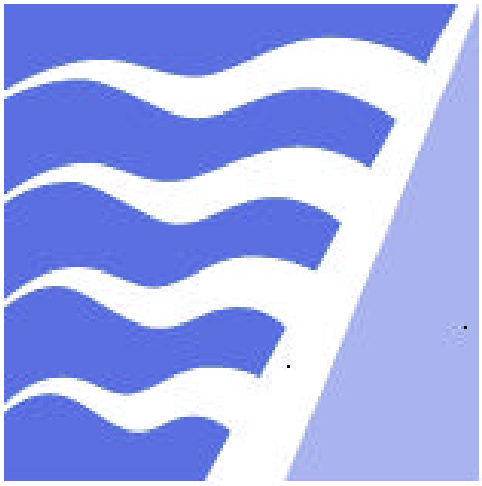
BAY AREA AIR QUALITY MANAGEMENT DISTRICT

TOXIC AIR CONTAMINANT CONTROL PROGRAM ANNUAL REPORT 1999



VOLUME ONE

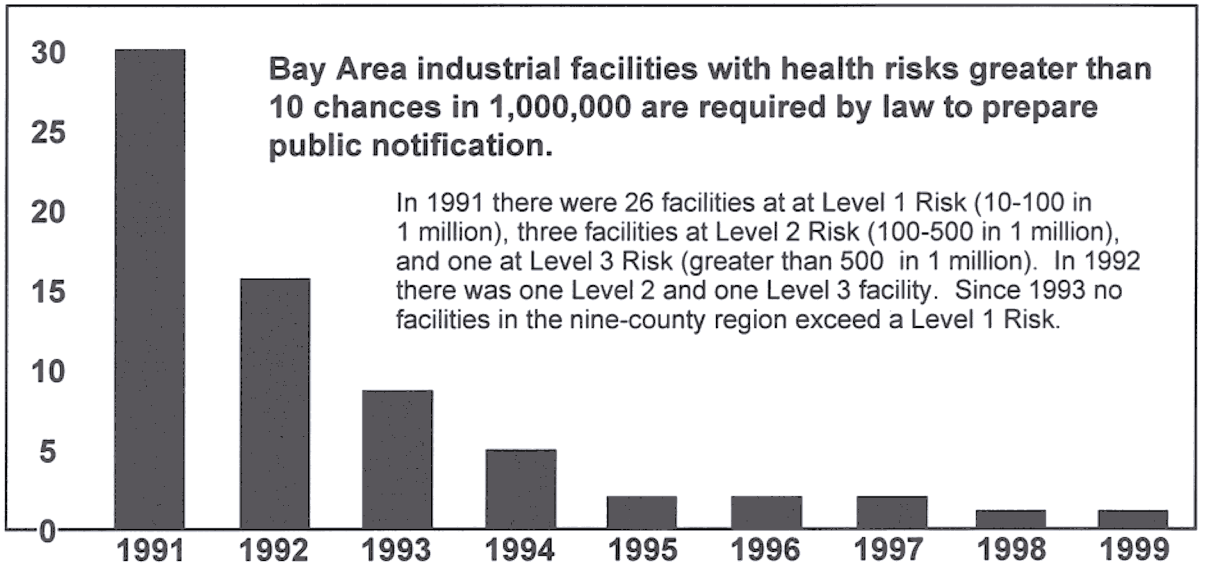
Toxic air contaminants:

- Health implications
- How we monitor and control them
- Progress made toward reducing the public's exposure

About this report...

The 1999 Toxic Air Contaminant Control Program Annual Report is the ninth in a series of reports to the public describing the current state of the Air District's Toxic Air Contaminant Program. In it you will find descriptions of the various aspects of a program that actually started in the mid-1980's when this agency began to monitor the Bay Area for specific airborne compounds that potentially may produce cancer and other chemically-induced adverse health conditions over a lifetime of exposure.

Air Toxics are an ever-increasing public concern as we learn more about their potential to do harm and as industrial mishaps become the staple for front-page headlines and the nightly news. Dire as the consequences of Air Toxics contamination remain, the good news is: *levels of exposure from industrial sources in the Bay Area have radically declined since the program's inception.* Thanks to federal and state laws as implemented in the Air District's control program, the number of facilities with toxic air emissions great enough to warrant public notification on the basis of health risk assessment (a process detailed in this report) has dropped from thirty facilities to a single plant.



Although technical in nature, this report is intended for the public and is easily understood by those who have an interest in the subject.

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The Toxic Air Contaminant Control Program Annual Report is published to provide the public with information regarding the Bay Area Air Quality Management District's programs to identify and reduce ambient concentrations of toxic air contaminants (TACs). The 1999 report summarizes the status of the programs that are used to identify and control ambient levels of TACs from stationary sources, and contains summaries of the TAC emissions inventory and ambient monitoring network for 1999.

Air Toxics New Source Review: New and modified source permit applications have been reviewed for air toxics concerns since 1987, in accordance with the Risk Management Policy established at the request of the District's Board of Directors. This policy continued in 1999, as District staff completed health risk screening analyses for approximately 140 permit applications.

Air Toxics Hot Spots Program: The Air Toxics Hot Spots (ATHS) Program involves the evaluation of health risks due to routine and predictable TAC emissions from industrial and commercial facilities. The District has established specific public notification measures for various levels of risk identified under the program (Levels 1, 2, and 3). In 1991, the first year of the risk assessment phase of the program, 30 facilities were identified with health risks of Level 1 or greater which triggered public notification requirements. The number of facilities requiring public notification has steadily decreased in recent years as industries continue efforts to reduce emissions and refine estimates of risk. There is currently only one industrial facility in the Bay Area that requires public notification under the ATHS Program as is shown in Table 1. This facility is at Level 1, indicating that the maximum cancer risk resulting from the facility's emissions is greater than 10 in one million but less than 100 in one million. The notification list does not contain any dry cleaners or gasoline stations, some of which have Level 1 risks, but which are being evaluated in an industrywide risk assessment on a statewide basis.

In addition to public notification requirements, the ATHS Program requires facilities to reduce their health risks below levels determined by the air districts to be significant within a certain timeframe. The District requires mandatory risk reduction measures for facilities with health risks of Level 2 or greater (maximum cancer risks of 100 in one million or greater). Now that all of the perchloroethylene dry cleaning facilities in the Bay Area have complied with mandatory risk reduction requirements established by the District, there are currently no facilities in the Bay Area that have risks identified as Level 2 or greater.

Control Measures for Categories of Sources: Eight Air Toxic Control Measures (ATCMs) have been fully implemented in the Bay Area through the State Toxic Air Contaminant Control Program. In the year 2000, a new ATCM to reduce the emissions of chlorinated TACs from automotive maintenance and repair activities was adopted by CARB, along with amendments that strengthen the existing ATCM governing the use of serpentine rock in surfacing operations. A regulatory needs assessment for diesel engines

was also adopted by CARB in the year 2000, and an ATCM for portable and stationary diesel engines is scheduled for adoption in early 2002.

