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ENVIRONMENTAL PROTECTION AGENCY

PUBLIC HEARING

ON

NATIONAL EMISSIONS STANDARDS

FOR HAZARDOUS AIR POLLUTANTS

at

Room 1500

312 North Spring Street

Los Angeles, California

February 15 - 16, 1972

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P R O C E E D I N G S

MR. MEGONNELL: The hearing will please come to order.

My name is William Megonnell. I am Director of the Division of Stationary Source Enforcement in the Environmental Protection Agency, and I have been designated by the Administrator as Presiding Officer for this hearing.

My colleague is Mr. Thomas Yost, an attorney, who is Director of the Legal Procedures Branch.

Our other representatives of the Environmental Protection Agency may participate in the proceedings, and if and when they do they will be appropriately identified.

For the record, this hearing is convened on February 15, 1972, at the U.S. Courthouse, 312 North Spring Street in Los Angeles. A copy of the December 16, 1971 Federal Register Notice calling this hearing is included in the record of a similar hearing which was held in New York City on January 18, 1972, and it will not be repeated in this record.

Now, a brief explanation of what the hearing is all about and the rules that will apply. The rules are going to be kept as simple as possible consistent with an

orderly proceeding.

Section 112 of the Clean Air Act defines a hazardous air pollutant as one that may cause or contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness. The Administrator of the Environmental Protection Agency was required, within 90 days after the enactment of the law, to publish a list of hazardous air pollutants for which he intended to establish emission standards. Such a list of pollutants, including asbestos, beryllium, and mercury, was published in the Federal Register on March 31, 1971. Proposed emission standards for the three pollutants were published in the Federal Register on December 7, 1971. The statute provides that not later than 180 days after the publication of the proposed standards, the Administration shall prescribe an emission standard for each such pollutant unless he finds on the basis of information presented at public hearings that such pollutant clearly is not a hazardous air pollutant.

The basic purpose of this hearing, then, is to allow opportunity for interested persons to comment on whether or not asbestos, beryllium and mercury are in fact hazardous air pollutants within the definition set forth

in the statute. The standards for these pollutants have been proposed and will be promulgated under procedures prescribed for all standards under the Federal Administrative Procedure Act, i.e., the standards are proposed, written comments on the standards are accepted and, after consideration of the comments, the standards are promulgated. This same process is being followed with regard to hazardous emission standards. Comments are now being received on the proposed standards. But in the case of hazardous emission standards, Congress provided for additional public participation by requiring hearings.

As I said, the basic purpose of this hearing is to allow public comment on the Administrator's initial decision to include each of the pollutants on the list, rather than to comment on the standards themselves; nevertheless, in the interest of increasing the opportunity for public participation in the entire rule-making procedure, the Environmental Protection Agency will permit presentations concerning the proposed standards as well as those relating to the question of whether or not the pollutant is in fact hazardous. Accordingly, we request that all participants specifically identify the nature of their statements. That is, either state that all or part of their presentation has

to do with whether or not the pollutant is hazardous.

Accordingly, since today's hearing is not a rule-making hearing under the Administrative Procedure Act, no formal procedures or rules of evidence will apply. Participants may submit any additional material which they feel should be brought to the attention of the Administrator. For this purpose, following adjournment of the hearing, the record will be kept open until March 3rd in order to permit maximum time for submission of additional material.

The Presiding Officer retains the right to limit presentations to the issues at hand; namely, (1) are the pollutants hazardous, and (2) do the proposed standards protect, with an ample margin of safety, the public health from the effects of the pollutants?

Accordingly, the Presiding Officer may limit the oral presentation if not pertinent to the matters at hand, and may ask that redundant or corroborative material be submitted rather than read. In addition, I should state that written materials may be submitted directly to EPA, outside the confines of this hearing record, for the full 90 day period allowed from the date of publication of the proposed rules in the Federal Register. That comment period ends on March 6, 1972.

A verbatim transcript is being made, and this will be the sole official record of the hearing. Persons desiring to purchase copies of the record should make arrangements with the reporter, Mr. Al Zimmer, during one of the recesses.

That concludes the introductory remarks.

Our first witness is Mr. David S. Cahn, representing the Ad Hoc Committee for Machine Applied Portland Cement Plaster, and while Mr. Cahn is coming up here, I would like to insert into the record some correspondence I have received. First is a letter from the City of Philadelphia, Assistant Health Commissioner, Edward F. Wilson, dated January 18, 1972, and the next is a supplementary statement by Leonard J. Goldwater, M.D., who appeared at the New York hearing. These will be reproduced in the record as if read.

MR. S.H. MOERMAN: My name is S.H. Moerman. Mr. Megonnell, could you give us some clue on the Philadelphia letter about the subject matter?

MR. MEGONNELL: Yes, I will be glad to summarize it.

Generally, they are in favor of the standards. They make some technical suggestions for an additional

investigation.

They comment, in the case of asbestos, that the prohibition against visible emissions during dismantling does present a technical problem that they don't quite know how to handle.

That is generally it. I would say they are in favor of the standards with some technical comments.

MR. MOERMAN: Thank you, sir.

A VOICE: Would you do the same with Dr. Goldwater's letter, please?

MR. MEGONNELL: Dr. Goldwater's letter relates exclusively to mercury, and he comments on the specific questions that appeared in the Federal Register announcement of these hearings.

As to whether mercury, when emitted to the ambient air may cause or contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible illness, he says he assumes that this does not apply to all forms or to unlimited amounts of mercury, but rather to the kind and amount of mercury that actually exists in the ambient air, and in these terms, he said he has serious doubts as to the propriety of considering mercury a hazardous air pollutant.

He also alludes to some more unpublished data which he has showing that a population exposed to mercury vapor in excess of 20 micograms per cubic meter of air for four weeks, as the result of an atmospheric inversion in an industrial community, did not develop urinary mercury levels higher than those of unexposed populations. This suggests to him that there is not any significant degree of absorption from atmospheric mercury.

The general tone of his supplementary statement is questioning whether or not mercury should be included as a hazardous air pollutant.

These two documents will be reproduced in the record as if read.

(The documents referred to above read as follows:)

"City of Philadelphia

January 18, 1972

"Administrator
Environmental Protection Agency
Room 17-70
5600 Fishers Lane
Rockville, Md. 20852

"Attn: Presiding Officer, Hazardous Emission Standards Hearings.

"Dear Sir:

"The Philadelphia Air Management Services is the official agency of the City of Philadelphia responsible for air pollution control within its jurisdiction. Included below are its comments and recommendations concerning several items covered in the proposed 'National Emission Standards for Hazardous Air Pollutants' published in the Federal Register of December 7, 1971. It is intended that these statements be included in the records of the scheduled public hearings; however, no personal presentation will be made. Each item is followed by its source, referenced as a paragraph from 40 CFR Part 61.

"1- Visible emissions of asbestos particulate matter from the repair or demolition of certain buildings and structures is prohibited; however, the control measures necessary to prevent such emissions are not suggested or discussed. The inherent complexity of control procedures necessary to contain emissions from these types of operations would seem to warrant further study in this area in order to formulate uniform control procedures. Studies of this type are presently being made in several large metropolitan areas. The results of these investigations should be evaluated so that a comprehensive control method can be developed and included in the National Emission Standards. (Subpart

B, Section 61.22, Paragraph (d) ).

"2- The equipment specifications for collecting asbestos particulates include a requirement that provisions be made for emptying the collection hoppers without creating visible emissions of particulate matter. Considering the hazardous nature of this material, this requirement should be amended to allow for no emissions from the collector emptying and materials handling operations, the removal of the collected material from the site, and the ultimate disposal method. Possible control procedures include the bagging of the collected material at the base of the hopper or the direct interception of the collected material in a wet hopper and removal in a slurry. The collected material could then be safely transported to a special burial site or processed for re-use. (Subpart B, Section 61.23, Paragraph (d) ).

"3- Although there is no specific reference to recirculating collection equipment exhaust air to work areas, a provision should be included to prohibit this practice. This prohibition would minimize employee exposure to these hazardous materials, particularly in the event of control equipment leakage or malfunction. It is realized that additional expense might be incurred for conditioning

make-up air and that this might properly be governed by Occupational & Safety laws rather than the Clean Air Act, but we believe that the prohibition should be included here. (Subpart B).

"4- Stationary sources should be required to comply with both the total allowable emission limitation and the outplant concentration limitation for beryllium. The source may be allowed to demonstrate compliance by either method with the understanding that if non-compliance can be shown by a regulatory agency using the method not chosen, the source will be considered to be in violation of the standards. (Subpart C, Section 61.32).

"The Air Management Services supports the format and limits stated in these National Emission Standards and is hopeful that additional standards will be forthcoming for other hazardous materials in our atmosphere.

"Thank you very much for your consideration of these comments.

"Very truly yours,
Edward F. Wilson
Assistant Health Commissioner"

---- ----

"Supplementary statement by Leonard J. Goldwater, M.D. on proposed National Emission Standard for Mercury.

"This supplementary statement is prompted by insights gained through attendance at hearings held in New York on January 18, 1972 and is addressed to the specific questions for which the hearings were held.

"1. 'Whether...mercury, when emitted to the ambient air, may cause, or contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness...'. In discussing this question, I assume that it does not apply to all forms or to unlimited amounts of mercury but rather to the kind and amount of mercury which might be found as an industrial effluent in gaseous or aerosol form. In these terms, I have serious doubts as to the propriety of considering mercury a Hazardous Air Pollutant. My reasons for this opinion include the following points:

"a. I am not aware of any evidence that atmospheric mercury has ever been shown to be a cause of ill health except among industrial workers with excessively high exposures and in a few bizarre household accidents. Human tolerance to mercury vapor is described in my earlier statement (bottom of page 6).

"b. Unpublished data which I have in my possession show that a population exposed to mercury vapor

in excess of 20 ug per cubic meter of air for four weeks, as the result of an atmospheric inversion in an industrial community, did not develop urinary mercury levels higher than those of unexposed populations. This suggests that this degree of exposure does not produce any significant degree of absorption.

"c. I know of no evidence that suggests any threatening buildup of mercury in ambient air.

"d. The monograph Hazards of Mercury cited as a reference in the EPA Background Information presents evidence that, 'The traditional food-chain buildup may not occur with mercury' (p. 32). The contributions to food chains by mercury in the atmosphere should therefore have no significance as a threat to health. This point is further amplified by the statement (p. 53) that, '...it would appear that unless a large increase in the level of atmospheric mercury occurs, the health hazard from airborne mercury would be relatively insignificant compared to that from eating contaminated food.' Contamination of food, such as that which occurred in Japan, in the Alamogordo incident, and in other episodes is irrelevant to the present discussion of mercury emissions. No one questions that under extreme accidental conditions, mercury compounds can be toxic.

"2. The second specific question is, 'What standards should be adopted to regulate emissions...' of mercury? In the event that the Administrator should find that mercury is a hazardous substance, the following points might be considered in setting an emission standard:

"a. A recent article by scientists at the Naval Undersea Research and Development Center and the Scripps Institution of Oceanography (Science 174: 692,1971) states that, 'The mercury content in the atmosphere appears to result primarily from degassing of the earth's crust' and '...a survey of industrial activity has not revealed mercury releases to the atmosphere that can rival that of the degassing rate...'. Disturbances in the earth's crust, such as that resulting from highway construction, can increase the rate of degassing (escape of mercury vapor from natural formations). An emission standard, therefore, should take into account the contribution of mercury vapor arising as a result of construction projects of all kinds.

"b. The combusion of fossil fuels is now generally recognized as a major contributor to atmospheric mercury. In terms of concentrations in stack effluents as well as in the total contribution, combustion of coal, oil and natural gas play a major role. Recent studies in

Illinois, for example, have shown that individual power plants discharge up to 5,400 pounds of mercury per year and it has been estimated that the power plants operated by a single utility company in a mid-western city emit some 16,000 pounds of mercury a year! Readings for mercury vapor as high as 6.9 ug/$m^3$ have been found at distances of several hundred meters from a power plant stack.

"c. Contributions of mercury vapor to the atmosphere of the same order of magnitude as those from power plants have been produced by incinerators. The manufacture of cement is another major contributor. It is entirely possible that a chloralkali plant downwind from a power plant or an incinerator will be bathed in ambient air containing in excess of 1.0 ug of mercury per cubic meter.

"I have cited the above figures in support of a rational approach to the control of mercury emissions if, indeed, controls are deemed necessary. It would seem logical to attempt to control the major sources of pollution rather than those which contribute relatively small amounts of mercury to the atmosphere.

"Since the time when I prepared my original statement (December 29, 1971), I have conferred with five or six chemists who are attempting to perfect an analytical

method for methyl mercury compounds. Their experiences confirm my earlier impressions about difficulties in obtaining reliable results. Doubts about the significance of reported results of methyl mercury analyses have not been dispelled.

"As is well known to many of my colleagues in a number of governmental agencies and elsewhere, my door is always open to anyone who wishes to discuss problems related to mercury.

"Leonard J. Goldwater, M.D."

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MR. MEGONNELL: Now I guess we are ready for Mr. David S. Cahn. Is he present?

(There was no response.)

MR. MEGONNELL: He is not here. Mr. Karl V. Lindell of the Quebec Asbestos Mining Association.

Mr. Lindell.

STATEMENT BY

DR. KARL V. LINDELL,

CHAIRMAN

ENVIRONMENTAL AND OCCUPATIONAL HEALTH COMMITTEE

QUEBEC ASBESTOS MINING ASSOCIATION

DR. LINDELL: My name is Karl V. Lindell, and I am Chairman of the Environmental and Occupational Health Committee of the Quebec Asbestos Mining Association. I am a Mining Engineer, graduate of the Michigan College of Mines and have been involved in almost all phases of the asbestos industry for over a quarter of a century until my retirement in December 1970, and since then as a consultant dealing more specifically with the problems related to the biological effects of asbestos. I have been asked to be the spokesman for the Canadian mines of asbestos as I have chaired this health committee since its inception in 1965. Our first responsibility was to seek the truth as to the biological effects of Asbestos, of all types and to this end organized the Institute of Occupational and Environmental Health of Montreal, which has been sponsored by the Quebec Asbestos Mining Association. I attended the hearings of EPA in New York in January and heard the statements made by my former colleagues from Johns-Manville Corporation, Burt Jobe, Executive Vice-President, Dr. Fred Pundsack, Vice-President of Research, Ed Fenner, Director of Environmental Control, as well as Dr. G.W. Wright, Head of Medical Research of Saint Luke's Hospital, Cleveland, and Doctor Corbett McDonald of McGill University and I concur

with their statements. Further as to my qualifications to speak on these matters, I was General Manager of the Asbestos Fiber Division of Canadian Johns-Manville Company Limited, responsible for the exploration for asbestos, worldwide, mining and milling at Company owned or operated properties, as well as all problems related to these operations, such as environmental and occupational health. In my later years I was also Chairman of the Board of the Canadian Company as well as a Senior Operating Vice-President and a Director of the parent company, Johns-Manville Corporation which now has headquarters in Denver, Colorado. In these capacities I travelled much of the world, visiting most of the operating asbestos mines and mills around the globe as well as manufacturing plants, laboratories doing medical research, and had attended conferences in many countries on the biological effects of asbestos. My travels have taken me to the Soviet Union on three occasions on exchange visits, where I visited their asbestos mining and milling operations. While there I had an opportunity to discuss health problems learning that their experience paralleled our Canadian in regard to asbestosis and the incidence of lung cancer. I would like to note that their mills were very clean. The fiber occurrences were identical to Quebec in their

characteristics and genesis.

My statement will try to paint with a broader brush the subjects touched upon by some of the statements already submitted to you, but first, let me state that we are entirely in agreement with the EPA that there is a need for control of asbestos emissions. The asbestos industry has recognized for many years that there are occupational health hazards associated with the excessive inhalation of asbestos dust. As a result, the industry, beginning at the Saranac Laboratories in Saranac Lake, New York, in the late 1920's, has sponsored and cooperated in a wide variety of scientific research projects designed to identify these hazards and to eliminate them wherever they may exist, not only in asbestos mines, mills and manufacturing plants, but also among fabricators and applicators of finished asbestos products. In recent years, the asbestos industry, either as individual companies or through the Quebec Asbestos Mining Association's sponsorship of the Institute of Occupational and Environmental Health in Montreal, has or is continuing to support medical research at such highly regarded institutions as McGill University in Montreal, Tulane University in Louisiana, Saint Luke's Hospital in Cleveland, the Environmental Sciences Laboratory at

Mount Sinai Hospital in New York, the Industrial Health Foundation in Pittsburgh, the University of California at Berkeley, Fairleigh Dickinson University in New Jersey, the University of Pittsburgh, the Medical College of South Carolina, and a number of others, both here and abroad.

In addition, in the industry's own research laboratoratories, scientists and engineers are also engaging in work related to health, developing better handling techniques for loosely bound asbestos products and also developing and improving techniques for the measurement and control of asbestos emissions both in the workplace and in the ambient air.

For many years the asbestos industry has been actively pursuing the goal of control of asbestos emissions, utilizing the best available technology of the times. Thus industry is sympathetic with the concept of controlling emissions, and have invested many millions of dollars in sophisticated and highly efficient dust control equipment and techniques to reduce worker exposure and to prevent the emission of hazardous amounts of asbestos fiber into the air.

Though there are as yet many unanswered questions in regard to the effect of inhalation of asbestos,

the following is a partial list of what is known today:

a) The hazard is dose related (Dr. Wright).

b) Disease can be eliminated if proper control measures are taken (Dr. Knox).

c) One group study showed that only smokers had lung cancer.

d) The general public is not at risk.

The report by Dr. McDonald of McGill University on a three year study of chrysotile workers in the Province of Quebec supports this finding.

e) "Asbestos bodies" or "ferruginous bodies" were as prevalent in the general public in 1934 as they are now in spite of the increased consumption of asbestos. This has been reported by Dr. Selikoff and his associates.

With regard to mesothelioma, I wish only to comment on the occurrence of mesothelioma briefly. Dr. Wagner in his report in 1960 found an excess of mesothelioma in asbestos workers in the Cape Province of South Africa. The particular asbestos involved is crocidolite, commonly called "blue-asbestos." However, several hundreds of miles to the east in the Transvaal area one did not find any mesotheliomas in the blue-asbestos mines. The difference here has not yet been

answered. Could it be that the workers had been also exposed in the chrome and manganese mines of the Kalahari, or to the dry air of the Kalahari desert itself? Professor Thomson in his report predicted an epidemic of mesothelioma because he saw an excess in the Cape Town area and reported that some 25% of the public had ferruginous bodies in their lungs. He also hypothesized that that since consumption of asbestos was growing it would create a problem. He named the various asbestos products used as breaking down and causing the pollution though he did not have evidence of this. Up to recent date he has not offered any further data to support his claims.

I would also like to call your attention to the fact that at the largest asbestos operation in Canada and I might say on this hemisphere no mesotheliomas have been seen. There is not any evidence to support the theory of an impending epidemic.

Sources of Natural Emissions

Dr. Pundsack in his paper in New York went into considerable detail on the dynamic process through which asbestos fibers get into the ambient air by natural means. He limited his discussion to the serpentine rock and asbestos fiber occurrences in the United States. But

looking at the geological map on a global basis we see for example that serpentine rocks occur on the west coast of both North and South America from Alaska to the southern tip of Argentina. Along these coastal ranges you will not find many mines, but, you will find fiber and serpentine occurrences in the ranges which even at this time are going through heavy erosion and weathering process, for the full length of the Western Hemisphere. There are isolated areas of serpentine as you move eastward in the U.S.A. and you will find them also in Canada, Mexico, and farther south in Central Brazil. Further east, there are extensive occurrences from the St. Lawrence River near Mont-Joli, Quebec, on down through the state of Vermont, on further through the Appalachian Mountains and further south to the Carolinas. The Parallel ranges in the Soviet and South Africa have proceeded further in the weathering process, but they can be seen on the surface. I might note here that there are crocidolite occurrences on this continent also, even though there are not any commercial deposits in this hemisphere except in Bolivia. Thus the natural sources of emission of asbestos are quite extensive. From the foregoing it is obvious that man has been exposed to asbestos fibers in the ambient air for a long time. Much work is

needed to be done to determine what is the threshold limit value for this background natural pollution. This of course only emphasizes the need to control man-made emissions.

Man-Made Emissions

I will not delve into man-made emissions except to comment on Talc which was mentioned briefly by Dr. Wright in his statement in New York. I am not aware of research on Talc or its effects. Drs. Wright and Dr. Louis Cralley (of U.S. Public Health Service) have investigated on few samples of Talcum Powder to learn that they do contain asbestos. Bates in his book on "Geology of the Industrial Rocks and Minerals" published in 1960 by Harper & Brothers, New York, does report on samples of commercial talc which contained either or both tremolite and anthophyllite in amounts varying from seven to seventy-eight percent. Steatite is the name given to pure Talc and it is also a hydrous magnesium silicate the same as chrysotile asbestos. You can therefore picture how generously we usually dust ourselves with this material. It is worth investigating fully.

Further Research

There are many areas of this problem requiri

further research. Our Scientific Committee is reviewing this situation as to priorities and availability of researchers and laboratories interested in this type of study.

Lastly, I wish to make a brief comment on Equipment Specifications.

With reference to the rules for equipment specifications 61.22 and 61.23 it is noted thatmost of Canadian mines dust control systems do not presently meet these specifications when referred to the fabric itself. However, when relating to operation it is believed that they will meet the requirements of the actual operation as the coating of asbestos fines on the cloth reduces the air flow to within the specifications limits. More testing will be needed to verify this.

That is my statement, sir, and I appreciate the opportunity to be heard.

MR. MEGONNELL: Thank you very much, Dr. Lindell.

You comment here that the Soviet mills are very clean?

DR. LINDELL: That is correct.

MR. MEGONNELL: Are they cleaner than the

United States and Canadian ones?

DR. LINDELL: I would say they are not all to that standard. The clean mills that we have in the United States and Canada will come up to that standard.

MR. MEGONNELL: I would like to acknowledge, with grateful appreciation, the assistance we have obtained from the asbestos industry, even though you did not read that paragraph in your prepared statement. I think you didn't want to pat yourself on the back, so I will do it for you.

DR. LINDELL: Thank you. I didn't want to get into controversy about that.

MR. MEGONNELL: No, there is no controversy.

DR. LINDELL: Okay.

MR. MEGONNELL: Do you have any progress report on ambient air measurement methods for asbestos?

DR. LINDELL: They told me that it was too early. We have had some results and we find that the results are varying from day to day and, as you can expect, the variation in the wind direction makes for a lot of difference, so that we feel we have to get about a year in order to put this information together.

MR. MEGONNELL: I was not speaking so much

about the levels you are finding.

DR. LINDELL: I see.

MR. MEGONNELL: But the actual measurement method, the technique. Are you coming out with anything simpler?

DR. LINDELL: You can use the membrane filter exclusively as being one of the most effective ones.

MR. MEGONNELL: The optical microscope?

DR. LINDELL: Yes, optical microscope.

MR. MEGONNELL: So you have seen the bigger flakes?

DR. LINDELL: That's right.

MR. MEGONNELL: What is a ferruginous body?

DR. LINDELL: Well, to start out, originally it was called the Julius body when they were first noticed, and since there was notice that it was covered by a protein ferruginous material -- I would rather you had a doctor tell you that -- but asbestos fiber does become coated when it is in the lung and the tissue, and this seems to be a defense mechanism of the body in order to take this fiber out of action.

Now, that term has been loosely used, and the reason we mention it is, though it was found in asbestos

in some of the earlier work, naturally you could expect that it was a core of asbestos, but later we found out from Dr. Thompson's work in Cape Town, he would call them asbestos bodies also, and so we find that in the urban population, with the electric razors you have, whiskers getting into the lungs can be coated and can look exactly the same, and you are only able to identify for certain whether it is an asbestos product or what kind of asbestos by the electron microscope.

MR. MEGONNELL: I notice you say there is no impending epidemic. I think we agree with that, but Congress, in passing the Clean Air Act, I don't think was foreseeing impending epidemics. They did see potential hazards, which I think you will agree with?

DR. LINDELL: Yes. The remark about impending epidemics was to counteract Dr. Thompson's much publicized report, that there was an epidemic on the way, and he has not done any work to demonstrate that since.

MR. MEGONNELL: Your reference to talc did disturb me a little bit, I guess, because it is such a ubiquitous source. Do you think this could be responsible for some of these ferruginous bodies that Dr. Selikoff and

others are reporting?

DR. LINDELL: I don't think there is any doubt about it.

MR. MEGONNELL: Also, in your prepared paper, you said you wanted to include some material that you did not have in time.

DR. LINDELL: That was about the fabric cloth. I did not have it, but I did find that you would accept a revision, so I revised it just to that extent, that the cloths that they were using do not have the permeability that is asked for in the rule, but immediately what they are putting into use, the fiber coats the tube inside and it does have that permeability.

MR. MEGONNELL: When you say "immediately," how long does it take?

DR. LINDELL: Well, this is one of the unanswered questions.

MR. MEGONNELL: I see.

DR. LINDELL: It does not take very long.

MR. MEGONNELL: A matter of hours?

MR. YOST: Hours? Days?

DR. LINDELL: No, I think it is a matter of hours only.

MR. MEGONNELL: If you get any data, of course, we would like to have it, and the record will be open.

DR. LINDELL: Surely. I think actually what is required here is not to shake the bags to its clean position, but to leave some of it in and shake the bags oftener. That I think is going to be the answer to that one.

MR. MEGONNELL: Thank you very much, Dr. Lindell, I appreciate your statement.

DR. LINDELL: Thank you.

MR. MEGONNELL: The next witness is Mr. R.C. Sutter of the Diamond Shamrock Chemical Company.

STATEMENT BY

MR. R.C. SUTTER

VICE PRESIDENT

DIAMOND SHAMROCK CHEMICAL COMPANY

MR. SUTTER: Mr. Megonnell.

My name is R.C. Sutter. I am a Vice President of the Diamond Shamrock Chemical Company. I would like to comment about the need and the practicality of the proposed national emission standards for mercury.

Diamond Shamrock Chemical Company operates four chlor-alkali plants equipped with mercury cells. These

plants are located in Deer Park, Texas (near Houston); Mobile, Alabama; Muscle Shoals, Alabama; and Delaware City, Delaware.

I have noted that any time an industry spokesman raises questions or objects to proposed environmental standards he is immediately accused by a large segment of the general public as being opposed to regulations and standards as such and being in favor of an indiscriminate, irresponsible use of the nation's natural resources. He is immediately suspect of willful poisoning and irresponsbile use of the atmosphere and waters for the disposal of chemical wastes. Nothing could be further from the truth. We in the chemical industry are committed to the necessity, yes the urgency, of the establishment of reasonable standards, regulations, and procedures to insure the maximum benefits of all of the nation's resources for the maximum number of the nation's people.

A person newly aware of the public clamor for improvement in the environmental quality and the emotional response from the general public, and unfortunately many of our otherwise responsible public figures in the communications media and in both elective and appointive public service, might get the idea that the nation, indeed the entire planet,

faced an impending disaster of major proportions. The implications in most of this current dialogue is that the quality of the environment is rapidly worsening and very little, if anything, is being done to reverse the downward trend. Again this implication and interpretation of environmental quality problems is far from the truth. In fact, the environmental quality is improving and very much is being done to accelerate the pace of this improvement. Let us unemotionally analyze our problems and let us establish reasonable and sensible programs for the solution of these problems as they are recognized. The key words are reasonable and responsible stewardship of our total resources for the maximization of man's welfare.

No impending disaster threatens us from mercury pollution of the atmosphere. The fact that mercury emissions from two industries (chrlor-alkali industry and the primary mercury production industry) can be identified and measured provides very little justification for the position that these emissions threaten the public health and therefore should be subject to federal regulation. The philosophy that says it is there, let's eliminate it or reduce it by the best available treatment regardless of cost or need and then let's prove that the regulation is justified on the

basis of the expected results, is not a very scientific nor reasonable approach to a reasonable use of our resources and the protection of the public health and welfare. In other words, treatment for treatment's sake is not justifiable, nor responsible, nor reasonable, nor beneficial. I can find no evidence to support the "suggestion" that an ambient air concentration level of mercury in the air below 1 microgram per cubic meter is necessary to protect the public health from illness due to inhalation of mercury. Nor can I find any evidence that the complete elimination of chlor-alkali plants and primary mercury production plants would have any effect at all on general ambient air quality.

Even if the suggestions and suppositions upon which the proposed standards are based were correct, it is interesting to note that the two industries to be regulated by these standards do not represent a major portion of the total mercury emissions to the atmosphere of this country. In June, 1971, under EPA contract No. CPA 70-128, W.E. Davis & Associates prepared a "National Inventory of Sources and Emissions for 1968." This inventory showed that the two industries to be controlled by these proposed standards were responsible for only 14.6% of the total man-caused mercury emissions reported by Davis in 1968.

There is no reason to believe that there has been anything but a reduction in the emissions from these two industries since 1968. In fact, the chlor-alkali industry has and is reducing its air emissions and the primary mercury producing industry has largely shut down in this country as the result of low mercury prices. The regulations we are discussing will probably finish off the primary mercury producing industry, that small part of it which may still be operating; thus we have regulations to control one industry source of mercury emissions to the air, that is the chlor-alkali industry which in 1968 represented that 8% of the total emission from man-caused sources not including the very significant natural sources of mercury emission to the air.

Since the very inception of the use of mercury cells by Diamond Shamrock 16 years ago, and the same generalization applies to the entire industry, we have been acutely aware of the hazardous nature of mercury vapor and the potential threat to the health of our own employees. From the very beginning we established and have consistently followed practices in our plants to minimize the hazard of mercury vapor and to protect the health of our employees. Not satisfied to depend only on our own medical analysis and judgment, we supported and participated in an extensive

independent research program (and one of Diamond's plants was used in this study). This independent research project was initiated in 1961 (long before the current crisis over mercury) under a contractual arrangement with Wayne State University in Detroit. This industrial health-oriented mercury research program had as its objective an assessment of the situation that existed under actual plant operating conditions insofar as worker health was concerned and assisted in establishing guidelines for operating conditions and procedures for testing and monitoring the plant employees. The results of this research program were publicized openly and widely throughout the world. Except for a very few isolated acute illnesses, no evidence of chronic illnesses was discovered even though one of the objectives of the study was to find such evidence if it existed. It should be pointed out that illness resulting from mercury vapor is reversible when the worker is removed from the contaminated environment. The monitoring of all of our employees is designed to detect any difficulties before they become a health problem. In addition, the American Conference of Governmental Industrial Hygienists has established guidelines for industrial practices. These guidelines now known as threshold limit values (TLV) have been consistently used by

the industry as guidelines in the operation of their plants. As recently as 1970 the guideline for mercury vapor was 0.1 milligrams per cubic meter ($mg/m^3$). This guideline has now been reduced to 0.05 $mg/m^3$. To our knowledge, when even the older guideline of 0.1 $mg/m^3$ -- I might comment that that is 100 milligrams per cubic meter -- has been achieved there have been no health problems evident amongst workers in chlor-alkali plants.

In 1956 Diamond acquired from the U.S. Government its first mercury cell chlor-alkali plant by purchasing a plant built for the Army Corps of Engineers. Extensive changes have been made to this plant to achieve the operating results necessary to meet present day standards for pollution control and industrial health. It should be noted that this old plant, which could not as originally desinged and built meet guideline TLV, had no chronic mercury illness problems amongst its workers during this 16 years of operation. These guidelines which have adequately protected the health of the workers in the chlor-alkali industry were as recently as 1970 100 times higher than is now suggested by the EPA as being necessary for the protection of public health.

There is not one shred of evidence to indicate

that the air emissions of mercury cell chlor-alkali plants constitute a public health threat to the communities in which they are located. I know of no before and after studies that show any increase in the ambient air concentration in communities as the result of the construction of a chlor-alkali plant in that community, nor do I know of any studies that show higher ambient air concentrations in communities in which chlor-alkali plants are located as compared to communities without such plants. I have never heard of a case where any member of the general public in any community in which a chlor-alkali plant is located showed any evidence at all of mercury health problems from mercury contained in the atmosphere. The positive evidence that mercury emissions to the air is not a public health problem is the fact that while we routinely monitor all of our employees, only the employees in the mercury cell rooms show any evidence of mercury absorption. The general plant population, that is those employees not generally employed in the cell room, show the normal response of any other unexposed population. The one significant and objective finding in the Wayne State University study was the apparent relationship between mercury in the blood and in the urine with exposure to mercury through inhalation.

This finding gave to the industrial physician a simple tool for monitoring mercury cell room workers and to detect abnormal levels of mercury long before any clinical symptoms manifest themselves. Our experience shows us that in any plant meeting the TLV guidelines, even the oldest guideline of 0.1 mg/m$^3$, the exposed cell room workers come to an equilibrium between intake and elimination well below the levels that would create any health problem.

Our objections to such rule-making as that under discussion, rule-making without any demonstrated need, is not that we cannot meet the standards as proposed but that it adds another burden and expense of testing, monitoring and reporting. This burden comes at a time when we are already heavily burdened with demands from local, state, and federal levels to test, to monitor, and to install systems to meet other stringent ambient air quality standards. Three sources of air emissions from chlor-alkali plants are enumerated in Section 61.58, namely, hydrogen vents, air vents from end boxes, and general cell room ventilation. The problems involved in measuring emissions in general cell room ventilation are the most difficult and subject to the most inaccuracies and subjective judgment. Section 61.61 makes provision for waiver of emission test

requirements and I quote from the rule, "after the initial testing, provided that in the judgment of the administrator the installed control system and the operating techniques are deemed adequate to insure the standard will be met." This provision is absolutely the most subjective method of evaluating or determining compliance with any standard. The need for such a provision to waiver emission testing is very obvious when one understands, as I am sure the engineers in the EPA do, the difficulties in accurately and objectively measuring the total airborne effluent from a chlor-alkali plant.

I suggest there is an objective method of determining the success with which any chlor-alkali plant is meeting the basic objective of limiting airborne emissions to a level that safeguards both the health of its employees and the health and welfare of the general public. This objective method already exists and is operative. We regularly monitor the cell room ventilation with the objective of keeping the mercury concentration in the cell room within the limits of the 0.05 $mg/m^3$ guideline TLV as established by the American Conference of Governmental Industrial Hygienists. I would also like to point out that no new federal rules or regulations are necessary to police this

practice since the operation of our plants is already under the surveillance of the federal government through the Occupational and Safety Health Act which became effective in August, 1971. Maintenance of the cell room air concentration below 0.05 mg/m$^3$ is an objective demonstration that "control system and operating techniques are adequate to insure the standard will be met."

As a very minimum, assuming that the EPA cannot accept the recommendation that the entire rule as it applies to mercury be dropped, the requirement for testing cell room ventilation emissions (even once) should be waived, provided that the operator can stay within the guideline of 0.05 mg/m$^3$ cell room concentration. Perhaps 40 to 50% of the allowable 2300 grams per 24 hours as provided in Section 61.53 could be arbitrarily allocated to the cell room general ventilation (the 2300 grams is pretty arbitrary to start with, ignoring plant size and location as it does) and the balance of 50 to 60% of the 2300 grams be allowed for the other two point sources, namely, hydrogen vent and end box vents.

