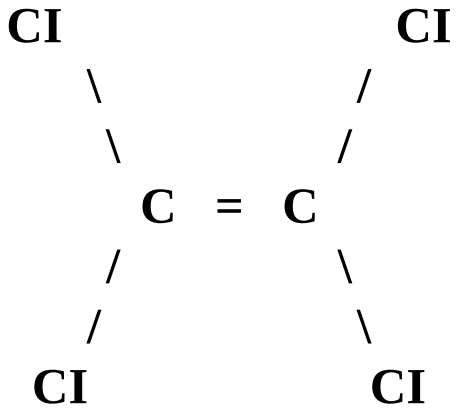
INITIAL STATEMENT OF REASONS
FOR RULEMAKING

STAFF REPORT/EXECUTIVE SUMMARY

PROPOSED IDENTIFICATION OF



PERCHLOROETHYLENE

AS A TOXIC AIR CONTAMINANT

AUGUST 1991

State of California

Air Resources Board

This report has been reviewed and approved by the staffs of the California Air Resources Board and the Department of Health Services. The contents do not necessarily reflect the views and policies of the Air Resources Board or the Department of Health Services, nor does mention of trade names of commercial products constitute endorsement or recommendation for use.

INITIAL STATEMENT OF REASONS FOR RULEMAKING

STAFF REPORT/EXECUTIVE SUMMARY

PROPOSED IDENTIFICATION OF PERCHLOROETHYLENE AS A TOXIC AIR CONTAMINANT

Prepared by the Staffs of the Air Resources Board
and the Department of Health Services

August 1991

INITIAL STATEMENT OF REASONS FOR RULEMAKING

STAFF REPORT/EXECUTIVE SUMMARY

The Initial Statement of Reasons for Rulemaking for the Proposed Identification of Perchloroethylene as a Toxic Air Contaminant includes a Staff Report/Executive Summary and Parts A through C. The purpose of the Staff Report/Executive Summary is to summarize Parts A and B of the document. Part A, prepared by the Air Resources Board (ARB) staff, is an evaluation of perchloroethylene's emissions, ambient and indoor concentrations, statewide population exposure, and atmospheric persistence and fate. Part B prepared by the Department of Health Services (DHS) staff, assesses the health effects of Perchloroethylene. Part C consists of responses prepared by the ARB and the DHS staffs to public comments on preliminary versions of the document. This document was developed pursuant to California Health and Safety Code sections 39660-39662 (Article 3 of Chapter 3.5 of Part 2 of Division 26 of the Health and Safety Code, titled, "Identification of Toxic Air Contaminants").

What are the requirements of Health and Safety Code Sections 39660-39662?

The Health and Safety Code requires the use of the following criteria for prioritizing compounds for evaluation as possible toxic air contaminants (TACs) as defined in Health and Safety Code section 39655: 1) risk of harm to public health, 2) amount or potential amount of emissions, 3) manner of usage, 4) persistence in the atmosphere, and 5) ambient concentrations.

Once a compound is selected to enter the TAC identification process, the ARB requests relevant information from the public and a written evaluation of available health effects information (Part B) from the DHS. The DHS staff's evaluation is required to contain an estimate of the threshold exposure level above which the compound causes or contributes to adverse

health effects. In the case where no threshold of significant adverse health effects can be determined, the DHS is required to state the range of risk to humans resulting from current or anticipated exposure.

Simultaneous with the preparation of the DHS health evaluation, the ARB staff prepares an exposure assessment (Part A) including information on the compound's usage, emissions or potential emissions, environmental persistence, and available ambient and indoor exposure levels.

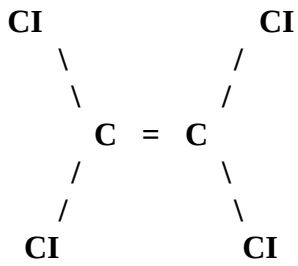
Following a public comment period, the Staff Report/Executive Summary and Parts A, B and C are formally reviewed by the Scientific Review Panel (SRP) at a public meeting. Upon reviewing the data, assessments, and conclusions of the report and ascertaining that appropriate scientific methods were used to gather and analyze the data presented, the SRP submits written findings to the ARB (the Board). At a public hearing, the Board decides whether or not the evidence in the document supports the identification of the compound as a TAC and, if so, whether there is evidence of a threshold exposure below which adverse effects are not expected to occur. Once a compound is identified as a TAC and listed in section 93000 of Title 17 of the California Code of Regulations, the ARB staff prepares a report on the need and appropriate degree of regulation pursuant to sections 39665-39668 of the Health and Safety Code.