National Emission Standards for Hazardous Air Pollutants (NESHAPs) being developed by U.S. EPA in accordance with Title III of the 1990 federal Clean Air Act Amendments have also become an important source of new air toxics control measures in California. These rules require that emissions be reduced using the Maximum Achievable Control Technology (MACT). Under State law, the District must implement and enforce all MACT Standards, or rules that are at least as stringent. A significant number of new MACT Standards have already been adopted by U.S. EPA, with more expected to be adopted over the next several years. Table 2a shows the NESHAPs that have already been adopted or proposed by U.S. EPA under Title III, and Table 2b shows the remaining rules that are scheduled for adoption.

Emissions Inventory: The 1999 emissions inventory continues to show decreasing emissions of many TACs in the Bay Area. The most dramatic emission reductions in recent years have been for certain chlorinated compounds that are used as solvents including 1,1,1-trichloroethane, perchloroethylene, and methylene chloride.

Ambient Monitoring Network: Table 3 contains a summary of average ambient concentrations of TACs measured at monitoring stations in the Bay Area by the District in 1999. Table 4 and Figure 2 show the calculated cancer risks associated with lifetime exposure to average 1999 ambient concentrations of these measured TACs. Of the pollutants for which monitoring data are available, 1,3-butadiene and benzene (which are emitted primarily from motor vehicles) account for over one half of the average calculated cancer risk.

Ambient benzene levels declined dramatically in 1996 with the advent of Phase 2 reformulated gasoline, with significant reductions in ambient 1,3-butadiene levels also occurring. Due largely to these observed reductions in ambient benzene and 1,3-butadiene levels, the calculated average cancer risk has been significantly reduced in recent years. Based on 1999 ambient monitoring data, the calculated cancer risk is 186 in one million, which is slightly less than the 1998 figure, and about 40 percent less than what was observed five years earlier.

The Bay Area Air Quality Management District has had, since 1987, a program to describe, control, and where possible, eliminate public exposure to airborne toxic compounds. This report updates the status of program activities and summarizes data collected during 1999.

The air toxics program is distinct from the District's efforts to control ambient levels of the "criteria pollutants" (e.g., carbon monoxide, nitrogen dioxide, ozone, particulate matter, and sulfur dioxide). Health-based ambient air quality standards have been set for criteria pollutants by the State and federal government. The air toxics program was established as a separate and complementary program designed to evaluate and reduce adverse health effects resulting from exposure to toxic air contaminants (TACs).

The District works to understand and to control both locally elevated concentrations (Hot Spots) and ambient background concentrations of TACs. This approach is delineated in the program adopted by the District's Board of Directors in November of 1990. The major elements of the District's air toxics program are:

- **Preconstruction review of new and modified sources** for potential health impacts, and the requirement for new/modified sources with non-trivial TAC emissions to use the Best Available Control Technology.

- **The Air Toxics Hot Spots Program**, designed to identify industrial and commercial facilities that may result in locally elevated ambient concentrations of toxic air contaminants, to report significant emissions to the affected public, and to reduce significant health risks.

- **Control measures** designed to reduce emissions from categories of sources of TACs, including rules originating from the State Toxic Air Contaminant Act (AB-1807) and the federal Clean Air Act.

- **The toxic air contaminant emissions inventory**, a database that contains the most recent and accurate information concerning emissions of TACs from permitted stationary sources.

- **Ambient monitoring** of toxic air contaminant concentrations at a number of sites throughout the Bay Area.

This report describes the elements of the District's air toxics program and discusses changes that have occurred during the past year. The Appendices contain the District's 1999 annual air toxics emissions inventory and data from the District's air toxics monitoring network collected in 1999.

The urban background of toxic air contaminants is the combined result of many diverse human activities. In general, the stationary sources for which the District has primary

jurisdiction contribute less significantly to health risks than do mobile sources. The District's program therefore focuses not only on reduction strategies for stationary sources, but also on promotion of similar strategies for mobile sources and other types of sources not directly influenced by District regulations and policies.

AIR TOXICS NEW SOURCE REVIEW

The District evaluates permit applications for new and modified stationary sources of air pollutants. Since 1987, that review has included an analysis of potential health risks resulting from emissions of TACs based on the Risk Management Policy established at the request of the District's Board of Directors. The goal of this program is to ensure that the health risks associated with TAC emissions from proposed projects are acceptable. In addition, net health risk benefits are realized when older, more highly polluting, sources are replaced with new sources that must meet more stringent control requirements.

The requirements of air toxics new source review are based on the results of Health Risk Assessment (HRA), an analysis that describes the possible adverse health effects which may result from public exposure to routine emissions of toxic air contaminants. These HRAs do not address the possibility of, or adverse health effects resulting from, accidental releases of toxic compounds. In California, review of industry's preparation for, and protection from, accidental releases is performed by Certified Unified Program Agencies (CUPA) or Administering Agencies (AA), which are typically local fire or health departments, or local offices of emergency services.

All permit applications for new and modified sources are screened for emissions of TACs. If any TAC is emitted in amounts that exceed specified de minimus levels, an HRA is completed by District staff using computer-modeled estimates of atmospheric dispersion. An HRA may be a conservative screening-level analysis, or a more refined analysis involving the use of various site-specific data (e.g., the use of actual meteorological data).

Where the predicted health risks from a proposed project exceed specified threshold levels, the new/modified source(s) must use the Best Available Control Technology to minimize TAC emissions (TBACT). If the residual health risks, after TBACT is applied, result in risks that exceed significance levels established for the overall acceptability of a project, then other risk reduction measures may be required, or the permit(s) for the proposed source(s) may be denied.

The District typically completes HRAs for about 150 to 200 permit applications per year. For the vast majority of these, the use of emissions control technology and other available risk reduction measures are successful in reducing the health risks associated with the proposed project’s emissions to acceptable levels.

In the year 2000, the District established a Risk Management Policy for permitting new/modified diesel-fueled engines based on the use of a new cancer unit risk factor adopted by Cal/EPA’s Office of Environmental Health Hazard Assessment (OEHHA). The District policy is similar to risk management guidelines for permitting new diesel-fueled engines that were adopted by CARB on September 28, 2000.

AIR TOXICS HOT SPOTS PROGRAM

Assembly Bill 2588, the Air Toxics "Hot Spots" Information and Assessment Act, was enacted by the State legislature in 1987. AB-2588 requires companies throughout California to provide information to the public about emissions of TACs, and the impact that those emissions may have on public health.