I would like to repeat for emphasis that we find no need for this rule. We suggest that there are other objective methods of measuring the success with which

we operate our cell rooms, and that the rule as it applies to cell room ventilations be waived.

We are familiar with the comments on proposed national emission standard for mercury submitted in New York by Dr. Leonard J. Goldwater, M.D., Professor of Community Health Sciences, Duke University; Visiting Professor of Environmental Sciences, University of North Carolina; Professor Emeritus of Occupational Medicine, Columbia University, and subscribe to Dr. Goldwater's remarks in their entirety.

I thank you for the opportunity of presenting this statement.

MR. MEGONNELL: Thank you, Mr. Sutter.

I hope you can appreciate a little bit the dilemma faced by the Environmental Protection Agency in this matter.

You sound firmly convinced that mercury is not a hazard. Congress, the public and the press, tell us quite another thing. We are caught squarely in the middle and we have got to act.

Of course, it is a lot easier to write a law than to administer it.

I notice you seem a little sensitive to

criticism that is often voiced when an industry spokesman speaks against the proposal. I don't know you, Mr. Sutter, or your company, but I think if we are honest about it, in some respects this is the past coming back to haunt a lot of industries. I have been round and round with all kinds of industrial groups that have flaunted the public welfare. I am not saying that your company or the chlor-alkali industry generally does this, but in some respects that may be what led up to the congressional action.

Another charge that is always made is that people are emotional. Some of the most emotional people I have ever met were industrial representatives.

Now, you say Environmental quality is getting better. What facts can you give me to substantiate it?

MR. SUTTER: Well, have you done anything about the mercury?

MR. MEGONNELL: Your statement says environmental quality is improving. That is a general statement. I don't have any facts.

MR. SUTTER: Well, I think the record would show that in a city like London and New York, the air quality is better than it was ten, twenty, fifty years ago.

MR. MEGONNELL: That may be. In London I

suspect there has been some improvement from the things I read. I personally would have to doubt it about New York.

We had our hearing there a couple of weeks ago, and I certainly could not see any improvement from when I lived there about eight years ago.

MR. SUTTER: I think the records of the New York City Environmental Control Agency would show that it is better.

MR. MEGONNELL: For sulfur dioxide, one pollutant, that is true.

I can't disagree with you either about the fact that the chlor-alkali industry and mercury production is just a small part of the mercury emissions. We know that. Our regulations are just a start really. Study of these other sources is going to continue, and I suspect other sources will be added from time to time.

I find somewhat irrelevant the fact that nationally any given industry is responsible for "X" percentage of anything. The question is locally. If there is one chlor-alkali plant in a community, it is not responsible for eight percent in that commun' is probably responsible for one hundred percent of

hazards of mercury vapors to our employees and we were concerned that we establish working rules and personal hygiene rules that would protect those employees.

MR. MEGONNELL: You seem to admit that mercury can cause reversible illness. Will you say it is purely reversible illness?

MR. SUTTER: Mercury vapor can kill people if they get enough of it.

MR. MEGONNELL: I think that is the dilemma the Administrator is faced with. He has a definition, and whether it is present in the community air in an amount to cause these illnesses is perhaps one of the things he must consider as to whether it is hazardous or not.

Do you ever transfer employees who are extremely sensitive perhaps to mercury?

MR. SUTTER: Not employees that I would say are sensitive. On occasions, there have been some people in maintenance who, for some reason or another, spent all day or all week working on a specific piece of equipment that had been contaminated with mercury. The mercury in their urine would go up as a result of this, and we would take those people off that job temporarily until the mercury in their urine came back to normal levels.

MR. MEGONNELL: Do your employees get routine medical examinations?

MR. SUTTER: Yes, they routinely examine, and urine analyses are routinely made.

MR. MEGONNELL: Why do you think the threshold limit value was cut in half recently? Was there new data found?

MR. SUTTER: I really don't know. I think it is just the general trend that if one-tenth is good, five one-hundredths would be better, and the feeling in industry has been to lower and lower concentrations in the cell rooms if these threshold limit values are obtainable.

MR. MEGONNELL: Well, you are all familiar with the threshold limit values in the caveats that are in the preface of this. They talk about wide variations in individual susceptibility, a small percentage of workers perhaps being subjected to discomfort at lower levels, and so forth.

Again, our concern is for people in the general community who do not, first of all, have this health screening. They do not have periodic visits or examinations. They may be extra sensitive. They may be old, young, infirm, or have some pre-existing disease.

Congress specifically said we have to consider the tail end of this distribution, not the normal. We are all normally healthy, we think, but there are some people out in the far end that we have to be concerned with.

MR. SUTTER: Well, I think the other point I am making here is that I recognize that I probably can't persuade you that you don't need this rule, and I recognize what you are saying to me as demonstrating a need for this rule, but I suggest to you that this industry is already subject to control, both voluntary and federal control, and it seems unnecessary to subject us to what appears to me to be very subjective control when we have a very good method of objective control of the emissions from our cell rooms.

Now, the two point sources that are enumerated in the rule-making are relatively easy to monitor. The cell room, I submit, is almost impossible to accurately and objectively monitor, and I am saying to you there is an objective measurement and it isn't strictly voluntary -- we are policed already by the Federal Government -- that if I cannot persuade you that the rule is unnecessary, and I am sure I cannot --

MR. MEGONNELL: I wouldn't say that.

MR. SUTTER: Then I submit to you that you waive this one requirement of the rule, since it is already subject to objective control.

MR. MEGONNELL: If I sound biased, Mr. Sutter, it is just because I am.

(Laughter.)

MR. MEGONNELL: But, seriously, it is not me you have to convince. It is the Administrator, and I don't know that it is as open and shut as you say. That is why we are holding this hearing.

Measuring the mercury content of the cell room air is only part of it, isn't it? Don't you have to know how much air is moving through that cell room?

MR. SUTTER: Well, that seems to be another matter of misconception.

We don't put the air through the cell room simply to dilute the mercury so that we can meet the TLV.

MR. MEGONNELL: That was my next question.

(Laughter.)

MR. SUTTER: We put the air through the cell room for comfort purposes, because of the heat that is generated in the cell rooms, and some of the cell rooms are in the south where it gets pretty hot in the summertime,

the Administrator certain things are done, this is very subjective, and I submit it is not necessary to be so subjective when we can monitor the cell room.

We do monitor the cell rooms. We must monitor the cell rooms under federal law. This is an objective measurement of how good we are operating.

We can't possibly meet the TLV's, without doing all the things that you have enumerated as being good practices. It is questionable that we will easily meet these TLV's even with all those things you have enumerated.

Every one of us has been busy in the past year or eighteen months putting covers on end boxes, putting covers on the funnels underneath, cleaning the floors, vacuuming the floors, picking up all the waste and keeptng everything underwater. All of these things you have enumerated, there is no way to meet the TLV's without doing all that.

MR. MEGONNELL: Really, I know the intent was to remove part of the test burden from the companies. Now, maybe we have not handled it properly, but I am glad your statement is in the record. We can at least reconsider it.

and some of these cell rooms are wide open on the bottom. They take air in through the sides, from underneath, and they discharge it at the top and through the sides. There is even one in this country where they do not have a cell room. I suggest that that one is going to be pretty difficult to monitor.

MR. MEGONNELL: I suspect if they don't have one, it will be pretty tough.

But it is entirely for comfort that you put all that air in?

MR. SUTTER: Yes.

MR. MEGONNELL: If you did not put it in, you would still meet the TLV?

MR. SUTTER: Probably not, but we put all that air through other cell rooms, diaphragm cell rooms, and there isn't any mercury. We probably put more air in through the diaphragm cell rooms.

MR. MEGONNELL: Do you think if there has to be a rule on this that the industry would object to a design or operating specification in place of an emission limit?

MR. SUTTER: Well, what I am saying is, and I quoted from the rule-making, that if in the judgment of

Thank you very much.

MR. SUTTER: Thank you very much.

MR. MEGONNELL: Any questions, Mr. Yost?

MR. YOST: I can't understand your statement that since you measure the cell room air, this in effect gives the public all the protection they need. Where does it go when it leaves the cell room? Do you catch it in a box or something?

MR. SUTTER: Let me talk about the rationale here. You provide for waiving with relation to the cell room if in the judgment of the Administrator we have followed adequately proper operating procedures.

Now, I say that measuring the cell room even once is a questionable thing as far as whether you are going to get the right answer or not, and I say that if we monitor the cell rooms, as we do anyway and as we must anyway in spite of this rule, we cannot meet those TLV's unless we have got all of the things that you have enumerated, and so I say it is not necessary to measure it even once.

Now, you enumerate three point sources in mercury, and they probably constitute ninety percent or more of the total emissions, but there are mercury emissions other places in the plant that are impossible to measure.

No one knows. It goes into the atmosphere, but the point is that the general plant population, who are certainly a lot closer to the plant than the general public would be, the people who work in the office, the people who work in the shops, who work in other areas of the plant, show no evidence of mercury poisoning. It is only the people that are in the cell room that show any absorption of mercury at all, and these people are well below any hazard level when they are working in a cell room that normally meets the TLV.

Over the past sixteen years in our case, and longer in the case of other manufacturers, we haven't met these one-tenth TLV's. Some of these older plants could not begin to meet these kinds of threshold limit values, and still no problem.

MR. YOST: Well, I agree with Mr. Megonnell that perhaps we, in an effort to be liberal with the industry and reducing the requirement for emission testing, may have been overzealous and we are not protecting the public enough. So, like you say, we are going to have to go back and take another look at that requirement.

MR. SUTTER: But I do recognize that currently the Environmental Protection Agency is receiving from all the states ambient air quality standards which we are going to have to meet.

MR. MEGONNELL: Not for mercury.

MR. SUTTER: Well, all kinds of things, and our people are going to be busy just monitoring, and some of these problems may be a lot more important than this one.

What I am saying is it isn't if this one was not under federal control. We would just like to avoid the extra work in doing something that we don't think will be very accurate or productive.

MR. MEGONNELL: I think your point is well made, and we do have to do some more homework.

MR. SUTTER: Thank you.

MR. MEGONNELL: Thank you, Mr. Sutter.

We will next hear from the representatives of Olin Corporation, Mr. W.A. Oppold and Dr. M.R. Gasque.

STATEMENT BY

MR. W.A. OPPOLD

VICE PRESIDENT, MANUFACTURING

CHEMICALS GROUP

OLIN CORPORATION

STAMFORD, CONNECTICUT

MR. OPPOLD: Gentlemen, I am pleased to be here today to be able to talk to you. My name is William A. Oppold. I am Vice President, Manufacturing, Chemicals Group of Olin Corporation of Stamford, Connecticut, and a Chemical Engineer Graduate of Iowa State University. My company produces a diversity of products, including metals, plastics, paper, sporting goods, and chemicals. We are a major producer of chlorine and high grade caustic soda and we employ mercury cells for this purpose at five plant locations in the United States.

My colleague, Dr. Mac Roy Gasque, and I wish to bring to your attention information which we feel certain you will want to study carefully before finally enacting an emission limitation for mercury. Our information relates first, to the proposed emission limitation, about which I shall speak, the health effects, which our Medical Director, Dr. Gasque, will talk about, and finally the analytical method. We will not speak about the analytical method, but will rest upon the written statement.

MR. MEGONNELL: It will be reproduced as if read into the record.

MR. OPPOLD: Thank you, sir.

In the matter of mercury discharge control,

Olin has established a record of effective cooperation with local, state and federal regulatory agencies. In the spring of 1970, when water-borne mercury discharges and their potential effect on the environment were first recognized as a nationwide problem, Olin initiated an intensive program to reduce mercury losses to the lowest possible levels. Olin talent from numerous disciplines was formed into a task force, several consultants were hired to supplement Olin's knowledge, and a technical group devoted a massive effort toward obtaining solutions to the problems involved in the abatement of water-borne mercury discharge.

While the technical arm of Olin's organization was attempting to identify problems and develop solutions to them, other segments were working with the then Federal Water Quality Administration, the U.S. Department of Justice, and State regulatory agencies in efforts to establish meaningful limits on mercury discharges in water. As a result of this cooperative effort of the parties concerned, these standards were not set prematurely but, instead, progressive reduction in mercury discharges was realized as the technical efforts identified problems and tested their solutions. The final limits were met by all Olin locations and, with continuing efforts, have been maintained below those limits.

Olin has for some time also been following a progressive program to reduce atmospheric mercury losses. By early 1971, Olin had completed the installation of vacuum-type mercury pick-up systems which helped reduce mercury vapor discharged with cell room ventilation air. Also, in late 1971, Olin completed installation of refrigeration equipment to reduce the mercury content of by-product hydrogen which generally is used as a fuel in power generation. This refrigeration equipment is currently being debugged and will soon be functioning per design.

Upon the announcement, in December, 1971, of the proposed national mercury emission standard and accompanying specific sampling and analytical methodology, Olin launched an expanded program to determine whether or not it was possible to meet such a standard. We believe that every conceivable factor affecting mercury emissions has been or is being investigated in detail.

For example, we have reviewed the EPA document "Requirements Necessary to Qualify for a Waiver of Emission Testing," received in January, and find that these requirements have been among our own internally developed practices for some time. Immediate equipment changes are being made where possible and more complex changes are being engineered.

Each of the appropriate control techniques described in a draft of "Control Techniques Document," supplied to us by EPA, has been examined for applicability to our plants.

In addition to the effort directed toward reducing mercury emissions, the matter of measuring them is the object of an intensive program. All previous data on emissions were based on measurements made by methods other than the one specified in the proposed standards. Further, the sampling and analytical apparatus, also specified, is, in most cases, significantly different from that used to obtain Olin's pre-December, 1971 data. The emission measurement program also has involved a cooperative effort between Olin and the Environmental Protection Agency's Office of Air Programs to compare Olin analytical methodology and equipment with that proposed as part of the mercury emission standard. Evaluation of the results of a series of comparative tests was still under way at the time of the preparation of this statement.

While it appears to be adequate, our analytical people find the iodine monochloride trapping and analysis system to be cumbersome and insensitive. We are concerned that we do not know of enough available data to establish the precision and accuracy of the method. With your

permission, I am submitting for the record some more detailed comments concerning specifics of the analytical method, which I do not propose to read.

MR. MEGONNELL: These will be incorporated in the record.

MR. OPPOLD: Thank you.

The results of Olin's mercury emission abatement and measurement efforts to date are shown as Appendix I. It can be seen that the results are encouraging. Even in the case of our biggest plant (565 Tons/Day), we have measurements showing the three points below the proposed limit at 4.63 lbs./day. Two of the others have been measured at 3.4 and 5.3 lbs./day. Data on the fourth and fifth plants are still sketchy, but indications are that similar results will be obtained. However, it is too early to determine from available data whether Olin can meet the proposed mercury emission standard of 5 lbs./day regularly. The following factors are involved:

(a) continuing startup problems with the refrigeration equipment keep us from being fully satisfied with the results. Better performance may be possible.

(b) Analytical methods and equipment - until only very recently (and only at one of four locations) has

Olin been able to obtain and begin testing with the specified mercury source sampling equipment. Considerable difficulty has been experienced with both the equipment and the analytical method. No insurmountable problems are foreseen, but it will take several months to solve the problems and characterize the precision and accuracy of the specified method and equipment. Meanwhile, we must note the distinct possibility that the readings are not showing the true values, nor even the values that another observer would obtain.

(c) All data representing the current level of emissions have been obtained under cool-to-cold winter conditions. It is logical to expect higher emission rates during hot, summer weather, due to the higher mercury vaporization rates. (The vapor pressure of mercury at 95°F. is ten times the vapor pressure at 32°F.)

Although Olin's abatement and measurement work is incomplete, enough information has been obtained to cause considerable doubt that the proposed mercury emission standard of 5 lbs./day can be met on a year around basis, especially in the cases of the larger facilities.

The failure of the standard, as proposed, to allow for multiple cellroom operations or relate the

emission allowance to production capacity would well result in limiting the size of mercury cell chlorine plants to a non-economic level. It seems that such a development would be most inequitable in view of the much larger quantities of mercury emanating from operations such as coal-fired power plants. To put the matter in perspective, if all 31 mercury cell chlorine plants were to be limited to emission of 5 lbs. of mercury per day, this would equate to 155 lbs. of mercury per day total. By comparison, mercury emissions from one of the large coal-burning power plants amounts to over 40 lbs./day.

In our opinion, it would be most desirable to defer setting a firm emission limit until the chlor-alkali producers are able to demonstrate what is practically achievable. However, since the Clean Air Act requires the Administrator to establish a standard, we urge that it be set at 10 lbs./day, a level which is clearly practically achievable. This will avoid unnecessary enforcement action, and, as we will show next, cause no significant danger to the people of the United States.

I would like to introduce Dr. Mac Roy Gasque, who, as Corporate Medical Director of Olin Corporation, has devoted a very large amount of time to a study of the effects

of mercury upon the human being. Dr. Gasque obtained his M.D. degree from the University of Virginia. He is in his 24th year with Olin and is a Diplomate of the American Board of Occupational Medicine and an Associate Clinical Professor of Environmental Medicine of New York University.

(The documents presented for the record by Mr. Oppold are as follows:)

References:

1. Mercury in the Environment. Geological Survey Professional Paper 713. A compilation of papers on the abundance, distribution, and testing of mercury in rocks, soils, waters, plants, and the atmosphere.

2. Weiss, Herbert V., Koide, Hinero, and Goldberg, Edward D. Mercury in a Greenland Ice Sheet: Evidence of Recent Input by Man. Science 174: 692-4, 1971.

3. Hall, Spencer K. Pollution and Poisoning. High lead levels are dangerous to man, and ambient concentrations are presently rising. Environmental Science and Technology 6: 30-35, 1972.

4. Wallace, Robin A., Shults, Wilbur D., Fulkerson, William, and Lyon, William S. Mercury in the Environment. The Human Element. ORNL-NSF Environmental Program. Work supported by the National Science Foundation

under NSF Interagency Agreement No. AAA-R-4-79. Oak Ridge National Laboratory Contract No. W-7405-eng-26. 1971.

5. Wood, J.M., Kennedy, F.S., and Rosen, C.F. Synthesis of methyl mercury compounds by extracts of a methanogenic bacterium. Nature London 220: 173-174, 1968.

6. Wood, John M. Microorganisms and mercury. Chemical and Engineering News, 4, 1971.

7. Kishore, Raj and Guinn, Vincent. Mercury in old tuna. Chemical and Engineering News, 14, 1971.

8. Kevorkian, Jack. Paper presented at October, 1971 meeting of the American Industrial Hygiene Association in Minneapolis.

9. Korns, Robert F. Report presented at Symposium on Mercury, University of Michigan, Ann Arbor, Michigan, September 29 - October 2, 1970.

10. Smith, R.G., Vorwald, A.J., M.D., Patil, L.S., M.D., and Mooney, T.F., Jr. Effects of Exposure to Mercury in the Manufacture of Chlorine. Am. Ind. Hyg. Assn. Journal, 31; 687-700, 1970.

## APPENDIX I

## MERCURY EMISSION, POUNDS PER DAY

| Plant Capacity | No. Cell Rooms | | Cell Room Ventilation | End Box Vent | Hydrogen Vent | Total |
|---|---|---|---|---|---|---|
| 265 | 1 | | 1-2 | 0.8 | 1.6 | 3.4 - 4.4 |
| 565 | | Plant A | 0.92-1.07 | 0.24-0.52 | 0.92-2.46 | 2.08-4.05 |
| | 2 | Plant B | 1 | 0.34-0.36 | 1.21-1.99 | 2.55-3.35 |
| | | Totals | 1.92-2.07 | 0.58-0.88 | 2.13-4.45 | 4.63-7.40 |
| 265 | 1 | | 3.5 | 0.5 | 1.3 | 5.3 |
| | | Plant A | | | | |
| 310 | 2 | Plant B | | (Data not available at time of statement preparation) | | |
| | | Totals | | | | |

SUPPLEMENT TO STATEMENT

FOR PRESENTATION TO

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

FEBRUARY 15, 1972

LOS ANGELES, CALIFORNIA

By: W.A. Oppold
Vice President, Manufacturing
Chemicals Group
Olin Corporation
120 Long Ridge Road
Stamford, Connecticut 06904

Since the distribution of the EPA analytical testing procedures for mercury in air in the Federal Register, December 7, 1971, Olin has set up the recommended apparatus and made test measurements in our chlor-alkali plants. We wish to report our observations for your consideration.

GENERAL METHOD

It is our opinion that the iodine monochloride trapping and analysis system is generally adequate. While we have not tested it on atmospheres containing organic mercury vapors, the literature background appears sufficient. It is our opinion, however, that the method is cumbersome, complicated and insensitive. The analytical

technique requires highly trained personnel to conduct the test. Olin does believe that additional work should be undertaken before the method is issued for general use, and we hope that alternative methods which are much faster may be allowed.

1. Method Blanks - It has been our limited experience to date that the reagent blanks produce inordinately high readings for any quantitative analytical procedures. In many of the actual measurements made, the magnitudes of the reagent blank was equal to or greater than the analytical measurement. Our laboratories found the high blank to be due to the NaOH, regardless of source. Substitution of KOH for NaOH gave very minimal readings. Our recommendation is that either a source of acceptable NaOH be designated or that KOH be investigated as a substitute.

2. Precision and Accuracy - As far as we can learn, data is unavailable concerning method precision and accuracy. Before a final decision is made on method acceptability, such studies should be completed and results published. Laboratories, at present, cannot evaluate the data being taken. From a strictly professional point of view, no method should be accepted unless it includes such information. Realistically, with the stringent emission

standards recommended, the low values of mercury being analyzed and the high volumes of air being utilized as a multiplier, such studies are mandatory.

3. Method Sensitivity - The overall analytical method and sampling times are designed around an insensitive cold flame atomic absorption instrument that gives usable Hg ranges from 0.1 - 0.5 ug/ml. Most laboratories have discarded this system for more sensitive ultraviolet approaches (Olin's laboratory instruments are routinely calibrated between 0.00025 - 0.005 ug/ml. Units such as the Beckman UV Photometer K23 or K24, equipped with gas cells, or Laboratory Data Control, Inc., Mercury Photometer are suitable). If this added sensitivity were available, much shorter trapping times could be used to obtain similar results. We, therefore, recommend that the stated sampling period be made more flexible, as long as sufficiently sensitive instrumentation is available to determine adequate information.

With the time required for the analysis system, only two analytical determinations can be realistically completed in a given eight-hour working period per crew. With more sensitive approaches, more information could be obtained in a given work day.

4. Apparatus - Generally, the information available to duplicate the recommended sampling apparatus is inadequate. Details are necessary on component layout and component specifications. In addition, recommended sources to obtain these components should be given.

No problems were encountered with the particulate sampling equipment. However, it was impossible for us to operate the midget impinging system as shown. We recommend that the rotameter be placed after the dry-gas meter, rather than before it. Further, since apparatus check-out is critical, we recommend that exact check-out procedures be made available.

5. Calculations - Obvious typographical errors are in the published version of the gas volume corrections formulae. These should be reviewed and corrected.

6. Continuous Analysis Systems - Because of the inordinately long time required to obtain a single analytical measurement, only a minimal and historical amount of information is available at any given time to make decisions. We, therefore, recommend that continuous analytical instruments, such as the Olin Mercury In Air Monitor, be considered usable for plant surveillance and regulation

purposes. Such instrumentation, in addition to minimizing the heavy manpower burden, would also provide more up-to-date usable information for contaminant source identification.

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MR. MEGONNELL: I wonder if you would mind, Mr. Oppold -- first of all, you have an advantage over me. With reference to these two documents that EPA prepared, I have never seen them, but I just work here.

(Laughter.)

MR. MEGONNELL: Do you have any idea yet as to the correlation or lack of correlation between the proposed sampling method and the one that is being used?

MR. OPPOLD: Well, that is still being worked on.

As we have said in here, we have just gotten our first sampling apparatus and we don't enough data yet to have established a correlation. We are working with the EPA people out of Durham with our continuous mercury air monitoring system.

MR. MEGONNELL: Did EPA test any of your plants?

MR. OPPOLD: They tested the Niagara Falls plant.

MR. MEGONNELL: Well, I have reviewed the statement on the analytical method and if I were to summarize it, it seems to say that our proposed sampling and analytical method is all right, but it could be done satisfactorily faster, cheaper, and maybe better.

MR. OPPOLD: That's right. It is very cumbersome.

MR. MEGONNELL: Fine. One comment on this non-economic level.

Unfortunately, Congress said that health is the only consideration in hazardous pollutants, not economics, not even control technology.

MR. OPPOLD: I understand.

MR. MEGONNELL: Do you agree that the Administrator was correct in including mercury as a hazardous pollutant under the definition of the Clean Air Act?

MR. OPPOLD: Would you state that question again?

MR. MEGONNELL: Do you agree with the Administrator's determination that mercury is a hazardous pollutant as defined in the Clean Air Act?

MR. OPPOLD: I agree that mercury can be a

hazardous pollutant. I don't know -- in fact, we don't feel that under the conditions that are available or comes from our locations, that it is a hazardous pollutant.

MR. MEGONNELL: I think that is really the crux of the whole thing we are facing. I don't think any rational man would say it can't hurt you, but whether or not it is likely in the atmosphere of the existing community seems to be the question.

MR. OPPOLD: That is what Dr. Gasque will address his remarks to, whether the levels you are talking about are meaningful.

MR. MEGONNELL: Do you have any idea where this coal burning power plant that emits over forty pounds of mercury per day is located?

MR. OPPOLD: Well, when this data was taken, we were talking about the 2,000 megawatt facility at Kingston.

There are, however, quite a few that produce mercury, and, if you would like, I can read them off to you.

MR. MEGONNELL: No. That is quite all right. I am with you on the fact that power plants, incinerators and some other sources have to be looked at. I don't think

there is any question about that.

I think we can proceed with Dr. Gasque now. Thank you, Mr. Oppold.

MR. OPPOLD: Thank you, sir.

STATEMENT BY

MAC ROY GASQUE, M.D.

CORPORATE MEDICAL DIRECTOR

OLIN CORPORATION

STAMFORD, CONNECTICUT

DR. GASQUE: Good morning, Mr. Chairman.

The material which I wish to present this morning will be in three parts. The first will be a general statement relating to the natural and to the industrial occurrence of mercury in our environment. I am going to submit this statement as part of the written statement. I recall what you said about redundancy, and this same material will appear elsewhere, and I am sure it is well known and will constitute no real consideration at this hear, so for the purposes of the record it is in here, it belongs in there, but I will not read it.

MR. MEGONNELL: That is very much appreciated, because we have a very full two day agenda and people are

still asking to come on.

DR. GASQUE: The material that I do want to go in some detail in involves my own experiences, which is not reproducible in the literature and it will not be offered by anyone else.

The first thing I want to comment on is the Smith report referring to insomnia, loss of appetite, loss of weight in industrially exposed workers, workers who are exposed to mercury in the atmosphere.

This data is not consistent with our own records. We have the records of 251 active employees in our plant at the present time, and the body weight records of this group of men show a slow gradual increase occurring through the years. It is just like the increase of non-mercury exposed employees. It resembles exactly the weight record of well paid, well fed industrial workers, and, unhappily, as a practicing physician, the problem of excessive body weight is much more important to me than the phantom, the nonexistent weight loss among mercury exposed workers.

MR. MEGONNELL: I'm with you on that one, too.

(Laughter.)

DR. GASQUE: I don't believe the Smith report will tolerate critical truth in it. With respect

to it, certainly our records have not borne that out.

The next part of the material I wish to present involves my own personal relationship with chlor-alkali plants. It goes over a period of twenty-four years.

Twenty-four years ago, when we began this operation, I was in charge of the medical aspects of this. I was afraid of mercury, and my fear was only exceeded by my ignorance of what mercury meant. I did not trust any of our examining procedures. I was skeptical about the whole business of how we tested the workers and how we tested the air.

However, in the early days, we would repeat our tests of the atmosphere frequently. We would go to different parts of the cell room. We knew where mercury should be in greater concentration, and we found that our tests were beginning to show up as we would predict, and gradually we developed confidence in our testing methods.

Urinary determinations were difficult in those days. I remember a chemist would be assigned for this purpose, and it would take a graduate chemist a couple of days to do the testing to make the mercury determination.

In order to have confidence in these urinary

testing methods, all urine samples were collected in the Medical Department. No sample was brought from anyplace else, but the workers delivered their samples in the medical office. All samples were coded. We frequently divided samples so that we could see if we would get the same answer on the same sample. We would also bring in nonexposed worker samples from time to time.

Also, dentists have been handling mercury all their lives in their dental offices, rubbing it in their hands. In those days, an amalgum of mercury was a principal filling material, and these gentlemen handled mercury, and I would recall how they would rub it in their hands, or the dental assistant would rub it in her hand, and they would hold it and examine it and would be close to the material.

So, I checked all the dentists in this little community and I checked all their technicians, and I began to get a feel that our mercury testing techniques with respect to the urine were quite reliable and I developed confidence in our tests.

At the same time, although I was ignorant about mercury, I felt as a practicing physician I knew the difference between a sick person and one who was healthy,

so along with all of that testing we carried out periodic physical examinations.

During the early years this was done at intervals of once a month. I was afraid of it. I brought them in often. I spent a lot of time in the mercury cell room looking around, checking the people, and so we assured ourselves and I assured myself that we were not causing sickness among this group of people.

Now, what did all this show? Well, I added it up the other day, and we have 340 man years of exposure. I hope that I pronounce "years" with emphasis, because I am not talking about hours; I am talking about man years.

With these procedures of urinary mercury testing, the atmospheric testing and physical examinations, we began to get some conclusions. With relation to the atmosphere, the records literally can be measured in terms of pounds, but the average atmosphere concentration of mercury, winter and summer, was approximately 110 micrograms per cubic meter.

The urinary mercury findings varied from the highest -- I don't mean the absolute highest, but the average among the highest was approximately 45 parts of mercury per million. The low level of mercury concentration

among the lowest levels of workers was approximately twelve parts per million, and a median value was approximately twenty-two parts per million.

Now, the crucial point I wish to make, and it seems to me is our business here today, is the fact that not one single mercury exposed worker in this plant was ever found to have a system -- and I don't mean a disease or the illness, but was not found to have one symptom suggestive of mercurialism.

It seems surely, with twenty-four years of experience and 340 man years of exposure, that if mercury were a disease producing substance in this context, symptoms and signs would have surfaced during this time, but this is not the fact. Symptoms and signs of mercurialism did not come forward even with this type of monitoring and with the examination of the employees at frequent intervals.

I think it is justifiable to assume that the disease producing potential of atmospheric metallic mercury has been overrated.

The question has been asked whether or not mercury in this sense is a hazardous substance. I can say, well, that question needs to be asked, but we have

not found evidence of that mercury is a hazardous substance used in this industrial way.

It might add something to our information here to tell you that there were certain people that were included in our testing procedures. This involves an engineer and the supervisor who only came into the department at brief periods during the day. However, they were in and out and were there a good deal. The mercury level of these men was always at the very minimum that we were able to check.

Last week I attended a medical conference, and a gentleman from the National Institute of Occupational Safety and Health delivered a discussion on the validity of industrial experience as a basis of threshold limits of values. He set some guidelines that I thought may have validity as far as this hearing is concerned. He stated that in order to account for the problem of latency, of delayed effects, that we would need to have twenty-five years observation.

I fully recognize the problem of latency, certainly in other pollutants. I am not convinced that it applies to mercury used in this sense.

Another guideline that was suggested as a

basis to determine the validity of industrial experience was the fact that air surveillance was necessary during this period of observation. Further, the body fluids of the exposed person had to be checked and monitored, and also all these numbers should be calibrated against the physical condition of the exposed workers.

Now, it seems to me that is what we have here -- well, not quite -- we have twenty-four years of experience, we have air sampling, we have urinary monitoring, combined with a periodic physical examination, which has not uncovered problems related to mercury.

By nature I am a conservative person, and I would not be associated with any industrial activity which would put at risk the welfare of an industrial worker. However, I can tell you that I would have no anxiety over the physical welfare of the industrial workers exposed to levels of atmospheric mercury as I have defined, approximately 110 micrograms, which is about 100 times more than is being proposed for the atmosphere, and I would have no fear over workers with urinary findings which I have described, especially in the light of nonexistent physical findings among the exposed workers.

So, in summary, workers exposed to an atmosphere containing mercury don't lose weight. Twenty-four years experience with a group of workers in a chlor-alkali plant has not resulted in any demonstrable signs, symptoms or disease related to such exposure.

(The following statement was submitted by Dr. Gasque for inclusion in the record:)

Mr. Chairman:

The material and data which I wish to offer will be presented in the following order:

1) A general statement dealing with the varying natural occurrence and the industrially induced occurrence of mercury in the environment.

2) A rebuttal of a report concluding that mercury in the atmosphere results in weight loss. Data from the medical records of 251 Olin employees working in chlor-alkali plants will be offered in support of this rebuttal.

3) A brief review of data accumulated during 24 years of operation of a chlor-alkali plant. These data will relate the respiratory environment in this plant to urinary mercury excretion and to the health status of all mercury exposed workers during the time period since the start-up of the plant to the present.

Mercury is a naturally occurring element that was present on this earth before life evolved. The atmosphere above mercury ore deposits may contain as much as 20 micrograms/$m^3$ of mercury. (1) Rain washes mercury from the atmosphere; immediately after rainfall the mercury content of the atmosphere above mercury ore deposits is essentially zero. (1) There is a continual cycling of mercury from the earth to the atmosphere to rain to streams and back to the earth.

Examination of ice samples taken from the Antarctic and from Greenland reveals that there has been no increase in mercury content associated with the increased industrial use of mercury. This is dissimilar from the studies related to lead. (2) (3)

There are bacterial species that appear to be capable of converting mercury compounds to elemental mercury. (4) There are plants that actually concentrate mercury from the soil and contain droplets of mercury. (1) Other bacteria can convert inorganic mercury to organic mercury compounds. (5) Again, there is in nature a mercury cycle just as there is a nitrogen cycle, a carbon cycle, a sulfur cycle. The rates of complex compound formation and degradation may vary under some conditions but the cycles continue.(6)

While recognizing that we live in an industrial culture, I do not believe that man has upset any of these cycles sufficiently to put the earth in jeopardy.

Based on the range of $2.5 \times 10^{10}$ and $1.5 \times 10^{11}$ grams of mercury per year released by vaporization from soil, the 31 mercury cell chlor-alkali plants in the United States would be releasing only 0.06 to 0.4 percent of the natural release if each of the plants released 10 pounds of mercury per day.