What is a toxic air contaminant?

According to section 39655 of the California Health and Safety Code, a TAC is "an air pollutant which may cause or contribute co an increase in mortality or an increase in serious illness, or which may pose a present or potential hazard to human health. TACs identified by the ARB pursuant to sections 39660-39662 of the Health and Safety Code are set forth in Title 17 California Code of Regulations section 93000.

What is perchloroethylene?

Perchloroethylene is a chlorinated aliphatic hydrocarbon compound containing a double bond. At room temperature, Perchloroethylene is a nonflammable, colorless, dense liquid with an ethereal odor. It is relatively insoluble in water, but miscible in alcohol, ether, chloroform, and benzene. Perchloroethylene is used as a solvent in a wide variety of industrial and consumer activities including dry cleaning, decreasing, paints and coatings, and adhesives.



Perchloroethylene

Does the Air Resources Board staff recommend identification of perchloroethylene as a toxic air contaminant?

Yes, the ARB staff recommends that the Board adopt the proposed amendment to section 93000, Titles 17 and 26 of the California Code of Regulations identifying perchloroethylene as a TAC because:

- there is sufficient evidence that exposure to perchloroethylene poses a public health hazard,

- perchloroethylene is detected in ambient and indoor air and does not break down in the atmosphere at a rate that would eliminate public exposure,

- perchloroethylene is listed as a hazardous air pollutant by the federal government pursuant to section 7412 of Title 42 of the United States Code; therefore, pursuant to section 39655 of the California Health and Safety Code, perchloroethylene is required to be identified as a toxic air contaminant, and

- the DHS staff recommends that perchloroethylene be identified as a toxic air contaminant and that perchloroethylene be treated as having no threshold exposure level below which no significant adverse health impacts are anticipated.

What evidence exists that exposure to perchloroethylene poses a public health hazard?

The International Agency for Research on Cancer (IARC) lists perchloroethylene in carcinogen category 2B (possible carcinogen, sufficient evidence in animals but inadequate or nonexistent evidence in humans). Animal carcinogenicity studies indicate that the liver and lymphatic system are the target organs. In 1985, the Environmental Protection Agency (EPA) listed perchloroethylene as a Group C carcinogen (possible human carcinogen, limited evidence of carcinogenicity in animals, inadequate human carcinogenicity data). In 1986, new evidence prompted the EPA Human Health Assessment Group to propose perchloroethylene as a Group B2 carcinogen (probable human carcinogen, sufficient evidence from animal studies but inadequate evidence or no data from epidemiological studies). However, the Halogenated Solvents Subcommittee of the Agency's Science Advisory Board has disagreed and instead believes that perchloroethylene should be classified on a continuum between Group 2B and Group C until the controversy is resolved, the Agency's official position is that perchloroethylene is in Group C. After reviewing available carcinogenicity data, the DHS staff agrees with IARC and EPA staff conclusions that perchloroethylene is a potential human carcinogen.

In addition to the potential carcinogenic effects discussed above, perchloroethylene causes a number of acute toxic health effects as a result of heavy and/or relatively prolonged exposure. These acute toxic effects include: skin and eye irritation, erythema, burns, blistering, and

tachycardia. Massive acute doses can induce central nervous system depression resulting in respiratory failure. In addition, humans have shown signs of liver toxicity following chronic exposure to 232 to 385 ppmv (parts per million by volume) or 1573 to 2610 mg/m^3 (milligrams per cubic meter -a milligram is one-thousandth of a gram and one gram is 0.035 ounces) perchloroethylene.

The mean annual statewide ambient concentration of perchloroethylene in California is estimated to be 0.37 ppbv (parts per billion by volume) or 2.51 $\mu g/m^3$ (micrograms per cubic meter - a microgram is one-millionth of a gram) while the maximum ambient 24-hour concentration measured in an urban area (Simi Valley) is 4.80 ppbv (32 $\mu g/m^3$). Based on a joint study conducted by the EPA and the ARB in 1987, the mean 24-hour average residential indoor Perchloroethylene concentrations in California can range from 0.34 to 1.01 ppbv (2.27 to 6.72 $\mu g/m^3$). The maximum 24-hour residential indoor concentration measured in this study was 7.9 ppbv (53.4 $\mu g/m^3$).

