

State of California
AIR RESOURCES BOARD

Response to Significant Environmental Issues

Item: Notice of Public Hearing to Consider the Adoption of a Regulatory Amendment Identifying Inorganic Arsenic as a Toxic Air Contaminant

Agenda Item No.: 90-10-1

Public Hearing Date: July 13, 1990

Issuing Authority: Air Resources Board

Comment: No comments were received identifying any significant environmental issues pertaining to this item. The staff report identified no adverse environmental effects.

Response: N/A

Certified: Patricia Hutchins for
Board Secretary

Date: 5/13/91

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RESOURCES AGENCY OF CALIFORNIA

State of California
AIR RESOURCES BOARD

Resolution 90-49

Date: July 13, 1990

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WHEREAS, Section 39600 and 39601 of the Health and Safety Code authorize the Air Resources Board (the "Board") to do such acts and to adopt such regulations as may be necessary for the proper execution of the powers and duties granted to, and imposed upon, the Board by law;

WHEREAS, Chapter 3.5 (commencing with Section 39650) of Part 2 of Division 26 of the Health and Safety Code establishes procedures for the identification of toxic air contaminants by the Board;

WHEREAS, Section 39655 of the Health and Safety Code defines a "toxic air contaminant" as an air pollutant which may cause or contribute to an increase in mortality or an increase in serious illness, or which may pose a present or potential hazard to human health;

WHEREAS, Section 39662 of the Health and Safety Code directs the Board to list, by regulation, substances determined to be toxic air contaminants, and to specify for each substance listed a threshold exposure level, if any, below which no significant adverse health effects are anticipated;

WHEREAS, in California, inorganic arsenic is emitted from many activities including wood and fossil-fuel combustion, geothermal steam development, arsenic pesticide/herbicide use, and windblown dust from dry lakebeds; and inorganic arsenic is not naturally removed or detoxified in the atmosphere at a rate that would significantly reduce the resulting public exposure;

WHEREAS, pursuant to the request of the Board, the Department of Health Services (DHS) evaluated the health effects of inorganic arsenic in accordance with Section 39660 of the Health and Safety Code;

WHEREAS, DHS concluded in its evaluation that inorganic arsenic is causally associated with cancer in humans; that health effects other than cancer are not expected to occur at existing or expected ambient levels of inorganic arsenic; that based on the upper 95 percent confidence limit of potency, the estimated range of lifetime (70 year) excess lung cancer mortality risk from continuous exposure to 1 $\mu\text{g}/\text{m}^3$ of atmospheric inorganic arsenic is from 6.3×10^{-4} (female never smokers) to $1.3_3 \times 10^{-2}$ (male heavy smokers); and that, based on available data, $3.3 \times 10^{-3}/\mu\text{g}/\text{m}^3$ is the most plausible estimate of the upper bound of the overall unit risk;

WHEREAS, for the reasons set forth in its evaluation, DHS treats inorganic arsenic-induced carcinogenesis as a nonthreshold phenomenon because DHS found no evidence that there is a carcinogenic threshold level for inorganic arsenic;

WHEREAS, upon receipt of the DHS evaluation, staff of the Board prepared a report including and in consideration of the DHS evaluation and recommendations and in the form required by Section 39661 of the Health and Safety Code and, in accordance with the provisions of that section, made the report available to the public and submitted it for review to the Scientific Review Panel (SRP) established pursuant to Section 39670 of the Health and Safety Code;

WHEREAS, in accordance with Section 39661 of the Health and Safety Code, the SRP reviewed the staff report, including the scientific procedures and methods used to support the data in the report, the data itself, and the conclusions and assessments on which the report was based, considered the public comments received regarding the report, and on April 16, 1990 adopted, for submittal to the Board, findings which included the following:

1. The evidence for carcinogenicity in humans due to inhaled arsenic is strong.
2. Inorganic arsenic is emitted into the outdoor air by a variety of stationary sources in California.
3. Hot spot exposures can present a significant source of inorganic arsenic, e.g., smelters, windblown dust (such as from the dry beds of Owens and Mono Lakes), pesticide application, agricultural burning, and tobacco smoke. Exposure by various routes to these sources should be considered as more data becomes available, and further research in this area should be conducted.
4. Based on the average particle size, inorganic arsenic has an estimated atmospheric lifetime of nine days.
5. Approximately 20.3 million people in California are estimated to be exposed to a population-weighted mean inorganic arsenic outdoor air concentration of 1.9 ng/m³.
6. Based on available data, indoor exposures to inorganic arsenic may be significantly greater than most outdoor exposures when tobacco smoke is present in indoor environments.
7. Adverse health effects other than cancer are not known to occur at predicted concentrations of inorganic arsenic in ambient outdoor air.