The mercury content of fish caught at the beginning of this century (7) does not appear to be significantly different from the mercury content of the same species of fish caught today. The mercury content of human lung tissue taken in the period 1913-1919 has been reported to be several times higher than human lung tissue taken at autopsy in 1971; the reduction is perhaps due to the decreased use of coal for home heating. (8)

It is only recently that rapid methods of measuring urinary mercury concentrations and extremely low concentrations of mercury in air, water, and food with a reasonable degree of reliability have become available. Therefore, there is little information on differences in overall health of populations having different levels of

mercury intake. The New York State Health Department did examine a number of persons in the Dunkirk-Niagara Falls area. (9) There are a number of sources of mercury in this area including two mercury cell chlor-alkali plants at Niagara Falls, one of which has been in operation since before the beginning of this century. Many of the people ate fish 3 to 5 times per week and the fish in that area are known to contain elevated levels of mercury. No one was found who showed any evidence of methyl mercury poisoning even though at least one person had approximately ten times as much mercury in hair as the average of the group. Even with an elevated methyl mercury intake from fish, no abnormal signs or symptoms that related to mercury intake were noted. Since these people lived in the area of two mercury cell chlor-alkali plants where it must be assumed they also had an exposure to mercury in air, it appears that there is not a health problem from inhalation of mercury in air in the vicinity of such plants.

Smith, et al, (10) after examination of subjective questionnaire answers concluded that inhalation of an atmosphere containing mercury resulted in "loss of appetite, loss of weight, and insomnia." Changes in appetite and sleeping habits can be elusive and difficult

to measure. Body weight, however, is obviously related to appetite and is more amenable to arithmetic definition. Data collected from the medical records of 251 Olin employees working in mercury cell room chlor-alkali plants for a period of the last six years reveals a small overall weight gain with 50% of the group more than 10% above their "normal" weight.

At an Olin plant in Pisgah Forest, North Carolina, a chlor-alkali mercury cell room began operation 24 years ago. Using the best instruments available, the atmosphere in this cell room was tested first at daily -- then later at weekly intervals.

During the first 12 years of operation of this facility, the urine of all mercury exposed workers was examined at intervals of approximately one month. The typical values of urinary excretion of mercury was as follows:

| Highest | Lowest | Average |
|---|---|---|
| 45 parts per million | 12 ppm | 22 ppm |

During the first 12 years of operation, the mercury exposed workers underwent physical examinations at intervals of approximately one month. Particular emphasis was placed on examining procedures designed to uncover neurological and/or neuromuscular abnormalities.

During the last 12 years, the same type of examination has continued except that during this latter period the intervals between examinations has been longer.

During these 24 years of operation, 340 man years of exposure to an atmosphere containing mercury have been logged. The average mercury content of the atmosphere was approximately 110 micrograms/$m^3$. This is about 110 times higher than the proposed emission limit. Surely, if this level of atmospheric mercury -- and if this level of urinary mercury excretion is associated with disease in man, evidence would have surfaced during these 24 years of very cautious and careful health monitoring of the exposed workers. But no such evidence has ever developed. And, the crucial point that is pertinent to our business here today is the fact that not one single worker has ever been found to have signs or symptoms suggestive of mercurialism. Not a single worker has been made sick or been transferred because of symptoms resulting from his work environment. These statements can be made with complete confidence because the entire work group to a man can be accounted for and their health status is a matter of record.

In some of our other plants, we have additional data involving even higher average mercury vapor

concentration and much higher urinary mercury excretion rates. The period of observation in this latter group has been somewhat shorter but, even so, our records involve more than 10 years exposure. Again, not one single worker has been sick, indeed, we have encountered no signs or symptoms suggestive of clinical abnormalities related to inhalation of mercury.

It seems obvious to me that the disease producing potential of elemental mercury has been overrated.

The Olin Medical Department is organized around the idea that our first duty is to provide surveillance and protection of workers from occupational disease and injury. This duty is based on combined professional, ethical, and legal obligations. By nature, I am a cautious person. I am unwilling to take risks where the welfare of an industrial worker is concerned. However, on the basis of my own experience, I would not feel the slightest anxiety over a respiratory environment which contains elemental mercury at the level of 2 micrograms/$m^3$. Literally hundreds of our workers have been exposed to many times this level of emission extending over thousands of man years exposure without any evidence of resulting health

problems.

In summary -

1) Man's environment contains mercury as a result of natural causes and as a result of our industrial culture.

2) Mercury in a typical chlor-alkali plant does not cause loss of appetite or loss of body weight.

3) Careful monitoring of many workers over 24 years exposure to mercury concentrations exceeding 100 times the proposed ambient level (1 ug/$m^3$) has revealed not one case of clinical mercurialism.

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MR. MEGONNELL: Thank you, Dr. Gasque. I don't know too much about the effects of mercury. I am learning a lot, more than I ever wanted to know, but you mentioned physical tests. Aren't there some mental effects?

DR. GASQUE: Yes, sir. Our tests were designed to uncover neurological or neuromuscular abnormalities. They were slanted in that direction because all the literature guided us in that direction, but our tests did not uncover any symptoms or signs which suggested neurological involvement.

MR. MEGONNELL: Could you specify what type of tests -- not that they mean anything to me, but to some of the physicians they would.

DR. GASQUE: Yes. When I bring these people into the examining room, I test the tremor in their hands, their eye movements, the coordination of their gait, the content of their manner, if it was a behavior that was bizarre. I would ask them concerning their appetite, their sleeping habits, their general state of well being.

MR. MEGONNELL: There was some evidence, I believe in the New York record of this type testing, and somebody said, "Well, that's awfully subjective." How else can you do it?

DR. GASQUE: Well, since that time, other methods have been developed to establish muscle, to see if there is a tremor developed after a certain length of time, and calibrate with an instrument and compare these records with nonexposed people.

No conclusions have been drawn from these later tests, but the methods are becoming a little more sophisticated.

MR. MEGONNELL: You started out by saying you were afraid of mercury when you went to work for the

company. Are you still afraid of it?

DR. GASQUE: Not in the industrial sense in which we have discussed, not in the mercury cell room. I am respectful of it and I don't believe it ought to be left laying around, and I believe in all the strict discipline hygiene maneuvers to keep it contained, but as far as being in it, the metallic variety, I am not afraid of it.

MR. MEGONNELL: You are convinced we can live with it by control procedures that we have?

DR. GASQUE: I am convinced that we can live with it without any problems in the context and in the atmosphere concentrations that I have described.

MR. MEGONNELL: Turning to your prepared statement, you mention that the atmosphere above mercury ore deposits may contain as much as twenty micrograms per cubic meter of mercury. Do people live in such atmosphere?

DR. GASQUE: When we talk about the atmospheric concentrations of this level, this refers to the degassing effects over strip mining and highway construction over volcanoes, over stacks of coal burning power plants.

MR. MEGONNELL: People actually live in atmospheres with twenty micrograms of mercury?

DR. GASQUE: I am not aware of anyplace

normally. We have that concentration in the cell rooms many times.

MR. MEGONNELL: I realize that.

DR. GASQUE: I am not aware of any natural occurring level or locations where the mercury is at this level -- that is, except under specific temporary circumstances.

MR. MEGONNELL: Then you refer to the science article by White, et al. I don't get the same interpretation out of reading that article. You say the Greenland ice reveals that there is no increase in mercury content associated with increased industrial use of mercury.

Maybe the word "use" is what is disturbing me, because they report quite the oppose and say there is a man-made contribution.

I am talking not so much of the use of the mercury as obtaining it.

DR. GASQUE: It was my understanding that these borings in the glaciers revealed variations in the mercury content of the samples, and these were calibrated against time, and it is very likely or possibly the levels years ago could involve times where volcanoes were active and there may have been excessive mercury in the environment at that time, which there would be less at the present time.

MR. MEGONNELL: Let me read a paragraph and see if I am reading it wrong. I am quoting from the White article:

"The mercury content in glacial materials of different ages from 1800 BC to AD 1965 indicate significantly higher rates of deposition of this element in recent years. Samples from waters deposited prior to 1952 had mercury contents ranging from 30 to 70 nanograms per kilogram of water with an average value of 60 plus or minus 17. The mercury concentrations in water deposited between 1952 and 1965 averaged 125 plus or minus 52 nanograms per kilogram of water with a range between 87 and 230. This increased content of mercury in glacial snows in recent times is probably a reflection of man's impact upon the environment. What activities of human society could be responsible for the added input to the atmosphere?"

When I read this article I came to exactly the opposite conclusion that you did.

DR. GASQUE: Let me put together some material related to this and I will forward it to your agency.

MR. MEGONNEL: Fine, and we will put it in the record.

DR. GASQUE: Yes.

MR. MEGONNELL: All right. Now, I have read a lot in newspapers and other places about the mercury content of fish, and you allude to that in your paper, too. You say it does not appear to be significantly different from the mercury content of the same species of fish caught today.

Do you have any idea how the fish were preserved?

DR. GASQUE: No, I am not aware of that.

MR. MEGONNELL: Most preservatives contain mercury --

(There was a chorus of "No.")

MR. MEGONNELL: Maybe I am wrong about that. I will have to refer to another letter, since I am not an expert on this.

This is a letter from K.K.S. Pillay. It appeared in Chemical and Engineering News on January 10, 1972, and, very briefly, he took bits of human brain tissue and put them in formaldehyde solution containing three micrograrams of radioactive mercury. The longer he left it in the more mercury was absorbed by the tissue, and he had a horrible time leeching it out once it got in there.

Now, I am just throwing forth a hypothesis here. He says, "I am also given to understand that an essential practice in the preservation of biological tissue is to periodically replace the preservative." He is the one who says here that some of the well-known preservatives use large quantities of mercury. I don't know. I am just quoting, and his theory is if they are preserved, you must routinely change the preservative from time to time. The longer it is in there, the more mercury is absorbed, and it is not coming out, so you naturally get higher contents of mercury in old fish.

Again, this is a theory. I think more work must be done it, but I don't think it is a closed issue.

DR. GASQUE: The laboratory techniques are not my field. The part that I claim competence in is the wellness of the employees that have been under my care.

MR. MEGONNELL: I appreciate that, and I am not badgering you.

DR. GASQUE: I did not think or feel that you were. I was trying to learn what I could.

MR. MEGONNELL: Is there such a think in your opinion, Dr. Gasque, as sensitivity of different people to mercury?

DR. GASQUE: Yes, sir, I will have to tell you that I feel that certain people with pre-existing disease -- it may be on a low level of vitality -- and whose physiological reserves might be reduced, would constitute a theoretically more sensitive group. I am not aware of any evidence of this. This is a feeling I have.

MR. MEGONNELL: Thank you, but that is one of the things, of course, that the Administrator must keep in mind in making his determination.

Would you agree basically with the Administrator's decision to put this on the list of hazardous pollutants?

DR. GASQUE: I am not convinced that mercury in the industrial context that we have described here is indeed a hazardous material. It has not turned out to be in my 24 years' experience with this.

MR. MEGONNELL: Do you have an opinion as to why ACGIH recently cut the TLV in half?

DR. GASQUE: Yes. I think it has been the tendency for the last -- for a generation to tighten up and, when in doubt, to lower the levels and to make the discipline that much greater.

MR. MEGONNELL: But you know of no new data or anything to substantiate it?

DR. GASQUE: No, sir. The data that is in my hands does not support the need for tightening up of mercury used in an industrial cell room.

MR. MEGONNELL: Any questions?

MR. YOST: No.

MR. MEGONNELL: Thank you very much.

DR. GASQUE: Thank you.

MR. MEGONNELL: The next testimony is by Mr. D.L. Emery, Aluminum Company of America, better known as ALCOA.

STATEMENT BY

MR. D.L. EMERY

PRODUCTION SUPERINTENDENT, CHLORINE PLANT

ALUMINUM COMPANY OF AMERICA

POINT COMFORT, TEXAS

MR. EMERY: We appreciate the opportunity of testifying here.

My name is D.L. Emery. I am presently production superintendent of the chlorine plant operated by the Aluminum Company of America or ALCOA, at Point Comfort, Texas. I am a registered professional engineer within the State of Texas. My educational background

comprises a Bachelor's degree in Natural Gas Engineering and a Master's degree in Physics with a minor in Chemical Engineering. I am a full member of the American Institute of Chemical Engineers and have been actively practicing my profession for 25 years.

I would like to comment on the regulations as proposed by the EPA on December 7 in three areas:

1. Evidence presented in several papers published which precipitated the publicity over mercury poisoning related primarily to organic mercury. Recent data of researchers Goldwater, Clarkson and Smith does not indicate imminent danger exists because of elemental mercury in our industrial environment. (Please refer to bibliography attached.)

The deaths attributable to mercury were in fact caused by a class of organometallic compounds, such as methyl mercury chloride, methyl mercury, and cyano methyl mercury guanidine. In some cases the material was formed as a byproduct in the manufacture of acetaldehyde and vinyl chloride, and in other cases was used as a seed dressing to prevent losses of the seed from decay. The preponderance of data collected by the Swedish Researchers involved methyl mercury which was used as a seed dressing

in Swedish agriculture. The widely publicized Huckleby case in New Mexico involved a tragic mishandling of a seed fungicide which contained methyl mercury.

2. A figure of five pounds mercury/day per chlorine plant is unattainable with existing plants, and I should say with our existing known technology, of Point Comfort's production capacity based on todays technology.

3. We have studied excerpts from a document released by the EPA entitled "Background Information Proposed National Emission Standards for Hazardous Air Pollutants: Asbestos, Beryllium, Mercury," dated December, 1971. A study of the document indicates to us that an emission figure of five pounds per day is incorrect for Alcoa's chlorine plant at Point Comfort.

The formula used in the background material for setting the maximum mercury emission per day at 5.1 lbs. per day is one obtained from the work of Turner of the Environmental Science Services Administration. The equation has the following form of:

$$Q\ max = \frac{4.23\ X\ max\ U\sigma z\ X}{F\ e\ 1/2\ \left(\frac{H}{\sigma z}\right)^2}$$

Where:

Q max = maximum allowable daily mercury

emission, g/day.

X max = maximum 30 day average allowable concentration of mercury at the plant boundary in micrograms/$M^3$. The EPA background material assumes 1.0 micrograms/$M^3$ arrived at from data obtained by Swedish researchers on methyl mercury and Swedish consumption of fish.

U = representative average wind speed, m/sec. assumed in the background material to be 2 m/sec.

6z = vertical dispersion term as a function of wind stability and distance, meters. This has been assumed as a Class "D" dispersion and is described in the material as being applicable to a rural valley site without turbulence induced by buildings or similar topographic features. This very important term is probably the most difficult to supply with a precise, meaningful value. The preferred method would be to make actual dispersion measurements at a plant site for known conditions. These values can then be interpolated for other wind conditions for the plant with some degree of confidence. Preliminary data from the plant at Point Comfort, Texas indicates a dispersion value midway between the lines for Classes A and B as shown on page 9 in figure 3-3 of Mr. Turner's work. This does not appear in the background material. In the work we have

done here, we have used the more conservative curve C in the calculation.

X - distance downwind to plant boundary line in meters and is apparently assumed to be 500 meters in the background material. The number of chlor-alkali plants in the nation is limited to between 20 and 30. Thus each plant could be treated on an individual basis with regard to the relationship of emission, ground level concentration and boundary line distance. A distance of 500 meters for all plants is arbitrary and unrealistic. Distance to the nearest well-traveled state highway at Point Comfort is 2200 meters.

F = maximum frequency of wind direction from a 22.5 degree sector and is assumed to be 40% in the background material.

About the only thing that we agree with is this term H, and we agree that this figure ought to be 10.

H = effective stack height in meters and is assumed to be 10.

The mercury cell chlor-alkali plant at Point Comfort is conservatively rated at 450 tons per day of chlorine and is adjacent to a bauxite refining plant where almost the entire production of low sodium chloride caustic is

consumed. The prevailing winds are from the south with an average velocity of 10.4 miles per hour or 4.6 meters/sec and this contrasts with less than five miles an hour used in the calibration in the background material, and the winds blow from a single 22 1/2 degree sector 17% of the time. The closest residence is 9,500 feet away and a well-traveled public highway is 7,260 feet away (2,200 meters). Mercury emissions occur from roof monitors, from a hydrogen stack, and from an end box ventilation stack. If the actual conditions are substituted, the equation becomes:

$$Q \text{ max} = \frac{4.23\ (1)\ (4.6)(180)\ (2{,}200)}{17} = 453{,}000$$

g/day or a calculated allowable emission of 1,000 lbs./day.

MR. MEGONNELL: There is a little discrepancy between the two figures.

MR. EMERY: There is a little difference, yes.

(Laughter.)

MR. EMERY: Of course the difference being the difference between the actual plants that we have and the hypothetical plant that has been used. We assume it is a hypothetical plant that is being used in the background material.

We could not tolerate such economic losses, but this does show that the parameters used are not

applicable to all plants.

We believe that a well run modern cell house is capable of keeping its emissions down to a level of 0.1 lb. mercury/ton of chlorine with present proven technology. At this time experimentation is progressing on redesign of pump tanks, end box covers, covering of mercury with brine, impregnated carbon systems, and hypochlorite scrubbing. Emission levels lower than 0.1 lb. mercury/ton chlorine must await technology being developed.

In summary:

1. The publicized episodes concerning mercury poisoning have involved organic compounds and not airborne inorganic mercury.

2. Additional information is needed to more adequately define the effects of airborne inorganic mercury on the environment.

3. Any regulation which requires emissions below 0.1 lb./ton of chlorine capacity is beyond the present established technology for existing chlor-alkali plants.

Thank you.

(The following is the bibliography referred to in the text of Mr. Emery's statement:)

BIBLIOGRAPHY

1. GOLDWATER, Leonard J., Professor of Community Health Science, Duke University. Absorption and Excretion of Mercury in Man. Archives of Environmental Health, Dec. 1964.

2. SMITH, R.G. et al. Effects of Exposure to Mercury in the Manufacture of Chlorine. J. Am. Ind. Hyg. Amn, 31 (1970).

3. U.S. Environmental Protection Agency. Background Information - Proposed National Emission Standards for Hazardous Air Pollutants: Asbestos, Beryllium, Mercury. EPA Office of Air Programs Pub. No. APTD-0753 (12/71).

4. TURNER, Bruce - Workbook of Atmospheric Dispersion Estimates. U.S. Dept. of Health, Education and Welfare - 1969.

5. CLARKSON - A Report of an International Committee on Maximum Allowable Concentration of Mercury Compounds. Archives of Environmental Health. Volume 19, pages 819-905, Dec. 1969.

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MR. MEGONNELL: Mr. Emery, I always have a lot of trouble with this "imminent danger" thing. There

is nothing in the law that says "imminent danger." That is part of the problem. It just says the substance may cause or contribute to, and I guess we are talking about a matter of degree. Some people are just people who perhaps would be dropping dead, and, on the other end of the scale, we are trying to see that nobody, even the most sensitive person, is affected at all.

MR. EMERY: Yes. I think that, going along with the questions that have been asked before, I would have to say that in my opinion mercury could be considered as a toxic substance, but not as a toxic polluter in today's society.

MR. MEGONNELL: I see. Can elemental mercury be changed to methyl forms by natural processes?

MR. EMERY: I have read information that indicates that it might be. I have also read as much indication that indicates that it cannot be, and both people are pretty positive apparently.

MR. MEGONNELL: That's my problem.

(Laughter.)

MR. EMERY: I will say that we, Alcoa, have engaged two doctors, a man and his wife, to conduct a study of mercury at Avoca Bay, and the effect that it has on the

environment of that bay, and he is positive in his statement that in Avoca Bay this could not happen.

MR. MEGONNELL: You say the five pound figure is unattainable with your plant. Do you have any idea what you are emitting now?

MR. EMERY: I would guess, and this can vary quite a bit -- we have made numerous measurements, and I would guess that we are probably emitting about 20 pounds per day.

We have a number of projects going on that are not finished that are going to lower this, but how much it will lower it remains to be seen.

MR. MEGONNELL: Do you share the previous testimony about the impracticability of measuring emissions from the cell room?

MR. EMERY: Well, the emissions that you measure from the cell room, in my opinion, are going to be more like a calibrated guess.

I will say this: That although I am not really prepared to testify on this method that has been proposed in the Federal Register -- I haven't had a chance to check it out -- yet we feel that the method that we are using, from what we have read, is much quicker and we feel

it is just as accurate. The method really consists of using a portable ultraviolet meter combined with an manomometer and using this to monitor our ventilated fans, our monitors and so on.

MR. MEGONNELL: It is essentially the same thing, I think, with a different instrument.

MR. EMERY: Yes.

MR. MEGONNELL: Incidentally, I don't think this calibration that was used at arriving at the standards is so hypothetical as you think it is. I understand that the group who made this study had five years of data in an area, and that was what was actually used.

Now, I can see your point. It bears no resemblance to Point Comfort, but we do find it a little difficult to envision its comparability between classes A and B for any length of time.

MR. EMERY: Well, we don't really have enough data. We have made about three determinations, downwind of the plant and downwind of the cell house itself, and these determinations came out this way.

MR. MEGONNELL: Again, in this, we know of a chlor-alkali plant within 100 meters of the highway. You have 1,000 meters.

MR. EMERY: Well, I hope they are smaller than we are.

MR. MEGONNELL: I guess they are. I don't know.

The Class C is what was used in our calculations, because that is what was obtained in this particular site.

Now, the trouble with this whole thing again goes back to the law. We have to write national emission standards. I think technologically we would have to agree with you. There are a limited number of plants. We could come up with different standards that would produce the same effect in various locations, but fellows like the attorneys tell us, "You can't do that. The law says a national emission standard," and the mood of Congress seemed to be to minimize the emissions of hazardous pollutants, not to permit you to move to a new location because the meteorological parameters are better and you can slip it in there, so, again, that is one of the conditions that is placed on the secretary which removes several degrees of freedom.

You are advocating in the case of your 450 ton per day chlorine plant a standard of about 45

pounds?

MR. EMERY: This is something I think we know that even in the worst summer conditions we could meet.

MR. MEGONNELL: All right. Any questions?

MR. EMERY: I think we know that.

MR. YOST: I understand that the TLV number was recently reduced substantially --

MR. MEGONNELL: Cut in half.

MR. YOST: Cut in half. Do you have any feel for what the emissions to the atmosphere are likely to be when you attempt to meet the new TLV number? Do you think it is likely to increase?

MR. EMERY: If a plant attempts to meet the new TLV numbers, I don't think any plant would go up. I mean if a plant now has an atmospheric level of .25 milligrams per cubic meter, we will say, .025, I don't think that any plant would cut down on their housekeeping and so on and let it go up to .05 just because the TLV says .05, if that is the question you asked.

MR. MEGONNELL: I don't think it is.

MR. YOST: I am not sure I understood his answer, because there are several more parameters that I am not aware of. I just never take a great deal of comfort as

a breather, and the public, when TLV values are met within a plant or that they are lowered and that industry now assures us they are going to meet these lower numbers, because, historically, the way they always meet TLV numbers is to pump it outside into the atmosphere and I don't know whether there is any reason to feel that it is going to be any different in this case.

MR. EMERY: Well, I will have to make the same statement that one other gentleman made here this morning.

The ventilation air is purely for the comfort of the employee and to keep the temperature down in the cell room and has nothing to do with reducing the TLV.

We attempt to reduce the atmospheric level of mercury in the cell room by improving end box covers, and we, by the way, are now on our fifth generation of end box covers in about four years. In our case, we are now in the process of covering our decomposer funnel, and we are going to reduce it to the lowest level possible, but we don't know what the level will be.

MR. YOST: Thank you.

MR. MEGONNELL: Thank you very much, Mr. Emery.

MR. EMERY: Thank you.

MR. MEGONNELL: Our next witness is Mr. Morgan North, and I think I can tell by the title of his paper I am in big trouble. It is entitled "Challenges on the Allegations of the Environmental Protection Agency Covering the Proposed Emission Standards for the Mercury Industry."

Is Mr. North present?

MR. NORTH: Yes.

STATEMENT BY

MR. MORGAN NORTH

MORGAN NORTH MINE MANAGEMENT

MR. NORTH: My name is Morgan North. I am the owner of Morgan North Mine Management. I am a mercury mine operator. I have been in and about mercury mines as an operator mostly since 1935. I am a director of the American Mercury Institute. I am a member of the American Institute of Mining Engineers, and I know a little bit about mercury. I do not know very much about Congress, and I don't think they know very much about mercury.

(Laughter.)

MR. NORTH: Every year there are hundreds of deaths in our country from such seemingly innocent substances as lye, rodent poisons, drain pipe solvents,

poisoned food; not to mention alcohol and tobacco. The government has seen fit to force the modification of some of these, done nothing at all about many, but in no case have they attempted to close out a whole industry. In all these categories there are victims by the thousands. Nearly everyone knowingly uses one or more of the preparations and to legislate them out of existence would be political suicide.

Why then is the domestic mercury industry being forced out of business, along with many of its customers? The answer has to be political rather than scientific. Someone discovered fish were apt to have a high mercury content. It was then discovered that there were some mercury cell chlorine plants discharging in the areas adjacent to where the fish were found. Then a family in the south came down with mercury poisoning -- and it was severe. The fact that the sacks of grain which caused their poisoning were marked as seed stock only and not for human or animal consumption and had fallen into the hands of an illiterate family was beside the point. Mercury was ruled out of seed grain although it rendered the seed far more effective and produced much more grain per acre at the same cost. Had this family used some other product bearing a warning label

which they could not read, they might have died. After the reports of these two incidents had made the press, a notorious firm of so-called consumer advocates, got on the bandwagon and fed anti-mercury propaganda to the world press at an alarming rate. No tests were run other than to test for mercury itself. The small voices of the producers and their customers went unheeded. Through lack of complete information, the public image of mercury has made the plague pale by comparison.

Today an elected official who can say that he contributed to the demise of the use of mercury is in, and he knows it. It makes little difference what the facts are. It would seem to me just as reasonable to rule out the use of steel because automobiles are mostly made out of steel and automobiles are the biggest killer this country has ever seen.

Let us go back to the fish again. It was soon discovered that fish all over the world have some mercury content and some at what is considered a high level. There is no proven relation between these fish and mercury producing or consuming plants. Many fish are found thousands of miles away from any known source. It has long been known that minute concentrations are indigenous to almost all parts

of the world and this from long before the advent of man. In museums some fish were found that had been taken from the Great Lakes long before there were any mercury cell plants in existence. Soon after this a group of doctors announced that by a series of scientifically-conducted experiments it was found that it would take far more mercury to hurt a human that could be had from normal consumption of fish. These items did make their way into the press but were ignored by the anti-mercury forces. Life Magazine ran an article which stated the mercury scare was greatly overrated. The truth of the matter is that there are no victims of mercury poisoning in this country. If there were, the most logical place to look for them would be in the industry itself. I have been in this business for almost 40 years and have handled it myself along with thousands of others. In all this time I have never known of one man who has had any serious case of mercury poisoning who worked for an informed employer. In gathering data for this hearing, the State Health Department of the State of California reported they had no records of any detrimental effects working within the old limits of one milligram per cubic meter. There have been a few cases where amateurs played with homemade equipment or where those who put mercury ores on open fires did get

sick. This cannot be controlled any more than one can control schoolboys' experimenting with homemade explosives.

One of the most knowledgeable scientists -- you asked us not to be redundant, but there are some things we have to do.

MR. MEGONNELL: When you mention mercury, you can't not mention Dr. Goldwater. I am finding that out.

MR. NORTH: One of the most knowledgeable scientists in the field of mercury toxicology is Professor Leonard J. Goldwater, M.D. of Columbia University. Dr. Goldwater has written a great deal on the subject but admits to being hampered in his studies by lack of victims. He has case files on many special-situation examples of mercurial poisoning but these were mostly one-of-a-kind accidents such as would occur in a laboratory experiment gone wrong. A few years ago, in a lecture he gave on testing methods, he said: "I have reached one conclusion which I believe cannot be disputed, namely, that the areas of ignorance are vast and the areas of knowledge are small."

Now we come to the Environmental Protection Agency --

MR. MEGONNELL: An unfortunate alliteration.

MR. NORTH: Now we come to the Environmental Protection Agency and its proposed standards for mercury. The avowed purpose of these standards is to reduce hazardous air pollutants which may cause or contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness. This is a laudable aim but the use of the word "may" suggests a capricious selection of subjects and might equally be applied to the breath of man or the emissions from the household kitchen stove. There are evidences where these emissions are harful and fatal. In the case of mercury, there have been no meaningful experiments to demonstrate what a safe concentration in the air would be. If tests were made directly from the stack gasses of a mercury plant, they would naturally be higher than the background level. I do not know of tests having been run in concentric rings around one of these plants in order to see just how far the mercury vapor does go. This then brings up the question of what constitutes a dangerous concentration. The standards used by mine examiners for the protection of the workers in the industry are admittedly arbitrary and very much on the conservative side. Most informed medical sources feel the limits used are much too low and a human can stand much more without harmful effects. Many times in the course

of my career I have received a routine report on a plant worker to the effect that the mercury level of his urine was above the acceptable standard but after rotation to another job away from the furnace, the next analysis would come through clear. Several of these men with whom I worked in the early days are now in their 70's and 80's and still going strong.

Most of the mercury deposits are but a small fraction of what they once were. Most are formed in the very old rocks of sedimentary origin. Erosion over thousands of years has in many cases completely washed away what might have been very large ore deposits and left but little of commercial value. In many parts of the world there are no known deposits, yet the mercury found in the fruit, vegetables and fish attest to the fact that they were once there. A good example of this would be to point out Lake Berryessa, in California. One-fourth of the mercury produced in the United States was made on the watershed of this lake. The fish tested showed less than half the mercury content of those caught and tested in the Merced River in Yosemite Valley. There are no known mercury deposits or gold mines on the headwaters of this river.

Earlier, I made the statement that the domestic

mercury industry is being forced out of business. Critics will say we are out of business anyway for reasons having nothing to do with the Clean Air Act. It is true that there has been a world overproduction of the metal in the last three years which would have lowered the price anyway but the thing that has driven our market to an all-time low, based on the dollar purchasing value, has been the erosion of our customers. In some cases the use of mercury in certain products has been ruled out completely and in others, standards for use have been set up that cannot possibly be met. This has caused plant closings and turned the mercury used back into a market that cannot absorb it. The traditionally wide swings of the market have been a factor mercury producers have always had to live with. We do not like it but the industry has kept on going. One year ago there were twenty reduction works running in the United States. Today there are seven, and at least two of these will shut down shortly. The survivors are literally hanging on by the skin of their teeth, and should the price decline much further, all will have to fold. The financial reserves of the mines are at their lowest ebb. The total production of the mines of the United States will probably be less than two million dollars in 1972.

The whole mercury mining industry puts up less than five percent of the known volume of pollution and, of all coal and metallurgical manufacturers, probably less than one percent.

Now the Clean Air Act gives us another set of problems in an area where we are least able to cope with them. The Act proposes a set of standards we know few of us can meet. We do not know what these standards are based on. We would think they should be a matter of some slight added value to the ambient concentration at a given distance from the source. We understand our emissions must be no more than five pounds of mercury per day at the stack or point of emission from the plant. Why this figure? Most of the domestic mines once produced at a rate many times that of recent years and yet in spite of many efforts, no commercially recoverable mercury has been found more than a few feet from the plant. By today's standards the old-time plants were not too efficient and their stack losses must have been many times that produced by modern facilities. Almost all of the mines are miles away from large population centers and the gasses are quickly dissipated.

The proposed testing equipment has been described at some length in the Federal Register. It

consists of components some of which have been in use for many years and others which are untried. None have been extensively tested in unison and no large-scale tests have ever been made for such a fine concentration in the commercial production of gasses. It does not seem fair to have a whole industry go down because of untested measuring devices, arbitrary unscientific standards and an unproven malady.

I has been stated that our gasses can be frozen and the objectionable components removed at a modest cost. This is not the case. Most mercury operations are very small and the cost, upon some inquiry, would be way beyond reason for most operators. On top of this, the solutions offered have not been tried and may very well prove not to meet the standards required, in which case the operator loses all.

In times of trouble this country has always needed mercury. It has not been able for the past 50 years to meet its own demands. We should have a reserve of mines on a standby operating basis so when trouble comes we can meet it with a supply that would be reasonable. It takes the better part of five years to develop and put on stream a dormant and unequipped mercury mine. Wars do not wait that long.

Putting the mines out of business will cause even more unemployment in a time we do not need it. This will include not only the directly involved workers but employees of our suppliers as well.

May I suggest that instead of rushing headlong into a crash program that means only ruin to many and cannot be proved to help anyone, that studies and testing be done, both to find the victims, if any, and to establish a cure that will really accomplish the goal sought. With the furnaces closing down as they are now, this would be a perfect time to test the air around each and then, say six months after the closing, test again and see if the air is significantly cleaner. This would be the kind of test reasonable people could understand.

MR. MEGONNELL: Thank you, Mr. North.

I want to assure you I certainly would not want to be a party to anything that has the intent of driving any industry out of business unless it is absolutely necessary. We are concerned, I think, with carrying out this congressional mandate in the most reasonable manner we can come up with.

You say there are no victims of mercury poisoning in this country. How does that tie in with

your illiterate southern family that you mentioned?

MR. NORTH: Well, I wouldn't say that there are no victims as a result of the mining activity, or generally speaking. I believe those two people in the south are the only known victims at this time.

MR. MEGONNELL: In your nearly 40 years, you have never known anybody who was affected by mercury? I don't mean killed, but getting the tremors, inbalance?

MR. NORTH: No, I have not. We are very careful not to let that happen.

MR. MEGONNELL: Well, I think the key to the whole thing is on page 3. You said you never knew of anybody who had a serious case of mercury poisoning who worked for an informed employer.

MR. NORTH: That is true.

MR. MEGONNELL: Historically, I think there have been cases.

MR. NORTH: Oh, yes, but almost all of Dr. Goldwater's cases, for instance, have been peculiar situations, such things as the original mad hatter situation, and so forth.

MR. MEGONNELL: Yes. Well, I think any of us would have to admit there are great gaps in knowledge.

The Clean Air Act did not give us much option, unfortunately. It had to be done. I think we are all learning a lot, particularly through this hearing process and through the comments that we are getting.

What do you mean on page 7 where you say, "Most of the domestic mines once produced at a rate many times that of recent years and yet in spite of many efforts, no commercially recoverable mercury has been found more than a few feet from the plant"? What do you mean by "commercially recoverable mercury"?

MR. NORTH: Well, a favorite trick of people in the mining game many years ago was to go around the old mercury mines and see how much mercury you could pick up, and you usually would be able to find some and this would be recovered and put in a jar. Many people have tried to wash the ground stacks perhaps 500 or 1,000 feet away and right up almost to the bases of them, and yet no mercury of any commercial value has ever been recovered. You may get a few globules but that is all, and this would be on a production rate of far greater than anything going today.

MR. MEGONNELL: There would be some pretty great gobs of mercury, wouldn't there, if you could make it commercially profitable to recover it?

MR. NORTH: Not at all. A very fine mist of mercury is all that is necessary, but you would have to go to an area that far around.

MR. MEGONNELL: I think you make some good suggestions in your last paragraph. I am all for finding out the facts.