There are four steps to implementing the Air Toxics Hot Spots (ATHS) Program established under AB-2588. In the first step, an air toxics emissions inventory is prepared for each facility in the Bay Area that has operating permits from the District. This inventory lists the emissions of TACs from each source based upon information supplied to the District by the affected facility and reviewed by District engineers.

In the second step of the ATHS Program, the District prioritizes facilities for additional scrutiny. The prioritization procedure considers the quantity and toxicity of pollutants emitted, and the proximity of persons that may live or work nearby. Each facility is categorized as high, medium or low priority. High priority facilities are required to prepare an HRA. The fact that a facility has been identified as high priority does not necessarily mean that nearby persons are at increased risk from the facility's air emissions. Rather, a designation of high priority indicates that the facility emissions need to be analyzed in more detail.

The third step of the ATHS Program provides this additional analysis by means of completion and review of a comprehensive facility-wide HRA. An HRA is an analysis that estimates the probability of adverse health effects that may result from exposure to routine emissions of TACs.

In the fourth step, the ATHS Program requires that exposed persons be notified regarding the results of an HRA if, in the judgment of the District, the calculated risks warrant such notification. Affected facilities are required to notify their neighbors of the results of an HRA through direct mail to households and through public meetings in accordance with notification procedures developed by the District. The District established specific public notification measures for various levels of risk identified under the program (Levels 1, 2, and 3).

The first cycle of the District's ATHS Program was completed in January 1991, with the submission of risk assessment documents by the first group of high priority facilities identified during the inventory phase of the program. Of the 123 HRAs submitted, 30 were Level 1 or greater (maximum cancer risks greater than or equal to 10 in one million), and therefore were required to engage in the public notification. In 1992, the number of Level 1 or greater facilities was reduced to 16. Continued efforts to reduce emissions and to refine estimates of risk reduced the number of facilities requiring public notification to nine in 1993, to five in 1994, and to two in 1995. All Level 2 and 3 risks (100 in one million or greater) were reduced to Level 1 or lower by 1993. There is currently only one facility

requiring public notification under the ATHS Program in the Bay Area, as is indicated in Table 1.

The ATHS Program requires air districts to maintain their toxics inventories, revising them on at least a quadrennial basis. In the Bay Area, emission inventories are updated annually through the District's ongoing permit renewal process. This annual update is used to re-prioritize all the facilities in the program, thus allowing for identification of any new facilities or significant increases in emissions at existing facilities. In this way, an additional 16 facilities have been identified as high priority since the first cycle of health risk assessments were completed in 1991. The HRAs prepared for all of these facilities indicate that the maximum health risks are below the public notification thresholds.

Dry cleaning facilities were removed from the public notification list in 1994. These sources, as well as gasoline dispensing facilities, are being evaluated in an "industrywide" HRA on a statewide basis as a part of the ATHS Program. The industrywide HRA completed for these facilities indicates that some of these facilities have Level 1 health risks.

In 1992, the ATHS Program was amended with the passage of SB-1731. This legislation requires facilities to implement measures to reduce risks below levels determined by the District to be significant within a certain timeframe. The District requires mandatory risk reduction measures under the authority of SB-1731 for facilities with health risks of Level 2 or greater (maximum cancer risks of 100 in one million or greater). In 1994, the District adopted Regulation 11, Rule 16, Perchloroethylene and Synthetic Solvent Dry Cleaning Operations, which incorporated the risk reduction requirements of SB-1731 for dry cleaners because many of these facilities had been identified as having risks of Level 2 or greater. The risk reduction measures required by this rule have now been fully implemented, and the health risks from all permitted dry cleaners have been reduced to Level 1 or lower. There are currently no facilities in the Bay Area (including dry cleaners and gasoline dispensing facilities) that have been identified as having Level 2 risks or greater requiring mandatory risk reduction measures under the ATHS Program.

SB-1731 also directed OEHHA to prepare new risk assessment guidelines for use in the ATHS Program. The guidelines, in several sections, are currently being developed by OEHHA. The sections include guidelines for assessing the impacts of acute and chronic exposures, guidelines for estimating risks due to carcinogens, and guidelines for inclusion of stochastic modeling in risk assessments. The draft documents must receive public review and examination by the Scientific Review Panel before being adopted by OEHHA. The OEHHA risk assessment guideline revisions are expected to be completed during the year 2001.

CONTROL MEASURES FOR CATEGORIES OF SOURCES

The primary mechanism for the development of retrofit air toxics control measures in California has been through the Toxic Air Contaminant Act, which was enacted in 1983 with the passage of AB-1807. Under this legislation, Airborne Toxic Control Measures (ATCMs) adopted by the California Air Resources Board (CARB) are implemented and enforced by the local air districts. To date, eight statewide ATCMs have been adopted by CARB and implemented in the Bay Area covering the following source categories: chrome plating and anodizing, cooling towers, commercial and hospital sterilizers, medical waste incinerators, paving operations that use serpentine materials, gasoline stations, perchloroethylene dry cleaners, and non-ferrous metal melting operations.

Several TAC control projects are currently being developed by CARB under the authority of AB-1807. A new ATCM covering the emissions of chlorinated TACs from automotive maintenance and repair activities was adopted by CARB on April 27, 2000. This ATCM requires manufacturers of brake cleaning products, carburetor cleaners, and automotive degreasers to remove any perchloroethylene, methylene chloride, and trichloroethylene from these products by June 30, 2001. CARB adopted amendments to the existing serpentine asbestos ATCM on July 20, 2000, which were intended to further reduce the public's exposure to airborne asbestos resulting from the use of serpentine aggregate in surfacing applications. CARB has also begun development of a new ATCM that would control asbestos emissions from construction and surface mining activities in areas with naturally occurring serpentine deposits. Finally, CARB will begin development of new ATCMs for diesel engines and automotive refinishing coatings in 2001.

In addition to the ATCMs, another source of new air toxics control measures are the NESHAPs developed by the U.S. EPA. These federal rules are also commonly referred to as MACT Standards, because they reflect the Maximum Achievable Control Technology. A large number of MACT Standards are due to be promulgated. Table 2a lists the MACT Standards that have been proposed or already adopted by U.S. EPA, and Table 2b lists the remaining MACT Standards scheduled for adoption. The District is required to implement and enforce all MACT Standards, or rules that are at least as stringent. Although the MACT Standards are expected to provide some additional TAC emission reductions in the Bay Area, their benefits are limited because the District has already implemented rules that cover many of the same source categories.

Another potential source of air toxics control measures may be the Clean Water Act, which requires implementation of control actions needed to restore and protect individual water bodies that do not meet water quality standards. The Regional Water Quality Control Board (RWQCB) has been evaluating the degree to which air emissions of mercury contribute to pollutant loadings into San Francisco Bay, which has been designated as impaired for this persistent bioaccumulative toxin. Currently, the RWQCB has proposed to reduce air emissions in the Bay Area through a voluntary partnership approach.