8. Based on available scientific information, an inorganic arsenic exposure level below which carcinogenic effects are not expected to occur cannot be identified.
9. Based on interpretation of available scientific evidence, DHS staff estimated lifetime excess cancer risk from exposure to airborne arsenic. Risks were evaluated separately by sex and for four smoking categories: never, former, light (less than 1 pack per day), and heavy smokers. Based on the upper 95 percent confidence limit of potency, the estimated range of lifetime excess lung cancer mortality risk from exposure to 1 $\mu\text{g}/\text{m}^3$ of atmospheric inorganic arsenic is from 6.3×10^{-4} (female never smokers) to 1.3×10^{-2} (male heavy smokers). Based on available data, $3.3 \times 10^{-3}/\mu\text{g}/\text{m}^3$ is the most plausible estimate of the upper bound of the overall unit risk. These upper bound excess risks are health-protective estimates; the actual risks may be below these values.
10. Using the population-weighted annual inorganic arsenic exposure concentration of 1.9 ng/m^3 (California's population-weighted average ambient concentration), the DHS staff estimates the number of excess cancer deaths among non-smokers due to airborne inorganic arsenic exposure to be 0.8 to 2 per million persons exposed throughout their lives. For former smokers, the risk ranges from 3 to 10 per million; for light smokers, from 5 to 14 per million; for heavy smokers, the risk ranges from 10 to 25 per million people at the current average ambient levels of airborne inorganic arsenic. The overall population-weighted average, based on current smoking levels in California, is estimated to range from 4 to 6 deaths per million. The upper bound of excess cancer mortality risk from a lifetime of exposure to 1.9 ng/m^3 of inorganic arsenic ranges from 1 to 25 cases per million persons exposed. This is to be compared with the background lifetime lung cancer rates estimated to range from 0.6 to 14.5 percent (for female never smokers to male heavy smokers).
11. Lifetime exposure to the mean ambient outdoor air concentration (weighted by population) of 1.9 $\text{ng As}/\text{m}^3$ for a population of 20.3 million Californians could result in up to 130 excess cancers, based on the most plausible upper bound estimate of unit risk. Residential indoor exposure associated with environmental tobacco smoke could add an additional unknown number of lung cancers based on this unit risk estimate.
12. Existing data suggests there is a potential for reproductive effects in humans. Although there appears to be a sufficient margin of safety between the ambient exposure and the observed effect levels, this issue should be revisited as hot spot exposure data become available.

13. Identification of inorganic arsenic as a toxic air contaminant is required by Health and Safety Code Section 39655, since it has been identified as a hazardous air pollutant under Section 112 of the U.S. Clean Air Act.

WHEREAS, the SRP found the staff report to be without serious deficiency, and the SRP agreed with the staff recommendation that inorganic arsenic should be listed by the Air Resources Board as a toxic air contaminant, and found that, based on available scientific information, an inorganic arsenic exposure level below which carcinogenic effects are not expected to occur cannot be identified;

WHEREAS, the California Environmental Quality Act and Board regulations require that no project having significant adverse environmental impacts be adopted as originally proposed if feasible alternatives or mitigation measures are available;

WHEREAS, a public hearing and other administrative proceedings have been held in accordance with provisions of Chapter 3.5 (commencing with Section 11340), Part 1, Division 3, Title 2 of Government Code;

WHEREAS, in consideration of the staff report, including DHS' evaluation and recommendations, the available evidence, the findings of the SRP, and the written comments and public testimony it has received, the Board finds that;

There is strong evidence that inorganic arsenic is a human carcinogen;

Health effects other than cancer are not anticipated at existing or expected inorganic arsenic exposure levels in ambient outdoor air;

The DHS and the SRP agree that the most plausible estimate of the upper bound of the overall unit risk is $3.3 \times 10^{-3}/\mu\text{g}/\text{m}^3$;

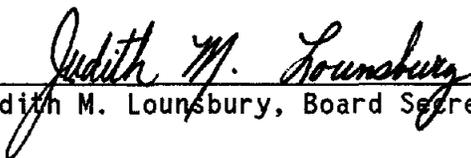
There is not sufficient available scientific evidence to support the identification of a threshold exposure level for inorganic arsenic;

Inorganic arsenic is an air pollutant which, because of its carcinogenicity, may cause or contribute to an increase in mortality or an increase in serious illness, or which may pose a present or potential hazard to human health; and

WHEREAS, the Board has determined, pursuant to the requirements of the California Environmental Quality Act and Board regulations, that this regulatory action will have no significant adverse impact on the environment.

NOW, THEREFORE BE IT RESOLVED, that the Board adopts the proposed regulatory amendment to Section 93000, Titles 17 and 26, California Code of Regulations, as set forth in Attachment A.

I hereby certify that the above is a true and correct copy of Resolution 90-49, as adopted by the Air Resources Board.



Judith M. Lounsbury, Board Secretary