The EPA staff's reference exposure level to protect against noncarcinogenic chronic adverse health effects in sensitive populations from persistent exposure to airborne Perchloroethylene concentrations is 5.25 ppbv (35 $\mu g/m^3$). Prolonged exposure exceeding this level may result in the development of adverse health effects. The DHS staff does not expect noncarcinogenic chronic health effects from average ambient or average indoor air exposures to perchloroethylene in California. However, there is insufficient data to comment on whether or not noncarcinogenic adverse health effects can be expected from near-source or "hot spot" exposures.

Is there a threshold level for perchloroethylene?

Within the context of TAC identification, a threshold level may be defined as: a level of pollutant exposure below which no adverse health effects are likely to occur. The DHS staff recommends that perchloroethylene be treated as having no threshold exposure level because:

1) perchloroethylene is an animal carcinogen and a ”potential human carcinogen”, and
2) presently, there is insufficient evidence available to designate an exposure level below which no significant adverse health impacts are anticipated.

Is perchloroethylene Produced or used in California?

Until recently, the state had one perchloroethylene production facility with an estimated production capacity of 25,000 tons per year. According to an official at the facility, Perchloroethylene is no longer produced at this plant.

Based on a survey of California halogenated solvent distributors, approximately 19,000 tons of perchloroethylene per year are used in the following: dry cleaning, decreasing, paints and coatings, adhesives, aerosols, specialty chemical production, printing inks, silicones, rug shampoos, laboratory solvents, and other miscellaneous uses.

What are the sources of perchloroethylene emissions?

Based on available information, an estimated 17,000 tons of perchloroethylene are released to California's atmosphere annually. The identified sources and their estimated emissions are summarized in Table 1. Emissions result from production, distribution, use, recycling, and disposal of perchloroethylene. Table 1 shows that approximately 80 percent of perchloroethylene emissions result from the use of the solvent in dry cleaning and decreasing operations.

What is the persistence of perchloroethylene in the atmosphere?

Depending on atmospheric conditions, the half-life of perchloroethylene (as a result of its degradation by reactions with hydroxyl radicals) is estimated to be about 100 days. Therefore, perchloroethylene is sufficiently persistent to be transported throughout an air basin before it is degraded.

TABLE 1

Summary of Sources and Estimated Emissions of Perchloroethylene in California*

Source	Approximate Emissions (Tons/Year)
Production**	15-65
Direct Uses	
Dry Cleaning	11000
Degreasing	3000
Paints, Coatings	1300
Adhesives	340
Miscellaneous	1600
Distribution	5
Solvent Reclamation	5-20
Disposal	
POTWs	50
Landfills	Insufficient Data
Groundwater Treatment	Insufficient Data

* See Part A, Chapter III for sources of data.

** As of 1991 Perchloroethylene is no longer produced in California.

What is the ambient concentration of Perchloroethylene?

Ambient monitoring data was collected at 19 ARB toxic air contaminant monitoring stations located throughout urban areas of California from July 1988 through June 1989. During this study period, 24-hour ambient minimum and maximum Perchloroethylene concentrations ranged from below the detection limit of 0.01 ppbv (see Appendix C of the Part A report for the method used to determine the detection limit) at San Jose to 4.80 ppbv (32 $\mu g/m^3$) at Simi Valley. The mean annual ambient concentrations ranged from 0.10 ppbv (0.7 $\mu g/m^3$) at Citrus Heights to 0.70 ppbv (4.7 $\mu g/m$ 3) at Concord. The estimated average population-weighted exposure for approximately 20 million Californians residing in the combined areas monitored by the 19 stations was 0.37 ppbv (2.5 $\mu g/m^3$) perchloroethylene.

What is the exposure level of people living near emission sources?