The air toxics emissions inventory is a database that contains the most recent and accurate information concerning emissions of TACs from permitted stationary sources in the Bay Area. The inventory includes routine or predictable releases, and is not intended to describe the potential for acute hazards from accidental releases. Information submitted by industry is reviewed for accuracy by District staff prior to inclusion in the inventory. This inventory, and a similar inventory for mobile and area sources compiled by CARB, is used to plan strategies to reduce public exposure to TACs.

The detailed emissions inventory data for 1999 are provided in Volume II of this Report. The data are sorted by county and city (Appendix B-1), and also alphabetically by pollutant (Appendix B-2). These are the District's best estimates of emissions of TACs, based on the information that facilities submitted in their most recent annual update reports that were entered into the District's Data Bank prior to December 31, 1999.

Emission thresholds above which emissions are reported have been established individually for each TAC based on relative toxicity. The reporting thresholds reflect the emission level that is estimated to result in a de minimus level of health risk based on a series of conservative risk assessment assumptions (e.g., lifetime exposure, screening modeling methods, low-level stack release located in close proximity to receptors). For carcinogens, the threshold reporting levels have been set at the emission level that corresponds to a cancer risk of 1 in one million. Non-carcinogen trigger levels represent the amount estimated to result in a hazard index of one.

In recent years, the usage of a number of industrial and commercial solvents has changed due to regulatory controls, and these changes are reflected in the District's emissions inventories. For example, the 1999 emissions of perchloroethylene in the Bay Area are over 40 percent less than emissions that were reported five years earlier. These emission reductions reflect the efforts of Bay Area dry cleaners to comply with the District's perchloroethylene dry cleaning rule. Similarly, the emissions of methylene chloride, another heavily regulated solvent, have been reduced by over 60 percent over the last five years. Reductions in 1,1,1-trichloroethane (TCA) emissions are even more dramatic over this five-year period, with emissions from permitted sources declining 75 percent. The production of TCA was banned on January 1, 1996, under national stratospheric ozone protection regulations.

The emissions of one chlorinated solvent, trichoroethylene (TCE), have increased somewhat in recent years despite being heavily regulated. The 1999 emissions of TCE are about 40 percent higher than the emissions that were reported five years earlier. TCE is a solvent that has been used, to a limited extent, as a substitute for TCA. The emissions of TCE from permitted sources in the Bay Area remains relatively low, however (e.g., the 1999 emissions of TCE are only about 5 percent of the 1994 emissions of TCA).

AIR TOXICS AMBIENT MONITORING NETWORK

Monitoring is considered the definitive method for establishing ambient pollutant concentrations. One limitation of air monitoring is that it is spatially limited to specific monitoring locations. This problem has been minimized to a great extent in the Bay Area by the operation of an extensive air toxics monitoring network. The locations of the air toxics monitoring sites operating in the Bay Area at the end of 1999 are shown in Figure 1.

The air monitoring network operated by the District includes gaseous sampling collected over 24-hour periods on a 12-day sampling frequency. The network began in 1986 with six sites, and has gradually been expanded to its present size of 16 sites. The sampling sites in the network are generally community oriented, and are most directly influenced by areawide sources. The network includes a non-urban background site located at Fort Cronkhite on the Pacific Ocean coastline. The analytical protocol includes the following gaseous compounds: benzene, 1,3-butadiene, carbon tetrachloride, chloroform, ethylene dibromide, ethylene dichloride, methyl tert butyl ether (MTBE), methylene chloride, perchloroethylene, toluene, trichloroethane, trichloroethylene, and vinyl chloride. [The District has recently deleted 1,3-butadiene ambient monitoring data collected after January 1, 1997. CARB also monitors for this compound using a more refined analytical methodology, and the District data did not compare favorably with the co-located CARB data].

The 1999 data for the District's ambient toxics monitoring network are presented in Volume II of this report. The data are sorted both by monitoring station (Appendix C-1) and by pollutant (Appendix C-2). The average 1999 TAC concentrations calculated from all of the measurements in the entire District monitoring network are given in Table 3. The following data were not included in calculating the 1999 average levels: (1) the Fort Cronkhite background site, (2) one of the two co-located samplers at the San Francisco site, and (3) the Fremont and San Pablo sites, at which sampling was suspended at the end of May 1999.

CARB also conducts routine air toxics monitoring at five of the District sites in the Bay Area as a part of the statewide toxics ambient monitoring network. The monitoring conducted by CARB includes several additional gaseous compounds (e.g., formaldehyde and acetaldehyde) as well as some particulate-based TACs (currently limited to several species of polycyclic aromatic hydrocarbons). [It should be noted that the pollutant coverage of the CARB network has decreased in recent years. Notable pollutants no longer included are the toxic metals and the chlorobenzenes].

Table 4 shows the lifetime cancer risks associated with annual average TAC concentrations measured in the Bay Area for the calendar year 1999. Figure 2 depicts the same data in graphic form. The cancer risks were calculated based on inhalation exposures using the Unit Risk Factors and exposure assumptions adopted by OEHHA for the ATHS Program. All of the carcinogenic TACs measured in the District and CARB monitoring networks in 1999 are included, except for ethylene dibromide, ethylene dichloride, and vinyl chloride, which were excluded because these compounds were not detected in any of the air samples taken. In calculating average concentrations for other TACs, samples less than the limit of detection

(LOD) of the analytical method used were assumed to be equal to one half the LOD concentration. In addition, because CARB suspended metals sampling in early 1999, the annual average concentrations of hexavalent chromium and nickel were based on data collected over the period March 1, 1998 to February 28, 1999.

The total calculated cancer risk due to lifetime exposure to average ambient concentrations of TACs measured in the Bay Area in 1999 was 186 in one million, which is slightly less than what was observed in 1998 (note that the 1998 cancer risk figure of 199 in one million included a 7 in one million risk from p-dichlorobenzene, which was not monitored in 1999). The average cancer risk has decreased in recent years; this same calculation was 315 in one million five years ago (i.e., based on 1994 monitoring data).

Of the pollutants for which monitoring data are available, 1,3-butadiene and benzene, which are primarily emitted from mobile sources, contribute most significantly to the inhalation cancer risk. These two pollutants together account for about 60 percent of the total risk. Other pollutants with contributions to the average inhalation cancer risk of three percent or more are carbon tetrachloride, formaldehyde, and hexavalent chromium.

The average ambient levels of benzene dropped significantly in 1996 due to the widespread use of Phase 2 reformulated gasoline, which began in the Bay Area in the second quarter of 1996. The average benzene levels for 1999 were about 60 percent lower than those observed five years earlier. A number of control measures already adopted by CARB should provide additional, although more gradual, reductions in mobile source related emissions of benzene and 1,3-butadiene in the future. These include the Low-Emission Vehicle/Clean Fuels (LEV) program and requirements for utility engines and off-road vehicles/engines.

