The HRAs are reviewed and approved by the District and OEHHA.

- **Public Notification** – If a facility’s health risk assessment indicates potential public health risk above established Public Notification levels, the facility must notify all exposed individuals. Notification levels as specified in District Rule 1210 are 10 in one million for cancer risks, a cancer burden of 1.0, or a chronic or acute health hazard index of 1.0 or greater (up to 5.0 based on evaluation of potential of public health impacts and after discussions with OEHHA).
- **Risk Reduction Audits and Plans** – If a facility’s health risk assessment indicates levels above the Risk Reduction level, the facility must submit a risk reduction audit and plan that demonstrates how the facility will reduce health risks below significant levels. Significant Risk Mitigation levels as specified in District Rule 1210 are 100 in one million for cancer risks, a cancer burden of 1.0, or a chronic or acute health hazard index of 1.0 or greater (up to 5.0 based on evaluation of potential of public health impacts and after discussions with OEHHA).
- **Annual Report** – The AB2588 annual report provides an inventory of emissions, summarizes priorities and progress of the program, ranks facilities, and describes the status of development of control measures to reduce emission of toxic air contaminants. These reports are used by health officials to develop strategies for protecting the public health.

## **2.2 The Hot Spots Program Health Risk Assessment**

Public health risk assessment is the process of gathering and evaluating available information related to the potential for exposure to toxic substances and estimating the magnitude and potential consequences of these exposures. Risk assessments typically consist of four components: hazard identification, dose-response assessment, exposure assessment, and risk characterization. Each of these components as they relate to this HRA are described in Section 4.0 below.

This health risk assessment was conducted in accordance with the following guidance. The California Air Pollution Control Officers Association (CAPCOA) Air Toxics “Hot Spots” Program Risk Assessment Guidelines were published by CAPCOA in June 1989. These guidelines were updated in January 1991 and October 1993. The purpose of the CAPCOA guidelines is to establish consistency in analytical and reporting methodology and to expedite agency review. Additional guidance is provided by the Guidelines for Preparing Health Risk Assessments in Accordance with the Requirements of the Air Toxics “Hot Spots” Information and Assessment Act, San Diego County Air Pollution Control District, December 16, 1997.

The California Air Pollution Control Officers Association (CAPCOA) Air Toxics “Hot Spots” Program Risk Assessment Guidelines were recently updated by the adoption of new or revised cancer unit risk factors and acute reference exposure levels. These new or revised values were used in this health risk assessment,

This HRA will be reviewed for completeness and accuracy by OEHHA prior to approval. Until such time that the HRA is reviewed and approved, the results should be considered preliminary.

## **3.0 Facility Description**

### **3.1 Location and Surroundings**

The Ketema A&E Division facility is located at 790 Greenfield Drive in El Cajon. A map that shows the facility location is provided as Figure 1. Figure 2 provides a more detailed view of the facility including facility boundary and source locations. The nearest residences are located east of the facility on Mollison Avenue.

### 3.2 Facility Operations

The facility is a manufacturer of aerospace and electrical components. Metal coating, metal deposition, precision welding, degreasing and abrasive blasting operations at the facility emit a variety of toxic air contaminants which were quantified by the District for the 1994 calendar year.

### 3.3 Facility Emission Rates

This health risk assessment is based on facility emissions for the 1994 calendar year. Emissions were calculated by the District using standardized emission estimation procedures and process information supplied by the facility. Based on a review of prioritization scores, compounds and sources that would not contribute significantly (more than a few percent) to risk were eliminated from analysis in the HRA. Metal deposition processes (APCD permit numbers 88152 and 30630) and a paint spray booth (permit number 4379) were found to be the only significant sources of toxic emissions. A summary of emission rates used in the health risk assessment are presented in Table 4.

**Table 4 – Summary of 1994 Facility Toxic Emissions**

Toxic Compound	Annual Emissions (lbs/yr)	Maximum Hourly Emissions (lbs/hr)
Butanol	0.3	0.306
Chlorofluorocarbons	27	0.474
Chromium (hexavalent)	0.06	0.001
Chromium (nonhexavalent)	0.85	0.022
Copper and Copper Compounds	<0.1	0.002
Formaldehyde	0.7	0.008
Hydrogen Fluoride	180	0.03
Lead and Lead Compounds	0.1	0.002
Methyl Chloroform	13,585	12
Methyl Ethyl Ketone	26.4	0.3
Nickel and Nickel Compounds	4.3	0.12
Toluene	53.4	0.605
Xylenes	0.1	0

*Note: The emission rate values presented in the ACE2588 program output are corrected for process operating schedule and therefore may not correspond with the values presented above.*

## 4.0 Assessment Methodology

### 4.1 Hazard Identification

Hazard identification is the process of determining whether a chemical may be linked to a particular health effect. During the hazard identification process a large amounts of information is evaluated to make a qualitative determination of whether a pollutant is a human carcinogen or is associated with other types of adverse health impacts. Toxics air contaminants that may result in adverse health impacts are divided into two broad categories; carcinogens and noncarcinogens.