Emission and meteorological information were used in a computerized model to predict ambient annual average concentrations in the areas immediately surrounding eight South Coast perchloroethylene-emitting facilities. Five of the facilities were located near the City of Industry and three facilities were located near Burbank. Seven facilities were decreasing operations and one facility was an industrial dry cleaner. The modeled ambient annual concentrations were evaluated with population data to estimate exposure levels for the population residing near the two cities. Only the contributions the eight modeled facilities made to Perchloroethylene exposure were studied. In reality, other emission sources are expected to contribute to the total ambient perchloroethylene exposure for the modeled population.

The following exposure estimates are based on the amount of Perchloroethylene contributed by modeled facilities and do not include background perchloroethylene exposure. The annual average population-weighted exposure to ambient Perchloroethylene (above background levels) for approximately 2.5 million people near the City of Industry is estimated to be 0.07 ppbv (0.5 $\mu g/m^3$). Approximately 2,000 people near the City of Industry are exposed to an estimated

maximum annual average ambient (above background) concentration of 6 ppbv (40 $\mu g/m^3$). The annual average population-weighted exposure to ambient Perchloroethylene (above background perchloroethylene) for approximately three million people near Burbank is estimated to be 0.03 ppbv (0.2 $\mu g/m^3$) and approximately 600 people are exposed to an estimated maximum annual average ambient (above background) concentration of 3 ppbv (20 $\mu g/m^3$).

Is there evidence of indoor air exposure to perchloroethylene?

Results from both indoor and personal monitoring in California homes indicate that people are exposed frequently to perchloroethylene from indoor air. Indoor air exposure to perchloroethylene is important because indoor air concentrations have been shown to be consistently higher than outdoor concentrations. However, the level of exposure can vary among homes because different numbers and types of emission sources may be present in individual homes. In a large southern California study, the 24-hour average concentrations for residential indoor air ranged from 0.34 to 1.01 ppbv (2.27 to 6.72 $\mu g/m^3$) while concurrent outdoor concentrations ranged from 0.26 to 0.66 ppbv (1.74 to 4.41 $\mu g/m^3$). Using personal nighttime sampling data to approximate indoor air exposure, the 12-hour average indoor nighttime concentrations ranged from 0.80 to 1.26 ppbv (5.45 to 8.56 $\mu g/m^3$) in comparison to the outdoor nighttime concentrations which ranged from 0.18 to 0.84 ppbv (1.24 to 5.72 $\mu g/m^3$). Results from indoor air monitoring of homes and public buildings in other states support the findings of California studies.

Are there other routes of exposure to perchloroethylene?

The public is expected to be exposed to minimal amounts of perchloroethylene through food ingestion, water ingestion, and skin absorption.

Perchloroethylene is not routinely measured in foodstuffs in the United States; however, it was detected in fish and a variety of jellies and sauces in a qualitative study in 1982. A British

study showed low levels of perchloroethylene in various foods with the highest levels (7 μg/kg) in margarine and olive oil. Based on market basket surveys in Europe, the estimated total daily perchloroethylene intake via food consumption ranges from 87.4 to 160 μg. British and European studies of perchloroethylene in food may not be applicable to California because of the difference in food sources and food consumption patterns.

Surface water provides approximately 60 percent and ground water provides approximately 40 percent of the drinking water in California. Perchloroethylene has not been detected at or above 0.5 ppb(w/w) (the ratio of the weight of perchloroethylene in ppb to the total weight of the water) in California surface waters. It has been detected in 7 percent of large public water systems and 0.6 percent of small public water systems using ground water. Typical water ingestion and skin absorption due to contact with water are not expected to contribute significantly to perchloroethylene exposure.

What is the cancer risk assessment for exposure to perchloroethylene?

After reviewing available studies on perchloroethylene carcinogenicity, the DHS staff based its cancer risk assessment on a 1986 National Toxicology Program (NTP) animal study. The DHS staff estimates the upper-bound risk of contracting cancer from continuous lifetime exposure to 1 ppbv to range from 2 to 72 x 10^{-6} [0.3 to 10.6 x 10^{-6}(μg/m^3)$^{-1}$]. This corresponds to up to 2 to 72 excess cancers among a million people continuously exposed to 1 ppbv (or up to 0.3 to 10.6 excess cancers among a million people continuously exposed to 1 μg/m^3) perchloroethylene over a 70-year lifetime.