Carbon tetrachloride accounts for about 15 percent of the 1999 average calculated cancer risk. Carbon tetrachloride exists at background levels in the air of about 0.10 to 0.13 parts per billion nearly uniformly on a global basis. It is believed that the emissions from stationary sources have globally accumulated in the atmosphere due to this compound's very long residence time (about 60 years). The production of carbon tetrachloride in the United States was banned beginning in 1996.

Formaldehyde accounts for about nine percent of the 1999 average calculated cancer risk for the Bay Area. Formaldehyde is emitted directly from vehicles and other combustion sources, and is also created during photochemical reactions in the atmosphere. The District-wide average formaldehyde level for 1999 (2.14 ppb) was somewhat higher than what was observed in 1997 and 1998 (1.86 and 1.79 ppb, respectively), but was lower than the 1996 average level (2.66 ppb).

Hexavalent chromium accounts for about eight percent of the average cancer risk calculated for 1999. The average 1999 hexavalent chromium ambient concentration in the Bay Area was about the same as what was observed in 1998. These recent average concentrations are, however, about one half of what was observed five years earlier (i.e., in 1994). The reason

for these decreased hexavalent chromium levels is not known; the levels that exist in the ambient air are clearly much greater than what can be accounted for in the District's permitted stationary source inventory. The relatively uniform geographic distribution of ambient hexavalent chromium levels suggests that emissions occur primarily on an areawide, rather than a point source, basis.

There is growing evidence that indicates that exposure to emissions from diesel-fueled engines (about 95 percent of which come from diesel-fueled mobile sources) may result in cancer risks that exceed those attributed to other measured TACs. In 1998, OEHHA issued a health risk assessment that included estimates of the cancer potency of diesel particulate matter (PM). Because diesel PM cannot be directly monitored in the ambient air, however, estimates of cancer risk resulting from diesel PM exposure must be based on concentration estimates made using indirect methods (e.g., derivation from ambient measurements of a surrogate compound). Based on CARB estimates of the population-weighted average ambient diesel PM concentration for the Bay Area in the year 2000, and the "best-estimate" cancer potency factor adopted by OEHHA, the average cancer risk associated with exposure to diesel PM is about 450 in one million.

One group of pollutants that are not routinely monitored in ambient air are polychlorinated dioxins and furans (generally referred to as "dioxin"). In an effort to improve the understanding of the levels of dioxin in the ambient air in the Bay Area, and their deposition onto land and water surfaces, the District is planning to conduct an ambient dioxin monitoring program. Monitoring began at the first site in this network when sampling began at Ft. Cronkhite on November 22, 2000. The Ft. Cronkhite site has been established as part of the U.S. EPA's National Dioxin Air Monitoring Network (NDAMN). Sampling at additional monitoring sites in the Bay Area are scheduled to be established by the District and CARB in 2001.

TABLES & FIGURES

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Table 1. Bay Area Facilities with Health Risks Requiring Public Notification Under the Air Toxics Hot Spots Program in 1999

Facility	City	County	Maximum Cancer Risk (Chances in One million)
Level 3 Risks (Greater than 500-in-one-million)			
None	n/a	n/a	n/a
Level 2 Risks (Between 100 and 500-in-one-million)			
None	n/a	n/a	n/a
Level 1 Risks (Between 10 and 100-in-one-million)			
Dow Chemical Company (1)	Pittsburg	Contra Costa	14

NOTES:

This table summarizes the facilities currently requiring public notification under the Air Toxics Hot Spots (ATHS) Program (AB-2588) in the Bay Area. Dry cleaners and gasoline stations are not included on this list because both of these source categories are being evaluated in an industrywide health risk assessment under the ATHS Program.

Public notification requirements under the ATHS Program are based on the health risks associated with a facility's routine toxic air contaminant (TAC) emissions as determined in a Health Risk Assessment. The "individual cancer risk" is the likelihood that a person exposed to concentrations of TACs from a facility over a 70-year lifetime will contract cancer, based on the use of standard risk assessment methodology established for the ATHS Program. These cancer risks are based on "best estimates" of plausible cancer potencies, as determined by the Cal/EPA Office of Environmental Health Hazard Assessment. The actual degree of risk cannot be determined, and may approach zero. The individual cancer risk at the location of the maximum exposed individual (MEI) is given. The cancer risk at other locations near the facility may be substantially lower.

(1) The Dow Chemical Company is currently in the process of preparing an updated ATHS Program Health Risk Assessment (HRA). The facility indicates that this HRA will demonstrate that that maximum cancer risks have been reduced below Level 1.

Table 2a. MACT Standards Adopted or Proposed Under Title III of the 1990 Amendments to the Federal Clean Air Act

Source Category	Type of Facility Affected
ADOPTED STANDARDS	
Acetal Resins Production	Major
Acrylic Fibers/Modacrylic Fibers Production	Major
Acrylonitrile-Budadiene-Styrene Production	Major
Aerospace Industries	Major
Amino Resins Production	Major
Chromium Electroplating and Anodizing	Area
Coke Oven Batteries (Charging, Top Side, and Door Leaks)	Major
Commercial Sterilization Facilities	Area
Epichlorohydrin Elastomers Production	Major
Epoxy Resins Production	Major
Ethylene-Propylene Rubber Production	Major
Ferroalloys Production: Silicomanganese and Ferromanganese	Major
Flexible Polyurethane Foam Production	Major
Gasoline Distribution (Stage I)	Major
Halogenated Solvent Cleaners	Area
Hydrogen Fluoride Production	Major
Hypalon™ Production	Major
Industrial Process Cooling Towers	Major
Magnetic Tape Manufacturing	Major
Marine Vessel Loading Operations	Major
Methyl Methacrylate- Butadiene-Styrene Terpolymers Production	Major
Methyl Methacrylate-Acrylonitrile-Butadiene-Styrene Production	Major
Mineral Wool Production	Major
Natural Gas Transmission and Storage	Major
Neoprene Production	Major
Nitrile Budadiene Rubber Production	Major
Non-Nylon Polyamides Production	Major
(continued)	

Table 2a. MACT Standards Adopted or Proposed Under Title III of the 1990 Amendments to the Federal Clean Air Act (cont.)