### 4.2 Dose Response Assessment

Dose response assessment is the process of determining the quantitative relationship between the exposure to a toxic compound and the occurrence of adverse health impacts. For carcinogens, the dose response relationship is expressed as a potency slope (or unit risk factor) which is used to calculate the probability or risk of cancer associated with a given exposure level. For noncarcinogens the dose response data are used to develop noncancer reference exposure levels (RELs). RELs developed to characterize health effects caused by long term exposure are termed chronic RELs. RELs developed to characterize health effects caused by short term exposure are termed acute RELs. Hazard identification and dose response assessments are performed by OEHHA and published for use by air districts. A summary of the health effects data used in this HRA are presented in Table 5.

## 4.3 Exposure Assessment

Exposure assessment is the process of estimating the extent of public exposure to each toxic air contaminant for which dose response data is available. Exposure assessment involves emission quantification, air dispersion modeling, evaluation of environmental fate, identification of exposure routes, identification of exposed populations, and estimation of long-term annual and short term (acute) exposure levels.

### 4.3.1 Air Dispersion Model Description

The Industrial Source Complex Short Term (ISCST3) model was used in this HRA to evaluate air dispersion. ISCST3 is a straight-line gaussian model, capable of handling complex, multiple emission point sources. ISCST3 includes algorithms that treat point, area, volume and lines sources, stack tip and building downwash and can be used in simple (flat) and complex terrain. Standard regulatory default model settings were used. ISCST3 dispersion modeling inputs and output are included in Appendix B.

### 4.3.2 Meteorological Data

The ISCST3 dispersion model requires sequential hourly meteorological data. Data includes wind speed and direction, ambient temperature, rural mixing height and stability class. In San Diego county, surface meteorological data are available for San Diego Lindbergh Field and Miramar Marine Corps. Air Station. Upper air meteorological data is available for Miramar Marine Corps. Air Station only.

Generally, for locations influenced primarily by maritime air masses, Lindbergh Field surface data is used with the Miramar upper air data. For inland locations, surface and upper air data for Miramar are typically used. Miramar surface and upper air data were used for this analysis. Three years of meteorological data (1991, 1992, and 1993) were used. The data was modified so that the minimum mixing height for any hour is not less than 100 meters. Acute exposures were based on worst-case hour conditions. Chronic and cancer exposures were based on 3-year average conditions.

### 4.3.3 Receptor Grid

The goal of developing a receptor grid is to ensure that the maximum impact points are identified. Several types of receptor grids are typically used in a refined health risk assessment. To initially define the zone of study, an expansive receptor grid is developed. Once the extent of the zone of study is determined, more dense receptor grids (not more than 100 meter spacing) is used to identify the maximum impact points. Maximum impact points include the point of maximum impact (PMI), and the maximum exposed individual risk which is calculated for both the maximum exposed individual resident (MEIR) and the maximum exposed individual worker in an occupational setting (MEIO).

### 4.3.4 Building Downwash

The concentration of toxic compounds at some nearby receptors may be affected by building down-wash. Building wake down-wash parameters were evaluated using the Environmental Protection Agency's Good Engineering Practice - Building Profile Program (GEP-BPIP). Figure 2 shows the facility and the sources used in the analysis. GEP-BPIP input and output files are provided in Appendix C.

## 4.4 Risk Characterization

Risk characterization is the integration of health effects and public exposure data to quantify both population wide and individual health risks.

#### 4.4.1 Risk Assessment Model

Health impacts were characterized at each receptor location using the ACE2588 (Assessment of Chemical Exposure) risk assessment model (Version 93288). Health impacts were characterized for cancer risk and acute and chronic non-cancer health hazards using the annual and 1-hour maximum ground level concentrations provided by the ISCST3 model. For multipathway carcinogens, the ACE2588 model calculates the individual excess cancer risk by adding together the contribution from each applicable exposure pathway including inhalation, soil ingestion, dermal exposure, ingestion of home grown food and mothers milk.