The DHS considered both the uncertainty surrounding the rate of perchloroethylene metabolism and the quality of cancer potency studies in animals in estimating the best value for the risk of cancer due to perchloroethylene exposure. The estimated cancer risk varies with the estimated rate of human perchloroethylene metabolism which ranges from a low of 2 percent to a high of 73 percent in different studies. Using a 25 percent estimate of metabolism in humans the

DHS staff estimates that the best value for the 95 percent upper confidence limit of cancer risk is 54×10^{-6} ppb 1 [8×10^{-6} $(\mu g/m^3)^{-1}$]. This corresponds to up to 54 excess cancers among a million people continuously exposed to 1 ppbv (or up to 8 excess cancers among a million people continuously exposed to 1 $\mu g/m^3$) perchloroethylene over a 70-year lifetime. The current EPA estimate of cancer risk, 6.5×10^{-6} ppb^{-1} [1×10^{-6} $(\mu g/m^3)^{-1}$], is approximately eight times lower than the DHS cancer risk because it is based on a 2 to 4 percent rather than a 25 percent estimate of perchloroethylene metabolism in humans.

Using the DHS's best value of cancer risk and assuming continuous, 70-year exposure to a mean statewide ambient concentration of 0.37 ppbv (2.5 $\mu g/m^3$) perchloroethylene, up to 600 potential excess cancer cases are estimated for California's population of approximately 30 million.

In addition to estimating statewide cancer risk from ambient exposure to perchloroethylene, it is necessary to estimate the extent of risk (above that attributed to background levels) from near-source emissions of the compound. The ARB modeled five perchloroethylene-emitting facilities in or near the City of Industry and three in or near Burbank to estimate "hot-spot" exposure. Seven facilities were decreasing operations and one facility was an industrial dry cleaner. Up to approximately 320 excess cancers are estimated per million people exposed to maximum ambient (6 ppbv) perchloroethylene concentrations attributed to the emissions from five facilities in or near the City of Industry. Up to approximately 160 cancers are estimated per million people exposed to maximum ambient (3 ppbv) perchloroethylene concentrations attributed to the emissions from three facilities in or near Burbank. For the combined population of 5.5 million people exposed to perchloroethylene emissions from the eight modeled facilities over a 70-year lifetime, up to 14 potential excess cancer cases (above those attributed to exposure to background perchloroethylene) are estimated. This estimate represents the upper range of plausible excess cancer risk and number of cancer cases; the actual risk and number of cancer cases may be significantly lower.

Due to the limited database on perchloroethylene indoor exposure, there is insufficient data to estimate the excess cancer cases associated with indoor air perchloroethylene exposure. To expand the database, the ARB is sponsoring indoor air monitoring studies on perchloroethylene as well as other toxic compounds.

What are the alternatives to identifying perchloroethylene as a TAC?

California Government Code section 11346.14 requires agencies to describe alternatives to the regulation which were considered by the agency and to set forth the agency's reasons for rejecting those alternatives. The only alternative to identifying perchloroethylene is not to identify it. We are not recommending this alternative because we believe that perchloroethylene meets the definition of a TAC and because perchloroethylene is listed as a hazardous air pollutant in section 112(b) of the 1990 Federal Clean Air Act Amendments "section 7412(b), Title 42 (i.e., tetrachloroethylene) United States Code]. Therefore, pursuant to section 39655 of the California Health and Safety Code, perchloroethylene is required to be identified as a TAC.

What would be the environmental impact of the identification of perchloroethylene as a TAC?

The California Environmental Quality Act requires public agencies to identify any potential adverse impacts on the environment which may result from their activities. The identification of perchloroethylene as a TAC itself is not expected to result in any impact on the environment.

The Board's identification of perchloroethylene as a TAC may result in the adoption of control measures by the ARB and the Air Pollution Control Districts pursuant to the California Health and Safety Code sections 39665 and 39666. Subsequent to identification, the adoption and implementation of control measures would benefit the public health by reducing perchloroethylene emissions, resulting in a reduced health risk due to perchloroethylene exposure. However, impacts to other environmental media (e.g., soil and water) may result from the

adoption and implementation of control measures. Any adverse environmental impacts associated with specific control measures will be fully explored and described at the time such control measures are considered for adoption pursuant to the California Health and Safety Code sections 39665 and 39666.