Source Category	Type of Facility Affected
Off-Site Waste and Recovery Operations	Major
Oil and Natural Gas Production	Major
Perchloroethylene Dry Cleaning	Area
Pesticide Active Ingredient Production	Major
Petroleum Refineries	Major
Pharmaceuticals Production	Major
Phenolic Resins Production	Major
Phosphoric Acid/Phosphate Fertilizer Production	Major
Polybutadiene Rubber Production	Major
Polycarbonates Production	Major
Polyether Polyols Production	Major
Polyethylene Terephthalate Production	Major
Polystyrene Production	Major
Polysulfide Rubber Production	Major
Portland Cement Manufacturing	Major
Primary Aluminum Production	Major
Primary Lead Smelting	Major
Printing and Publishing	Major
Publicly Owned Treatment Works	Major
Pulp and Paper Production	Major
Secondary Aluminum Production	Major
Secondary Lead Smelting	Area
Shipbuilding and Ship Repair (Surface Coating)	Major
Steel Pickling Facilities and Hydrochloric Acid Regeneration Plants	Major
Styrene-Acrylonitrile Production	Major
Styrene-Butadiene Rubber and Latex Production	Major
Synthetic Organic Chemical Manufacturing	Major
Tetrahydrobenzaldehyde Production	Major
(continued)	

Table 2a. MACT Standards Adopted or Proposed Under Title III of the 1990 Amendments to the Federal Clean Air Act (cont.)

Source Category	Type of Facility Affected
Waste Treatment and Disposal: Hazardous Waste Incineration	Major
Wood Furniture Manufacturing	Major
Wool Fiberglass Manufacturing	Major
PROPOSED STANDARDS	
Boat Manufacturing	Major
Carbon Black Production	Major
Cellulose Products Manufacturing	Major
Cyanide Chemicals Manufacturing	Major
Ethylene Production	Major
Leather Finishing Operations	Major
Metal Coil (Surface Coating)	Major
Municipal Landfills	Major
Nutritional Yeast Manufacturing	Major
Paper and Other Web (Surface Coating)	Major
Petroleum Refineries (3 Vents)	Major
Polyvinyl Chloride and Copolymers Production	Major
Primary Copper Smelting	Major
Spandex Production	Major
Tire Manufacturing	Major
Vegetable Oil Manufacturing Solvent Extraction	Major
Wet Formed Fiberglass Mat Production	Major

NOTES:

This table lists the MACT Standards that are adopted, or that have been proposed, by U.S. EPA under Section 112(d) of the 1990 Amendments of the Clean Air Act as of December 20, 2000. "Major" means the MACT Standard applies only to major sources of hazardous air pollutants (HAPs). A major source of HAPs is a facility that emits, or has the potential to emit considering controls, 10 tons per year or more of any individual HAP or 25 tons per year or more of any combination of HAPs. "Area" means the rule applies to both major sources of HAPs and area sources as well (i.e., facilities with HAP emissions below the major source thresholds). Area sources are subject to MACT Standard if U.S. EPA makes a finding that emissions from affected area sources present a threat of adverse effects to human health or the environment.

Table 2b. 10-Year MACT Standards to be Adopted Under Title III of the 1990 Amendments to the Federal Clean Air Act

Source Category	Type of Facility Affected
Alkyd Resins Production	Major
Alumina Processing	Major
Ammonium Sulfate Production-Caprolactam By-Product Plants	Major
Asphalt Concrete Manufacturing	Major
Asphalt Processing	Major
Asphalt Roofing Manufacturing	Major
Asphalt/Coal Tar Application-Metal Pipes	Major
Auto and Light Duty Truck (Surface Coating)	Major
Benzyltrimethylammonium Chloride Production	Major
Brick and Structural Clay Products Manufacturing	Major
Carbonyl Sulfide Production	Major
Ceramics Manufacturing	Major
Chelating Agents Production	Major
Chlorinated Paraffins Production	Major
Chlorine Production	Major
Clay Products Manufacturing	Major
Coke By-Product Plants	Major
Coke Ovens (Pushing, Quenching, and Battery Stacks)	Major
Combustion Turbines	Major
Dry Cleaning (Petroleum Solvent)	Major
Engine Test Facilities	Major
Ethylene Processes	Major
Ethylidene Norbornene Production	Major
Explosives Production	Major
Flexible Polyurethane Foam Fabrication Operations	Major
Friction Products Manufacturing	Major
Fumed Silica Production	Major
(continued)	

Table 2b. 10-Year MACT Standards to be Adopted Under Title III of the 1990 Amendments to the Federal Clean Air Act (cont.)

Source Category	Type of Facility Affected
Hydrazine Production	Major
Hydrochloric Acid Production	Major
Industrial, Institutional and Commercial Boilers and Process Heaters	Major
Integrated Iron and Steel Manufacturing	Major
Iron and Steel Foundries	Major
Large Appliance (Surface Coating)	Major
Lightweight Aggregate Manufacturing	Major
Lime Manufacturing	Major
Maleic Anhydride Copolymers Production	Major
Manufacture of Paints, Coatings, and Adhesives	Major
Metal Can (Surface Coating)	Major
Metal Furniture (Surface Coating)	Major
Miscellaneous Metal Parts Products (Surface Coating)	Major
OBPA/1,3-Diisocyanate Production	Major
Organic Liquids Distribution (Non-Gasoline)	Major
Paint Stripping Operations	Major
Photographic Chemicals Production	Major
Phthalate Plasticizers Production	Major
Plastic Parts and Products (Surface Coating)	Major
Plywood and Composite Wood Products	Major
Polyester Resins Production	Major
Polymerized Vinylidene Chloride Production	Major
Polymethyl Methacrylate Resins Production	Major
Polyvinyl Acetate Emulsions Production	Major
Polyvinyl Alcohol and Polyvinyl Butyral Production	Major
Primary Magnesium Refining	Major
Printing, Coating, and Dyeing of Fabrics	Major
(continued)	

Table 2b. 10-Year MACT Standards to be Adopted Under Title III of the 1990 Amendments to the Federal Clean Air Act (cont.)

Source Category	Type of Facility Affected
Quaternary Ammonium Compounds Production	Major
Reciprocating Internal Combustion Engines	Major
Refractories Manufacturing	Major
Reinforced Plastic Composites Production	Major
Rocket Testing Facilities	Major
Rubber Chemicals Manufacturing	Major
Semiconductor Manufacturing	Major
Sewage Sludge Incineration	Major
Site Remediation	Major
Symmetrical Tetrachloropyridine Production	Major
Taconite Iron Ore Processing	Major
Uranium Hexafluoride Production	Major
Wood Building Products (Surface Coating)	Major

NOTES:

This table lists the MACT Standards that were scheduled for adoption by U.S. EPA under Section 112(d) of the 1990 Amendments of the Clean Air Act by November 15, 2000 (the so-called "10-year standards"), and which have not been proposed as of December 20, 2000. "Major" means the MACT Standard will apply only to major sources of HAPs, unless U.S. EPA makes a finding that emissions from affected area sources present a threat of adverse effects to human health or the environment.