MR. NORTH: That is all we want to know.

MR. MEGONNELL: Well, I agree with it.

Your information and opinions will be carefully considered before the rules are finally promulgated. I cannot predict what is going to come out of all this, but I very much appreciate your statement.

MR. YOST: I don't necessarily agree with everything you said, but I like your style.

(Laughter.)

MR. NORTH: Thank you.

MR. MEGONNELL: The last witness for this morning is Mr. Robert Widing of PPG Industries.

STATEMENT BY

MR. ROBERT E. WIDING

VICE PRESIDENT OF MANUFACTURING

INDUSTRIAL CHEMICAL DIVISION

PPG INDUSTRIES, INC.

MR. WIDING: Mr. Chairman and gentlemen:

My name is Robert E. Widing, Vice President of Manufacturing, Industrial Chemical Division, of PPG Industries, Inc. I appreciate this opportunity to comment on the Proposed National Emission Standard for mercury as a hazardous air pollutant which appeared in the Federal Register, Tuesday, December 7, 1971.

PPG Industries, Inc. operates three mercury cell chlor-alkali facilities affected by subject proposed National Emission Standards. These facilities are located at Natrium, West Virginia; Lake Charles, Louisiana; and Guayanilla, Puerto Rico.

The proposed standard on mercury implies that present mercury emissions to the atmosphere by the facilities producing mercury from ore and the mercury cell chlor-alkali plants have created an imminent hazard to the health of the general public. Although specific incidents have resulted in mercurialism in Japan[3] due to alkyl mercury, I have been unable to locate any references to suggest that ambient mercury levels present in the U.S. have produced mercurialism in the general public.

Dr. L. Goldwater, M.D., Professor of Community Health Sciences, Duke University, made a statement

at the Public Hearing in New York on January 18, 1972, which we endorse. His statement is extremely pertinent to the subject; and his testimony does deserve careful consideration before finalizing publication of a mercury standard.

The proposed regulations[4] and the accompanying background information[2] contain numerous unsupported statements that imply the following:

1. The public health is threatened by mercury emissions to the atmosphere;

2. The threat is primarily due to the processors of mercury ore and mercury cell chlor-alkali producers; and

3. The threat will be significantly reduced if the proposed regulations are established.

I would like to deal with each of these suppositions in order.

1. <u>Is the public health threatened by mercury emissions to the atmosphere?</u>

The background information[2], in describing the nature of the mercury air pollution problem, states that

(a) mercury is discharged to the atmosphere from numerous types of industrial and community sources,

(b) it is possible for this mercury to return to the earth with fallout and rainfall, and

(c) mercury may then be transported to the hydrosphere and find its way to aquatic life and into the human food chain.

Based on these premises, it is concluded that the United States has a mercury-in-air problem. Yet, no data has been presented to show the levels of mercury concentrations presently existing in ambient air throughout the United States. There is no evidence cited showing mercury in air to be causing water pollution problems. No epidemiological studies have been conducted that would show mercury to be even a minor health problem in the United States. There have been no reported incidents of symptoms of mercury poisoning among the general population indicating that airborne mercury is a problem. Techniques of epidemiology and public health studies are well known and should serve as a basis for conclusions drawn concerning whether mercury is a hazardous air pollutant.

The background information[2] further follows a rationale which equates organic mercury with inorganic mercury and mercury in fish with mercury in air. It concludes that ambient air concentrations below one microgram

of mercury per cubic meter are necessary to protect the public health.

It is well known from the account of the Minamata incident[3] that methyl mercury (organic) cannot be eliminated from the body as rapidly as inorganic mercury. The symptoms from organic mercury are usually not evident until a harmful dose has been ingested. Methyl mercury is known to cause permanent damage to the brain and the central nervous system.

On the other hand, mercurialism as a result of exposure to inorganic mercury vapor or mercury salts can be detected by early symptoms and is reversible. These extrapolations using data on organic mercury to support conclusions regarding mercury vapor in air have also implied that essentially all mercury taken in by breathing adds to the total body burden. Not taken into account is the elimination of mercury through urine and feces.

The administrator states that an ambient concentration level in the air below one microgram per cubic meter is sufficient to protect the public health from illness due to inhalation. It is argued, however, that much higher concentration levels of mercury in the atmosphere

may also be sufficient to protect the public health. Without adequate ambient air data, the administrator, in selecting a very low value of one microgram runs the risk of not being able to attain this low level even with complete control of mercury processing and mercury cell chlor-alkali production. In the future, the public could become unduly alarmed at values reported higher than one microgram.

2. Is the mercury emission to the atmosphere primarily due to processors of mercury ore and mercury cell chlor-alkali producers?

In the background information[2] it is stated that "some major sources of atmospheric mercury are considered to be coal-fired power plants, paint, primary nonferrous smelters, incinerators, mercury cell chlor-alkali plants, primary and secondary mercury processing plants, and general laboratories and hospitals."

No mention is made of natural emissions which may occur due to degassing crustal materials of the earth. There is evidence from analysis of glacial samples from Greenland and Antarctica[5] that such natural mercury emission may far outweigh those contributed by industry. Such data show that it is difficult for man-made sources to significantly change the world mercury burden resulting from natural

crustal emissions.

The industrial sources of mercury emissions to the atmosphere in the United States were estimated in 1968 to be 9-12% due to mercury cell chlor-alkali producers, 9-13% due to primary and secondary mercury ore processors. The remaining 75-82% comes from coal-burning, incineration and others.

Due to economic conditions, almost all mercury ore processors in the United States have shut down their operations. Thus, from the preceding data, it can be seen that the proposed regulation change would regulate only about 9-12% of the known industrial emissions. If natural emissions were included in this calculation, this percentage would be much smaller and these were escalated in one of the earlier papers.

3. <u>Will the "threat" of mercury emission be eliminated if the proposed regulations are established?</u>

At this point in time there is not sufficient evidence to show that mercury levels must be as low as one microgram Hg per cubic meter to protect the public health. Further, there is no evidence presented to indicate that one microgram Hg per cubic meter is now exceeded except a statement on page 17 of the background information[2] stating that

there are a few data which would indicate that a concentration of one microgram Hg per cubic meter may be approached on a 24-hour basis in large industrial cities.

No evidence is presented which would indicate that the sources of such mercury in these cities are mercury cell plants or even that the proposed regulations would reduce the mercury concentrations in these cities.

The mercury emission sources cited in the paragraph above would indicate that the mercury in such atmospheres would be more likely caused by coal burning or incineration than from mercury cell chlor-alkali producers. This is particularly true when it is noted that the emissions of chlor-alkali producers and ore processors are usually not located in highly populated areas.

The 5.0 pounds per day mercury emission standard, according to the background information[2], is based upon a mercury cell installation located in a valley with neutral conditions and a wind speed of 4.6 mph. This model is not representative of many mercury cell plant locations and arbitrarily penalizes plants with more favorable locations. The proposed standard presumes that satisfactory control technology exists to adequately control all mercury emissions to the atmosphere from a mercury cell plant.

Control technology does not exist for removing mercury from cell room ventilation air. Reducing mercury emissions at this point must depend upon good housekeeping practices similar to those required for maintaining a safe working environment for cell room workers. Such housekeeping practices, along with existing control technology for controlling mercury emissions from hydrogen and cell end box ventilation air, may be adequate to allow plants smaller than the average size plant of 244 tons of chlorine per day capacity to meet the standard.

It is quite doubtful whether plants as large as 500 to 750 tons per day can continually meet the 5.0 pounds per day standard. Only rough estimates have been made of cell room ventilation losses based upon mercury concentrations at floor level and an estimated ventilation rate. No complete tests have been conducted using the Method 2 as outlined in the Federal Register.[4] Several partial tests have been run to test the equipment. At this point in time, no one can state with authority what the daily mercury loss would be from a large cell room as determined by the proposed Method 2.

However, the mercury concentration in the cell room air is already regulated by the Occupational Safety and

Health Act of 1971. If OSHA Standards and the threshold limit values of 50 micrograms per cubic meter are met and confirmed by sampling of cell room air, this would be sufficient evidence that the cell room emissions are adequately controlled.

The standards that protect a cell room employee should be sufficient to protect the public outside the cell room with the additional large dilution that occurs as cell room air enters the general atmosphere.

The evidence is clear -- there are no reported incidents of symptoms of mercury poisoning among the general population.

The background data[2] supports the evidence -- it requires 300 micrograms per day methyl mercury intake to produce symptoms in the most sensitive humans. So, the 300 micrograms per day already has a good safety factor for the general population.

Why then should an additional safety factor as high as 10 be applied when the evidence indicates a smaller factor such as 2 to 5 would be more than adequate to protect the most sensitive humans? Why should an additional safety factor as high as 10 be applied when the mercury cell chlor-alkali mercury emissions are inorganic

and not methyl mercury?

The importance of this point is as obvious to you as to me since this is the whole basis for arriving at 1 microgram per cubic meter ambient air quality.

Further, in equating the 1 microgram per cubic meter standard back to the cell room emissions in numbers, relatively neutral air conditions have been assumed which adds again to the safety factors. Something closer to average air conditions would be more realistic since the human system will eject mercury in the normal waste process.

The safety factor upon safety factor approach is not realistic.

SUMMARY

In summary, I want to emphasize the following points:

1. The administrator has not shown that the public health is threatened by existing ambient air mercury levels. Neither has he shown that mercury processing and mercury cell chlor-alkali plant mercury emissions threaten the public health. Therefore, we feel that the proposed standard is not necessary.

2. The proposed standard would strongly

penalize the mercury cell chlor-alkali producers, which account for only 9-12% of industrial mercury emissions.

3. There is insufficient data to support the conclusion that the mercury level in ambient air must be as low as one microgram mercury per cubic meter to protect the public health.

4. Since the mercury concentration in cell room air is already regulated by existing OSHA standards and threshold limit values, it should not be necessary to measure the cell room mercury emissions.

5. Adherence to OSHA Standards and threshold limit values protects the worker and, in our opinion, the public. However, a single emission standard such as 5 pounds per day for all size plants is not consistent. If such a standard is set for an average size plant of 244 tons per day, the standard should be increased proportionately with increasing plant size. Emission values two or three times larger still provide adequate protection for even the most sensitive humans.

Thank you, gentlemen.

(The following references were submitted for the record by Mr. Widing.)

REFERENCES

1. Smith, R.G. et al. Effects of Exposure to Mercury in the Manufacture of Chlorine. J. Am. Ind. Hyg. Assn., 31 (1970),

2. U.S. Environmental Protection Agency. Background Information - Proposed National Emission Standards for Hazardous Air Pollutants: Asbestos, Beryllium, Mercury. EPA Off. of Air Programs Pub. No. APTD-0753.

3. Takeuchi, Tadao. Biological Reactions and Pathological Changes of Human Beings and Animals Under the Conditions of Organic Mercury Contamination.

4. Federal Register, Volume 36, No. 234 - Tuesday, December 7, 1971, pp 23239-23255.

5. Weiss, Herbert G. et al. Mercury in a Greenland Ice Sheet. Evidence of Recent Input by Man. Science 174 (November 12, 1971), p. 693.

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MR. MEGONNELL: Thank you, Mr. Widing.

MR. WIDING: I would just like to make a comment on this Mr. White's article which has been receiving lots of attention.

On the last page of this article, I would like to read this sentence. He says:

"A variety of activities of man that result in greater exposure of the earth's crust through alteration of terrestrial surfaces allows more mercury vapor and more gaseous compounds to enter the atmosphere."

Now, I noticed in reading this the same thing you did, Mr. Megonnell,and that is from 800 BC to about the present level you could say we are up about 50 percent.

I read this very carefully with that thought in mind as I went through the article, and I suggest that what he is saying here, that the alteration of the surface of the earth due to farming and many other activities that do expose a lot more of the earth to the gases will do it.

MR. MEGONNELL: I was thinking of road building.

MR. WIDING: Anything that scars the earth.

MR. MEGONNELL: That is what I thought. It is man-made, but not necessarily mining.

MR. WIDING: No, it is not, or processing. It is not specifically pointed at a specific industrial dimension.

MR. MEGONNELL: No. I wonder if some of these power plant effluents are not circling the globe and ending up in someplace like Greenland.

MR. WIDING: I think they are. They get into the trade winds and get up into the atmosphere, but the important point here is this fellow is estimating that the natural emissions vary somewhere between 125 and 150, and the total mercury production two or three years ago was only 8.8 grams, so that was the total production of mercury in the world, so that you look at this 8.8 and compare it to probably somewheres perhaps around 80 to 100 or so and say how can that significantly impact, you know, if that was all of the mercury that was produced.

MR. MEGONNELL: You can do that with any pollutant. The amount of $H_2S$ put into the atmosphere from natural phenomena greatly exceeds that put in by man. Unfortunately, the amount put out by man is in a concentrated urban area usually.

MR. WIDING: I agree, Mr. Megonnell. There should be some local controls where you do have an opportunity or a chance for possibly exceeding, but I think in the general atmosphere of pollution control we should not lose sight of the fact that within mother nature there is borne a high digestive capacity, and if it were not there we probably would not have much of an earth today, and we should use that capacity in our controls.

MR. MEGONNELL: I agree. I think a lot of people have the opinion, though, that it has been misused and, in fact, it has been exceeded.

Well, the trend is towards clean for clean's sake. I don't argue with it. I think it is very desirable. That is why they lowered the industrial hygiene thresholds from one milligram to a half. That is the only reason these gentlemen seem to believe was behind it. It is just a natural evolution and progression in this country to want clean because we can get there.

MR. WIDING: Yes, it is. All the producers, and you have heard everybody testify this morning, have been very concerned about the working conditions of their employees.

We recognize the qualities of mercury and we in our plants too carry on very strict medical programs and observations on our people as well as the atmosphere within which they work, and we producers ourselves support it and voluntarily initiated that investigation of the Wayne State Study, from which, after due deliberations, we felt it would be best to lower it from .1 down to .05, but I don't think that we should be indicted by saying one-tenth is bad because we were able to lower it to .05.

It is in order with what you mentioned. We see a way to get there and we know it as an additional bit of cost as far as the operations are concerned, but we have never had a case of mercury poisoning in any of our workers and I don't know of any chlor-alkali producer that has.

MR. MEGONNELL: All right. Our concern, of course, in the total environment is the great mix of different pollutants. You can tell by rather refined statistical analysis that people died in New York at a certain time and in London. We don't know exactly what killed them. A lot of physicians suspect it is this total mix, this conglomeration of gasses and particulate matter of all sorts and types.

I don't know that it is even fair to look at a pollutant alone. We do for practical reasons, but I myself suspect that any pollutant combination with another pollutant probably has a little more effect than either one of them would alone.

I think I have spoken enough about this.

MR. WIDING: It's bad to be exposed to pneumonia or to scarlet fever.

MR. MEGONNELL: It is bad enough to be exposed to air pollutants.

I have spoken enough about the imminent hazards. I think that is just a direct misinterpretation. The Act never says it has to be an imminent hazard. It says that the Administrator has to take certain precautionary measures to prevent any hazard.

You seem to say that methyl mercury can cause permanent damage to the brain. I would call that serious irreversible illness. You say that exposure to mercury vapor causes symptoms that are reversible. These two things seem to fit exactly the definition given in the Clean Air Act.

MR. WIDING: Well, sir, let's say we say that because we have the data from the Minimata incident and we have the data from the Alamagorda incident, of course, and these things were carried to far excesses, but you are talking about levels that just aren't occurring in the atmosphere or in the waters of the United States today.

MR. MEGONNELL: Again, we are talking about the degree.

MR. WIDING: You know, if you get too much water you can drown.

(Laughter.)

MR. MEGONNELL: That's right. You are not

a physician, I take it?

MR. WIDING: Pardon?

MR. MEGONNELL: You are not a physician?

MR. WIDING: No, I am not.

MR. MEGONNELL: But you know a lot about mercury. Is it likely that the run of the mill garden variety M.D. would recognize the symptoms of mercury if a fellow walked in off the street without occupational exposure history or something like that?

MR. WIDING: Well, I am not sure that I am really qualified to answer that.

MR. MEGONNELL: I didn't expect a medical opinion. You might have talked to a lot of medical men.

MR. WIDING: You know, there are so many symptoms. You know, you are tired and so forth, and lots of us feel that way that are not even close to mercury.

MR. MEGONNELL: That's true. Again, we do have this problem with the law that calls for a national emission standard.

I think our calculations are probably a little better in the case of your Ohio River plant than they are for the gentleman from Texas, a little more pertinent.

MR. YOST: You know all about the meteorology of that valley.

MR. MEGONNELL: I almost made a career of air pollution in the Ohio River Valley.

MR. WIDING: I would be glad to talk to you about it.

MR. MEGONNELL: I think that is all. Thank you very much.

I would like to announce, although we have received quite a few requests from persons who wish to appear, if there are any who have not yet made their wishes known, please contact Mrs. Marge Smith. She is in the rear of the room, that attractive looking young lady back there, and she will put you on the schedule at an appropriate time.

We will now recess for lunch until 2:00 o'clock.

(Thereupon, at 12:40 P.M., a luncheon recess was taken.)

* * *

AFTERNOON SESSION

2:00 P. M.

MR. MEGONNELL: The hearing will please come to order.

Our first witness for this afternoon is Mr. Edgar Conant of Stauffer Chemical Company.

STATEMENT BY

MR. EDGAR CONANT

MANAGER, ENVIRONMENTAL CONTROL

STAUFFER CHEMICAL COMPANY

MR. CONANT: My name is Edgar Conant and I am Manager, Environmental Control for Stauffer Chemical Company. I have a B.S. in Chemical Engineering from the University of Illinois. I have been plant manager at several Stauffer locations.

The company operates two mercury-cell chlor-alkali plants, one in Alabama and one in Louisiana. We wish to comment regarding the proposed standards for mercury emissions to the atmosphere.

Need for Control

Section 112 (a) (1) of the Clean Air Act of 1970 states: "The term 'hazardous air pollutant' means an

air pollutant to which no ambient air quality standard is applicable and which in the judgment of the Administrator may cause, or contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness."

Considering the foregoing definition, we do not see the need for the proposed standard to be applied at this time to a mercury-cell chlor-alkali plant. We do not know of a single incident of damage to public health caused by mercury emissions to the atmosphere from a mercury-cell chlor-alkali plant. No such incident is included in EPA's background material relating to the proposed standard. As far as we know the possibility of such hazard being imminent has not been demonstrated.

I would like to interject at this point that we understand that the Administrator is not obligated to act until the hazards become imminent, and I will come back to that later.

The industry has used mercury cells for many years and there has been ample time for any adverse effect of atmospheric emissions on public health to have been discovered or to have made itself evident. To our knowledge no such manifestations have occurred. Without clear evidence

for the need for regulation, the proposed standard becomes at best premature.

Therefore, it has been proposed and we therefore want to consider next the EPA basis for proposing control.

EPA is proposing control based on a concentration at fence-line not to exceed 1 ug/$m^3$. By comparison, for many years the American Congress of Governmental Industrial Hygienists has recommended a mercury exposure threshold limit value of 100 (and more recently 50 ug/$m^3$) for a time-weighted 8-hour average daily exposure, 40 hr/week. The federal Occupational Safety and Health Act standard is 100 ug/$m^3$ acceptable ceiling concentration. There is a 50 to 100-fold difference between present standards and the level proposed by EPA. Even when allowance is made for 24 hr. 7-day/week exposure, differences between healthy employees and young, old or sick members of the public, etc., there is still a discrepancy between present standards and the EPA level proposed. Present standards have protected employees' health, the record on this point is clear.

The foregoing casts doubt on the validity of the basis used by EPA in arriving at the proposed "safe"

concentration. The basis incorporates unproved assumptions and gaps in knowledge, as evidenced by these quotes from EPA's background paper, "Technical Report No. 3 - Mercury."

From page 15, "Consequently most atmospheric mercury is probably chiefly elemental mercury in vapor or aerosol form."

From page 16, "Data on the dietary (food and water) intake of mercury are scarce." Following this statement a generalization is made that an average diet can be expected to contain about 10 ug/day of mercury. There is no precise data given in support of this generalization, nevertheless the figure is used as part of the basis for arriving at a "safe" average daily concentration of mercury in air. Thus the key point of what constitutes a safe level of mercury in the atmosphere is based in part on information which is at best sketchy and at worst faulty.

On page 17, referring to another key point, we read, "Currently there are few existing data concerning atmospheric concentrations of mercury. Those data that do exist, however, indicate that a concentration of 1 ug $Hg/m^3$ may be approached, on a 24-hour basis, in large industrial cities. The measurement of mercury and its compounds in ambient air and from industrial-plant effluents

has only recently received attention; as a result, measurement methodology is in a state of evolution."

Thus it is clear that adequate data on the atmospheric concentration of mercury is lacking, and that in fact, methods for measuring these minute concentrations are still evolving.

The Administrator's judgment is that mercury is a hazardous air pollutant as defined in section 12 of the Clean Air Act of 1970. The previous quotations, taken from EPA's own background document, do not support that judgment; rather, they show a definite lack of factual basis for such a conclusion. It is our position that no imminent hazard exists and that more facts should and must be developed to determine whether there is any need for regulation under the language of the statute. In the absence of an imminent hazard there is time to develop these much-needed facts and to proceed on an orderly basis to a correct conclusion.

Emission Control

Addressing the proposed limit of 5 lb. of mercury emission per day, we do not know whether we could meet this limit on a consistent day-in, day-out basis, considering weather variations, operating difficulties, etc..

even with application of the best available technology.

One of the emissions included in the proposed control is the cell room ventilation air. Attempts at cell room ventilation air emission measurement show this to be a complex and extremely difficult task, with so many variables as to make validity of results uncertain. And in fact, EPA has recognized this difficulty as well as the lack of available control equipment for cell house ventilation air emissions. It would seem that the federal Occupational Safety and Health Act is sufficient regulation and that in view of this EPA could safely forego control of cell room ventilation air emissions.

In addition, the proposed standard includes a method of sampling and analysis new to the industry and to Stauffer. We do not know whether we could meet the proposed standard based upon these new methods.

Sampling and Analytical Methods

We find that in the research analytical laboratory the proposed method can be made to give results comparable to our present sulfuric acid/permanganate method, but with difficulty. The method is decidedly more complicated and cumersome, and there is not a body of experience behind it as there is with the conventional method. To

date it appears that the proposed method may not have the precision of the conventional permanganate method.

Further, the sampling train is complicated, requiring more work per sampling point and the number of sampling points required may be excessive for certain cases.

We have yet to try the proposed methods under plant conditions but it will be certainly more difficult for plant chemists and technicians to master than the permanganate method. The proposed method's added complexity has been "justified" by the observation that the method will trap and include organic mercurials better than the permanganate method. This argument is not relevant to the emissions of a mercury-cell chlor-alkali plant, since these are inorganic mercurials only. Therefore there is no benefit evident from adding this complex and burdensome method to the plant's many other problems.

Turning to Economic Impact considerations of the proposed standard, we want to say first that our company is committed to pollution control in our operations. However, we are becoming concerned at the rapidly increasing economic impact of pollution control regulations. When the expenditures required to comply with all of the pollution abatement regulations at all levels of government are

considered, it is evident that industry, the taxpayer and the consumer public are overburdened.

If industry is to remain viable, some selection among the many environmental needs is necessary. Priority must be given to protection of health. Because choices must be made it is most important to know whether a proposed regulation is in fact really essential to the protection of health. Based on the record we do not believe the proposed mercury-cell chlor-alkali plant emission control fits that category. The record does not show that public health would benefit from the proposed control.

Conclusion

In conclusion we wish to make these observations and recommendations.

First, EPA has not shown any clear hazard to health from mercury-cell chlor-alkali plant mercury emissions to the atmosphere. Absence of any case of damage to public health from this source over a period of many years is prima facie evidence that these emissions are not hazardous within the definition of a hazardous pollutant in section 112 of the Act. Therefore, it is our opinion that EPA should find, based on the content of these public hearings, that mercury in emissions into the

atmosphere from mercury-cell chlor-alkali plants does not constitute a hazardous air pollutant within the meaning of Section 112 (a) (1) of the Clean Air Act and that therefore no regulation of emissions from these plants is needed.

Second, if in spite of inadequate demonstration of need EPA persists in setting a mercury-cell chlor-alkali plant emission standard, then we would request that the cell-house ventilation air be excluded from this standard, recognizing that the federal Occupational Safety and Health Act regulation regarding mercury concentration in cell-room air is in force and that this, in effect, limits cell-room emissions.

Third and last, recognizing that the proposed sampling and analytical procedures are more complex than the presently-used conventional procedures, and that the proposed procedures offer no compensating advantages when applied to mercury-cell chlor-alkali plants, we recommend that the proposal for the new methods be rescinded and that the present sampling and widely-used sulfuric acid/permanganate methods be retained.

We appreciate this opportunity to comment and we urge that EPA give favorable consideration to these observations.

MR. MEGONNELL: Thank you, Mr. Conant.

You know, one other thing that I don't think I mentioned in this hearing is that in the legislative history, Congress almost mandated that they expected EPA would include mercury as a hazardous pollutant, and, of course, the Administration is trying to respond to that. I think you understand that because of your extemporaneous remark about the imminent danger, and so forth.

MR. CONANT: On the other hand, the Act clearly states that the Administrator's judgment determines what goes on that list, not Congress.

MR. MEGONNELL: That is true. That is right. It is pretty hard for a person in the Administration to disregard something that they say in a congressional report, so he has proposed this.

Whether he promulgates it or not remains to be seen, and that is, of course, one of the purposes of this hearing.

Why in your opinion did ACGIH lower, cut in half, the threshold limit values for mercury?

MR. CONANT: Well, I believe I have heard that question asked of the other participants, and my answer would have to be the same.

MR. MEGONNELL: It is just a matter of attainability?

MR. CONANT: I think so, and general public pressures.

MR. MEGONNELL: You mentioned the 50 to 100 fold difference between industrial standards and the standards we are proposing. I would say that this perhaps is not unusual, when you are relating pollution as experienced by the general public to that experienced within an industrial plant by normally healthy workers who are exposed eight hours a day, forty hours a week, and I would like to ask you how you make allowance for differences between healthy employees and young, old, or sick members of the public, as you say on page 2, other than to include a safety factor?

MR. CONANT: I am not a medical man, but a safety factor of 50 to 100 would seem a bit extravagant to me for that purpose.

MR. MEGONNELL: I have just done a little calculation here. Let's take this 50 micrograms per cubic meter, which is the in-plant air quality measurement. We divide it by three right away, because potentially out in the community the person can be exposed twenty-four hours

a day, so now we are down to sixteen micrograms. He is exposed potentially seven days a week rather than five, and five-sevenths of sixteen is eleven.

Now, applying a safety factor of ten brings us down to 1.1 micrograms, which is just about what has been proposed for community air levels.

Does the safety factor of ten appear unreasonable to you?

MR. CONANT: There is already a safety factor of ten or something in that fifty that you started out with, and now you are introducing another one at the other end of the line.

Now you have a safety factor of ten times; right?

MR. MEGONNELL: It is quite possible. I don't know the background of the industrial levels.

MR. CONANT: This is why we say it seems extravagant and perhaps overdone to reduce an already well tested, well proven safe limit to the extent that has been done here if it is purely on a basis of concern for public health without any definite sufficient test data behind it to show that this degree of reduction is actually necessary.

MR. MEGONNELL: I recognize that there are gaps in the data.

MR. CONANT: We are saying, again, that since this is not an imminent situation apparently, based on past experience, there again must be time to get some of this data and come to a conclusion on a rational basis, rather than on a basis of public pressure or some other basis.

MR. MEGONNELL: Do you have any data that would refute the supposition that most atmospheric mercury probably is elementary mercury, vapor or air form?

MR. CONANT: No, we don't.

MR. MEGONNELL: Do you have any data on the average dietary intake of mercury other than what has been published?

MR. CONANT: If we had, I would have used it. We don't.

MR. MEGONNELL: All right. I notice you disagree that mercury is a hazardous pollutant as defined in the Act, and I certainly can't disagree with the need for more knowledge -- there always is -- and I hope we can count on Stauffer, of course, to develop some of that knowledge, and I am sure we can.

I think I am familiar with your company's policy statement and, if I am correct, it is clear policy of Stauffer Chemical Company that economics will take a back seat if a health hazard can be shown.

MR. CONANT: We have said in this case that the public health must come first, and therefore it becomes very important to be sure that something done under the flag of protecting public health really is necessary for that purpose.

MR. MEGONNELL: I think you made some very good points and add much food for thought on the sampling analytical methods.

I am equally concerned, because my division has to enforce these. We have to use the same methods, and I want to make sure they are right and are no more complicated than necessary.

MR. CONANT: Yes, sir.

MR. MEGONNELL: I would like an explanation of how you feel that limiting the content of mercury in cell room air limits emissions from the cell room. I think Mr. Yost was digging at that same question.

MR. CONANT: The atmospheric air will limit the concentration.

MR. MEGONNELL: But it does depend on the quantity of air coming through.

MR. CONANT: I think the concern in public health is in terms of a mercury concentration also, one microgram per cubic meter.

MR. MEGONNELL: Yes.

MR. CONANT: That is the concentration number.

MR. MEGONNELL: Right. Now, our people in EPA may be perfectly familiar with these widely used sampling methods. I want to make sure, though.

Could you furnish details on these methods or the references for them?

MR. CONANT: Not off the top of my head. I would be very glad to send that information in.

MR. MEGONNELL: For the record. That would be very helpful.

MR. YOST: I have a question. I notice that it is true of your testimony and those of others in the chlor-alkali industry that you admit that there does not seem to be any rational basis for cutting in half the TLV values.

MR. CONANT: No. I believe what I said was

I don't know of any rational basis.

MR. YOST: Right.

MR. CONANT: There may be one.

MR. YOST: All right. All the witnesses were asked the same question and all of them said they didn't know any reason why it was, other than the fact of public pressure or otherwise.

MR. CONANT: Yes.

MR. YOST: Yet I gather from what I have heard that the industry uniformly accepted this change without any concern or, as a matter of fact, they endorsed its reduction, and I cannot understand why you would so casually accept a reduction of that magnitude, and yet now, when we are proposing regulations which to your mind have no more rational basis than the other one did, you are very upset.

Could you tell us what the difference is, why in one case you went right ahead, and yet in the other case you are getting up tight about it?

MR. CONANT: Yes, I have two reasons. One reason was given earlier in the day here. It was something industry had learned how to do over a period of time. It was not something that came out by edict in a very big

hurry and had to be done within 180 days or whatever.

Secondly, you are comparing there a reduction, a cut to one-fiftieth now that you were talking about, going from fifty down to one microgram per cubic meter, and I submit there is quite a difference between those two cases in terms of need, reasonableness and industry's ability to comply.

MR. YOST: I thought I heard one of the industrial representatives say today that they thought they could probably meet the regulation, but that was not their concern. They were talking about the need for it, and now you are bringing in another factor, that you say not only isn't there a need for it, but you can't meet it anyway. There are some people who say, "We think we can do it, but we don't know why we have to."

MR. CONANT: This morning I heard statements on both sides of the question. Some companies felt they could meet this; others felt they could not. Stauffer does not know.

MR. YOST: Thank you.

MR. MEGONNELL: Thank you very much, Mr. Conant.

The next witness is Mr. Edmund J. Laubusch of the Chlorine Institute.

STATEMENT BY

MR. EDMUND J. LAUBUSCH

THE CHLORINE INSTITUTE, INC.

MR. LAUBUSCH: I am Edmund J. Laubusch. I am a graduate engineer, having received a bachelor's degree from the Newark College of Engineering and a master's degree, in sanitary and public health engineering, from the Massachusetts Institute of Technology. Throughout my professional career I have been associated in some way with environmental health, first in government service and, later, in industry.

I will defer from reading what already is part of the testimony background which helps qualify me to speak in terms of interest in this area.

MR. MEGONNELL: I think one thing you forgot in your pedigree was about twenty years ago, you and I shared an office in Washington in Public Health Service.

MR. LAUBUSCH: I believe it was in New York City, wasn't it?

MR. MEGONNELL: No, it was in Washington.

MR. LAUBUSCH: Was it in Washington?

(Laughter.)

MR. YOST: It doesn't seem to have made a big impression on him.

(Laughter.)

MR. LAUBUSCH: As a matter of fact, in Washington, I also shared an office with Gene Jensen, who was in the water quality phase.

MR. MEGONNELL: I just want to say it doesn't prejudice me for or against you.

(Laughter.)

MR. LAUBUSCH: Since 1956 I have been associated with The Chlorine Institute, Inc., initially as sanitary engineer, as Technical Manager since 1958, and I am now also as Assistant Secretary-Treasurer.

The Chlorine Institute is an international trade association of chlor-alkali producers and other firms involved with chlorine manufacture, packaging, shipment or use. Throughout its 48-year existence, the Institute has addressed itself almost exclusively to matters of safety. It has worked diligently with other trade and professional groups, as well as with government authorities at all levels, to insure maximum worker and public safety in connection with the manufacturing, transportation and use of chlorine.

The Institute's 24 U.S. chlorine-producer members account for about 97 percent of our Nation's current

annual chlorine production, approximating 9.7 million tons, and represent an industry whose replacement capital cost exceeds $2 billion.

Thirteen of the Institute's U.S. chlorine-producer member companies employ a manufacturing route in which mercury is used as a cathode in electrolytic cells. Annually, about 2.6 million tons, or 27.2 percent of total U.S. chlorine production, are produced by this route at 29 locations throughout the country. We speak for those companies regarding the health effects of environmental airborne mercury and, consequently, regarding the current proposals for control of mercury emissions associated with such chlor-alkali manufacturing operations.

The chlor-alkali industry's concern about the health risks of mercury is not new. Permit us, please, to illustrate. Recognizing its responsibility to insure the health of its workers occupationally exposed to mercury (and chlorine) vapors and, to a lesser degree, to inorganic mercury particulates, the industry embarked, in 1961, on a research program to assess the situation. It should be noted that this preceded by several years the 1963 report (1) of the accumulation of methyl mercury chloride in fish in Minamata Bay; the awareness during 1964-65(2) that Swedish

fresh water fish contained elevated methyl mercury concentrations; and the emergence of the U.S. government's mercury "crash" programs in March, 1970.

The research program, of course, of which we speak was the one alluded to several times today, and was conducted by Wayne State University in Detroit under sponsorship of The Chlorine Institute. It extended from 1961-1970 at a cost to the Institute alone of about a third of a million dollars. The costs to the 19 individual North American chlorine producers who voluntarily participated in the program probably exceed that amount by about five-fold. It represented -- and still does, to the best of our knowledge -- the most exhaustive and complete health-oriented mercury research program ever undertaken by any industry. Its results were publicized, openly and widely, throughout the world. The Institute, in fact, sent the principal research investigator, Dr. Ralph G. Smith (Now of the University of Michigan), to an international symposium held in Stockholm in November, 1968, to discuss his findings with other mercury toxicology experts. The research results, albeit imperfect, contributed to the decision of that international group to recommend (3) incorporating an additional safety factor into the then-widely accepted occupational exposure threshold level of one-

tenth milligram per cubic meter.

