State of California
AIR RESOURCES BOARD

Response to Significant Environmental Issues

Item: Public Hearing to Consider the Adoption of A Regulatory Amendment Identifying 1,3-Butadiene as a Toxic Air Contaminant

Agenda Item No.: 92-10-1

Public Hearing Date: July 9, 1992

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: Pat Hutchens
Pat Hutchens
Board Secretary

Date: 3/2/93

State of California
AIR RESOURCES BOARD

Resolution 92-54

July 9, 1992

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WHEREAS, sections 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, 1,3-butadiene is a potential toxic air contaminant which has been monitored in the ambient air in California;

WHEREAS, in California, the major identified sources of ambient 1,3-butadiene are direct emissions from mobile sources due to incomplete combustion of gasoline and diesel fuels;

WHEREAS, 1,3-butadiene is not naturally removed or detoxified in the atmosphere at a rate that would significantly reduce public exposure;

WHEREAS, pursuant to the request of the Board, the Office of Environmental Health Hazard Assessment (OEHHA) evaluated the health effects of 1,3-butadiene in accordance with section 39660 of the Health and Safety Code;

WHEREAS, the OEHHA concluded that 1,3-butadiene is 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 because it is a suspected human carcinogen;

WHEREAS, the OEHHA concluded that noncancer health effects are not expected to occur at existing statewide ambient levels of 1,3-butadiene;

WHEREAS, based on the upper 95 percent confidence limit of potency, the estimated range of lifetime (70-year) excess cancer risk from continuous exposure to 1 ppbv of atmospheric 1,3-butadiene is from 9.8×10^{-6} to 8×10^{-4}; and that the OEHHA best value for the upper 95 percent confidence limit of cancer unit risk for 1,3-butadiene is 3.7×10^{-4} ppb^{-1};

WHEREAS, based on the OEHHA's best value cancer unit risk factor of 3.7×10^{-4} per ppb and the corresponding concentration for ambient exposure, the number of potential excess cancer cases due to ambient exposure to 1,3-butadiene is estimated to be 140 per million people for a 70-year lifetime which corresponds to a potential excess cancer burden of 4,200 for a California population of 30 million over a 70 year period;

WHEREAS, for the reasons set forth in its evaluation, the OEHHA treats 1,3-butadiene-induced carcinogenesis as a nonthreshold phenomenon because the OEHHA found no evidence that there is a carcinogenic threshold level for 1,3-butadiene;

WHEREAS, upon receipt of the OEHHA evaluation, the staff of the Board prepared a report including, and in consideration of, the OEHHA 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 March 19, 1992, adopted, for submittal to the Board, findings which include the following quoted material:

1. There is evidence that exposure to 1,3-butadiene produces cancer. The International Agency for Research on Cancer (IARC), the United States Environmental Protection Agency (US EPA), and the U.S. Occupational Safety and Health Administration (OSHA) have found that 1,3-butadiene causes cancer in animals. The IARC and the US EPA have classified 1,3-butadiene as a possible (Group 2B) and probable (Group B2) human carcinogen, respectively, on the basis of sufficient evidence for carcinogenicity in animals and inadequate evidence in humans. However, it is our understanding that the IARC will upgrade its human evidence evaluation to "limited" this year, and categorize 1,3-butadiene as a probable (Group 2A) human carcinogen. The OSHA has found that exposure to 1,3-butadiene is associated with an increased risk of death from

cancer of the lymphohematopoietic system, and has classified 1,3-butadiene as a potential occupational carcinogen.

2. Because 1,3-butadiene is listed as a hazardous air pollutant under Section 112 of the United States Clean Air Act of 1990, identification of 1,3-butadiene as a toxic air contaminant is required by the California Health and Safety Code Section 39655.

3. Based on available scientific information, a level of 1,3-butadiene exposure below which no carcinogenic effects are anticipated cannot be identified.

4. Based on a health protective interpretation of the available scientific evidence, the upper bound of the lifetime excess cancer risk resulting from 1,3-butadiene exposure ranges from 9.8×10^{-6} to 8×10^{-4} per ppb [4.4×10^{-6} to 3.6×10^{-4} per microgram per cubic meter ($\mu g/m^3$)]. This range of risk is based on data from studies in rats and mice. The best value of the upper bound of risk is 3.7×10^{-4} per ppb (1.7×10^{-4} per $\mu g/m^3$). This value is based on data from a recent bioassay in mice. Appendix I compares the best value of the upper bound 1,3-butadiene cancer unit risk with those of other compounds reviewed by the SRP. These 95 percent upper bound lifetime risk estimates are health-protective estimates; the actual risk may be much lower.

5. Mobile sources (both on- and off-road) are responsible for the majority of the identified emissions of 1,3-butadiene. Mobile sources that do not have a functioning exhaust catalyst emit far greater amounts of 1,3-butadiene than do mobile sources with functioning catalysts. Stationary sources contribute to ambient concentrations of 1,3-butadiene during petroleum refining, fuel combustion, production of certain chemicals, and the manufacturing of styrene-butadiene copolymer products.

6. Based on data collected by the ARB's ambient toxic air contaminant monitoring network from 1988 through 1989, the estimated mean annual population-weighted outdoor ambient exposure for California is 0.37 ppbv (0.82 $\mu g/m^3$).