Table 3. Summary of 1999 BAAQMD Ambient Air Toxics Monitoring Data

Compound	LOD (ppb)	% of Samples < LOD	Maximum Conc. (ppb)	Minimum Conc. (ppb)	Mean Conc. (ppb)
Benzene	0.10	0	3.10	0.10	0.52
Chloroform	0.02	91	0.33	<0.02	0.01
Carbon Tetrachloride	0.01	0	0.15	0.08	0.10
Ethylene Dibromide	0.02	100	<0.02	<0.02	0.01
Ethylene Dichloride	0.10	100	<0.10	<0.10	0.05
Methyl Tert Butyl Ether	0.50	17	6.40	<0.50	1.00
Methylene Chloride	0.50	83	19.6	<0.50	0.66
Perchloroethylene	0.01	0	3.51	0.01	0.11
Toluene	0.20	0	11.1	0.20	1.40
1,1,1-Trichloroethane	0.05	5	4.66	<0.05	0.15
Trichloroethylene	0.08	91	0.52	<0.08	0.05
Vinyl Chloride	0.30	100	<0.30	<0.30	0.15

NOTES:

This table summarizes the results of the BAAQMD gaseous toxic air contaminant monitoring network for the year 1999. These data represent monitoring results at 15 separate sites. Data from several sites were excluded from the table as follows: the Fort Cronkhite "clean-air" background site; one of the two co-located samplers in San Francisco; and the Fremont and San Pablo sites at which sampling was suspended at the end of May 1999.

(1) "LOD" is the limit of detection of the analytical method used.
(2) "% of samples < LOD" is the percent of the total number of air samples collected in 1999 that had pollutant concentrations less than the LOD.
(3) "Maximum Conc." is the highest daily concentration measured at any of the 15 monitoring sites.
(4) "Minimum Conc." is the lowest daily concentration measured at any of the 15 monitoring sites.
(5) "Mean Conc." is the arithmetic average of the air samples collected in 1999 at the 15 monitoring sites. In calculating the mean, samples with concentrations less than the LOD were assumed to be equal to one half the LOD concentration.

Table 4. Cancer Risk Due to Average Ambient Concentrations of Toxic Air Contaminants Measured in the Bay Area in 1999

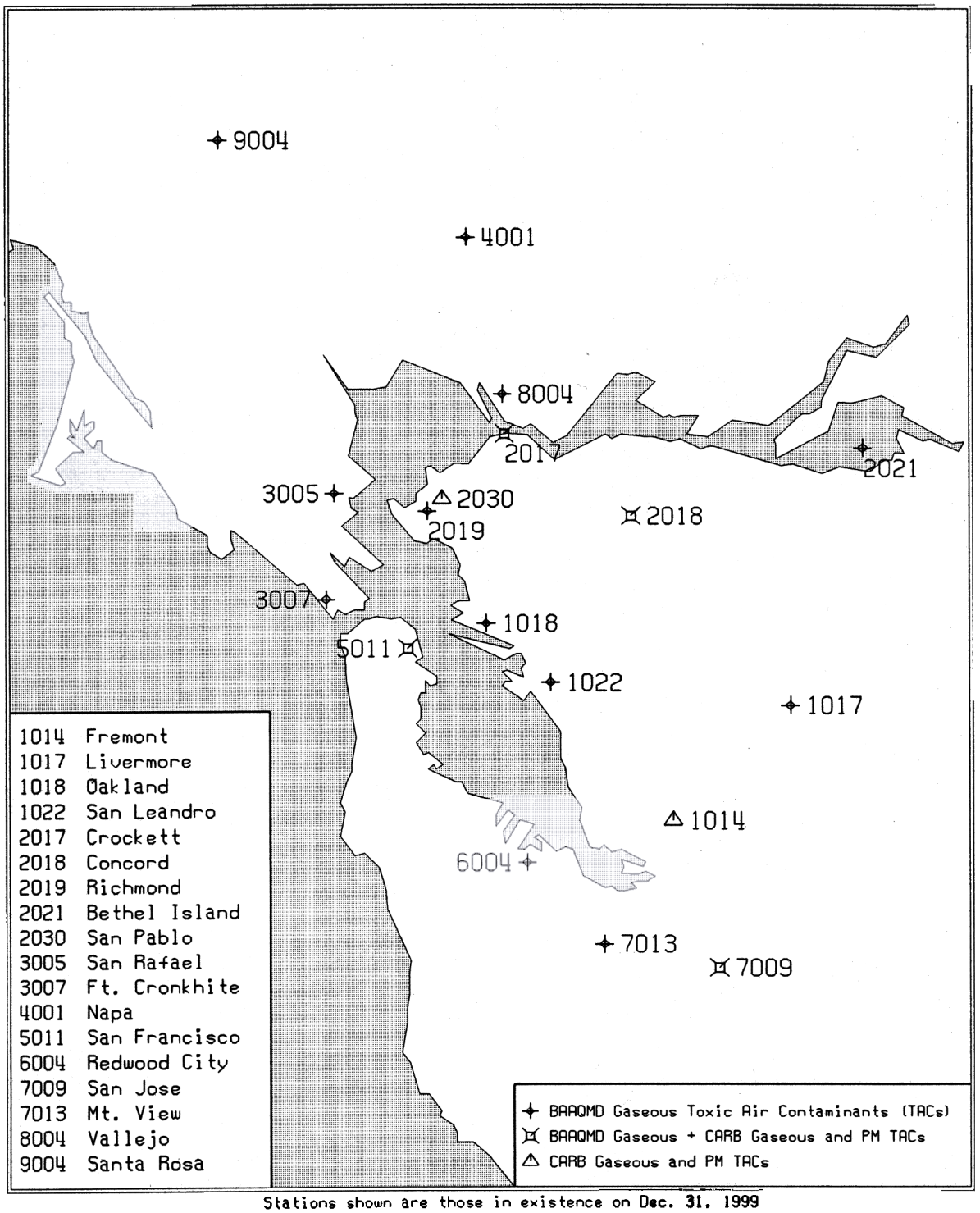
Gaseous TACs	Concentration		Unit Risk	Cancer Risk
	ppb	$\mu g/m^3$	$(\mu g/m^3)^{-1}$	Chances in one million
1,3-Butadiene(2)	0.17	0.39	1.7E-04	65.7
Benzene(1)	0.52	1.69	2.9E-05	49.0
Carbon Tetrachloride(1)	0.10	0.65	4.2E-05	27.3
Formaldehyde(2)	2.14	2.67	6.0E-06	16.0
Perchloroethylene(1,3)	0.11	0.77	5.9E-06	4.5
Acetaldehyde(2)	0.76	1.39	2.7E-06	3.8
Methylene Chloride(1)	0.66	2.32	1.0E-06	2.3
Chloroform(1)	0.01	0.06	5.3E-06	0.3
Trichloroethylene(2,4)	0.02	0.10	2.0E-06	0.2
Particulate TACs	**ng/m^3**	**$\mu g/m^3$**	**$(\mu g/m^3)^{-1}$**	**Chances in one million**
Chromium (hexavalent)(2,5)	0.10	1.02E-04	1.5E-01	15.3
PAHs(2,6)	0.64	6.43E-04	1.1E-03	0.7
Nickel(2,5)	2.66	2.66E-03	2.6E-04	0.7
Total for all TACs				**186**