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June 11, 1991

Mr. William C. Lockett, Chief
Office of External Affairs
California Air Resources Board
1102 Q Street
Sacramento, California 95814

Dear Bill:

The Scientific Review Panel on Toxic Air Contaminants has reviewed the Report on Perchloroethylene and has formulated its findings regarding the report. I am formally submitting the Scientific Review Panel's findings to the Air Resources Board.

Sincerely,

//s//
Dr. James N. Pitts, Jr.
Chair, Scientific Review Panel

Enclosure

cc: Scientific Review Panel

Scientific Review Panel Findings on the Perchloroethylene Report

As Adopted at the Panel's June 10, 1991 Meeting

In accordance with California Health and Safety Code section 39661, the Scientific Review Panel (SRP) reviewed the report ("Proposed Identification of Perchloroethylene as a Toxic Air Contaminant") prepared by the staffs of the Air Resources Board (ARB) and the Department of Health Services (DHS) on the public exposure to, and health effects of perchloroethylene. The Panel also reviewed the public comments received on this report. Based on this review, the SRP finds that the report on perchloroethylene is without serious deficiencies and agrees with the staffs of the ARB and the DHS that:

1. There is evidence that exposure to perchloroethylene results in animal carcinogenicity and possible human carcinogenicity. The International Agency for Research on Cancer (IARC) lists perchloroethylene in Group 2B of its classification scheme for carcinogens (possible carcinogen, sufficient evidence from animal studies but inadequate or nonexistent evidence in humans). Staff of the United States Environmental Protection Agency (EPA) recommended perchloroethylene be assigned to Group B2 of its classification scheme for carcinogens (probable carcinogen, sufficient evidence from animal studies but inadequate evidence or no data from epidemiological studies). However, the classification has undergone considerable debate and the 1985 classification as Group C (possible carcinogen, limited carcinogen in animals, absence of human data) continues to be the official designation. Based on available scientific data, the Panel concurs with DHS, EPA, and IARC that perchloroethylene is carcinogenic for animals and possibly carcinogenic for humans.

2. Based on available scientific information, the DHS staff found no evidence of a perchloroethylene exposure level below which no carcinogenic effects are anticipated.

3. Perchloroethylene is listed as a hazardous air pollutant under section 112 of the United States Clean Air Act of 1990.

4. Based on the interpretation of available scientific evidence, the DHS staff estimate that the upper 95 percent confidence limits on the lifetime risk of cancer from Perchloroethylene range from 2 to 72 x 10^{-6} ppbv [O.3 to 10.6 x 10^{-6} ($\mu g/m^3$)$^{-1}$]. The DHS staff identified the best value of perchloroethylene cancer unit risk as 54 x 10^{-6} ppbv [8 x 10^{-6} ($\mu g/m^3$)$^{-1}$]. Table I compares the best value of upper-bound perchloroethylene cancer unit risk with those of other compounds reviewed by the SRP (the dates these compounds identification reports were approved by the SRP are included in Table 1). Upper-bound excess lifetime risks are health-protective estimates; the actual risk may be significantly lower.

TABLE I

Compound	Unit Risk ($ppbv^{-1}$)	Unit Risk $(ug/m^3)^{-1}$	Date SRP Approved
Inorganic Arsenic	particulate	3.3×10^{-3}	4/16/90
Nickel	particulate	2.6×10^{-4}	5/15/91
Vinyl Chloride	20×10^{-5}	7.8×10^{-5}	10/19/90
Perchloroethylene	54×10^{-6}	8×10^{-6}	6/10/91
Chloroform	2.6×10^{-5}	5.3×10^{-6}	8/14/90
trichloroethylene	1.1×10^{-5}	2×10^{-6}	4/16/90
Methylene Chloride	3.5×10^{-6}	1×10^{-6}	4/18/89

5. The major identified sources of perchloroethylene emissions to California's outdoor air are dry cleaning and decreasing activities which use perchloroethylene as a solvent.

6. Based on its gas-phase reactivity with hydroxyl radicals, perchloroethylene's estimated half-life is approximately 100 days.

7. Based on data collected by the ARB's ambient toxic air contaminant monitoring network, the estimated mean annual population-weighted exposure for approximately 20 million Californians is 0.37 ppbv.

