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 Nickel (Metallic Nickel and Inorganic Nickel Compounds) as a Toxic Air Contaminant

Agenda Item No.: 91-6-1

Public Hearing Date: August 8, 1991

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: 1/27/92

State of California
AIR RESOURCES BOARD

Resolution 91-40

August 8, 1991

Agenda Item No.: 91-6-1

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, in California, metallic nickel and inorganic nickel compounds (hereinafter nickel) are emitted from many activities including fossil fuel and wood combustion, asbestos mining and milling, secondary smelting, municipal refuse and sewage sludge incineration, electroplating, and cement manufacturing; and nickel 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 nickel in accordance with section 39660 of the Health and Safety Code;

WHEREAS, DHS concluded in its evaluation that nickel 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 nickel; 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 ug/m^3 of atmospheric nickel is from 2.1×10^{-4} to 37×10^{-4}; and that, based on available data, 2.6×10^{-4}/ug/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 nickel-induced carcinogenesis as a nonthreshold phenomenon because DHS found no evidence that there is a carcinogenic threshold level for nickel;

WHEREAS, upon receipt of the DHS evaluation, staff of the Board prepared a report including and considering the DHS evaluation and recommendations in the form required by section 39661 of the Health and Safety Code. In accordance with the provisions of that section, the report was made available to the public and submitted 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 May 15, 1991 adopted, for submittal to the Board, findings which included the following:

1. The evidence for carcinogenicity in humans from inhaled nickel is strong. In 1984, the U.S. Environmental Protection Agency (EPA) concluded that nickel refinery dust and nickel subsulfide are human carcinogens. In 1990, the International Agency for Research on Cancer (IARC) concluded that nickel compounds are carcinogenic to humans and that metallic nickel is a possible human carcinogen. Based on available scientific data, we agree with the DHS and IARC's classification of nickel compounds as human carcinogens.

2. Nickel is present in many forms including soluble and insoluble compounds. Human epidemiology has shown that nickel sulfate and combinations of nickel subsulfide and nickel oxides are carcinogens in humans. Several nickel compounds are genotoxic or carcinogenic in animals. While there may be differences in the potency of these different forms of nickel, available evidence does not permit quantification of separate risk estimates. As a result, a single potency has been developed.

3. Because nickel was identified as a hazardous air pollutant under Section 112 of the United States Clean Air Act, identification of nickel as a toxic air contaminant is required by California Health and Safety Code section 39655.

4. Nickel is emitted into the outdoor air by a variety of stationary sources in California.

5. Stationary sources such as fuel combustion, cement manufacturing, municipal refuse and sewage sludge incineration, secondary smelters, and electroplating contribute 18 to 353 tons per year of nickel into California's atmosphere. Mobile sources such as gasoline and diesel

powered vehicles also contribute 5.4 to 7.2 tons per year of nickel emissions to the atmosphere.

6. Tobacco smoke is the major source of indoor exposure to nickel. Wood burning is another indoor source of nickel. In light of the high emissions of nickel in sidestream smoke and the amount of time most people spend indoors, it is apparent that environmental tobacco smoke may contribute much more to people's exposure to nickel than does inhaling ambient outdoor air.

7. Based on the average particle size, nickel has an estimated average atmospheric lifetime of seven days.

8. Approximately 20.3 million people in California represented by the ARB toxics monitoring network are estimated to be exposed outdoors to a population-weighted mean nickel concentration of 7.3 nanograms per cubic meter.

9. Adverse health effects other than cancer are not predicted to occur at known concentrations of nickel in ambient outdoor air.

10. Computer modeling of potential near source exposures to fuel oil combustion units indicate potential exposure to concentrations of nickel up to 10 times higher than the statewide ambient average.

11. Based on available scientific information, it is reasonable to assume that a nickel exposure level below which carcinogenic effects are not expected to occur cannot be identified.

12. Based on interpretation of available scientific evidence, the DHS staff estimated the range of unit risk is from 2.1×10^{-4} to 37×10^{-4} per ug/m^3. The lower end of this range is the human average estimate; the upper end is the 95 percent upper confidence bound for the animal study. We concur with the DHS staff that 2.6×10^{-4} per ug/m^3 is the best value unit risk factor.

Table 1 compares the best value for nickel with those of other compounds recently reviewed by the SRP.

TABLE 1

Compound	Unit Risk (ppb-1)	Unit Risk (ug/m3)-1	Approved by SRP
Nickel	particulate	2.6×10^{-4}	05/15/91
Vinyl Chloride	20×10^{-5}	7.8×10^{-5}	10/19/90
Chloroform	2.6×10^{-5}	5.3×10^{-6}	08/14/90

13. Using the population-weighted annual nickel exposure concentration of 7.3 nanograms per cubic meter (California's population-weighted average ambient concentration) and the DHS value for unit risk, the DHS staff estimates 1.5 to 27 excess cancer cases per million are expected to result. Using the best value for unit risk, the DHS staff estimates the excess carcinogenic risk from a lifetime exposure is 2 cancer cases per million. Assuming that this applies to the California state population of 30 million people, this could result in up to 60 excess lifetime cancer cases statewide. Indoor exposure to nickel from tobacco smoke could add an unknown additional number of lung cancers to this risk estimate.

14. Based on the findings of nickel-induced carcinogenesis in humans and animals, as well as the results of the risk assessment, the SRP concurs with the staff of the DHS in finding that nickel compounds are air pollutants 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, the SRP found the staff report to be without serious deficiency, and the SRP agreed with the staff recommendation that nickel should be listed by the Air Resources Board as a toxic air contaminant, and found that, based on available scientific information, a nickel 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 nickel is a human carcinogen;

Health effects other than cancer are not anticipated at existing or expected nickel 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 $2.6 \times 10^{-4}/ug/m^3$;

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

Nickel 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 91-40, as adopted by the Air Resources Board.

Pat Hutchens

Pat Hutchens
Board Secretary