NOTES:

This table summarizes the cancer risks associated with exposure to average ambient (outdoor) toxic air contaminant (TAC) levels measured at a number of sites in the Bay Area during 1999. Cancer risks are calculated for the inhalation pathway using the Unit Risk Factors adopted by Cal/EPA's Office of Environmental Health Hazard Assessment for the Air Toxics Hot Spots Program, and assuming 70-year continuous exposure. Risks are calculated for the carcinogenic TACs for which routine sampling was performed by the BAAQMD or CARB in 1999, except for ethylene dibromide, ethylene dichloride, and vinyl chloride, which were excluded because none of these were detected in any of the air samples taken. In calculating average concentrations, samples less than the limit of detection (LOD) were assumed to be equal to one half the LOD concentration.

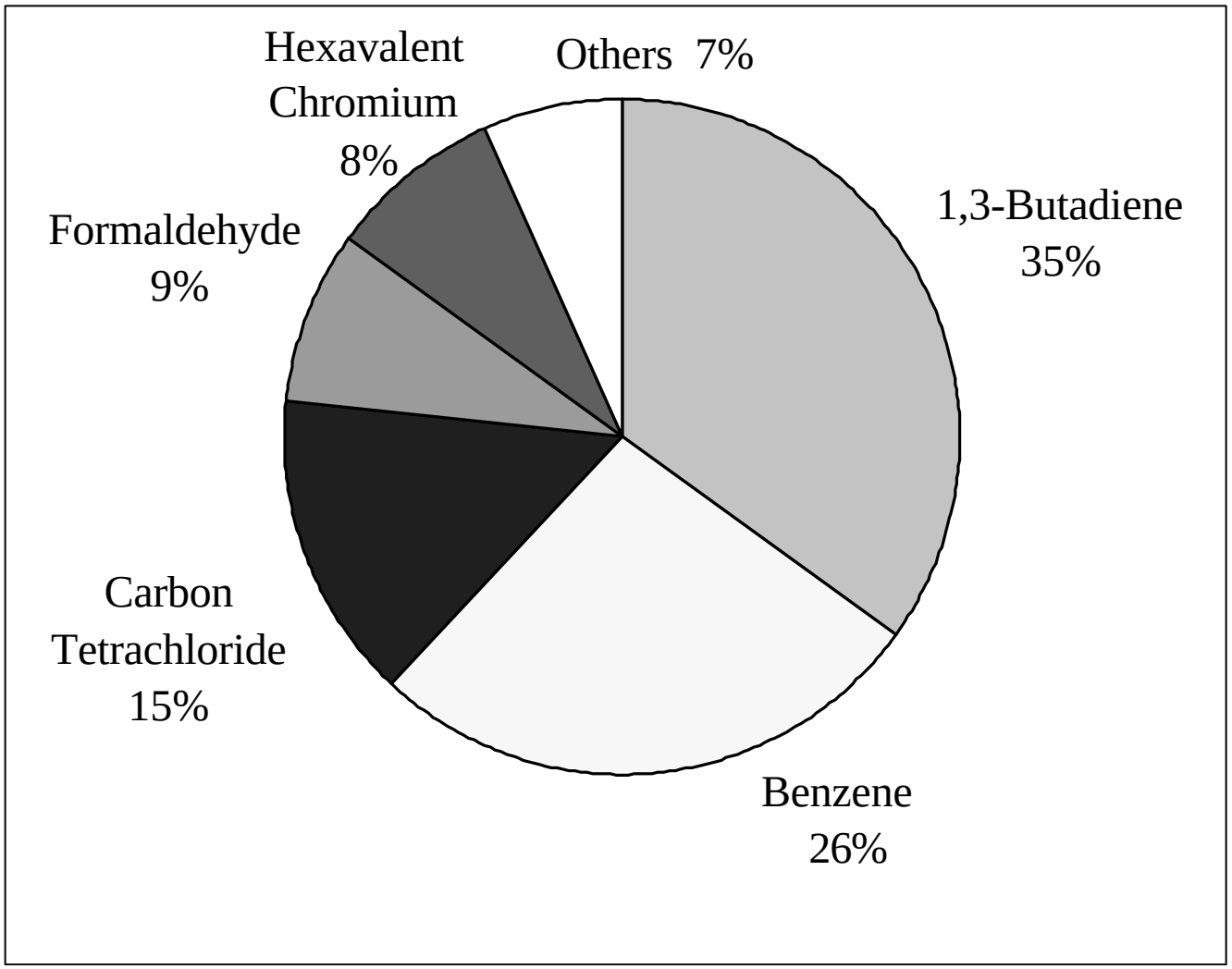
(1) The concentration used is the mean of all daily samples taken for the BAAQMD network in 1999, as specified in Table 3.
(2) The concentration used is the mean of all daily samples taken for the five Bay Area sites in the CARB network in 1999.
(3) The mean perchloroethylene concentration is heavily influenced by a single site, San Rafael, which is located in close proximity to a dry cleaning shop and which had an annual concentration of 0.6 ppb. The mean network concentration, excluding the San Rafael site is 0.07 ppb (cancer risk of 2.7 in one million).
(4) CARB data are used for this TAC because an analytical method with a lower LOD was used by CARB.
(5) CARB suspended sampling of metals in March 1999. Value listed is based on sampling conducted during the period March 1, 1998 through February 28, 1999.
(6) The PAH concentration represents the sum of the following species collected as PM_{10}: benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene.

Figure 1. Bay Area Ambient Air Toxics Monitoring Network



Stations shown are those in existence on Dec. 31, 1999

Figure 2. Pollutant Contribution to Cancer Risk Due to Average Ambient Concentrations of Toxic Air Contaminants Measured in the Bay Area in 1999



NOTES:

This chart summarizes the pollutant contribution to the cancer risk associated with inhalation exposure to average ambient toxic air contaminant levels measured at a number of sites in the Bay Area during 1999, based on data provided in Table 4. Cancer risks are calculated for the inhalation pathway using the Unit Risk Factors established by Cal/EPA's Office of Environmental Health Hazard Assessment for the Air Toxics Hot Spots Program, and assuming 70-year continuous exposure. The total average cancer risk for all of the measured TACs was 186 in one million for the inhalation pathway. "Others" are acetaldehyde, chloroform, methylene chloride, nickel, PAHs, perchloroethylene, and trichloroethylene.