The question has come up often today, and I would like to read into the record the author's statement as to his conclusions with respect to this.

MR. MEGONNELL: I am grateful we are going to get the answer to that.

MR. LAUBUSCH: I will quote further as I progress in my testimony, but in answer to the question, at least in part, Dr. Smith says that, "The data presented here" -- and his report is part of the proceedings -- "show no significant signs or symptoms in persons exposed to mercury at or below a level of 0.1 milligrams per cubic meter. However, the data do raise a question regarding the adequacy of the safety factor provided by a TLV of this magnitude."

Now, not all the participants in this mercury research program agree necessarily with the observation of the author, and they did not, as an institute or industry, endorse it.

Following that symposium, and again influenced by our data, the American Conference of Governmental Industrial Hygienists, in May, 1970, changed the 8-hour, time-weighted Threshold Limit Value for occupational exposures

to mercury from 0.1 to 0.05 milligram per cubic meter. Mercury-cell chlorine producers immediately responded to reduce cell room emissions to within the new standard and further, in fact, to comply with the even more restrictive "ceiling" standard imposed under the Occupational Safety & Health Act which became effective August 27, 1971.

Anticipating possibly a question in this regard, the parent OSHA Act provides that mercury shall not at any time exceed a ceiling level of 0.1 milligrams per cubic meter.

MR. MEGONNELL: And this 0.05 is an average?

MR. LAUBUSCH: The 0.05 is a time-weighted average concentration. It is a recommendation by the ACGIH, but occupational safety and health people via the Department of Labor and the Department of Health, Education and Welfare have adopted as the national concensus standard the American National Standards Institute recommendation. This was a 1943 recommendation, which was re-affirmed in 1971. Currently their standard is being revised. It has been in essence approved by all of the members on the committee, and it will conform to the ACGIH TLV time-weighted average of 0.05.

MR. MEGONNELL: Since we have stopped, could you describe to me how the chlorine producers immediately

responded to decrease cell room concentrations?

MR. LAUBUSCH: They did it by tightening up on housekeeping and operations within their plants.

MR. MEGONNELL: Not by blowing more air through?

MR. LAUBUSCH: No.

We cite this example first to point out that the North American chlor-alkali industry has exhibited pioneering leadership in controlling and reducing its mercury emissions to insure worker health and safety. We hope, also, that it will refute the EPA observation[5] (p. 17) that "economic reasons have dictated the use of those mercury emission controls that are employed."

We wish first to address ourselves to the question: Is, in fact, mercury a "hazardous air pollutant" as defined in Sec. 112(a) (1) of the Clean Air Act. This, at best, is a difficult subject to broach, for it becomes necessary to support or challenge someone's personal judgment -- in this case, that of the EPA Administrator.

As regards EPA's posture on the health hazards of airborne mercury, only two statements have thus far been made available to us[5,14] -- one about a single, double-spaced typewritten page in length, and the other a bit more,

five pages. These two statements are reasonably consistent and include six commendable reference sources that are also common to both of them.

We also have become aware of the existence of the National Air Quality Criteria Advisory Committee, and of its role in counselling EPA on "air quality considerations, on the assessment of adverse health effects, and on the approaches and protective philosophy underlying the proposed emission standard for mercury." We have tried to obtain, or to examine, records of discussions and findings of this group so that we could be as well illumed in these areas. But we have been advised that only informal conferences of the group have taken place and that no written records are available for our inspection. To complete the record, we ask that the letter of January 25, 1972, from Ernst Linde, EPA, be incorporated into the record as part of our testimony.

MR. MEGONNELL: That will be included as if read.

MR. LAUBUSCH: Considering the scores of literature citations which have some pertinent to this subject, it is astounding that the baseline reports made available to us and, presumably, also upon which the

Administrator has formed a preliminary judgment, are so relatively scant. Moreover, as our further statements will attempt to demonstrate, many of EPA's interpretive findings and conclusions developed therefrom, at least in the very brief form in which they have been presented and made available to us, are subject to considerable question.

An inherently-germane and centrally-significant consideration relating to assessment of the health effects of environmental mercury burdens is that of transformation. The underlying theme embraces these fundamentals: (1) mercury, in whatever form it exists in the environment, is potentially exchangeable, in some degree, among the air, land and water phases; (2) mercury, in whatever form and from whatever phase, is potentially capable of being taken up by aquatic animals in the form (among others) of methyl mercury; (3) ingestion, by humans, of fish and other food containing methyl mercury may cause irreversible harm to present and progeny populations. As best as any of us can now determine, these appear to be plausible observations. It is in the subsequent projections and extrapolations that our differing viewpoints are especially manifest.

The statement is made[5] (p. 15) that "...most mercury compounds degrade to elemental mercury

under the action of sunlight." This question is out of context as the author[10] was discussing ocalists and organomercury compounds; such compounds do indeed decompose to elemental mercury when exposed to ultraviolet light (19,20). However, we are not concerned with organomercury compounds but, rather, with elemental mercury vapor and air.

The reactions of elemental mercury vapor with oxygen and water vapor under the influence of ultraviolet radiation have been well documented[21-23]. The product formed is mercuric oxide. This can readily be demonstrated in an ultraviolet absorption cell. Reactions which are photochemically induced only proceed more rapidly, not in an energetically unfavorable direction. The reaction of mercury vapor with oxygen to form mercuric oxide is highly favorable.

All the physio-chemical evidence now available now indicates that mercury vapor rapidly converts to inorganic salts, chiefly mercuric oxide, in the presence of ultraviolet ozone and oxide of nitrogen. It should be noted that mercuric oxide is substantially less toxic than elemental mercury vapor[24].

Thus, it cannot be assumed "that exposure to atmospheric mercury represents exposure to mercury vapor." And it does not follow that "most atmospheric mercury is probably chiefly elemental mercury in vapor or aerosol form." This statement actually is a misquotation of the source[6] (p. 15) which properly concludes "...we know practically nothing about the chemical and physical forms of mercury in the atmosphere or of their transformations therein." All the physio-chemical evidence available indicate that mercury vapor rapidly converts to inorganic salts in the presence of ozone or oxides of nitrogen.

It is also stated[14] (p. 1;5,p.17) that "Inorganic mercury which reaches the waterways can be metabolized by microorganisms to methyl mercury (and dimethyl-mercury). Testimony presented by Dr. Leonard J. Goldwater[15] (pp. 4-5), based on Japanese studies and others currently underway at the University of Wisconsin, raises some question that such phenomena occur widely -- in nature. Furthermore, as pointed out by investigators at Oak Ridge National Laboratory[16], certain organisms apparently are capable of converting just about all types of mercury compounds <u>into metallic mercury vapor.</u> It would appear, then, that a mercury cycle exists in nature just

as a carbon cycle and a nitrogen cycle exist. Thus, mercury and mercury-containing compounds are widely interconverted in nature and that rate of formation of any one -- such as methyl mercury -- vs. the rate of decomposition should be an important consideration. Yet, no apparent recognition of the kinetics of chemical and/or biological reactions and equilibria are evident in EPA's appraisals, with which we are familiar.

As to human consumption of fish and foodstuffs containing methyl mercury chemically synthesized, the Minimata, Niigata and Alamagordo incidents are abundantly clear. But let the record show that there has not been a single recorded incidence of the "Minimata syndrome" anywhere in the world resulting from consumption of fish, in any amount, alleged to contain methyl mercury which might have been biologically produced.

Upon emergence of the U.S. government's awareness, in March, 1970, that an environmental mercury "crisis" might exist, our industry immediately responded and broadened its earlier involvement. On the industry's behalf, I was sent to and visited Scandinavian health, environmental and conservation authorities, both in and out of government, as well as chlorine producers in Sweden

and Finland in June, 1970, to obtain first-hand information on the situation there and measures being employed to combat it. The visits, and subsequent visits by myself and others from industry, and the continuing liaison resulting from them, have proved most valuable.

Somewhat later, in August of 1970, a team of U.S. government experts spent a week in Sweden and three days in Finland with physicians, scientists, engineers and public officials in these countries who already had been actively working on mercury problems. This Study Group on Mercury Hazards, headed by Dr. Norton Nelson (director of New York University's Institute of Environmental Medicine), included representation, among others, from HEW's Secretary's Pesticide Advisory Committee, the Food & Drug Administration, the Departments of Agriculture and Interior, and the then Water Quality and National Air Pollution Control Administrations. The report of the Study Group(6), published in March, 1971, included this observation: "It would appear that unless a large increase in the level of atmospheric mercury occurs the health hazard from airborne mercury would be relatively insignificant compared to that from eating contaminated food." It would appear, on this basis alone, that publication(7) by the Administrator that same month,

on March 31, 1971, of a List of Hazardous Materials which included mercury, was unsubstantiated, or, at the very least, premature. What contrary evidence was obtained, and by whom in the seven intervening months since our government's Study Group returned from Scandinavia? We are aware of none having been published then or even to this day.

The U.S. expert Study Group report goes on to say this: "Nevertheless, there is so little known about mercury in the air that it behooves us to develop a much more acute scientific awareness of the situation. We agree. Towards that objective, the Group submitted (6), (p.53) the following "specific recommendations for further research (which are based on the gaps which must be filled in order to properly delineate the role of airborne mercury in environmental contamination: (underlines mine)

"1. Determine the chemical and physical forms of mercury in the air both near to and remote from known sources.

"2. Determine the quantitative aspects of transformation of mercury and its compounds in air and the controlling circumstances.

"3. Determine chemical or physical forms in which mercury is emitted to the air from soil, water,

vegetation, and man-made sources; how much is emitted from each source; and which are significantly large sources.

"4. Determine a total budget for the environmental distribution of mercury, including sources, transport, transformation, deposition, and fate."

We submit that these objectives are far from being realized. They represent a huge effort, requiring unprecedented mobilization of talent and resources, from all available sources. While much good research is currently underway and new data are being continually advanced, in our judgment they are yet comparatively meager, clearly incomplete and simply not sufficiently conclusive to justify the action now proposed.

Let us next turn our attention to toxicity considerations. Dr. Horton's testimony(14, p.1) states that "Airborne mercury is a hazard to the public insofar as ... mercury which is inhaled may add to the toxicity of methyl mercury, the primary source of which is the diet." He further states (Ibid. p.4) that "the best available data suggest that methyl mercury and mercury vapor have similar and probably additive effects."

Two reports figure prominently in Dr. Horton's appraisal. One of the reports(4) is that of the chlor-

alkali industry research study previously mentioned. The reference thereto,however, is especially deficient in not clearly stating that loss of weight and loss of appetite statistically associated with elevated, occupational exposures to mercury vapor were worker-reported symptoms and not objective findings. Moreover, it should be emphasized that this research study, and its results, have dubious or, at best, only very limited pertinence to the consideration at hand. The study was specifically designed to assess the health status of workers occupationally exposed to mercury vapor; it was neither designed nor intended for any other purpose. Despite limitations and imperfections, the study protocol used achieved that objective. Not a single case of mercurialism, acute of chronic, was observed among the 642 mercury-exposed workers included in the study. And in the author's words, "...individuals displaying the (neurophyschiatric) symptoms, -- that is, insomnia, nervousness -- found to be more prevalent with increased mercury exposure would be hardly distinguishable from other employees exhibiting similar symptoms for a variety of reasons unrelated to exposure to mercury."

I suggest that this perhaps is one of the

reasons that some of the people who supported and participated in the study may not agree in toto with the conclusion.

Since the completion of the medical studies of workers, the Institute research program has continued in two different directions: First of all, we have financed a major, long-term study -- this is a five year exposure study -- of mercury vapor inhalation by monkeys -- the closest primate to man. The results, which have been submitted for publication to the Journal of the American Industrial Hygiene Association, show very little evidence of health impairment noted even at 500 micrograms per cubic meter vapor exposure levels.

The second effort has been a further attempt to find out if there are any objective ways to measure workers' psychological worries. Careful health audits on workers have been continued, employing electromyographs, and this work is being done under contract at the University of Michigan, and tremorgraphs for gauging tremor. At the present time, our results are still negative.

The second principal EPA reference source referred to by Dr. Horton is a very comprehensive report[9] of a Swedish Expert Group alleged by EPA to have concluded (P,p.17) that "a total dietary intake of 30 micrograms per

day of methyl mercury is safe." The statement is inaccurate. On the contrary, the Swedish report is quite specific: It states that "the acceptable daily intake of methyl mercury through fish would correspond to about 30 micrograms of mercury as methyl mercury." (All underlines mine) (9,pp.30,290)

From these two reports, a case is advanced (5,p.16) that "Because similar intakes of methyl mercury and mercury vapor appear to produce detrimental effects exposures to methyl mercury (diet) and mercury vapor (air) will be considered equivalent and, ... therefore, the combined intake of the two should be restricted to the equivalent of 30 micrograms of methyl mercury."(14,p.5). (Underlines mine.)

By a series of assumptions and calculations, mixing methyl with other organic and with inorganic mercury forms; ingestion of methyl and other mercury forms, via food and water, with inhalation of "mercury" as vapor or an aerosol or whatever, and absorbable or otherwise -- we are confronted with potpourri of a level of simply "mercury" as an ambient air goal and upon which the proposed national emission standard for mercury is derived. This approach is unacceptable and not in accord with known facts. The

toxicity of different forms of mercury is very different. Elemental mercury vapor and inorganic salts of mercury are not equivalent to methyl mercury in physiological effects, in mode of action, or in rate of excretion. Methyl mercury is much more toxic, it causes irreversible damage before reversible damage can be detected, and it is much more slowly excreted from the body.

My recollection is that a half life of organic methyl mercury is in the range of 75 to 80 days, whereas the half life of mercury vapor is in the range of about 20 to 30 days.

The effects of 20 micrograms of methyl mercury ingested and 10 micrograms of mercury vapor inhaled are simply not equivalent and additive.

Mr. Ruckelshaus has stated(8) that "information currently available suggests that an ambient concentration level in the air (of mercury) below one microgram per cubic meter is sufficient to protect the public health from illness due to inhalation of mercury in the environment." (Again, we ask what <u>form</u> and <u>kind</u> of mercury: vapor, aerosol, particulate, inorganic and/or organic? And how determined? The present state of analytical art, as EPA concedes, and others have testified, particularly when

you were talking about methyl mercury and other complex organic mercurials, is in a "state of evolution.")
He also has stated that "the only industries known to be emitting mercury in quantities ... that may cause the ambient concentration level to exceed 1 ug/$M^3$ are the facilities producing mercury from ore and the mercury cell chlor-alkali plants."

We are aware of no published studies of general atmospheric mercury levels related to the health effects of occupationally-unexposed populations nor are we aware after seven decades of operation and mercury sales in this country and elsewhere that the general public have suffered any ill effects.

Published[11] and unpublished studies, employing a variety of analytical methods, do demonstrate, however, that total atmospheric mercury often exceeds one microgram per cubic meter. One such unpublished study established levels of 3 to 20 or more micrograms per cubic meter, for as long as four weeks under inversion conditions, in the Ohio Valley. Urinary mercury levels from about 20 exposed persons of the general population ranged from nondetectible amounts to maximum of 16 micro grams per liter. These excretions fall well within the

generally-accepted norm for occupationally-unexposed individuals of 20-30 micrograms mercury per liter[3]. From these limited data it must be concluded that either the mercury was not present in an absorbable form, that there was essentially no absorption below some concentration substantially higher than one microgram per cubic meter, or, that the mercury existed in some relatively non-toxic chemical form -- perhaps as an aerosol smaller than the lower critical size for lung absorption. This example illustrates how little actually is known about both the nature or effects of various forms of airborne environmental mercury.

I will not read the next two paragraphs. I would like them to be included in the record. They have been alluded to several times earlier this morning.

Moreover, some quite recent evidence tends to cast considerable doubt on the extent of industry's role as a major contributor to environmental mercury burdens. For instance, we cite the work published[12] jointly by scientists from the Naval Undersea Research and Development Center and the University of California's Scripps Institution of Oceanography. Dated glacial samples from Greenland and Antarctica from 800 B.C. to 1965 (summer deposit) were

analyzed for mercury content and were recorded at 62 and 98 nanograms per kilogram of water, respectively. The authors state "we reach the conclusion that the mercury in the atmosphere probably arises predominantly from the degassing of crustal materials and that, if there is a measurable global impact by man upon the atmospheric burdens of mercury, it may be through an enhancement of this degassing process." They also present data which show that mercury released into the environment from chlor-alkali plants probably constitutes not more than two percent of all mercury so released each year from all sources. Initiating control on an industry which might be responsible for only two percent of the total released can have only a minor, insignificant impact on the mercury problem if one indeed exists.

I would, however, comment that the data do show variations in mercury content with time, but do not show a sharp or consistent increase correlated with increased industrial use of mercury, and I personally support Mr. Widing's observation and that also that Dr. Goldsmith transmitted in his supplementary testimony.

MR. MEGONNELL: Goldwater.

MR. LAUDBUSCH: Goldwater, rather, that the

probable reason for the increase is due to excavation and movement of the surface materials.

Another study casts similar doubts. Dr. Edwin Wilmsen, at a meeting of the American Association for the Advancement of Science in Philadelphia, on December 28, 1971, reported(13) that preserved samples of fish from archeological sites, ranging in age from 300 to 2,000 years, contain mercury at levels comparable with those found in fish today -- some ranging above our FDA's 0.5 ppm action level, I think some as high as 9.5 ppm and some were considerably lower than FDA's action level. Other like reports have been published in the past year.

Yet even another study(17) contributes to the uncertainty. Jack Kevorkian, M.D., et al, of Saratoga General Hospital, recently tested various human tissues and organs from 59 autopsy cases covering the period 1913-1970 for total mercury content, and 10 individual samples for methyl mercury. They observed that the total mercury content of most human organs has dropped sharply during the last 60 years and suggest that the sharp drop may reflect a cleansing of the general environment of mercury and a diminution of any pollution threat. Methyl mercury ranged from 0 to 74 percent of total mercury levels and 2 or 3

brain samples had no methyl mercury at all. While inconclusive, the study does demonstrate how little we know about mercury in the humban body.

In summary, and in direct response to the factual and legal points of the notice of hearing, we submit that:

1. There presently exists no evidence even suggestive that any of us now are -- or can reasonably or imminently be expected to be -- exposed to mercury concentrations in air we breathe which "may cause, or contribute to, an increase in mortality or an increase in serious irreversible, or in incapacitating reversible, illness," as defined in Section 112(a) of the Clean Air Act;

2. Insufficient data are available upon which to base <u>any</u> ambient air goal for mercury, particularly one that is not quantified as to the kind and/or form of mercury involved;

3. Adoption of a level of one microgram per cubic meter of mercury, maximum 30-day average concentration, even as an ambient air <u>goal</u>, is meaningless by itself and will inevitably result in unnecessary and unwarranted concern that the public health is being endangered;

4. The effectual input of mercury into air by industry and from other potential or existing sources, particularly as related to health consequences, has not yet been quantified;

5. The statement, "The only industries known to be emitting mercury and in a fashion such that ... may cause the ambient concentration level to exceed 1 microgram per cubic meter are the facilities producing mercury from ore and the mercury cell chlor-alkali plants.", is not sufficiently reflective of past and emerging research findings. Moreover, it completely ignores the substantial emissions from power generation and other sources.

Let me clearly state for the record that I speak for the U.S. mercury-cell chlorine producers who are members of the Chlorine Institute only with regard to designation of mercury as a "hazardous air pollutant," as defined by the Clean Air Act, and to the validity of EPA's ambient air goal. Let me also state that we believe mercury emissions from all sources, industrial and otherwise and including chlor-alkali operations, should be reduced to <u>practicable</u> minimum levels, and towards that goal I and our members have been in constant communication with EPA's Office of Air Programs personnel during the

past year.

But let our mutual approach and response be rational and scientifically sound, for our common good. The Chlorine Institute urges our government's and our industry's constant scrutiny of all such matters. And I pledge, on behalf of the industry I represent, as well as personally, our continuing support.

Thank you.

(The following information referred to by Mr. Laudbusch in his statement was submitted for the record, as follows:)

REFERENCES

(1) Fukiki, M. Kumato Igakukai Zasshi, 37 (1963) p. 494.

(2) Lofroth, G. Methylmercury: A Review of Health Hazards and Side Effects Associated with the Emission of Mercury Compounds into Natural Systems. A report of the Swedish Working Group on Environmental Toxicology (3/20/69).

(3) Anon. Maximum Allowable Concentrations of Mercury Compounds. Arch. Env. Health, 19 (Dec. 1969).

(4) Smith, R.G. et al. Effects of Exposure to Mercury in the Manufacture of Chlorine. J.Am.Ind.Hyg. Assn., 31 (1970) pp. 687-700

(5) U.S. Environmental Protection Agency. Background Information -- Proposed National Emission Standards for Hazardous Air Pollutants: Asbestos, Beryllium, Mercury. EPA Off. of Air Programs Pub. No. APTD-0753 (Dec. 1971).

(6) Special Report to the Secretary's Pesticide Advisory Committee, DHEW, Nov. 1970. Hazards of Mercury. Environmental Research, 4: 1 (March, 1971).

(7) Federal Register, 36:62 (March 31, 1971) p. 5931.

(8) Federal Register, 36:234 (Dec. 7, 1971) p. 23239.

(9) Nord. Hyg. Tidkr. (Stockholm). Methylmercury in Fish. Supplement No. 4 (1971).

(10) Jonasson, I.R. Mercury in the Natural Environment: A Review of Recent Work. Geological Survey of Canada, Paper 70-57 (1970) p. 12.

(11) Vaughan, William M. et al. Mercury Vapor Emissions: An Appraisal of Selected Sources. Preliminary Report, State of Illinois Institute for Environmental Quality (April 1971).

(12) Weiss, Herbert C. et al. Mercury in a Greenland Ice Sheet: Evidence of Recent Input by Man.

Science, 174 (Nov. 12, 1971) p. 693.

(13) Report - Wilsen, Edwin. Presented at American Association for the Advancement of Science meeting, Phila., Pa. N.Y. Times (Dec. 28, 1971).

(14) Horton, John. Health Hazards of Airborne Mercury. EPA Testimony, Public Hearing, New York City (Jan. 18, 1972).

(15) Goldwater, Leonard J. Comments on Proposed National Emission Standard for Mercury. Presented at EPA Public Hearing, New York City (Jan. 18, 1972).

(16) Wallace, Robin A. et al. Mercury in The Human Environment: The Human Element. Oak Ridge National Laboratory, Contract No. 7405-eng. 26 (reprinted March, 1971) pp. 15-16.

(17) Kevorkian, Jack et al. Mercury Content of Human Tissues During the Twentieth Century. Presented to Amer. Public Health Assn. (Oct. 12, 1971).

(18) Wood, John M. Microorganisms and Mercury. Ltr. C & EN (Nov. 22, 1971) p.4.

(19) Wolf, C.J. and Walker, J.Q. Radiolysis of Liquid and Solid Dimethyl Mercury. J. Phys. Chem., 72:10 (1968) pp. 3457-3462.

(20) Gomer, R. and Noyes, W.A. Photochemical

Studies XLI: The Photochemistry of Dimethyl Mercury. J. Amer. Chem. Soc., 71 (1949) pp. 3391-3394.

(21) Hammond, G.S. and Pitts, J.N. Advances in Photochemistry. New York: Interscience (1963) pp. 225-227, 273.

(22) Noyes, W.A. Photochemical Studies VI: The Photochemical Reaction Between Oxygen and Mercury Vapor at Relatively Low Pressures. J. Amer. Chem. Soc., 49:12 (1927) pp. 3100-3106.

(23) Gunning, H.E. Primary Processes in Reactions Initiated by Photoexcited Mercury Isotopes. Can. Chem. J., 36 (1958) pp. 89-95.

(24) Williams, C.R. et al. Mercury Exposures in Dry Battery Manufacture J. Ind. Hyg. Tox., 29 (1947) pp. 378-381.

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Mr. Edmund J. Laubusch
Assistant Secretary
The Chlorine Institute, Inc.
342 Madison Avenue
New York, New York 10017

Dear Mr. Laubusch:

This is in response to your letter of January 20, 1972 regarding the National Air Quality Criteria Advisory Committee.

As stated in the Introduction to Office of Air Programs Publication No. APTD-0753, "Background Information - Proposed National Emission Standards for Hazardous Air Pollutants: Asbestos Beryllium Mercury," December 1971, the National Air Quality Criteria Advisory Committee has been consulted on air quality considerations, the assessment of adverse effects, and the approaches and protective philosophy underlying the proposed standards. There were several meetings at which these matters were discussed. These discussions generated advice and comments by individual members and an exchange of views; they did not produce and they were not intended to produce formal findings or recommendations by the Committee. I am unable therefore to comply with your request for copies of the Committee's findings.

A copy of the membership list of the National Air Quality Criteria Advisory Committee is enclosed. The Committee was established in March 1968 for the purpose of providing advice and consultation on the development and documentation of air quality criteria for atmospheric pollutants. It is utilized also for providing advice and consultation on related matters as deemed desirable or required under section 117(f) of the Clean Air Act as

amended by the Clean Air Amendments of 1970.

Section 117(f) states the requirements for consultation "with appropriate advisory committees, independent experts, and Federal departments and agencies" prior to taking certain control actions or making certain determinations. These include publishing a List of Hazardous Air Pollutants under section 112(b) (1) (A); and publishing any standard for a hazardous air pollutant under section 112(b) (1) (B).

As you will note from the enclosed copy of the Clean Air Act, as amended, section 117 deals with the President's Air Quality Board and with other advisory committees. The National Air Quality Criteria Advisory Committee is one of the several other advisory committees serving the Environmental Protection Agency.

I have no up-to-date membership list of the President's Air Quality Advisory Board and I have taken the liberty of sending a copy of your letter, together with a copy of my reply, to Mr. Jack C. Oppenheimer, the Executive Secretary of the President's Air Quality Advisory Board so that he may respond directly to that portion of your inquiry which refers to the Board.

Please let me know if I can be of further

assistance.

Sincerely yours,

Ernst Linde
Executive Secretary
National Air Quality Criteria Advisory Committee

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# NATIONAL AIR QUALITY CRITERIA ADVISORY COMMITTEE

January 1972

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MR. MEGONNELL: I must congratulate you, Mr. Laubusch, on what I consider a very comprehensive and quite provocative statement. It gives us plenty to chew on in considering or reconsidering this matter. I do have a few questions.

You seem to -- I don't know if the word is "resent" or at least resist the statement that economic reasons help dictate the reduction of mercury emissions in the chlor-alkali industry.

Don't you think there was a factor of loss of mercury, for one reason, and aren't Workmen's Compensation laws an economic incentive?

MR. LAUBUSCH: The past record of the industry and that of the Institute has been one of addressing itself totally to the matter of safety.

We, as an Institute, are unconcerned with the financial aspects of whatever might be pertinent. The work which we sponsored and have continued to sponsor at Wayne State University and elsewhere was totally motivated on the basis of insuring the health status of the workers which are employed by the industry.

MR. SLAUGHTER: Let me stick in a comment. We did not mean the cell room emissions on that statement.

What is meant there is the hydrogen screen and end box installation. Nobody removed mercury from the hydrogen screen a few years ago unless they had a sale that required mercury in it.

Let me straight the record straight.

MR. MEGONNELL: This is Dale Slaughter, who kind of devoted his life to this subject for the past years.

MR. LAUBUSCH: Dale was expanding on the material portions of which I quoted from the background document.

MR. MEGONNELL: What form, solid, liquid or gasses is mercuric oxide?

MR. LAUBUSCH: Solid.

MR. MEGONNELL: Does it stay suspended in the air for any period of time?

MR. LAUBUSCH: It is widely transported within the air, as are most mercury compounds, whether they be organic or inorganic.

MR. MEGONNELL: I know very little about it. I know it is pretty heavy. I imagine the settling rate is relatively fast compared to lighter aerosols.

MR. LAUBUSCH: Apparently. I don't know.

MR. MEGONNELL: Does The Chlorine Institute have any information on the points you bring up on page 7, the rate of formation versus the rate of decomposition?

MR. LAUBUSCH: I will submit as supplementary testimony at least a dozen or more references, which I feel are pertinent and which do address themselves to these considerations.

MR. MEGONNELL: That will be very helpful.

MR. LAUBUSCH: That will include also Dr. Woods' brief comment, and letters to the editor in the magazine.

MR. MEGONNELL: I think we could agree that this matter of conversion to the methyl form in nature is at least argumentative. There does not seem to be any firm conclusion that I can get out of it. I can find statements both ways.

MR. LAUBUSCH: I might say that several of the members of our industry are supporting a research program which is being coordinated by the manufacturing Chemists Association, which has as its principal objective resolution of this very item.

MR. MEGONNELL: Why was the loss of weight done subjectively in this study you were talking about?

MR. LAUBUSCH: Well, the study protocol called for only one medical examination during the study year, so there was no way of relating, as part of that study, whether in fact there was an increase or decrease in weight.

MR. MEGONNELL: You merely asked the man?

MR. LAUBUSCH: It was totally subjective, a questionnaire item.

MR. MEGONNELL: I see. You seem to object to the use of data from a study where it wasn't specifically designed to answer this question. Isn't it sometimes worthwhile to use scientific data in ways that don't necessarily coincide with the designed purpose of the study?

MR. LAUBUSCH: Yes, I think that is so, but one must always realize the limitations in the use of that data.

For instance, I might comment on the report by the National Research Council of the National Academy of Science just recently transmitted to EPA concerning the atmospheric or the hazards of fluorides in the ambient environment to public health, and I believe the conclusions of that voluminous report were, in spite of the fact that some 125,000 tons of fluorides are annually introduced into

the atmospheric environment, that there is no hazard to general public health, the hazard being to plants and animals.

By that same token, there is an ACGIH value for fluorides, which I believe is about two and a half parts per million in the industrial occupational scene, so one cannot automatically translate one from the other.

MR. MEGONNELL: Correct. I just wanted to know if you were generally opposed to using such information.

MR. LAUBUSCH: No.

MR. MEGONNELL: Now, in this test on monkeys, you speak about health impairment. Are you making any attempt to include psychological tests, if that is the correct word?

MR. LAUBUSCH: Yes. I can't detail this at this moment.

MR. MEGONNELL: It wouldn't help me if you did. I just wanted to know.

MR. LAUBUSCH: A psychologist was retained, and there were behavior performance tests which were included, which will be reported at the ACGIH meeting in May of this year.

MR. MEGONNELL: Is there any evidence of

methyl mercury in food other than fish?

MR. LAUBUSCH: I have never seen any. The only reference that I can recall having seen or heard with regard to mercury, total mercury content in foods, was that mentioned by Dr. Goldwater and that which was incorporated in the proceedings of the Stockholm conference of 1968.

MR. MEGONNELL: I will say that I am personally, and I guess professionally, disturbed by some of your information on page 11. I am not a physician. I have not read the Swedish report, but you appear to point up some serious misinterpretations of the data on EPA's part.

Now, perhaps you didn't imply that there was purposeful distortion.(laughter), but at the very least I think we owe you a re-evaluation of these data before final action on the proposed regulations.

That is a personal opinion. That has nothing to do with EPA or the Administrator's opinion, but I think we have to go back and look at them.

MR. LAUBUSCH: I, incidentally, was the only American observer at the press conference in Stockholm when this report was officially transmitted to the Swedish public, and I personally at that time spoke with five of the thirteen authors, and they were quite clear, and I might

also point out that there was not unanimity of the opinion among the thirteen as regards the conclusions of that report.

MR. MEGONNELL: That is not unusual.

Now, this work in the Ohio River Valley -- and, incidentally, I am not surprised that it was done there -- that is a good place to look for any kind of a pollutant. It looks like very interesting noteworthy data. I wonder why it has not been published and wonder if you can make it available to us or tell us where we can get it.

MR. LAUBUSCH: I believe, sir, it is already in the hands of EPA.

MR. MEGONNELL: Good. Is that true?

MR. SLAUGHTER: We have the data. We don't believe it (laughter). Our measurements show that they are off by a factor of ten or more, but, Bill, while you are hitting this, how about going back to page 12 and asking him to submit some more data on the elemental mercury vapor and elemental mercury, the relative toxicity? We would love to have some reports of real good comprehensive studies comparing methyl mercury and elemental mercury vapor.

MR. LAUBUSCH: I am not certain that such data are available in great depth, but I am certain that in the opinions of the world's leading mercury toxicologists,

that there is a very distinct gradation and difference between or among the toxicity considerations of all forms of mercury.

This is the reason why certain levels are established for organic, let's say, alkyl mercury versus inorganic or versus mercury vapor.

MR. SLAUGHTER: I agree there are various opinions that there are relative differences in their toxicity, but if we had that data and somebody had done a study and shown the exact ones, then we can deal with it a lot better.

MR. LAUBUSCH: I suspect that if you examine the 100 references that are part of that report, that you will find something illuminating.

MR. YOST: I doubt you will find a perfect report. I don't think it has ever been done yet.

MR. LAUBUSCH: Right.

MR. MEGONNELL: Well, on this matter to preserve fish, I talked a little bit about it this morning. What does it really tell us?

MR. LAUBUSCH: Well, I think it at least suggests that the concentrations and the build-up in fish is nothing that is particularly new.

I am not certain that all the data are valid. It has been pointed out in my testimony and earlier testimony, both here and in New York, that there are grave concerns over the analytical methods for a determination of methyl mercury.

MR. MEGONNELL: Were you familiar with this chemical engineering newsletter that I quoted from this morning?

MR. LAUBUSCH: I believe I had seen it.

MR. MEGONNELL: I am very skeptical of the work with fish and human organs that have been preserved, I have to assume from this letter, with at least some mercury contamination in the preservative.

MR. LAUBUSCH: Well, that may be. I don't know. I am sure that the scientists who have prepared these reports have probably given adequate consideration to this very pertinent factor.

There also is this that might be pointed out, that in certain fish the levels are indeed below the FDA level of 0.5. In others they are much higher, so if there was an influence of a mercury bearing preservative, I would suspect, not knowing the pysiology of fish, that the build-up would be comparable among the species.

MR. MEGONNELL: Yes. I mean, I have so many doubts about it.

MR. LAUBUSCH: Well, we all have doubts. I think the principal purpose of calling these things to mind is to raise these doubts and to explore the doubts and to demonstrate that we do need to learn a great deal more.

MR. MEGONNELL: In the studies on human organs, you say mercury has dropped sharply during the last six years, and suggest that the sharp drop may suggest a cleansing of the general environment, and so on. Isn't that somewhat inconsistent with the testimony that nature is by far the greatest contributor of mercury, unless there is some reason to believe it is psychic?

MR. LAUBUSCH: Well, perhaps this is somewhat taken out of context. I think the author himself suggested that his rationalization of the reason for it being the reduction of the amount of coal burning within the individual homes and not the general environment.

MR. MEGONNELL: I think that would be pertinent.

Now my final comment: You have a statement here, how little we know about mercury in the human body?