7. Based on the ARB emission inventory, areas that may be expected to have 1,3-butadiene levels higher than the mean statewide concentration are near facilities using 1,3-butadiene for the production of resins and polymers, synthetic rubber manufacturing facilities, chemical production facilities, petroleum refineries, stationary fuel combustion sources, and congested freeways. New data from the AB2588 Air Toxics "Hot Spots" emissions reporting program should be used to evaluate "hot spot" exposures if 1,3-butadiene is identified as a toxic air contaminant.

8. Based on its gas-phase reactivity with the hydroxyl radical, ozone, and the nitrate radical, 1,3-butadiene's estimated tropospheric lifetime ranges from a few hours to about 12 hours.

9. Limited indoor monitoring for 1,3-butadiene indicates that individuals exposed to indoor environmental tobacco smoke (ETS) are almost certainly exposed to higher concentrations of 1,3-butadiene indoors than outdoors. The measured concentrations of 1,3-butadiene indoors ranges from 1.5 to 8.6 ppbv (3.3 to 19 $\mu g/m^3$). This range of indoor concentrations compares to the outdoor statewide average 1,3-butadiene concentration of 0.37 ppbv (0.82 $\mu g/m^3$).

10. Studies of mice exposed to ppm concentrations of 1,3-butadiene indicate that 1,3-butadiene is taken up rapidly by the body and metabolized. Cancer results in multiple sites, including the heart, lung, mammary gland, ovaries, forestomach, liver, pancreas, thyroid, testes, and hematopoietic system. Exposure to 1,3-butadiene at higher concentrations ($\geq$ 1,000 ppm) is associated with tumors in the rat. Although it is not included in the calculations for the risk assessment, it is important to note that 1,3-butadiene is one of only two chemicals (the other being the fungicide Captafol) known to induce cancer in the heart of laboratory animals.

11. Epidemiological studies of production workers exposed to 1,3-butadiene provide limited evidence of an increased risk of death from hematologic neoplasms, especially leukemia and other lymphomas. Adverse health effects other than cancer are not expected to occur at mean statewide outdoor ambient concentrations.

12. Based on the OEHHA staff's best value cancer unit risk of 3.7×10^{-4} per ppb (1.7×10^{-4} per $\mu g/m^3$), and the ARB staff's population-weighted outdoor ambient exposure of 0.37 ppbv (0.82 $\mu g/m^3$), up to 140 potential excess cancers per million are predicted if exposed to this level over a 70 year lifetime. This corresponds to an excess cancer burden of up to 4,200 cancers statewide (based on a population of 30 million people).

13. Based on the available scientific evidence, we conclude that 1,3-butadiene should be identified as a toxic air contaminant.

WHEREAS, Appendix I to the SRP findings, which compares the best value of upper-bound 1,3-butadiene cancer unit risk with those of other compounds, is set forth as Attachment B to this resolution and incorporated by reference herein;

WHEREAS, the SRP found the staff report to be without serious deficiency, agreed with the staff recommendation that 1,3-butadiene should be listed by the Air Resources Board as a toxic air contaminant, and found that, based on available scientific information, a 1,3-butadiene 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 the provisions of Chapter 3.5 (commencing with section 11340), Part 1, Division 3, Title 2 of the Government Code;

WHEREAS, in consideration of the staff report, including the OEHHA's 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:

1. there is evidence that exposure to 1,3-butadiene produces cancer.

2. adverse health effects other than cancer are not expected to occur at statewide outdoor average ambient concentrations.

3. the OEHHA and the SRP agree, and the Board concurs, that the best value of the upper bound of the overall 1,3-butadiene cancer unit risk is 3.7×10^{-4} ppbv^{-1}.

4. 1,3-butadiene 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.

5. there is not sufficient available scientific evidence to support the identification of a threshold exposure level for 1,3-butadiene.

6. this regulatory action does not impose any control measures or reporting requirements on any person or business and will not result in any costs of compliance for California small businesses or for private persons or other businesses.

7. at such time as control measures are proposed for emissions of 1,3-butadiene, information regarding the cost of compliance with the proposed regulations will be developed and made available for review and comment by interested persons and businesses prior to consideration by the Board at a public hearing.

8. given the scientific basis of the Board's action, no alternative to identifying 1,3-butadiene as a TAC would be more effective in carrying out the purpose for which the regulation is proposed or would be as effective and less burdensome to affected private persons than the proposed regulation.

9. this regulatory action will have no significant adverse impact on the environment.

NOW, THEREFORE BE IT RESOLVED, that the Board hereby identifies 1,3-butadiene as a toxic air contaminant and adopts the proposed regulatory amendment to section 93000, Titles 17 and 26, California Code of Regulations, as set forth in Attachment A.

BE IT FURTHER RESOLVED, that the Board directs the Executive Officer to forward all available data on indoor exposure to 1,3-butadiene to the Department of Health Services, Division of Occupational Safety and Health of the Department of Industrial Relations, the State Energy Resources Conservation and Development Commission, the Department of Housing and Community Development, the Department of Education, and the Department of Consumer Affairs.

I hereby certify that the above is a true and correct copy of Resolution 92-54, as adopted by the Air Resources Board.

Pat Hutchens

Pat Hutchens, Board Secretary