ACE2588 model outputs are presented in Appendix D. The ACE2588 model output provide a variety of information about emissions, receptor fields used, terrain elevations, peak 1-hour and average annual concentrations for all compounds at all receptors, cancer risk by pathway at all receptors, acute hazard indices by endpoint at each receptor, chronic hazard indices by endpoint at each receptor, and the contribution to the cancer risk, and acute and chronic noncancer risk by compound at the peak receptor(s). Emission rate values presented in the ACE2588 model outputs are corrected for process operating schedule and therefore may differ from annualized emission rates.

Unit risk factors, oral cancer potency factors, and acute and chronic acceptable exposure levels for non-cancer compounds used in the preparation of this HRA are from the California Air Pollution Control Officers' Association (CAPCOA), "Air Toxics 'Hot Spots' Program Revised 1992 Risk Assessment Guidelines," October 1993, or OEHHA recommended revisions to those values.

#### 4.4.2 Cancer Risk and Non-cancer Health Hazard Index Assessment Methodology

The ISCST3 model was run using a 1-gram per second emission rate to determine the annual and maximum hourly dilution factor. Dilution factor is expressed as a concentration per unit emission ( $\mu\text{g}/\text{m}^3$  per  $\text{g}/\text{s}$ ) at each receptor location. Dilution factors are then multiplied by the source emission rate for each compound to obtain the maximum hourly and annual average concentration for each compound (per source). The annual average concentration multiplied by the unit risk factor (URF) yields the lifetime inhalation cancer risk per compound. Risks are calculated individually by source at each receptor location. Inhalation cancer risk is calculated according to the following equation:

$$\text{Cancer Risk}_i = \sum_j \sum_k [(X/Q)_{ij} \times Q_{jk} \times \text{URF}_k]$$

Where:

- $i, j, k$  = Individual receptors (i), sources (j), or pollutants (k),
- $\sum$  = The summation over sources (j) or pollutants (k),
- $(X/Q)_{i,j}$  = Dilution factor ( $\mu\text{g}/\text{m}^3 / \text{g}/\text{s}$ ) at receptor (i) for source (j),
- $Q_{j,k}$  = Emission rate ( $\text{g}/\text{s}$ ) from source (j) of pollutant (k), and
- $\text{URF}_k$  = Unit risk factor ( $\mu\text{g}/\text{m}^3$ )<sup>-1</sup> for pollutant (k).

Population excess cancer burden is calculated using the following equation:

$$\text{Population Excess Cancer Burden} = \sum_i (R_i \times P_i)$$

Where:

- $i$  = Individual census tracts within the zone of impact
- $\sum$  = The summation over individual census tracts (i)
- $R_i$  = Risk at individual census tracts
- $P_i$  = Population at individual census tracts

Population Excess Cancer Burden is calculated for both worker and residential populations in each census tract within the zone of impact.

Annual average concentration divided by the chronic reference exposure level (REL) yields the chronic total hazard index (THI) per source for each receptor and for each compound. Maximum one-hour concentration divided by the acute reference exposure level (REL) yields the acute total hazard index (THI) per source for each receptor for each compound. Compounds that affect the same target organ or systems are summed to give the aggregate health hazard index. Total inhalation health hazard index is calculated as shown below.

$$\text{Total Hazard Index (THI)}_i = \sum_j \sum_k [(X/Q)_{ij} \times Q_{jk} / \text{REL}_k]$$

Where:

- $i,j,k$  = Individual receptors (i), sources (j), or pollutants (k),
- $\sum$  = The summation over sources (j) or pollutants (k),
- $(X/Q)_{i,j}$  = Dilution factor ( $\mu\text{g}/\text{m}^3 / \text{gm}/\text{s}$ ) at receptor (i) for source (j),
- $Q_{j,k}$  = Emission rate (g/s) from source (j) of pollutant (k), and
- $\text{REL}_k$  = Reference exposure level ( $\mu\text{g}/\text{m}^3$ ) for pollutant (k).

## 5.0 Risk Assessment Results

Adverse health effects are reported as “excess lifetime cancer risk”, or as a “total hazard index”.

Excess cancer risk is the maximum estimated increased risk of cancer following chronic exposure to a chemical suspected of being a human carcinogen and is expressed as the probability of a person contracting cancer over a lifetime of exposure to chemical emissions. To calculate this, the health risk assessment follows a conservative formula which defines lifetime exposure as 24 hours per day, every day for 70 years.