I think I would have left off "in the human body." We seem to know a lot that is adding up to almost nothing, and I must admit I am confused. I don't know if other people share that, but the record is going to be a tough one to analyze. I can conclude that already.

Any questions, Mr. Yost?

MR. YOST: No, thank you.

MR. MEGONNELL: Thank you very much, Mr. Laubusch.

MR. LAUBUSCH: Thank you.

MR. MEGONNELL: Has Mr. David Cahn arrived?

MR. CAHN: Yes.

MR. MEGONNELL: Fine. Mr. Cahn is representing the Ad Hoc Committee for Machine Applied Portland Cement Plaster. He was our first speaker this morning but had not arrived when he was called.

Mr. Cahn.

STATEMENT BY

MR. DAVID S. CAHN

CHAIRMAN

AD HOC COMMITTEE FOR MACHINE

APPLIED PORTLAND CEMENT PLASTER

MR. CAHN: My name is David Cahn. I hold several degrees, including a doctorate in Engineering and Minerals Processing. I am currently Director of Environmental Control for American Cement Corporation, but I am appearing today on behalf of the Ad Hoc Committee for Machine Applied Portland Cement Plaster as its Chairman.

May I apologize for not appearing this morning, and may I also thank you for rescheduling this testimony at this time.

The Ad Hoc Committee for Machine Applied Portland Cement Plaster wishes to comment upon the proposed National Emission Standard for Asbestos, specifically paragraph 61.22(e) (1) and 61.22(e) (2) as published on page 23242 of the Federal Register of December 7, 1971 (Vol. 36, No. 234). The Committee, whose members are listed in the Appendix, is composed of organizations concerned with the manufacture and use of machine applied portland cement

plaster which may contain very small amounts of asbestos fibers, as will be discussed below.

The members of the Ad Hoc Committee are California Lathing and Plastering Contractors Association of Los Angeles, California, Contracting Plasterers Association of Southern California of Los Angeles, California, W. C. Froelich, Inc., of Los Angeles, California, Kaiser Cement and Gypsum Corporation of Oakland, California, and Riverside Cement Company, Division of American Cement Corporation, of Los Angeles, California.

It is the purpose of this statement to demonstrate the following to the Environmental Protection Agency:

1. That the E.P.A. may have not intended to include the manufacture of machine applied portland cement plaster in those materials affected by the National Standards for Hazardous Air Pollutants.
2. That the spraying of portland cement plaster containing minor amounts of asbestos does not cause the emission of any hazardous amounts of asbestos into the atmosphere and does not constitute a health hazard to persons involved with either the immediate manufacture and application

of this material or the long term use of facilities constructed in part with this material.

3. That the prohibition of the use of asbestos in machine applied portland cement plaster will reduce productivity and increase the cost of building construction utilizing portland cement plaster.

Portland cement plaster, as referred to herein, typically contains less than 0.4% by weight of asbestos fibers. The asbestos is essential for machine application of the plaster, particularly pumping to elevations of several hundred feet, and also imparts other desirable properties to the finished plaster coat, such as resistance to cracking.

In the background information accompanying the "Environmental News" release of December 3, 1971 (entitled "Standards Proposed for Three Hazardous Pollutants"), the E.P.A. stated:

"The field fabrication of asbestos-bearing products - particularly insulating materials and the spray application of asbestos fireproofing - are two specific end uses that would be controlled by the proposed standards. Prohibition of spray applications would

have no major impact on the price of asbestos or upon asbestos producers since this use represents only about 0.5% of the annual domestic consumption. Increased costs for substitute materials range from zero to a maximum of 15%...."

The 1971 National Academy of Sciences report entitled "Asbestos, The Need for and Feasibility of Air Pollution Controls" stated on page 22:

"Almost all the asbestos fiber used in the United States for manufacturing products becomes tightly bound within the products and usually undergoes little actual abrasion or wear before being discarded. Asbestos cement products (accounting for most of the asbestos used in the United States), shingles, and floor tiles are in this category. . . . In some products - for example, as bestos cloth, paper, and sprayed fireproofing materials - asbestos fibers are not tightly bound or mixed with another material that holds them in place. Fiber release from these products occurs primarily during the application and removal. The spray fireproofing of buildings with materials containing asbestos is a case in point. This operation can be a serious source of

emission, in that it usually occurs in densely populated areas."

From these comments, it is apparent that the E.P.A. intended to prohibit the spraying of high asbestos content (20-60%) fireproofing and insulation materials, which do not firmly bind the fibers and comprise a very small portion of the United States asbestos consumption. By contrast, asbestos-cement products in which the fibers are firmly bonded by the portland cement matrix, form a major part of the United States asbestos market.

Portland cement plaster is quite dissimilar to asbestos fireproofing because of its fifty-fold lower asbestos content and its ability to hold the fibers in both the plastic and hardened state. The similar methods of machine application have resulted in what we believe to be an unintentioned inclusion of portland cement plaster in paragraphs 61.22(e)(1) and 61.22(e)(2) which would prohibit the "spraying of any product which contains asbestos on any portion of a building or structure" and "the spraying of any product which contains asbestos in an area directly open to the atmosphere." As will be shown further, the machine application itself does not constitute a health

hazard nor cause the emission of asbestos to the atmosphere.

Study No. S-1888 of July 26, 1968, conducted by the California Department of Public Health (which was entitled "Report of an Industrial Hygiene Investigation of the Pneumatic Application of Plaster") reported on page 14 two emission test results for spraying a fireproofing material containing 10% by weight of asbestos. Dust concentrations at the operator's breathing zone, as measured by standard Cascade Impactor slide methods, showed concentrations of 0.2 and 1.1 million particles per cubic foot of air (or mppcf); both well below the 2.0 mppcf time-weighted threshold limit values adopted in 1968 by the American Conference of Governmental Industrial Hygienists.

The report concluded on Page 9:

> "Under the conditions of this study, dust inhalation exposure hazard was found to be minimal; the possibility of related pneumonoconiosis development among plastering gun operators appears to be remote."

And further on:

> "Lastly, it must be noted that a review for 1966 and 1967 of the 187 'Doctor's First Reports of Work Injury' pertaining to occupational diseases among

plasterers in the construction industry broadly corroborates the findings, conclusions, and recommendations outlined . . . above."

Results of three additional tests on a fireproofing plaster containing 11% asbestos reported by the California Department of Health (Study No. S-2058, of November 22, 1968), showed atmospheric dust concentrations of 1.0, 0.75 and 0.70 mppcf; again less than half the recommended time-weighted TLV for asbestos dusts.

The 10-11% asbestos contained in the fireproofing plasters mentioned above is significantly less than the usual 20-60% found in fireproofing plasters. Machine applied portland cement plaster contains less than 0.4% asbestos and, by extrapolation of the results mentioned previously, the atmospheric concentrations of asbestos fibers resulting from the machine application of portland cement plaster should be about twenty-five times less than that reported for the 10% asbestos concentration fireproofing plaster.

Additionally, asbestos emissions from the machine application of portland cement plaster would be substantially below the limit in paragraph 1910.93a;

Standard for Exposure to Asbestos Dust, proposed by the Occupational Safety and Health Administration (Federal Register, Vol. 37, No. 7, January 12, 1972, p. 467).

No technically and economically feasible substitute for asbestos in machine applied portland cement plaster has been practically demonstrated. Conservative estimates of the in-place cost increase due to removal of the less than 0.4% asbestos in portland cement plaster average 50%, primarily because the plaster could no longer be machine applied. A very significant decrease in productivity would also result from the necessity to manually convey and apply the plaster.

We submit that the three points previously mentioned have been demonstrated. To allow the continued manufacture of machine applied portland cement plaster we suggest that paragraphs 61.22(e)(1) and 61.22(e)(2) of the proposed National Emission Standard for Asbestos be amended to permit the spraying of a product which contains less than 1% by weight of asbestos and which contains sufficient moisture to prevent any emissions during the spraying operation.

I thank you for the opportunity to appear,

and I would be happy to answer any questions.

MR. MEGONNELL: Thank you, Mr. Cahn.

You say there are no non-hazardous substitutes that you can use in this operation?

MR. CAHN: There have been some studies performed, mostly with fibrous types of materials. They have not really gone beyond the laboratory stage, and so they haven't been demonstrated in the field.

It is my recollection that the cost of the substitute material which most likely could be used, although it hasn't been demonstrated, is approximately three times that of asbestos.

MR. MEGONNELL: When you use this process are the walls normally up on a building?

MR. CAHN: Yes. This is spraying of the plaster onto a board upon which chicken-wire has been placed.

MR. MEGONNELL: My only concern then is in demolition. Do these asbestos fibers remain bound, or could they be released at a time like that?

MR. CAHN: I would say that the only time a significant amount of these fibers would be released is if the plaster is essentially pulverized. Otherwise, the

release would be very small, because the fibers are held by the portland cement quite firmly.

MR. MEGONNELL: You have no quantitative data at this time?

MR. CAHN: No. I'm sorry, we don't.

MR. MEGONNELL: The standard that has recently been proposed by the Department of Labor is five microns?

MR. CAHN: Yes.

MR. MEGONNELL: I think we ought to ask Mr. Slaughter, since you raised the question, was it really intended to include this type operation?

MR. SLAUGHTER: We haven't studied this one, Bill.

MR. MEGONNELL: You are going to reconsider?

MR. SLAUGHTER: He is right in saying that we were considering the 20 to 60%, and we are definitely looking into several applications of much lower percentage.

MR. CAHN: Well, we didn't wish to cast any aspersions upon the thoroughness of your study, but this is a product that is used almost entirely within the southwest United States, and in the east and midwest it is not used.

MR. MEGONNELL: If you meant to cast aspersions,

you did it very tactfully (laughter).

Mr. Yost?

MR. YOST: What is the quality of asbestos that allows it to be used in such small proportions and yet it makes the whole thing possible or not possible?

MR. CAHN: We are not certain. We think one of the qualities is the tubular shape of the asbestos fibers which allow a relatively large amount of water to enter and leave, which applies a spraying or a cushioning action to this material which allows it to be pumped. It is surprising to us, but we have seen demonstrations where, by removing this very small amount of material, it absolutely will not move through the machine, and by placing it in, it will.

MR. YOST: Another area where we don't know very much.

MR. MEGONNELL: We find those areas big.

Thank you very much, Mr. Cahn.

At this time, we will take a ten minute recess.

(After a short recess.)

MR. MEGONNELL: The hearing will please be reconvened.

I understand some people had difficulty hearing, so we moved the witness table to the side, which should improve the situation.

Our next witness is Mr. Benton B. Bailey of New Idria Mining & Chemical Company.

STATEMENT BY

MR. BENTON B. BAILEY

VICE PRESIDENT AND MANAGER OF OPERATIONS

NEW IDRIA MINING AND CHEMICAL COMPANY

SAN JOSE, CALIFORNIA

MR. BAILEY: Gentlemen:

My name is Benton B. Bailey, Vice President and Manager of Operations for New Idria Mining and Chemical Company. We are the largest producers of mercury in the United States and the second largest in the western hemisphere.

Before proceeding further, I would like to briefly explain to you a few facts concerning the mercury industry in this country. We are a small industry, operating small mines, the largest being only 300 TPD. In 1969, before the bottom dropped out of the mercury market,

$14,828,000 worth of mercury was produced. This represents only 36% of the United States consumption and only 10% of world production. There were 432,591 short tons of ore treated and its average grade was 5 lb. of mercury per ton. The average price in 1969 was $505.04 per 76 lb. flask or $6.65 per pound. The present price is $215 per flask or $2.83 per pound and it appears that it may be going lower. It already has. This does not include the producer's selling cost that will run from $15 to $25 per flask.

As a result of this decline in price all U.S. producers have, from necessity, drastically curtailed their operations or have closed down. My company has closed down two of its three mines and has cut the labor force of its third mine by one third.

Recently, at a meeting of the American Quicksilver Institute we attempted to take an inventory of present U.S. production, and though we have but limited knowledge of the small individual operator, it is doubtful if present production will reach 10,000 flasks in 1972 or 35% of the 1969 rate.

None of these producers are showing any substantial profit and most of us are extremely gratified

if we can just maintain a positive cash flow. Exploration and development have been severely curtailed or else entirely eliminated. It is impossible to do more than plan on a month to month basis, and when our reserves play out or prices eliminates them, we will be forced to cease operations. In short, the mercury production industry in this country is severely hurt and regulations at this time may be locking the barn door after the horse got out.

The futility of enforcement of any standards on emissions from plants of mercury products is readily apparent when the total United States mercury production is examined.

The following is a list of the only six active plants now in operation:

| Plant | Tonnage Treated | Production Flasks Per Month |
|---|---|---|
| New Idria Mining and Chemical Company | 3000 tons per mo. | 150 |
| Guadalupe Mining Co. | 450 | 150 |
| Knoxville Mining and Exploration Company | 1000 | 100 |
| El Paso Natural Gas | 6000 | 100 |
| Sonoma International | 1000 | 100 |
| Santa Clara Quicksilver | 900 | 50 |
| Total | 12350 tons per mo. | 650 flasks |

We have no knowledge of the small retort operations where one or two men process from 500 pounds to a ton of ore per day. There are undoubtedly a dozen or more mines of this type. Some are only intermittent operations; others are fairly steady. However, because of their process and size, they probably will not be in violation of the recommended standards.

Thus considering the above list and using the E.P.A. calculations on stack emissions (National Emission Standards For Mercury From Primary Processing, Secondary Recovery, and Chlor-Alkali Plants; page 46), we determine the following:

These calculations use a figure of 3000 CFM of air when in reality air consumption is less than 2000 CFM for a 100 TPD operation.

Therefore, reducing the 17# per day as shown by one third, we arrive at a figure of 11.4#.

Thus with 12350 tons per month (30 day) we have an equivalent of four 100 TPD operations or a mercury emission of 45.4 per day. Assuming an operating year of 350 days, the annual total would be 15,874 pounds or 8 tons. This is a relative small amount or less than 1% of

the total emissions as shown by your inventory on page 16 of the same publication. I will later refer to this emission inventory a second time.

Let us now examine the Federal Register where in early December the recommended standards for Asbestos, Beryllium and Mercury were published, and I quote: "The only industries known to be emitting mercury in quantities and in a fashion such that these facilities, assuming a negligible background level, may cause the ambient concentration level to exceed 1 ug/$m^3$ are the facilities producing mercury from ore and the mercury cell chlor-alkali plants."

This statement is based on very broad assumptions and, as near as I can determine, has very little facts to back it up. I have checked with all of the other five mercury plants, and to our knowledge no one has ever sampled the air for mercury either near the plants or in any of the surrounding area. I submit that they have only assumed that the so-called limit of 1 ug/$m^3$ has been exceeded. For such an essential matter, that is so very important to the entire question, to be based on assumption and not on fact is inexcusable. The plants are there, the air is there, and for very little effort and cost the true

dimensions of this problem can be determined.

The question of pollution and the fact surrounding it deserve careful study. Entire industries, many more other than just mercury, are going to spend vast sums of money in attempts to meet standards set forth by E.P.A. and other agencies. These efforts should at least start with scientific facts. No study has been made of the mercury industry and its effect on people intimate to it. Yet almost perfect circumstances lend themselves to this study. At the Idria Mercury Mine there are fifth generation people living there whose fathers and forefathers worked in the mine and plants their entire life. At the Almaden Mine in Spain, in operation for over 2,000 years, there is an unequaled opportunity to observe hundreds of people, generation after generation, who have spent their entire life earning a living as laborers in this mercury operation.

Let me quote from a recent study at the Saratoga General Hospital in Detroit titled, "Mercury Content of Human Tissues During the Twentieth Century": "The possibility of widespread deadly mercury contamination of our environment as a result of our industrialized way

of life looms extremely large through the current public obsession with ecology and pollution. Whether merely a fad or not, it certainly has had profound social reverberations in the form of mass anxiety leading to panic type action -- often with little or no scientific basis -- resulting in chaos, fear, and the economic pain of damaged or killed sectors of industry and commerce."

In reviewing the problem we were astounded that so little investigation had been reported relative to the mercury content of human tissues[1-5]. Knowledge of mercury levels in fishes is doubtlessly important as a potential source of human ills, but it is analysis of human tissues which will determine with finality whether environmental mercury pollution is of sufficient magnitude to pose a real human health threat, all other biological hosts notwithstanding. Such was the imperative aim of our preliminary study[6], and the results motivated the present in-depth attempt to objectivize, in some measure, this unduly emotionally charged matter.

Let me quote further from a paper by Leonard Goldwater, Professor of Community Health Sciences, Duke University: "While it is important to measure mercury levels

in various parts of various species, including man, the findings will tell only a small part of the story. Of equal or greater importance is the form in which the mercury is present, and above all, whether or not it has caused any harm. The latter of these aspects has been almost entirely neglected.

Now return once more to the Emission Inventory previously referred to in the E.P.A.'s National Emission Standards. Though it is extremely difficult to agree with many of these figures I will only dispute three. Primary producer I have previously covered, so let us examine coal and oil. From "Hazards of Mercury Special Report to the Secretary's Advisory Committee, Department of Health, Education, and Welfare on page 32, they state therein as follows: "It is reasonable to estimate that the average concentration is at least 1 part million in coal or with a coal production of 500,000,000 tons, coal would contribute 500 tons of mercury to the atmosphere.

"This value does not include that mercury contributed from the refinement and use of products from crude oils which may contain even higher concentration of mercury."

It is also of interest to note that at the Cymric Oil Field in California both the natural gas and crude oil are saturated with mercury. Native mercury separates from the crude oil at the local pumping station. Total mercury yield from all the fluids is unrecorded from this field, but may be in the order of hundreds of tons. This field is still in commercial production. These last figures are from the U.S.G.S. Professional Paper #713.

Thus it would be reasonable to assume that crude oil and gas will contribute amounts of mercury equivalent to coal.

How about the mercury battery? This use consumes approximately 400 tons per year. I believe that a safe assumption would be that at least 25% of these would finally end up in the incinerator for another emission of 100 tons.

Now the inventory total stands at 1,909 tons and the emissions from primary producer is equivalent to only 0.4 of one percent, hardly an amount that should cause anywhere near the concern that other sources should. This inventory does not take into effect the non-ferrous smelters, the aluminum industry, elementary phosphate plants, brick

kilns and the cement industry -- all large contributors.

Nor do all the aforementioned industrial releases to the atmosphere even begin to equal that for which Mother Nature is responsible. Dr. Evaldo L. Kothny, Research Chemist, State of California Department of Public Health, states as follows: "With these values and estimates of the total amount of mercury on the continents to a depth of 1,000 m. yields 40,000,000,000 tons. However, prime sources of environmental problems stem from exploitable deposits. Although many sources of information differ, a mean value of 30,000,000 tons seem to be a reasonable estimate. This represents only 0.1% of the total. If all this mercury flows eventually to the oceans, is it likely to affect the world's balance? The question can be answered by comparing the amount of dissolved mercury 50 to 200,000,000 tons in the oceans with the above figures. At the present rate of mining, 10,000 tons per year, and considering that half of the metal is put back into the environment, it would take 10,000 years to double the content of the oceans assuming the mercury content would stay in solution throughout that time."

He then states further concerning the mercury

in the atmosphere: "Because of the volatility of the mercury compounds, about 100 tons/day of mercury are released over the continents by transpiration from soil and from vegetation. This latter effect is most readily observed in the first minutes after sunrise. Each major power plant releases a ton per year or more by burning fossil fuels, which contain significant amounts of mercury. Other sources of gaseous Hg released in urban areas are contributed by space heating, steel plants, ceramic manufacture, smelting of ores and industry in general."

Thus, if the atmosphere were not being continually cleansed, the mercury content would shortly be dangerously high. This continuing cycle between land, air, and water is essentially in balance, and he explains thus: "The river discharge of Hg into the world oceans is 2,500 to 3,000 tons per year, without accounting for the precipitation which directly removes 20,000 to 24,000 tons per year over the oceans and 10,000 to 12,000 tons per year which precipitates back to the continents without runoff to the oceans. Thus, the total obtained by computing these sinks, 33,000 to 39,000 tons per year, equals approximately the calculated evaporation from the continents,

100 tons per day equivalent to 36,000 tons per year. Mining accounts for 10,000 tons per year and its impact on the global cycle is primarily of local importance, because about half is directly put back into smaller environments. Therefore, the release of 6 tons per year into internal waterways by 50 chemical companies, excluding chlor-alkali plants, does more harm than a multiple of that amount released into the atmosphere by burning processes."

Regardless of whether his figures on the atmosphere are accurate or not, his overall hypothesis must be correct. There is no question that very significant amounts of mercury are released into the atmosphere from all land masses. Thus, since this process has been going on for millions of years, the atmospheric load would have assumed proportion completely out of balance with nature if it were not continually cleansed.

It is interesting and very important to note that a recent study by pathologists have shown a significant decrease of mercury in human tissues over the last several decades and a logical conclusion that the environment as concerns mercury is better today than at the turn of the century. Let me quote:

"Even with these limitations, a few coarse but undeniably real trends are definitely discernible. The most important regarding possibly dangerous environmental pollution demonstrates unequivocally an extraordinary decline in mercury content in almost all organs studied, sharper in the early decades of this century, leveling off recently. Assuming that such tissue content is an expression of the relative degree of general environmental content or 'pollution,' the only tenable deduction is that our environmental sources are also diminishing. In other words, whereas originally we had hoped at best to demonstrate no significant worsening of environmental 'pollution' over the six decades studied, the facts indicate a gratifying cleansing of the environment, or the absolute reverse of recent 'scare' pronouncements which led to such inexcusable panic actions on the part of authorities who had no factual knowledge for truly sound judgment. We are forced to this conclusion despite any reported levels (or changes thereof) in any other kind of life or material. For only the actual human tissue content of mercury can be used as a measure of potential pollution, because only it can be directly related to potential or real human illness due

to mercury. Yet 'normal' tissue levels of mercury in humans, or indeed for any other organism, have not even begun to be delineated!"

Now on page 12 of the EPA emission report, it states that where there is suitable technology to reduce mercury emission significantly, it is prudent to require that these air pollution control measures be adopted by all operators or owners. My question is what process and where and how were they proven a success even in the pilot plant stage. Our company has been experimenting for several years with different methods of reducing our stack loss. We have tried water scrubbing with limited success. We have tried activated charcoal and though this latter method reduced our stack loss by approximately 30%, the amount of carbon needed and difficulty of recovery of the mercury from the carbon made it impractical.

As of the present, considerable more work and testing must be done before any control technique can be pronounced as successful and practical.

Now, taking a good look at the entire picture of mercury in our environment, it would seem as if attempting to control the primary producer is similar to

scratching a mosquito bite while laying in a bed of poison ivy. This entire question of controls should be considered with considerable caution. It is obvious that the primary producer is only a minor, very minor, polluter in the overall picture. Present circumstances have put them in a position where any added costs cannot be supported, and there is certainly no money for research to develop control process. I do not believe that there is any question that the enforcement of the recommended standards will put all producers of consequence out of business, and this country will then become, for the first time in its history, completely dependent on foreign production for its industrial demand of mercury.

(The following documents were submitted as exhibits to the record by Mr. Bailey: "Mercury Content of Human Tissues During the Twentieth Century," by Jack Kevorkian, M.D., et al; "Mercury in the Environment," Geological Survey Professional Paper 713; "National Emission Standards for Mercury from Primary Processing, Secondary Recovery, and Chlor-Alkali Plants"; "The Three Phase

Equilibrium of Mercury in Nature," by Evaldo L. Kothny, Ph.D., and attached tables; "Hazards of Mercury," dated November 1970, by the Study Group on Mercury Hazards. Said exhibits will be contained in the files of the Environmental Protection Agency.)

MR. MEGONNELL: Thank you, Mr. Bailey.

I noticed running throughout all these statements there are a lot of national emission figures, and whenever we propose controlling anybody, the question is "Why me? I am only one percent of the problem," or 3, or something like that. "I object to using national emission figures. How about the local situation?"

You yourself say on Page 7, to paraphrase it, that you take mercury out of the environment and put it directly back into smaller environments, so the local problem is really the thing we are trying to get at.

MR. BAILEY: Practically all the mines, and let me speak about the mines we have in particular, our Idria mine, there is one rancher located about three miles to the southeast and there is one other rancher about four miles to the southwest. Those were the only ones within

a radius of eight miles.

MR. MEGONNELL: Well, you might have a very good point in the particular location, because I am not familiar with it.

MR. BAILEY: Let me take our Almaden mine. Our Almaden mine is situated on a ridge 1500 feet above the valley floor where the nearest human habitation is.

MR. MEGONNELL: It falls down on them (laughter). The figures are calculated. I think you make a good point. We should be doing some of these studies. I think we all wish we had the data and that this wasn't foisted upon us so fast.

MR. BAILEY: It's being foisted on us pretty fast too.

MR. MEGONNELL: This study you talk about, the one from Saratoga General Hospital, it mentions the reason they undertook this study is because of the almost void in any available data. Have they issued any reports from their study yet?

MR. BAILEY: I have the report and they are readying it for publication. They gave me permission to use it.

MR. MEGONNELL: Is it in a form that we could submit into the record, or is it premature?

MR. BAILEY: It's a little premature.

MR. MEGONNELL: Then we can be looking for it any day?

MR. BAILEY: You can be looking for the report to come out any day.

MR. MEGONNELL: When natural gas and crude oil are saturated with mercury, what concentration is that?

MR. BAILEY: I am not a chemical engineer, so I couldn't tell you.

MR. MEGONNELL: Well, if it settles out, do they recover it?

MR. BAILEY: According to the U.S.G.S., yes, there is an unrecorded production from this field, which they estimate will run into hundreds of tons.

MR. MEGONNELL: It should be commercially recoverable then?

MR. BAILEY: According to the U.S.G.S., it is commercially recoverable.

MR. MEGONNELL: On Page 8 you say,"and let me quote." I would like to ask you, from what? You failed

to give a reference there.

MR. BAILEY: Would you finish that up a little? My copy here is just a slight bit different from yours.

MR. MEGONNELL: It is the paragraph beginning "It is interesting and very important to note that a recent study by pathologists," et cetera.

MR. BAILEY: Right. This is the same quote from the Saratoga General Hospital.

MR. MEGONNELL: Fine.

MR. BAILEY: The Pathology Department.

MR. MEGONNELL: I frankly do not see how logically they can conclude that the environment as concerns mercury is better today than at the turn of the century. If we first of all assume that the natural emissions from degassing are increasing, certainly the consumption of coal and oil is increasing, how could it be going down?

MR. BAILEY: I think there is the same principle, that you will find that about the turn of the century, when coal was used as an element to heat the different homes, our smog conditions from burning the coal in the wintertime were considerably worse than it is today, and with the advent of natural gas, electric heat and what

not, the burning of coal in the home --

MR. MEGONNELL: Inside a home environment. I see.

MR. BAILEY: Inside the home.

MR. MEGONNELL: But the whole outside environment --

MR. BAILEY: All that smoke went to the outside and all the fumes, you must assume, and all the gasses went to the outside.

MR. MEGONNELL: I also happen to know that consumption of coal has increased, although for home heating it has gone down.

MR. BAILEY: That is right.

MR. MEGONNELL: So I don't see the logic in their conclusion.

MR. BAILEY: Well, you want to remember, before it was every individual home. Now it is concerned around the borders of your local community, whereas before it was spread all over.

MR. MEGONNELL: I can see where the environment inside a house has improved.

MR. BAILEY: I won't argue that point.

MR. MEGONNELL: Okay. Now, another thing: On this decrease in the amount of mercury in the human body, I can see some reasons why this is logical. Dr. Goldwater, for example, told us about the days when they thought syphilis could be cured by mercury.

MR. BAILEY: That's right.

MR. MEGONNELL: And they were giving massive doses of mercury for that and using diuretics. And, also, I am sure that the industrial hygiene measures that have come on through the years have reduced the amount of mercury, so there is a pretty logical reason why it should be going down in people that have been studied.

MR. BAILEY: Well, these pathologists had complete medical records of all the subjects on their treatment for different diseases and what not, and they picked these 59 cadavers, or what you will, from people who had not supposedly had any contact with mercury.

MR. MEGONNELL: Those studies to me are rather inconclusive because of the things I have discussed.

MR. BAILEY: They are inconclusive. They are just additional evidence.

MR. MEGONNELL: I would like to ask Mr.

Slaughter, could you answer Mr. Bailey's question about these processes that apparently have been successfully applied, on Page 9 of his statement?

MR. SLAUGHTER: Let me get the right page.

I don't have the control technique document with me, but this really didn't say anything about it has been successfully applied there.

MR. MEGONNELL: He said they weren't. Apparently, you said they were.

MR. SLAUGHTER: We don't directly say they are, but there are several different things that can be tried. It is going to depend on the type of ore this year, for one thing, the beneficiation and retarding rather than the furnace itself, if your ore is such that you can use the beneficiation process properly.

MR. BAILEY: And if you can't, then water is available.

MR. SLAUGHTER: And another thing that hasn't been tried is every time you reduce the temperature of the stack gas 10 degrees, you cut in half the saturation value of mercury in the stack gas, so rather than emit it at 90 degrees as is presently done, if you emit it at 50

degrees Fahrenheit you cut the emissions of mercury by a very large factor.

MR. BAILEY: How would you suggest doing it?

MR. SLAUGHTER: Usually refrigeration, air conditioning -- several different methods could be tried, all of which should be technologically feasible to do with present technology. There are internal scrubbing systems that are used in other industries for reducing mercury emissions.

MR. BAILEY: I think the possibility of scrubbing may be right. However, these things are being tried, and whether they are practical is another matter. Now, so far as I know, they have never been true of anyone in the mercury producing industry. As you say, some ores are amenable and some ores are not. In some places you have water; in some places you have not.

MR. SLAUGHTER: Each mine is going to have to look at possibly a different way to go. Just the recording process itself, you can't use that for your large volume mines, but that greatly reduces the emissions of mercury.

MR. BAILEY: Oh, yes, but I'm afraid my

clients would not be very substantial.

MR. SLAUGHTER: But the cooling is one tremendous method.

MR. BAILEY: The biggest objection when I talked to the refrigeration people was the acid condition of our fumes. They didn't know quite what to go to to combat the acid condition.

MR. SLAUGHTER: It takes special materials.

MR. BAILEY: We used stainless steel in our condensers, the very best we can get, to combat that condition, but we still find that we have a corrosive factor that will destroy those condensers in three to five years.

MR. MEGONNELL: I think the crux of the situation is the final decision by the Administrator as to whether or not these are hazardous pollutants that must be controlled. If he makes that determination, any other considerations take a back seat. I mean I can realize it is a matter of great concern to the industry, but Congress frankly said in its report that it either be controlled or closed, if it comes to that. We don't want to see anything closed, believe me.

MR. BAILEY: There is only one answer. You

guessed it.

MR. MEGONNELL: Thank you, Mr. Bailey.

Now, for a little change of pace, I think we are going to talk about beryllium. Our first speaker is Mr. Martin B. Powers of Brush Wellman Corporation.

STATEMENT BY

MR. MARTIN B. POWERS

BRUSH WELLMAN, INC.

MR. POWERS: My name is Martin B. Powers and I am here to present the views of Brush Wellman, formerly The Brush Beryllium Company, on the beryllium portion of the proposed National Emission Standards for Hazardous Air Pollutants. In order to place these comments in proper perspective I believe it would be useful to touch briefly on the history of our company in the area of environmental controls and its role in the development of an ambient air standard, as originally established by the Atomic Energy Commission.

The recommendations of the Atomic Energy Commission for permissible levels of air-borne beryllium were developed cooperatively among the AEC, the State of

Ohio, and The Brush Beryllium Company, in and around Brush's facilities in Lorain, Ohio during the late 1940's. These included the in-plant occupational levels, and the out-plant community level of 0.01 micrograms of beryllium per cubic meter of air as a monthly average now proposed by EPA as an alternative standard for Beryllium.

When the AEC chose to produce beryllium in Government-owned facilities, Brush was given the job of designing, constructing and operating the plant at Luckey, Ohio until those operations were discontinued in 1958. When we built our privately owned and operated beryllium refinery in Elmore, Ohio, in 1953, we voluntarily designed into it the air filtration equipment necessary to assure adherence to the AEC-recommended level of 0.01 micrograms. This was done at our own expense and with no legal or contractual obligations to do so. Today we have privately owned and operated plants in the States of Ohio, Utah, California and Pennsylvania and all are equipped with air filtration devices and monitored regularly to assure occupational and community levels of air-borne beryllium within ghe AEC recommended levels. Thus, we at Brush have pioneered in the establishment of clean air in the vicinity

of beryllium plants for over twenty years.

We firmly believe that industry, the public, and government officials should all cooperate toward the establishment of scientifically sound, meaningful criteria that can and should be the basis for control of air pollution. It is in that context, and with that intent, that this statement is submitted. We will come back to this point later in our statement.

Included in the publication of the proposed standards in the Federal Register of December 7, 1971, was a request for information on whether beryllium "is in fact hazardous within the meaning of Section 112 of the Clean Air Act" and also as to the "extent to which promulgation of these emission standards will be of benefit to the public health." In our opinion, these are two separate and distinct questions with separate and distinct answers required for each.

First, with respect to the question of whether beryllium meets the definition of a hazardous material as set forth in Section 112, we submit that it does not. That definition is in two parts. The first of which reads: "(1) The term 'hazardous air pollutant' means an

air pollutant to which no ambient air quality standard is applicable. . ." Beryllium was the first material for which an ambient air quality standard was ever developed. The nature and extent of the epidemiological, climatological and engineering analysis work done to develop this standard and the fact that it has stood the test of over twenty years of safe application, clearly make it a most effective ambient air standard. This ambient air quality standard was first tentatively approved by the AEC on a year by year basis until 1956 when it was permanently approved. It has since been adopted by various Federal, State and local governmental agencies, professional societies and by at least all the major producers and users. We understand EPA interprets the language in Section 112 with respect to the applicability of an ambient air quality standard as meaning exclusively an ambient air standard promulgated by EPA. We find nothing in the Act or in the legislative history of the Act to support that most restrictive interpretation.

The second part of the definition of a hazardous air pollutant in Section 112, reads as follows: "And which in the judgment of the Administrator may cause, or contribute to, an increase in mortality or an increase in

serious irreversible or incapacitating reversible illness."

Non-occupational beryllium disease has occurred in only two communities in the United States. The sources of the exposures were two refineries operating under completely uncontrolled conditions. One of these plants is no longer in existence and the other is no longer a refinery. Workers left these plants with dust covered clothing. The effluent in the immediate vicinity of one plant was so bad, neighbors had to sweep the dust off their front steps each morning.

The EPA Background Information statement cites Beryllium Registry data to the effect that out of 60 non-occupational cases, 18 were exposed only to effluents in the community air. The balance were contact type exposures. However, the Registry data is not current. As new information comes to light, more and more of the non-occupational cases appear to be contact exposures rather than community air pollution cases. In 1959 DeNardi reported twenty cases in Lorain, Ohio, of which ten were contact cases. Dr. DeNardi now informs us that he has identified seventeen of the twenty cases as contact exposures and the remaining three lived in very close proximity to the plant.