8. The ARB staff estimated exposure to near-source emissions based on modeling eight perchloroethylene-emitting facilities in the South Coast Air Basin. Five facilities are located in or near the City of Industry and three facilities are located in or near Burbank. Results showed individuals could be exposed to levels significantly above background. In light of this hot spots information, ARB should further extend its modeling and data collection activities throughout the state.

9. Using the DHS staffs best value of cancer unit risk (54×10^{-6} $ppbv^{-l}$ see number 4 above) and the ARB staff is population-weighted exposure (0.37 ppbv, see number 7 above) up to 600 potential excess cancers are predicted for Californians population of 30 million due to ambient Perchloroethylene exposure. This estimate represents the upper range of plausible excess cancer risk and cancer cases; the actual risk and number of cancer cases may be significantly lower.

10. The DHS staff does not expect noncarcinogenic adverse health effects to occur from average ambient or indoor air perchloroethylene exposure in California. However, there is insufficient data to comment on whether or not noncarcinogenic adverse health effects could result from near source or "hot spot" exposures.

11. Results from both indoor and personal monitoring in California homes indicate that people are exposed frequently to higher indoor than outdoor perchloroethylene concentrations. However, the level of exposure can vary among the homes because different numbers and types of emission sources may be present in individual homes.

12. Based on available scientific evidence indicating that perchloroethylene is an animal and a possible human carcinogen, we conclude that perchloroethylene should be considered a toxic air contaminant.

We agree with the ARB staff recommendation to its Board that perchloroethylene be listed as a toxic air contaminant.

I certify that the above is a true and correct copy of the findings adopted by the Scientific Review Panel on June 10, 1991.

//s//

Dr. James N. Pitts, Jr.
Chairman, SRP

PROPOSED REGULATION ORDER

Amend Titles 17 and 26, California Code of Regulations, section 93000 to read as follows:

93000. Substances Identified as Toxic Air Contaminants

Each substance identified in this section has been determined by the state Board to be toxic air contaminant as defined in Health and Safety Code section 39655. If the state Board has found there to be a threshold exposure level below which no significant adverse health effects are anticipated from exposure to the identified substance, that level is specified as the threshold determination. If the Board has found there to be no threshold exposure level below which no significant adverse health effects are anticipated from exposure to the identified substance, a determination of "no threshold" is specified. If the Board has found that there is not sufficient available scientific evidence to support the identification of a threshold exposure level, the "Threshold" column specifies "None identified."

Substance	Threshold Determination
Benzene (C_6H_6)	None identified
Ethylene Dibromide ($BrCH_2CH_2Br$; 1,2-dibromoethane)	None identified
Ethylene Dichloride ($C1Ch_2CH_2c1$; 1,2-dibromoethane)	None identified
Hexavalent Chromium (Cr (VI))	None identified
Asbestos [asbestiform varieties of serpentine (chrysotile), riebeckiate (crocidolite), cummingtonite-grunerite (amosite), tremolite, actinolite, and anthophyllite]	None identified
Dibenzo-p-dioxins and Dibenzofurans chlorinated in the 2,3,7 and 8 positions and containing 4,5,6,or 7 chlorine atoms	None identified
Cadmium (metallic cadmium and cadmium compounds)	None identified
Carbon Tetrachloride (CCl_4; tetrachloromethane)	None identified
Ethylene Oxide (1,2-epoxyethane)	None identified
Methylene Chloride (CH_2Cl_2; Dichloromethane)	None identified

Substance	Threshold Determination
Trichloroethylene (CCl_2CHCl, Trichloroethene)	None identified
Chloroform ($CHCl_3$)	None identified
Vinyl Chloride(C_2H_3Cl, Chloroethylene)	None identified
Inorganic Arsenic	None identified
Nickel (metallic nickel and inorganic nickel compounds)	*None identified*(1)
Perchloroethylene (C_2Cl_4; Tetrachloroethylene)	None identified

NOTE: Authority cited: sections 39600, 39601 and 39662, Health and Safety Code. Reference: sections 39650, 39660, 39661 and 39662, Health and Safety Code.

1. Language in italics is not a part of this regulatory action. The Board adopted an amendment to section 93000, Title 17, California Code of Regulations, identifying nickel as a toxic air contaminant. However, the amendment has not yet been submitted to the Office of Administrative Law for review and filing with the Secretary of State.