Non-cancer risk is based on the health impact on a single organ in the body from toxic air contaminants for acute (short) and chronic (long-term) exposure which are calculated as fractions. These fractions or hazard indices are the maximum acceptable public exposure level to a toxic air contaminant. The acceptable exposure level is generally the level at (or below) which no adverse health impacts are expected. The sum of these hazard indices is called the total hazard index and is an indication of the likelihood of experiencing chronic or acute (non-cancer) health effects. A total hazard index of less than one (1.0) is not likely to result in adverse health effects including sensitive individuals. With a total hazard index above one, there is a greater potential that adverse health impacts may result.

### 5.1 Concentrations of Toxic Air Contaminants

Annual average and predicted peak 1-hour concentrations of each evaluated compound are presented in tabular form in Appendix D (ACE model output).

### 5.2 Carcinogenic Risk Assessment Results

The maximum estimated cancer risk at an occupied receptor due to emissions from this facility is 4.5 in one million at the MEIR. The MEIR occurs east of the facility near the facility property line. Hexavalent chromium emissions from coating operations (source 4379) are the primary contributor to the MEIR risk. The maximum estimated risk an occupational location (MEIO) is 0.98 in one million and is located west of the facility. A map showing the PMI, MEIR, MEIO and sensitive receptors (if any) is presented as Figure 3. The estimated risk value at the MEIO and MEIR (based on 1994 emissions) do not exceed the cancer risk public notification level (10 in one million) specified in District Rule 1210.

Table 2 summarizes the estimated cancer burden. Five census tracts were evaluated. Cancer burden (for both residents and workers) was calculated for each census tract. Estimated cancer burden (0.017) is significantly less than the cancer burden public notification level (1.0) specified in District Rule 1210.

### 5.3 Chronic Health Hazard Indices

The maximum estimated chronic health hazard index at an occupied receptor due to emissions from this facility is 0.020 at the MEIR. The MEIR is east of the facility near Mollison Avenue. The maximum estimated chronic hazard index at a occupational location (MEIO) is 0.014 and is located west of the facility. A map showing the PMI, MEIO, MEIR and sensitive receptors in the study area (if any) is presented as Figure 4. The chronic non-cancer total hazard index does not exceed the public notification level and significant risk mitigation level (1.0 THI) specified in District Rule 1210.

### 5.4 Acute Health Hazard Indices

The maximum estimated acute health hazard index at an occupied receptor due to emissions from this facility is 4.24 at the MEIO. The MEIO occurs west of the facility. The maximum estimated acute hazard index at a residential location (MEIR) is 2.86 and is located west of the facility. A map showing the PMI, MEIO, MEIR and sensitive receptors in the study area (if any) is presented as Figure 5. Nickel emissions from metal deposition operations (source 30630) are the primary contributor to the acute hazard index. The toxic endpoint is the immune system. This acute noncancer total hazard index at the MEIO exceeds the public notification level and significant risk mitigation level (1.0 THI) specified in District Rule 1210.

### 6.0 Uncertainty

By their nature, health risk assessments cannot be completely accurate. Scientists don't have enough information on actual public exposure and on how toxic contaminants affect people. When information is missing or uncertain, risk analysts make assumptions that tend to overestimate the potential risk. This provides a margin of safety in the protection of human health. An example of this is the assumption that residential exposures occur 24 hours per day for 70 years, even though people typically are not at their residences 100 percent of the time for 70 continuous years.

However, factors that may tend to underestimate risk are difficult to evaluate. These include the cumulative effect of emissions from other nearby facilities and the potential for complex mixtures of toxic air contaminants to create an additional health problem by their combined reaction to each other.

Because health risk assessments cannot be relied upon to accurately predict rates of disease in the population they are best used as a tool to compare facilities and evaluate emission and risk trends. In the Air Toxics "Hot Spots" program the District uses HRAs to estimate which facilities present the highest risk to the public. Facilities with risks that exceed the District's risk public notification level as specified in Rule 1210 are required to notify the public of the estimated risks. Facilities with estimated risks exceeding the significant risk level are required to reduce risk below that level, generally within five years.

### 7.0 References

California Air Pollution Control Officers' Association (CAPCOA), "Air Toxics 'Hot Spots' Program Revised 1992 Risk Assessment Guidelines," October 1993.

San Diego Air Pollution Control District (SDAPCD), "Guidelines for Preparing Health Risk Assessments in Accordance with the Requirements of Assembly Bill 2588: The Air Toxics 'Hot Spots' Information and Assessment Act of 1987," December 16, 1997.