It would no longer be possible, given the industrial hygiene controls in existence for the past twenty years, to efer have a repeat of these pre-1950 conditions.

Beryllium, at the concentration levels which have existed in the community air for the past twenty years, will not produce the medical effects set forth in the definition of a hazardous pollutant. At the January 18th hearing in New York, Dr. Eisenbud was asked if beryllium was a hazardous pollutant and he replied that it was potentially hazardous but that potential hazard had been under control for twenty years. Dr. Barth of EPA is quoted in Environmental Science & Technology, Volume 5, No. 7, July 1971 as saying, "We placed beryllium on the EPA list of hazardous pollutants because of its potential for creating serious disease. We do not imply by this that there is a serious problem at the present time in the U.S., but as more and more uses for beryllium are discovered, there will be more potential sources for beryllium release into the atmosphere. Beryllium is so inherently dangerous, particularly when breathed into the lungs, that it needs to be watched more carefully than other materials."

Thus, we appear to be talking about a material which is not hazardous today but which is potentially

hazardous. We submit that there is no reasonable basis for assuming this potential will become a reality. To the contrary, experience of the past twenty years, wherein the use of beryllium has increased tremendously without any appreciable increased concentration of beryllium in the community air levels, indicates that this will not happen.

If we are to assume that any postulation, no matter how remote, is sufficient reason to designate a material as "hazardous" under the Act, then almost any substance known can be so construed, and the designation process becomes an arbitrary and highly selective one. With respect to our opening comment, we do not feel such an approach is either scientifically sound or productive of meaningful criteria.

We submit that there is no current (and by that I mean post 1950) evidence on which the Administrator might base a judgment that beryllium at these modern levels could "cause, or contribute to, an increase in mortality, or an increase in serious irreversible, or incapacitating reversible illness." In summary, we believe that beryllium doesn't meet either of the two requirements of the definition of a hazardous air pollutant as set forth in the Act.

However, having said that, we hasten to point out that this is not to say that we do not support the promulgation of some standard of control for beryllium as being of benefit to public health. Quite the opposite. Our own voluntary compliance for years with the AEC ambient air quality standard was a practical endorsement of that standard. We feel that promulgation by EPA of the AEC ambient air standard, together with the AEC administrative implementation procedures, would be of benefit to the public health. We do not feel that the additional requirements proposed in this standard, such as the 10-gram emission standard, add anything of benefit to the public health.

Our position is that an emission standard for beryllium is both unnecessary and undesirable and that the long established ambient air quality standard of 0.01 micrograms per cubic meter as a monthly average concentration, applicable to all emitters, should be promulgated as a benefit to public health.

Ambient air standards represent the most practical and effective means of community air control of beryllium. They provide for measuring the concentration at the point of maximum ground contamination off the plant

property at the breathing zone level of the exposed population. By contrast, emission levels must be extrapolated to ground concentration levels by complicated diffusion equations. These equations must include provision for a whole host of variables including climatological conditions, stack or exit height, nature and conditions of emission, terrain contours, existence of buildings or other obstructions, etc. The ability to determine these accurately for a given single situation is difficult. When one attempts to establish a national emission standard applicable to all emitters everywhere, the correlation between emission standard and ambient air concentration in the vast majority of instances will be quite remote. Thus, in the proposed standards under consideration, we submit that there will be little correlation between the ten gram emission standard and the 0.01 monthly average in the vast majority of cases. The EPA background information on hazardous pollutatnts states that the ten grams per day was a conservative computation. In the majority of cases, therefore, the ten gram limit would result in a maximum average ground concentration considerably below 0.01 micrograms, which is itself an admittedly conservative standard with a demonstrated safety margin. We believe

this adds an unnecessary burden on many small fabricators and producers of beryllium with no justifying health benefit to the public.

Normally, where there is more than one emitter, establishment of an emission standard may be necessary to identify and assess the amount that each individual emitter contributes toward the total ambient air concentration in the community. However, in the case of beryllium, no such reason exists. No community in the country has more than one significant emitter of beryllium. Identity of the source of emission is not a problem. Nor is there any likelihood of this situation changing in the near future.

The introduction to the proposed regulations contains the following statement: "However, it is anticipated that most sources will elect to comply with the given emission limitation. Buildings or other obstructions in the vicinity of the source, or location in highly urbanized areas, may make it impossible to design and locate a sampling network that provides sufficient assurance that areas of maximum concentration are measured." We agree that a sampling network that will identify the maximum ground concentration point with some degree of precision may not be feasible in

many cases; however, we submit that if the beryllium concentrations, as measured, are in the order of say a ten thousandth (.0001 micrograms per cubic meter) of a microgram per cubic meter or lower, then the inability to measure precisely is of no practical concern.

We also believe that the waiver provision in Section 61.35 should be broadened to include a waiver for those small foundries or machine shops that elect to use the ambient air standard and can then demonstrate that the beryllium concentration in the ambient air in the vicinity of their plants is so low that continued sampling is unnecessary.

With the Hearing Examiner's permission we propose to submit for the record, a separate written supplement to this statement which will provide detailed comments on the administration and implementation of the proposed ten gram per day emission standard and the 0.01 ambient air standard. These detailed comments and supporting documentation have been omitted from this presentation in the interests of conserving time at this hearing. We would, however, like to summarize our comments in those areas.

We find inherent in the samplying, analysis and reporting requirements a sense of "imminent hazard"

totally at odds with the experience of the past twenty years. Examples of this are:

The five day limit on emission analysis - 61.34(d)

The twenty-four hour limit on ambient analyses - 61.37(b)

The reporting of each month in excess of 0.01 - 61.37(e)

and

The reporting of each single measurement in excess of 0.03 - 61.37(e)

The administrative procedures adopted by the AEC were far more practical and have successfully withstood the test of time. Those procedures were not lax nor easy to comply with. We submit that in the absence of any illness in the community as a result of exposures to beryllium over the past twenty years, the AEC procedures are demonstrably safe and economically attainable although the AEC regulations are not without some economic hardship themselves.

The only other major comment we have is that if the ten gram emission is retained, then the sampling and analysis of the ten gram emission standard is both unduly restrictive and unnecessarily complicated and expensive. There are at least three analytical techniques for beryllium that are generally recognized as acceptable and we see no

reason to specify one as mandatory. Similarly, there are a number of recognized sampling techniques depending on the emission conditions and we see no reason to specify the complicated and expensive equipment and procedures set forth in Method No. 3 as mandatory. There are a number of small processors of beryllium that undoubtedly would be safely within the ten gram standard but who could never afford the expense of proving this by the elaborate procedures of Method No. 3. We do not believe it is the intent of EPA to drive such processors out of the industry but we are convinced that will be the practical effect if Method 3 is not deleted and replaced by some more reasonable techniques. We will suggest specific alternatives to Method 3 in our detailed supplemental comments.

This completes our statement. Thank you.

MR. MEGONNELL: Thank you, Mr. Powers.

Now I would like to speak first to this question of where you maintain that there is an air quality criteria for beryllium and has been for some 22 years, and you say there is nothing in the legislative history of the Act to support our interpretation of it.

I will refer to Report No. 91-1196 of the

Committee on Public Works of the U. S. Senate, where they are discussing air quality criteria: "Pollution agents which would be subject to the provisions of this section will be those which are emitted from widely distributed air pollution sources and generally present in the ambient air in all areas of the Nation."

Now we turn back to the section on hazardous emissions. They specifically list asbestos, cadmium, mercury and beryllium as being identified as pollution agents which could be subject to emission prohibition standards to be established under the hazardous emission provision.

So I think that clearly was the intent of Congress.

MR. POWERS: Well, again, though, the definition itself says "that for which no ambient air standard is applicable," I believe is the language, and we maintain that there has been one applicable for twenty years, so again going back to the Act, throughout the Act they use the terminology "National primary or secondary air quality standards" to designate those standards that are being developed under the Act by EPA or under the preceding legislation. They refer to that language in this hazardous section and

they just say "for which no ambient air standard is applicable."

I am not an attorney, but I would presume that when you depart from the language, there is a purpose for departing from the language.

MR. MEGONNELL: Yes, I think that is in that legislative history. They explain why they departed from it. But let's consider this: Now, assume I go along with you saying that there is a criterion for beryllium. You are familiar, I am sure, with the actions that set up the Clean Air Act. If there is a criterion, we must then adopt a national air quality standard. Every state in this country must hold hearings, propose its individual standards, and submit them to us for review and approval.

I think you had better hope that your argument does not impress the Administrator, or it is going to be complete chaos for your industry. You are going to have different standards in every state and maybe some cities in this country.

MR. POWERS: I would presume that the 0.01 has a sufficient history, that just as EPA adopted it, just as the Academy of Sciences adopted it and recommended it, and

just as the states that do have a mandatory state standard today, those that do all have the 0.01. I would presume that anyone who attempted to establish a standard state-wide, city-wide or nationally, would use the 0.01.

In the first place, I think the fact that it has twenty years of safe effective application would, I think, make it difficult for anyone to adopt anything less restrictive, and I think the same factor would make it economically and scientifically inadvisable to try to make it any more stringent.

MR. MEGONNELL: Well, I think if we adopt a standard, that is going to be it, and we obviously agree with it since we are proposing it.

MR. POWERS: And we also, you notice, in our statement endorse it. We have no quarrel with 0.01. We are all in agreement there.

MR. MEGONNELL: But if we adopt that as an ambient air quality standard, the states then must go back and propose source emission standards to achieve that number. They may not say ten grams per day; they may say four, and there is nothing we can do about it because the Act gives the state the right to be more stringent than we are. Some

states have even adopted more stringent sulfur oxide and particulate standards than we did nationally. They are in effect in some states. They may not be scientifically or economically justifiable, but they are on the books.

MR. POWERS: Well, it is unfortunate that there isn't another category, because obviously beryllium doesn't belong really under Section 112, or 109 either, but I realize you are limited to two choices.

MR. MEGONNELL: I never expected this argument (laughter). I never thought anybody would say that beryllium was not a hazardous pollutant.

MR. POWERS: Well, it isn't at the levels in which it has existed for the past twenty years, and you recognize that when you say you recognize this as a hazardous material, the impression is that there is a more serious problem than others, whereas EPA by its own admission, for whoever reads it and reads the record, has agreed that there hasn't been a case in twenty years. And so everybody in this room, I would presume, is knowledgeable to this effect, but when it gets declared as a hazardous material, everybody in the public doesn't know this. Customers don't know this. Users don't know this.

MR. MEGONNELL: Well, I think we are just formalizing what you are doing.

MR. POWERS: You are indeed, except that you are declaring it, though, as a hazardous material when, as a matter of fact, it hasn't been a hazardous material for twenty years.

MR. MEGONNELL: It has been a hazardous material for twenty years. It has been a hazardous material forever. It has always been, but you are controlling it.

MR. POWERS: Let me say this: You've got a list of toxic materials, and I haven't counted it but it's about this thick (indicating). There must be hundreds, if not thousands of materials in there. All of those then at some point should be declared hazardous, and all we are submitting is we would like to be the last one rather than the first one (laughter).

MR. MEGONNELL: Again, he said, "Why me?" Well, I think you made a pretty good case for the fact that your industry has very carefully controlled its emissions, and I am willing to concede that.

Again, we are just making sure that the others to it too. You may get some unknowledgeable and maybe

unscrupulous competitors some day, and we want to see that they do the same thing as Brush Wellman does.

MR. POWERS: Good (laughter).

MR. MEGONNELL: And don't run away.

MR. POWERS: Okay.

MR. MEGONNELL: I think the quote by Dr. Barth is quite good. It sounds very reasonable to me.

MR. POWERS: Yes.

MR. MEGONNELL: Again, I don't think that the experience over the past twenty years indicates that this will not happen, as you say. It demonstrates that it has not happened, and we are going to see that it doesn't happen from now on. Okay?

MR. POWERS: No quarrel.

MR. MEGONNELL: Again, the Administrator does have what might appear to be arbitrary and highly selective powers, but he is a pretty smart man and uses it with great discretion. He didn't do it with table salt and iron oxide and things like that.

MR. POWERS: I am not sure I believe the implications of that (laughter).

MR. MEGONNELL: One thing that I am wondering

about: I am concerned, like you, about the small processers, the machine shops. It's surprising to me that we never heard from any, unless you are speaking for them?

MR. POWERS: No, we have no agency to speak for them, but I think the problem is that most of these people are not knowledgeable in this area. They are not familiar, as we are. We have to keep abreast of these things, with the implications of these regulations.

I think you will hear from them when you come around and try to enforce them, Mr. Megonnell.

MR. MEGONNELL: I was just afraid of that. I would rather hear from them now, believe me.

How can you determine this point of maximum ground concentration?

MR. POWERS: There are theoretical methods of determining where it should be based upon the equations. The meteorologists will tell you that they can do it theoretically. It never stays at that one point very long, obviously, so it is a kind of a fictitious thing, I grant that.

MR. MEGONNELL: Well, that is the problem I have. I mean the meteorologists can tell me whether it is supposed to be there, but I won't find it there.

MR. POWERS: No, it won't be there. It will be someplace else.

MR. MEGONNELL: You acknowledge the difficulties of making meteorologist's predictions in one part of the paragraph, and then you say the point of maximum concentration where you are putting great reliance on these meteorological predictions, and that is rather inconsistent.

MR. POWERS: Well, in our case, of course, we have a much more elaborate network of sampling than you would normally expect to have with a small machine shop who has essentially no emissions.

MR. MEGONNELL: You must know by now where the maximum concentrations are.

MR. POWERS: We think we do.

MR. MEGONNELL: What happens to beryllium in the atmosphere?

MR. POWERS: I don't really know. I don't know.

MR. MEGONNELL: Then there's no use asking the next question.

MR. POWERS: All right, don't (laughter).

MR. MEGONNELL: Are you suggesting an

alternative to the ten grams per day where you have a concentration standard here?

MR. POWERS: I am saying 0.01 should be made applicable to everybody and you ought to drop the ten gram per day standard. I think that when you get to measuring the small foundries and the machine shops, most machine shops have equipment that will filter or bed-house it, or something like this. Their emissions will be relatively low because of that. The foundries do not have this type of equipment, but they are dealing in much smaller quantities, the dilute alloy, maybe 1 percent beryllium. These peoples' emissions will also, I am sure, be found to be very, very low.

There have been samples taken in the vicinity of foundries and ambient air samples taken in the vicinity of foundries and machine shops, and this has been the situation. So I would think that when EPA has a little data about these people, they will then have enough confidence to give them the waiver we have proposed in this, and that is that if you read minute quantities in the vicinity of these people, that it would not be necessary for them to continuously monitor thereafter.

MR. MEGONNELL: Okay. Well, I am looking,

just as you are, for some way to reduce the workload if it is unnecessary, and I am sympathetic to that extent.

We will certainly be happy to receive this additional material. As you know, the record is open until March 4th, and March 6th for the Federal Register notice.

MR. POWERS: Right.

MR. MEGONNELL: The matter of one test method, I feel, is really important from a legal enforcement standpoint. If you can demonstrate equivalence to the Administrator's satisfaction, I think that is going to be quite acceptable, but, as far as my division is concerned, we will have to use the method, whichever is finally adopted, in the Federal Register.

MR. POWERS: Well, I would strongly urge reconsideration of Method 3 as far as the ten gram, but, of course, as we point out, we would recommend that you dispense with the ten grams anyway and that will dispense with that problem.

MR. MEGONNELL: All right, thank you very much.

MR. POWERS: Thank you.

MR. MEGONNELL: Next we have Mr. Edmund M.

Velten of Kawecki Berylco Industries, Inc.

STATEMENT BY

MR. EDMUND M. VELTEN

VICE PRESIDENT

KAWECKI BERYLCO INDUSTRIES, INC.

MR. VELTEN: Mr. Chairman, my name is Edmund M. Velten, Vice President of Kawecki Berylco Industries, Inc., one of the two primary beryllium producers in the United States. My association with KBI and its predecessor, The Beryllium Corporation (Berylco), dates from 1957 when I left the Federal Government's employ after an extended term of service with the AEC and its wartime antecedent, the Manhattan Engineer District.

As a Federal employee, I had responsibilities in beryllijm production and fabrication which required close attention to the control of airborne beryllium in the work-place and in the environs of beryllium plants. (You have already received from Merril Eisenbud at last month's New York City session of these hearings a first-hand account of some of the action taken by the AEC in the late 1940's for the protection of communities against adverse health effects from beryllium exposure.)

My first assignment at Berylco was to bring into production a large new beryllium plant which the company was constructing at Hazleton, Pennsylvania. This assignment included the institution of appropriate controls of beryllium exposure in the occupational environment and in the ambient air. Today I have executive responsibility for KBI's environmental quality programs, which include those at the Hazleton beryllium plant, at the Reading, Pennsylvania beryllium alloy plant, and at a recently-acquired beryllium fabrication operation in Yonkers, New York.

I consider it appropriate, Mr. Chairman, to acknowledge advance acquaintance with the statement prepared for these hearings by Martin B. Powers on behalf of Brush Wellman Inc. (formerly The Brush Beryllium Company), the other primary beryllium producer. Mr. Powers' employers and mine, though competitors, have worked cooperatively on matters relating to beryllium's health effects for many years. By voicing agreement with the Brush Wellman statement at this time, I plan to avoid a point-by-point reiteration of their position.

In the notice of these public hearings which Administrator Ruckelshaus inserted in the Federal

Register for December 16, 1971, participants were requested "to identify specifically the portion of their presentations, if any, directed to the issue of whether the pollutant in question (in this case beryllium) is or is not a hazardous pollutant, as defined in section 112(a)(1) of the Act." At this point in our presentation, we take the position that beryllium is not a hazardous pollutant as defined in the Act and will proceed to give our reasons.

There is no doubt that in the occupational environment excessive exposures to beryllium have caused workers in beryllium plants to contract berylliosis, a chronic lung disease. There have also been verified non-occupational cases; many of these cases were female relatives (mothers, wives, sisters, daughters) who handled the soiled work clothing of sons, husbands, brothers, or fathers employed in the beryllium industry. Eisenbud (Journal of Industrial Hygiene and Toxicology, Vol. 31, No. 5, pp. 292,3) has found clothes-handling exposures to range above one milligram of beryllium per cubic meter of air. He estimates that "the home laundering of work garments can account for the inhalation of approximately 17 micrograms of beryllium per day." The occupational threshold limit value for beryllium which the

American Conference of Governmental Industrial Hygienists and others have adopted is two micrograms of beryllium per cubic meter of air on the 8-hour basis.

Such practices as issuing company-owned work clothing to employees in beryllium refineries and fabrication plants (thereby preventing employees from taking work garments home) and the laundering of work clothing in plant or industrial laundries date back to about 1950. These controls have effectively eliminated a major source of non-occupational berylliosis. In 1965, Hardy (New England Journal of Medicine, Vol. 273, No. 22, Page 1194) had this to say on the subject: "An active case-finding program by Lieben in Pennsylvania has uncovered very few more patients and none exposed since neighborhood air and work-clothes exposure have been controlled."

There is now a growing belief that most, if not all, non-occupational cases have experienced exposure of the clothing-contact type or some other form of exposure of much greater severity than that produced merely by living in the neighborhood of a beryllium plant and breathing community air containing only trace levels of beryllium. Thus Stokinger in the American Industrial Hygiene Association Journal for May-June 1969 makes this observation at page 197:

"Minimal environmental exposures in the vicinity of beryllium production plants are supposed to have resulted in the so-called 'neighborhood cases.' Subsequent investigation has shown in many cases, however, that exposure to beryllium was not confined to the neighborhood, thus leaving in doubt the validity of the neighborhood cases."

Lieben and Williams have commented to the same effect in the Journal of Occupational Medicine, Vol. 11, No. 9, September 1969 at page 484: "The term 'community cases' is substituted in this paper for the term 'neighborhood cases' used in earlier papers, and includes individuals with no beryllium exposure that could be attributed to working in the beryllium industry, or whose family had no member who was a relative of a beryllium-exposed employee. In the earlier papers it was implied that these cases might be due to pollution of the ambient air."

The paper from which the preceding quotation was taken is a 1968 follow-up study of occupational and non-occupational berylliosis at the Berylco plant in Reading, Pennsylvania. The authors further state: "It was found that several individuals previously reported as 'neighborhood cases' had additional exposure which could have either caused or contributed to the beryllium etiology of the disease."

They also credit Berylco personnel with supplying information which assisted in the establishment of the additional exposure in some of these cases.

Berylco staff and consultants had begun to question the validity of the air-pollution theory of beryllium intoxication in 1965. In a request made at that time to the branch of the U. S. Public Health Service which is now the National Institute for Occupational Safey and Health (NIOSH), the company asked that PHS make a broad-gauge study of the occupational health aspects of beryllium exposure and, in addition, a more restricted study which would be confined to a re-evaluation of the exposures in the Reading "neighborhood" cases. The latter investigation was undertaken by the Federal agency in cooperation with the Pennsylvania Department of Health and was completed in 1970. The more comprehensive occupational study by them is still in progress.

One source of doubt that air pollution was a carrier of beryllium disease lay in the paradoxical results of air pollution and epidemiological surveys made in the area of the Reading plant by Pennsylvania Department of Health specialists in 1948. Sussman, Lieben and others (American Industrial Hygiene Association Journal, Vol. 20, No. 6, December 1959, page 504) reported atmospheric beryllium

concentrations which followed the expected pattern: the highest numbers were close to and downwind of the plant, and the values reported decreased with distance from the source. The epidemiological findings of Lieben and Metzner (American Industrial Hygiene Association Journal, Vol. 20, No. 6, December 1959, page 494) were, however, in no way parallel. Twenty-one "neighborhood" cases were reported. Of these, only one resided within one mile of the plant. Eight others lived more than one, but less than four, miles away. The greatest concentration of cases, however, ten in all, were clustered in an area more than four but less than five miles from the source; in this band the levels of airborne beryllium were extremely low. If topographical or meteorological influences were the explanation, we would expect not low, but elevated, concentrations in the four-to-five-mile interval. We suspect that the contradiction is best explained on the basis of a misplaced emphasis upon residence aggravated by incomplete exposure history. In short, the data are not consistent with the existence of an air-pollution problem.

The statements we have quoted from the appraisal of Lieben and Williams of the Reading situation in 1968, while cautious and conservative, certainly point in the same direction. They too, we might add, made specific

note of the contradiction between community-air exposure and case distribution in Reading as follows: "No satisfactory explanation has been offered, either previously or in this paper, why, when pollution was heaviest in the immediate neighborhood of the plant there should be more individuals with berylliosis living as far as five miles away."

The joint investigation of the Reading "neighborhood case" exposures by the Public Health Service and the Commonwealth of Pennsylvania was, as we have indicated, completed in 1970. The findings have not, however, been published or reduced to report form. But from sources close to the project we understand that the information has served to up-date the Commonwealth's case records and does establish additional exposure in still more cases which had been presumed to be due exclusively to exposure to beryllium in the ambient air.

Thus students of beryllium intoxication seem to be finding in Reading the same type of new evidence that has been uncovered in Lorain, Ohio as reported in Mr. Powers' testimony. It is all the more persuasive when one considers that only in these two communities, Reading and Lorain, have air pollution cases of berylliosis been reported. The experience of the fluorescent-lamp industry was suffi-

ciently dramatic to cause one to look for air pollution cases to be reported near the lamp plants if air pollution were in fact causative. In these establishments, occupational cases occurred at an alarming rate until the use of beryllium oxide in the lamps was discontinued. Yet in none of the New England, North Jersey, and Pennsylvania communities where the plants operated do we hear of neighborhood cases.

Others have pointed out, and we agree, that there is an ambient air quality standard applicable to beryllium, a circumstance which alone suffices to remove beryllium from the definition of a hazardous air pollutant as set forth in the Act. More to the substance of the question is the convincing evidence that beryllium, after thirty years of industrial use, has shown on tendency, when emitted to the ambient air, to contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness. As we have seen, the claim has been made in two localities only that beryllium in the ambient atmosphere has had adverse effects upon community health, and in both places the supporting evidence is rapidly eroding away.

In proposing the initial emission standards for hazardous pollutants in the Federal Register for December 7, 1971, the Administrator asked that all interested

persons present information on the extent to which promulgation of the standards will be of benefit to the public health. We believe that the cause of public health will best be served by the broadest possible application of the standard set forth in section 61.32(b) of the proposed standards and the elimination, wherever possible, of the one set forth in 61.32(a). This will provide control of proven effectiveness and avoid the practical, technical, and economic shortcomings of the ten-gram emission standard which others have pointed out in considerable detail.

What we are suggesting is that beryllium emissions be controlled by requiring ground-level concentrations to conform to the ambient air quality standard of 0.01 microgram of beryllium per cubic meter of air as a monthly average. This is an over-restrictive standard, having been designed with a safety factor built in, but compliance is entirely feasible in terms of available technology and necessary investment. Regulation of beryllium emissions by stack monitoring should, we suggest, await the development of a method of comparable feasibility.

Mr. Chairman, that ends my statement. Thank you.

MR. MEGONNELL: Thank you, Mr. Velten.

Since I was so unsuccessful in trying to convince ot even sway Mr. Powers from his position about a hazardous pollutant, I'm not even going to try it with you (laughter).

Incidentally, I noticed that the safety factor that is applied in the industrial hygiene standards is about 200 in the case of beryllium.

MR. VELTEN: Yes, or following your arithmetic around for the 8-hour day and so forth, it will be back to about 100.

MR. MEGONNELL: So it is not unusual to apply a factor like that when moving from industrial to community air?

MR. VELTEN: Well, as Merril testified how the 0.01 came about from the taxicab business --

MR. MEGONNELL: That's not in the record (laughter). I know a few people are rather shy about taking credit. You forgot to read a sentence where you had supplied data for a lot of these studies, so I give you credit.

MR. VELTEN: Thank you.

MR. MEGONNELL: But, unfortunately, it seems that you had better stop studying this thing. The more we learn, the less we seem to know. As you say, the facts are

being eroded away.

Were any special studies made in these communities with reference to fluorescent lamps to detect any increased berylliosis?

MR. VELTEN: I can't answer that first-hand. I understand work was undertaken on behalf of the AEC Register to find these types of cases, and to my knowledge none was turned up.

MR. MEGONNELL: Could you tell me, Mr. Velten, what happens to beryllium once it is released to the atmosphere?

MR. VELTEN: No.

MR. MEGONNELL: Now, in a city such as New York, are there or are there likely to be machine shops on higher level floors in some of those tall buildings? Do you know of any?

MR. VELTEN: I don't know of any in New York City. You are thinking of Manhattan proper?

MR. MEGONNELL: Yes.

MR. VELTEN: Of Manhattan and other boroughs, but not under this situation.

MR. MEGONNELL: That is the only difficulty I see with perhaps ground level monitoring. I lived in New York for about eight years, and you know people don't live

at ground level in Manhattan and a lot of these other places. They live hundreds of feet in the air, and some of these emission points, assuming there are machine shops in some of the higher levels, could be at the same elevation, higher or lower than where people live, and the emissions from a plant could in fact be going right over to the air intake of that apartment.

MR. VELTEN: I would expect, Mr. Megonnell, that in the case of a machine shop -- we are talking of conventional machine shop operations?

MR. MEGONNELL: Yes.

MR. VELTEN: And in this case, with the output I am assuming, because the alloy is rather limited, that there is a chance of a proverbial snowball that you would get any emission that would be anywhere approaching 0.01 or, for that matter, your ten gram emission.

MR. MEGONNELL: I see.

MR. VELTEN: This has been our experience in machine shop operations.

MR. MEGONNELL: I think it is appropriate to be brought up, and we should reconsider it. I certainly don't want to waste time and money in enforcing something that is no problem, so I think we have to get more data

on it.

MR. VELTEN: We are concerned about these small shops that handle the alloys. The people that handle the pure metal are generally fairly sophisticated people, to start with, and already are knowledgeable.

MR. MEGONNELL: Thank you very much, Mr. Velten.

MR. VELTEN: Thank you.

MR. MEGONNELL: Next we have Mr. William C. Kossack of Lockheed Missiles & Space Company.

STATEMENT BY

MR. WILLIAM C. KOSSACK

COORDINATOR

SAFETY AND INDUSTRIAL HYGIENE

LOCKHEED MISSILES & SPACE COMPANY, INC.

SUNNYVALE, CALIFORNIA

MR. KOSSACK: I am William C. Kossack. I am Coordinator of Safety and Industrial Hygiene for the Lockheed Missiles & Space Company. I have a master's degree in Industrial Engineering from Harvard University and I have been certified in Engineering Aspects of Industrial Hygiene by the American Board of Industrial Hygiene.

Lockheed Missiles & Space Company has been one of the largest users of beryllium metal in the United States for over 14 years. We are currently handling over 6,000 pounds of beryllium metal per month. We perform all types of fabrication and processing including dry machining, chemical etching, electrochemical machining, hot forming and spark sintering. Our raw material is pure beryllium metal ingots and powder and our products are structural parts for missiles and spacecraft.

Since our first beryllium part, we have operated within the 1949 AEC guidelines for beryllium-in-air concentrations. We have provided the most suitable exhaust systems within our plants to protect our employees and have provided the necessary air cleaning systems on our exhaust discharges to protect our neighbors. We have continuously sampled the air inside our plants and in the neighborhood to assure ourselves that we were within the guidelines.

We feel our 14 years of experience qualify us to comment on the proposed emission standards for beryllium.

With regard to the hazardous nature of beryllium in the ambient air, we go along with the studies done of the non-occupational exposures during the 1940's.

The studies indicated that cases of chronic beryllium disease probably resulted from exposures to beryllium in the air in the neighborhood of beryllium extraction plants and, therefore, the release of beryllium into the ambient air should be limited to protect the public health. The AEC recommended neighborhood air guideline of .01 ug/$m^3$ averaged over 30 days was established to do just that. The fact that no additional neighborhood air cases have occurred since the establishment of the guideline indicates that this is a safe number and that industry should be allowed to continue to use it.

The establishment of a single total quantity per source emission limit in lieu of the neighborhood air concentration guideline is an extrapolation which cannot be scientifically justified. The neighborhood air guideline which has been proven safe by over 20 years of experience is the 30 day average concentration measured in the breathing zone of the public. My knowledge of atmospheric diffusion prediction tells me that even when all controllable parameters, including source strength, are known and held constant the variation of predicted to actual ground level concentrations will be in orders of magnitude just due to the whims of nature. When the variations in source strength due to production schedules and machine operations are applied on top

of this variation, the possibility of using a source strength limit becomes even more impractical. When the variations due to topography, stack height and distance are disregarded, a single source strength limit becomes ridiculous.

The point I want to make is that the 10 grams per day emission limit would only produce a .01 ug/$m^3$ 30 day average neighborhood air concentration in one case in a million. To honor this 10 gram number with the requirement of using the expensive and time consuming stack sampling method outlined in the Proposed Rule Making is not in the best interest of public health or the economical usage of scarce equipment and qualified manpower.

We have done stack sampling of our beryllium operations over the years, but have grown to realize that the overall results are only semi-quantitative at best. I feel that I am thoroughly familiar with our beryllium operations, still I would not hazard to select any two-hour period on any exhaust system and say that it would represent the maximum emission rate from that system. To set up artificial production runs to simulate maximum conditions would be costly in terms of very expensive raw material and production time, and to do it with every system every 90 days would be prohibitive. Our approach to stack sampling has been to take

centerline samples over week long periods so as to average out the variations in production operations. When doing this, one cannot use multiple traverse points and, therefore, the added accuracy gained by multiple traverse points is sacrificed but a much more representative sample is obtained. Since we have never considered stack samples to be a substitute for neighborhood air samples, a high degree of accuracy was not needed. Most of our stack sample filters are not even analyzed, but are simply checked visually for indication of air cleaner failure.

We believe that Section 61.32(b) is the proper statement of the beryllium standard to protect the public. Further mandatory qualifications can lead to many unreasonable restrictions.

For instance, the requirement in Section 61.37(b) that filters should be changed at least every 4 days and shall be analyzed within 24 hours after collection cannot be justified by the basic neighborhood air standard and can add greatly to the complexity and cost of operating a monitoring system. Merrill Eisenbud stated at the New York hearing that we are concerned here with long term exposure. There is no evidence in 20 years experience with the 30 day average limit to justify a further limit to apply to a 4-day period.

If a 4-day sampling period and separate limit is being called out so that air cleaning equipment breakdowns can be detected early, then the stack sampling option should be changed to call for continuous or much more frequent sampling than every 90 days. If the only reason for the 4-day filter change limit is to avoid fluctuation in sampling flow rate due to dust loading on filters, then I suggest that the rule be written with enough flexibility to allow the owner or operator to use the most practical combination of sampling rate, filter paper and analytic method to give reliable results. For beryllium neighborhood air samples at Lockheed Missiles & Space Company we use constant flow air sampling pumps at one cubic meter per hour air flow, collecting on 18 mil HV-70 filter paper and analyzing by the Morin Fluorometric Method. This combination permits us to run four weeks or more between filter changes without any decay in flow rate, and gives 99+ percent efficiency on submicron sized particles.

The 672$m^3$ of air sampled during this period means that over 6 micrograms will be detected on the filter if the .01 ug/$m^3$ standard is exceeded. This is many times the minimum amount detectable by the analytic method. Further, this arrangement requires only one filter change, one analysis, and one simple calculation per month per sampling

point. Additional advantages to this system are that a 1 $m^3$/hr air sample pump can be very quiet, can operate over long periods of time without attention and can be equipped with a chart recorder to document the sampling period. These are important considerations in selecting neighborhood air sampling points.

We have many years of experience using the above system for neighborhood air sampling and feel that we can say with confidence that no neighbor has ever been esposed to beryllium-in-air concentrations that exceed the AEC recommended guidelines.

This completes my statement. Thank you.

MR. MEGONNELL: Thank you, Mr. Kossack.

I too have an M.S. in Industrial Hygiene from Harvard, and I was sent there to study air pollution, and I always made kind of a joke about it. About all they taught me to do was pollute the air. Just keep a lot of workers going and shoot it out.

MR. KOSSACK: I was there a little later (laughter).

MR. MEGONNELL: Do you have any idea, any opinion or data as to what happens to beryllium once it goes into the atmosphere?

rather ridiculous, but, unfortunately, that is what the law says, and the best thing we can do would be to put the option in, that anybody can use it, 0.01 ambient air quality standard. I don't know what else we can do about it.

MR. KOSSACK: Well, I think the 10 micrograms was a likely expression that any estimation, you can understand, is an oversimplification, and I think the public might be able to understand ten grams, and so that may be what you will have to give them, but it is certainly not explainable.

MR. MEGONNELL: I wonder if it is feasible to expect, for example, a small machine shop using beryllium alloy to set up an ambient air sampling network. I suspect that would be very expensive for them.

MR. KOSSACK: Well, we in recent months have added to our network. We had four or five before, and we have added a few more, anticipating what we are going to have to deal with you people on, but on the basis just for our own information, we felt that the fact that we are getting concentrations of 2 orders of magnitude below the limit, we don't have to worry about moving all over completely covering the whole neighborhood. If we were very close to the limit, then I would say I had better be more thorough with it.

MR. MEGONNELL: You have also got the benefit

of 14 years of data that a person suddenly subjected to the new regulation won't have.

MR. KOSSACK: I don't know whether with the small machine shop it could not be the local regulatory agency's responsibility as far as the sampling. We have had a lot of cooperation from the county health department, not so much with us because we are staffed up pretty well ourselves, but with our subcontractors, and I think that the public health service agencies should do that.

MR. MEGONNELL: Well, I think, again, you have thrown out some thoughts that are useful for consideration, and I am sure that the people who analyze this record are certainly going to study it.

Thank you very much.

MR. KOSSACK: Thank you.

MR. MEGONNELL: Next we have Dr. Donald J. Sibbett of Geomet, Inc.

STATEMENT BY

DR. DONALD J. SIBBETT

VICE PRESIDENT

GEOMET, INCORPORATED

DR. SIBBETT: I would like to thank you for

the opportunity to make these remarks today.

I am Donald J. Sibbett. I have a Ph.D. in physical chemistry.

Geomet, Incorporated, headquartered in Rockville Maryland with its Instrument Division in Pomona, California is concerned with the management, protection and use of natural resources. Since 1968, the corporation has been examining the occurrence, significance and problems associated with mercury in the environment.

In my following remarks I do not propose to address myself to the environmental health aspects of mercury pollution nor to the standards which are desirable or acceptable. Some carefully selected set of standards is clearly required. Instead, I wish to discuss some aspects of the techniques used to measure mercury in the air.

In order to measure all forms of mercury over the full range of concentrations encountered in the air, Geomet has developed and tested a series of devices designed to measure elemental, combined and particulate forms of the element. Typical situations which have been examined include:

(1) ambient conditions in industrial and non-industrial locations,

(2) stack emissions,

(3) special interior monitoring applications such as in industrial, miscellaneous laboratory and residential situations and

(4) prospecting for ores.

Prior to development of appropriate methods, the Geomet staff studied a variety of techniques. For industrial plant and field uses we have judged that the proposed standard wet chemical methods have several disadvantages. These include:

(1) requirements for trained laboratory and field personnel,

(2) the long times required for acquisition of single samples,

(3) the relatively tedious procedures with more than ample opportunity for error,

(4) poor reproducibility and

(5) scanty data relative to the costs involved.

Guided by these evaluations, we have developed an integrated sampler-analyzer based upon the following principles:

(1) conversion of all vapors and particulates

to elemental mercury by incineration in a catalytic reactor (if required),

(2) extraction of elemental mercury from air by amalgamation on a silver or gold wire grid,

(3) desorption of the collected mercury as a concentrated pulse by direct passage of electrical current through the wire collector and

(4) quantitation of the vapor pulse by a UV photometer.

Signals are processed electronically and readout is presented digitally or by printer.

In order to compare the performance of the Geomet monitor with the method proposed by the Environmental Protection Agency for the measurement of mercury vapor from stationary sources, we have initiated an in-house program. In this activity, samples of elemental mercury vapor contained in a stirred 400 liter chamber are simultaneously collected by the iodine monochloride bubbler technique and also analyzed by our monitor. The bubbler samples are analyzed by the atomic absorption spectrophotometer techniques specified in the Federal Register*.

Initial results comparing the two methods are as follows:

Comparative Data, Geomet and Proposed Methods for Measurement of Gaseous-Emissions from Stationary Sources

| Sampling Interval Minutes | ICI Bubbler-AAS Method (ug/M$^3$) | GEOMET Monitor Average Value (ug/M$^3$) | Number of GEOMET Data Points |
|---|---|---|---|
| 123 | 11.1** | 1.29 | 27 |
| 153 | 12.7 | 11.7 | 35 |
| 156 | 15.4 | 12.6 | 33 |
| 160 | 11.1 | 11.3 | 41 |
| 97 | 31.9 | 28.7 | 21 |
| 194 | 84.0 | 83.6 | 24 |

The methods appear to give reasonably equivalent results over the range between 10 and 80 ug/M$^3$. However, at lower levels the Iodine Monochloride-AAS method appeared to produce high results. These anomalous results at low concentrations have been observed previously, also. The significance of this problem is uncertain at this time.

From 21 to 48 analyses were carried out by the Geomet instrument in the period required to collect each of the samples for testing by the bubbler-atomic absorption spectrophotmeter method. During these tests, the automated

*Reference: Federal Register, Vol. 36, No. 234, December 7, 1971 page 23,250.

**Probably in error; concentration of source was considerably lower than accountable by this result.

monitor operated without attention; results were obtained directly from a strip chart recorder.

It is apparent that the bubbler method requires some reasonable estimation of the absolute amount of the mercury sample to be obtained in any operation. At excessively high levels, more than a single atomic absorption analysis may be required at different dilutions to obtain a precise result. At low levels, the method appears in some doubt. Obviously, more data are required to confirm the low level inaccuracy of the bubbler technique. In addition, data with compounds of mercury and particulates are needed.

We have also used this instrument in conjuction with a catalytic incinerator to measure mercury vapor and mercury compounds in the ambient air of living spaces after application of a commercial latex paint. The tested latex preparation contained 0.0047% elemental mercury as a fungicide. On completion of the paint application, mercury levels in the range of 4.0 ug/$M^3$ were observed in a closed room. After one week, levels had declined to 1.9 ug/$M^3$. At this time, the rate of decline was extremely slow, less than 0.05 ug/$M^3$/day. The indoor concentration was approximately a thousand times greater than the ambient out-of-doors values. The concentration of vapor in the room air was a

function of the external air temperature and atmospheric pressure. Assuming an appropriate value for the ventilation time constant, the data have been analyzed. At the end of 220 hours, approximately 0.43% of the available mercury had been exhausted from the wall coating. The ventilation analysis indicates that mercury-containing vapors will remain in the air for extremely long periods. A simple linear extrapolation of the data indicates the presence of sufficient mercury to emit at a rate of 100 ug/day for more than seven years.

MR. MEGONNELL: That is a pretty significant finding in indoor environment.

DR. SIBBETT: I think so.

MR. MEGONNELL: I personally find rather attractive the number of samples you can run within the same time period that is specified in the EPA proposed tests. Is EPA familiar with your instrument?

DR. SIBBETT: Yes, EPA has three versions of our instrument which are being tested.

MR. MEGONNELL: I have no questions. I appreciate very much your statement. Thank you.

Our final witness for today is Dr. Selina Bendix of the Oceanic Society.

STATEMENT BY

DR. SELINA BENDIX

PRESIDENT, EAST BAY CHAPTER

OCEANIC SOCIETY

DR. BENDIX: I am Dr. Selina Bendix. I have a bachelor's degree in chemistry in UCLA, and a Ph.D. in physical chemical biology from the University of California at Berkeley. I am here to represent the Northern California Stanford and Monterey Committees on Environmental Information. We are all affiliates of the National Organization of Scientists Institute for Public Information.

I also represent the Oceanic Society, an international organization devoted to the protection of aquatic ecology.

In the interest of the lateness of the hour, I am not going to read my entire prepared statement, but I will add a few comments in answer to some of the points that have been raised this afternoon.

In view of the known and unknown hazards of toxic substances released to the environment, we are glad to see the Environmental Protection Agency act to set National Emission Standards for asbestos, berryllium, and

mercury. We can only regret that the standards do not go further to cover lead, cadmium, nickel, and arsenic, and expect that such standards do not go further to cover lead, cadmium, nickel, and arsenic, and expect that such standards will be forthcoming in the near future.

It is to be hoped that these standards will be administered with judicious restraint in the granting of waivers of compliance. Excessive use of the waiver provisions could undermine the effectiveness of these proposed rules. The provisions in section 61.11(a) for a two year limit on waivers is an excellent means of preventing abuse of the waiver provisions. We would like to see a provision added to section 61.13 which would specifically provide for both public disclosure of the granting of waivers and the notification of the employees of companies granted such waivers.

The proven toxicity of small amounts of asbestos, beryllium, and mercury makes it particularly desirable that provision be added for down-wind monitoring from sources in areas with a prevailing wind direction and for night and weekend monitoring.

With regard to beryllium I think there are two key facts which indicate a need for concern. One is

that lung damage from beryllium may have a latency period of up to thirty years. That is an awfully long time to wait and find out whether you have made a mistake in your judgment.

The other is that the consumption of beryllium in the United States has increased by 500% in the last 20 years. This means that the opportunities for exposure to beryllium have been increasing at a very great rate, and that we do not, in fact, have the data to judge how good the measures that have been taken in the last ten years or fifteen years are. We are going to have to wait until the workers who have been exposed or have not been exposed in the last ten years have another ten, fifteen, twenty, twenty-five, thirty years of their life span before they develop the symptoms, and then it is too late to do anything.

It is therefore necessary to control the release of beryllium to the environment, as proposed in Subpart C.

As most of the beryllium consumed in the United States is used to harden copper alloys which are used in communications, computer, electronic and electrical equipment, it would seem desirable to provide for some sort of surveillance to assure that none of these uses are

releasing beryllium to the air.

Now I would like to make some comments at this point about a conversation I had last night with Dr. J. Bartlett, who was for a number of years involved in the Santa Clara County Health Department. He was involved in the setting of the Sanitary Health Department standards for beryllium safety with regard to the Lockheed plant, whose representative we have just heard from, and other beryllium sources in Santa Clara County.

I believe that he is in possession of some unpublished data. He regrets very much that he did not hear about this hearing until two or three days ago and was therefore unable to be here.

I think that if there is any way in which you can contact him, it is possible that you might be able to get some very useful information from him.

The points which have particularly struck me which he has raised were these: (1) that there is a very large variation apparently in individual sensitivity to berylliosis, and that there is some considerable indication that this is in part related to the hereditary predisposition towards allergic responses, that people with asthma or with other types of allergic problems are much

more likely to have a response to beryllium in the environment than others.

The other point that he brought up is that the safety standards for beryllium have been derived with respect to the so-called standard man and that there is considerable evidence that the standard woman is more sensitive than the standard man, that the standard child is more sensitive than the standard woman, and that in particular when a woman gets pregnant, for some reason she becomes particularly susceptible to adrenal failure in the presence of beryllium stress.

Now, I have not seen documentation in the literature for this. I can only report what I heard last night from Dr. Bartlett, but it certainly seems to me that this is worth checking out.

MR. MEGONNELL: You can inform Dr. Bartlett, if you would, that the record will be open until March 3rd.

DR. BENDIX: Yes, I have noticed that you mentioned that, and I shall inform him and encourage him to communicate with you.

With regard to asbestos, asbestos can give rise not only to unusual types of lung cancer, but also to substantial increases in the incidence of circulatory and respiratory disease, and has even been implicated in the

unusually high incidence of stomach cancer in Japan. Dr. Irving J. Selikoff told the Senate Subcommittee on Labor that "8% of all deaths among (U.S.) insulation workers are due to a completely preventable cause, pulmonary asbestosis." He estimates that there are 50,000-100,000 asbestos insulation workers employed in the U.S. The Public Health Service estimates that 3.5 million American workers are exposed to asbestos on their jobs.

Asbestos fibers have now been found to be ubiquitous in the lungs of city dwellers. This circumstance has led Thomson to predict that asbestos-induced mesothelioma may become as frequent as cigarette-associated lung cancer is at the present time.

Uses of asbestos which account for a relatively small proportion of total consumption account for a disproprortionate amount of the asbestos in urban air. The restriction of the spraying of asbestos in Section 61.22(e) should alleviate one of these sources. A number of cities, such as New York, Boston, Chicago, and Philadelphia, have already banned the spraying of asbestos fireproofing materials; safer methods of greater effectiveness are available.

Another possible source of urban asbestos is

brake linings ("It's in brake linings on 83,000,000 U.S. cars"). The California Air Resources Board has initiated a study to evaluate whether asbestos from brake linings constitutes a hazard.

In view of the recent optimism over the potential use of asbestos for surfacing highways and airport runways, the coverage of Section 61.22(f) should be expanded to cover asbestos-rich surfacing materials as well as tailings. The constant wear on any road surface containing asbestos will result in a contribution to the atmospheric asbestos content.

Current studies at the School of Public Health at the University of California at Berkeley indicate that it is possible to develop an electron micrographic method for assay of asbestos in the air which is superior to the light microscope standard of the Occupational Safety and Health Standards. Whatever method is ultimately adopted for quantitation of atmospheric asbestos (and it is desirable to develop an emission standard dependent upon such a method) should ideally permit the classification of asbestos fibers by size, as size may well affect the biological response, and should permit evaluation of the presence of other potentially harmful fibers in the air,

such as fiber glass.

A source of asbestos exposure which is not covered by the present rules is talc which contains asbestos fibers and is used in dispensing pesticides. This is a possible hazard to the pesticide appliers and to the agricultural workers who subsequently work in treated areas. Talc is also widely used in cosmetics and baby powders.

We hope that in addition to the control of atmospheric asbestos, the hazards of ingestion of asbestos fibers originating in the filtration of beverages, oils, and pharmaceuticals will be regulated.

Mercury. For many years it has been a standard practice to dump mercury in the nearest deep body of water. Now, we find that biochemically adept microorganisms have been busily turning this mercury into methyl mercury, a highly effective neurotoxin. Whatever the source of mercury, whether it be from the combustion of coal or the leaching of treated seed, the mercury ultimately ends in the ocean or lakes. Here it travels through the ecosystem, increasing in concentration at each stage. It has been estimated that the annual addition of mercury to the ocean is three million kilograms.

Mercury in the air ultimately lands in the

ocean, because when it rains and there is mercury in the air, the mercury is washed out of the air and ultimately will run off and eventually land either in the nearest lake or in the ocean, so that any mercury which is emitted to the air is going to be ultimately involved in what happens to the mercury pollution of water bodies.

There was some good correlation between the mercury content of fish in fresh water and of marine fish which have the localized habitat and man-made sources of mercury. The cases in which high concentrations of mercury have been found in fish far away from man-made sources of mercury pollution are all cases of large fish, such as tuna, which have been well documented and have tremendous ranges -- some of them can cross the entire Pacific Ocean -- so that it is not surprising to find contaminated tuna.

There have been similar problems with respect to radioactivity after the first Pacific tests, where radioactive fish have turned up 1,000 and 1,500 miles away from the test, and this is a problem that was not at that time anticipated and is certainly something we should be prepared for at this point.

With regard to the comments that were made about the tremendous amount of mercury that is in the ocean,

this is certainly true, and if you calculate the amount of mercury that man is releasing to the environment and compare this to the total volume of the ocean, it is indeed negligible.

There is only one small problem. This is a very nice theoretical calculation, but, in fact, most of this mercury is landed in coastal and estuarine areas which have a much higher proportional contribution to the bio-productivity of the sea and are the marine food sources for man.

Therefore, the disproportionate concentration of mercury in these coastal areas is of considerable importance, even though, in fact, if there were full mixing of the mercury the situation would not be a critical one.

It is now believed that the human brain, lung and kidneys already exceed the 0.5 parts per million Food and Drug Administration tolerance level for fish. Mercury crosses the human placental barrier and collectively accumulates in the fetus. The fetal nervous system is more sensitive to damage than the adult system. Symptoms of irreversible mercury damage resemble those of cerebral palsy. The report of the California Interagency Committee on Environmental Mercury states that it is not yet possible

"to evaluate the possibility that a portion of cerebral palsy cases and other types of congenital brain damage are the result of methyl mercury poisoning."

Until such a determination can be made, we cannot safely assert that there have been no cases of mercury toxicity due to the ingestion of food containing methyl mercury.

Standards which protect man from direct toxicity may not be adequate to protect more sensitive organisms which may ultimately influence man's food supply or the composition of the air he breathes. The current water safety limit is considered to be 5 parts per billion, but one part per billion of several mercurial fungicides is enough to produce a significant reduction in the photosynthesis of phytoplankton. The tiny plants which make up the phytoplankton form an important part of the base of the aquatic ecological pyramid, and are also involved in maintaining, along with all other photosynthetic organisms, the contribution of oxygen to the air and maintaining the balance between carbon dioxide and oxygen in the atmosphere.

At this point, I would also like to make a comment. Someplace this afternoon there was a comment made, I believe, that there was no information available on the up-

take of mercury by plants. There is indeed such information available indicating that a very wide variety of plants do indeed pick up mercury. They pick up very small quantities, but it is definitely detectable.

There has never been a case in which it has been necessary to confiscate any food supply because of this level, but it is possible to directly correlate the extent of methyl mercury treated seed to the mercury content of quite a number of common food crops, and if you would like to have the reference I will supply that to you.

MR. MEGONNELL: We would like to have it. Thank you.

DR. BENDIX: The threshold for harmful effects of mercuric chloride on the eggs of the sea urchin Paracentrotus lividus is between 2 and 3 parts per billion.

The electrolytic chlor-alkali industry is the largest single user of mercury because one of their common brine electrolysis cells uses a flowing sheet of mercury as a cathode. These plants produce waste brine, caustic soda filter backwash wastewater, hydrogen cooler condensate, residues from cell cleaning, etc., which contain inorganic mercury compounds. Reduction of water pollution from such plants, in compliance with recent Environmental Protection

Agency restrictions on discharge of mercury into waterways has frequently involved the use of open temporary or permanent catch basins and open treatment vessels. Each when covered by water, an appreciable amount of mercury vapor reaches the air from submerged mercury deposits, and it is in fact possible to locate underwater mercury by aerial survey. It is therefore important that emission of mercury to the air be controlled now.

The social costs of mercury exposure of restricted groups of the population, from mercury mines, various industrial mercury uses, medico-dental mercury applications, and laboratory exposure, are also significant. We would like to see regulation aimed not only at control of community-wide exposure but also at limitation of exposure of groups with high risk of inhalation of toxic amounts of mercury.

With regard to the often commented on figures or the various kinds of interpretations that are made of data on museum specimens for fish, I think it should be realized that mercuric chloride has been a very common preservative for museum specimens over a long period of time, and having had occasion to help in the preservation of museum specimens myself, I can tell you that no matter

what anyone may assure you, there is no such thing as a proper written record of what has been used to preserve each specimen.

When you have a specimen where there is no proper label to tell you what it is in and you are faced with the fact that there has been evaporation from a poor seal and you are going to lose that specimen if you don't dilute up the preservative, you hold it up to the air, you open it and you smell it, and you make an educated guess as to what the last person put in there, and you put in some more and you don't write down what you did (laughter).

MR. MEGONNELL: I appreciate that. I have been vindicated (laughter).

MR. BENDIX: Now, I would also like to say that it is possible that some of these figures are good. That does not take us off the hook, because until we establish whether or not brain damage that has been ascribed to unknown or other causes may in fact have been due to in utero poisoning with mercury compounds from food which the mother ate, we cannot tell whether in fact many cases that have been in the medical literature, as long as the medical literature exists, may not have been

due to methyl mercury or other forms of mercury poisoning, so just because we find fish with a high level of mercury, this does not mean that because the problem has existed for a long time, that it is not still a problem, and let's hope that we are better equipped to deal with it now than people were to deal with it a hundred years ago.

In conclusion, I would like to say that the Northern California Committee for Environmental Information and the Oceanic Society support the efforts of the Environmental Protection Agency to control the emission of hazardous air pollutants. We hope that the new rules will be vigorously enforced, extended as warranted by new data, and broadened to include other toxic materials.

MR. MEGONNELL: Thank you very much, Dr. Bendix.

Did I hear you say that levels of mercury in some human tissues commonly exceed five parts per million?

DR. BENDIX: Five-tenths of a part per million. That is the fish standard.

MR. MEGONNELL: .5?

DR. BENDIX: The brain figure is believed by some people to be about two parts per million.

## AUTHENTICATION

I, John S. Seitz, certify that I am the Director of the Office of Air Quality Planning and Standards of the U.S. Environmental Protection Agency's Office of Air and Radiation and that the attached documents are true, correct and compared copies of documents in my official custody under 40 C.F.R. §2.406, consisting of:

Documents from the EPA Rulemaking Docket for the National Emissions Standards for Hazardous Air Pollutants, Docket No. A-80-47, Asbestos NESHAPs Review, Item Nos. I-A-1, I-A-2, I-A-3, I-B-23, I-D-1[2], I-D-17, I-D-33, I-D-36, I-E-2, I-F-1, I-F-2, I-F-3, I-F-4, I-I-90, I-I-94, I-I-138, II-C-123, II-D-54, II-E-106, II-I-39, and II-I-41.

Subscribed under penalty of perjury on _____, 19___.

_____
John S. Seitz, Director
Office of Air Quality Planning
and Standards (MD-10, RTP)

## Certification

I, E. Donald Elliott, certify that I am the Assistant Administrator and General Counsel of the U.S. Environmental Protection Agency, that I have duties throughout the United States and that the official whose signature appears above has legal custody pursuant to 40 C.F.R. §2.406 of the original document of which a copy is attached, as witnessed by my signature and the official seal of the Environmental Protection Agency which appear below.

_____
E. Donald Elliott
Assistant Administrator and
General Counsel

Date: _____

MR. MEGONNELL: Two parts per million. Could you supply sources of these data?

DR. BENDIX: Yes.

MR. MEGONNELL: Is it the theory that beryllium is dose related? In other words, thirty years at a lower level might equal ten years at a higher level?

DR. BENDIX: I am not really knowledgeable enough about beryllium to answer that.

MR. MEGONNELL: All right, fine.

DR. BENDIX: Mercury is more my field.

MR. MEGONNELL: I see. Well, is there any individual susceptibility to mercury?

DR. BENDIX: Yes. It is known that there are differences in susceptibility, by virtue of the fact that the younger the organism the more sensitive the nervous system is, and the earlier in pregnancy the exposure the greater the probability of damage.

With respect to two people of the same age and the same sex, I don't believe that anybody has any theory that I have heard to explain the difference of susceptibility.

This is the kind of problem which you have, I think, with any toxic agent or any infectious agent, that

there are any number of hereditary and environmental permanent or temporary kinds of conditions that influence the susceptibility at the given time, and I think this is one of the problems in setting standards, that you have to have a safety factor which allows for a reasonable portion of this variability.

MR. MEGONNELL: Yes. You seem to support the theory that biological organisms do change elemental mercury to methyl mercury.

DR. BENDIX: I think there is extensive evidence that a great number of such organisms do.

I must confess that I would not even be entirely surprised to see a release next week or next month indicating that there is some bacteria that lives in the human gut that can do it.

MR. MEGONNELL: I thought -- I may be wrong -- either in the proceeding today or the hearing in New York, somebody said that there were fish in isolated lakes, not these far ranging fish like tuna that you were talking about, that also --

DR. BENDIX: Yes, in California the fish that are in isolated lakes have above one-half a part per million of mercury in natural occurring areas. This is due to natural

resources, and California having by far the greatest natural deposits of mercury of any state in the United States has somewhat a different problem from the rest of the country in this respect, because we will continuously be turning up problems of where we have to differentiate from something which is a part of the natural situation which the indigenous fauna may to some extent have adapted to. Certainly, the amount of mercury in some areas has an evolutionary effect, so that there are probably more mercury tolerant animals in the area. This does not mean that it is still not going to be toxic for man, and I sometimes wonder about those people who are perhaps drinking from small streams they should not be drinking from. I mean nobody has time to go into the mountains and check every one of these small streams. I think there may be a problem there.

MR. MEGONNELL: You have enough to do in towns where people are living.

I think Dr. Leonard Goldwater has also subscribed to the theory that a lot of mercury, after emission, is fixed in the soil and sediment and so forth.

Do you have an opinion on that?

DR. BENDIX: Well, I don't think that much of it is fixed in the soil. I think that it tends to move.

I think that where it lands in a place where there isn't much water current to move it and where sediments are deposited on top of it, that there is pretty fair indication that this is protected.

One of the problems that they had in Sweden is that some of the lakes where mercury had landed because of agricultural mercury use or commercial mercury use -- I think it comes from mostly agricultural -- are lakes with an extremely low rate of sediment deposition, and there has been nothing to cover the mercury up.

MR. MEGONNELL: And lakes naturally overturn, don't they? Aren't there seasons?

DR. BENDIX: You mean the water overflows. The mercury is heavy. It is going to be on the bottom. It is not going to go with the spill-over.

MR. MEGONNELL: It would not come up with the sediment and so forth?

DR. BENDIX: I mean a small amount of it, if you stir up the sediment, yes. If you have small microorganisms that are metabolizing it, yes, but the problem is that the mercury is metabolized in fact at a very slow rate. A very small percentage who get mercury is being handled by biological organisms at any level of

exposure, and it is just a very small amount of it which is enough to produce an appreciable effect, and this is one of the problems that we are going to be faced with in dealing with these continuing sources and finding means of covering them up.

The Japanese have tried dredging either at Minamata or Nigata, and found that they ended up with a worse situation than they started out with, because they simply stirred so much of it up and they could not effectively remove it.

MR. MEGONNELL: I have one final question. I think you made a good point about much of the ocean mercury being in the estuaries.

Now, in the Chesapeake Bay where we had zinc going in, we got corrugated oysters. Is this also true of mercury?

DR. BENDIX: It is true. There are data being collected in the San Francisco Bay area by several different people, which is not yet extensive enough to be published, but which indicate that mercury is in fact being concentrated by some of the shell fish.

MR. MEGONNELL: I have one more final question: In the proposed standards our staff made the assumption, and

it was conservative, that elemental mercury equals methyl mercury in toxicity. Do you have an opinion on that?

DR. BENDIX: I think it depends on whether you take this in a literal sense or in a figurative sense.

In the biological sense, knowing that in the elemental mercury that is around in the environment it is ultimately going to be exposed to some organism that can convert it to methyl mercury -- in this sense, I would say yes.

Mercury in any form whatsoever in the environment is ultimately equivalent to methyl mercury. In an immediate sense, I don't think so.

MR. MEGONNELL: Thank you very much, Dr. Bendix.

DR. BENDIX: You are very welcome.

MR. MEGONNELL: I appreciate your statement.

At this time we will adjourn until 9:00 o'clock tomorrow morning.

(Thereupon, at 5:55 P.M., an adjournment was taken until February 16, 1972, at 9:00 o'clock A.M.)

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FEBRUARY 16, 1972

9:00 A.M.

MR. MEGONNELL: The hearing will please come to order.

We have a rather full schedule today. I hope we can find some means of cutting it short so we can finish it before too unreasonable an hour this evening.

Our first witness this morning is Mr. K.W. Nelson from the American Smelting and Refining Company.

Is Mr. Nelson here?

(There was no response.)

MR. MEGONNELL: I guess he is not.

Then we have Mr. Frank H. Zimmerman and Dr. Hans Weill of the Asbestos Information Association/ North America.

STATEMENT BY

FRANK H. ZIMMERMAN

ASBESTOS INFORMATION ASSOCIATION/

NORTH AMERICA

MR. ZIMMERMAN: Good morning. I will try and keep this as short as possible for you.

MR. MEGONNELL: Thank you.

MR. ZIMMERMAN: My name is Frank H. Zimmerman and I am Director of Corporate Safety and Environmental Health for the National Gypsum Company. I am here today representing the Asbestos Information Association/North America, which consists of 13 of the nation's largest miners, manufacturers and importers of asbestos and asbestos-containing products. The member companies of the Association are listed on a sheet which I have provided.

We support in general the position taken by the Johns-Manville Corporation in its presentation at the January 18 hearing in New York City, and also contained in the National Academy of Sciences document on asbestos, that at present the general public is not in danger from the minute amounts of asbestos fiber present in the ambient air. We also concur with the position that it is prudent and feasible to establish reasonable emission standards and controls that will protect the public and ensure that hazardous levels of asbestos will not develop in the community air in the future.

We, therefore, in principal, support the proposed Environmental Protection Agency National Emission Standards on asbestos.

Nevertheless, there are certain sections of

the regulations which we feel require alteration or rewording, and on behalf of the Association, I would therefore like to recommend to the EPA the following changes.

With regard to Section 61.21 Definitions, we agree with the intent of the EPA in trying to establish definitions for visible emissions and particulate matter that would encompass all types of particulate emissions which might possibly contain potentially hazardous amounts of asbestos. Nevertheless, from a practical standpoint, there are difficulties in the definitions as written.

For example, in many asbestos using manufacturing operations, there are particulate emissions to the atmosphere which may be visible but which do not contain any asbestos. As Mr. E.M. Fenner of Johns-Manville pointed out in his testimony in New York, an example of such emissions could be from the sand preparation and drying operations in an asbestos-cement pipe plant.

In another example, a visible particulate emission might contain a very minute percentage of asbestos fiber, and would by visible <u>only</u> because of the non-asbestos particulate matter in the emission, yet the standards as written would not differentiate between such an emission and one of pure asbestos fiber from an uncontrolled plant or

an improperly maintained bag house.

To resolve this difficulty, I think it is essential to return to the basic intent of the EPA in establishing asbestos standards in the first place, and that was, of course, to protect the general public by reducing emissions of fiber into the ambient air consistent with the best available technology.

While it is always desirable when possible to restrict emissions of any nature from any source, industrial or otherwise, it is not necessary in order to be consistent with the purpose of these regulations to prevent the emission of non-asbestos containing particulate matter. Free asbestos fiber is the declared hazardous substance with which we are concerned, and the primary job of the EPA and the industry should be to keep asbestos emissions, not particulate emissions per se, at as low a level as is possible. As has been pointed out, not all potential particulate emissions from an asbestos manufacturing operation necessarily contain asbestos, and to require that the same strict controls be applied to them as are applied to asbestos emissions goes beyond the scope of the regulations.

We are sure that it was not the intent of the

EPA to present insurmountable obstacles to concerned and dedicated companies within the industry, but to ensure that uncontrolled asbestos emissions would be prevented. With this philosophy in mind, I would like to suggest the following solution to this problem.

We suggest that the definition for visible emission be rewritten as follows: "Visible emission" means, for the purpose of this subpart, any visually detectable emission of particulate matter containing free asbestos fibers in excess of the amount which would be emitted from a fabric filter device or other suitable collection installation, as described in section 61.23.

Such a definition would not be inconsistent with the intent of the regulations, and would in fact closely parallel the approach taken by the EPA in section 61.22, subparts (a-1) and (a-2); (b-2) (b-3) and (b-4); (c-1) and (c-2); and in (e-3).

In conjunction with this definition change, we would also suggest that the definition of particulate matter in Section 61.21, subpart (h) be reworded as follows: Particulate matter means any material containing free asbestos fiber, other than uncombined water, which exists in a finely divided form as a liquid or solid.

The wording "free asbestos fiber containing particulate matter" or "particulate matter containing free asbestos fiber" should be used throughout the Standard in place of the less specific terms "material" and "particulate matter."

Our next suggested change in the standards is with regard to Section 61.22, subparts (e-1) and (e-2) regarding the prohibition of the spraying of <u>any</u> product containing asbestos on any portion of a building or structure or in an area directly open to the atmosphere. We realize that this section of the regulations was designed primarily to deal with the problem of the use of asbestos-containing spray fireproofing compounds in high rise building construction.

Those of us in the industry who have followed the course of the spray fireproofing controversy over the past two years can well understand the EPA's decision to prohibit this particular use of asbestos. However, the regulation as worded would also ban the use of a number of asphalt-asbestos spray roofing and foundation compounds and adhesives that we feel do not fall into the same category as the fireproofing compounds. These asphalt spray compounds contain an average of around 5

percent asbestos fiber locked solidly in the asphalt binder. They are applied in a manner which could not conceivably create any emissions of free asbestos fiber to the atmosphere.

A member company of the Asbestos Information Association which manufactures these products contacted a number of reputable testing laboratories in the Cincinnatti area to run a series of fiber counts on the application of these asphalt-asbestos compounds. When the process was explained to the testing laboratories, they replied that they did not see how any free fiber could be released during application, and concluded that it would be essentially a waste of time to run the tests.

Accordingly, we recommend that Section 61.22, subparts (e-1) and (e-2) be reworded so as to eliminate products of this nature from the proposed ban. This can be accomplished in two ways. Either the proposed ban in (e-1) and (e-2) can be made specific to spray compounds in which water is the sole liquid binding agent, or else subparts (e-1) and (e-2) can be totally eliminated, and subpart (e-3) slightly reworded so as to apply to all asbestos-containing spray compounds.

Now, sir, we did a little homework last night and we are going to change this next paragraph that you have

in your sheet, and we are going to give you a copy of it so that you will have it. Here is the new reading that I think you can live with:

We would like, however, to suggest a wording change for Section 61.22, subpart (c-1) that is somewhat different from that recommended by Mr. Fenner. We feel that this paragraph should be reworded as follows: Emissions, in direct forced gas streams, of particulate matter containing free asbestos fiber resulting from manufacturing or fabrication operations shall not contain free asbestos fiber in excess of the amount which would be emitted if such forced exhausts were treated in fabric filter installations, etc.

Our final suggested change in the regulations is with regard to the prohibition on visible emissions from mine tailings dumps. As was expressed by Mr. Fenner of Johns-Manville at the New York hearing, the control of tailings dump emissions is the one requirement in the regulations with regard to mining operations that the industry at this time does not know how to meet. As the EPA is well aware, the industry has been working on this problem for a number of years without finding a suitable solution, nor are we confident of being able to discover

one within the two year waiver period allowed under the law. We would therefore like to recommend to the EPA the following three point plan to deal with this problem.

1. The prohibition on tailings dump emissions should be deleted from the regulations for the present.

2. An industry program should be set up with EPA guidance and approval to discover a suitable method for controlling these emissions.

3. When a method has been developed, the prohibition on visible tailings dump emissions should then be reinserted in the regulations.

I realize that this approach to the problem is somewhat unorthodox, however, there are several points which speak in its favor. Of prime importance is the medical evidence with regard to the lack of asbestos health hazards in the vicinity of chrysotile asbestos mines. Dr. Hans Weill of Tulane University will speak directly to this aspect of the situation in his presentation. Secondly, the asbestos mines in this country are few in number and, for the most part, located in areas far from any large population centers. Thirdly, as I stated before, the industry does not know how to solve the problem at this time and is skeptical about its chances of doing so in the

near future.

This last point is of considerable importance to those companies that are faced with the practical problem of meeting the mining regulations. No matter how well controlled the asbestos mines in this country are at present, it is reasonable to assume that additional funds will be required to comply with the regulations. If a company feels that it will end up closing down its mining operations in two years because of the tailings dump problem, it may very well decide not to spend the money needed to comply with the other requirements of the regulations, and instead close down operations immediately. This is a situation which I am positive none of us would like to see occur.

We feel that this proposal, though somewhat unusual, is not unreasonable in light of the industry's willing acceptance of the vast majority of the proposed regulations, our past cooperation with the EPA in health matters, and our avowed determination to do all that is necessary within the limits of technical feasibility to control asbestos emissions into the ambient air. We hope that these things will be taken into consideration by the EPA when evaluating our proposal.

In conclusion, I would like to once again express our continuing recognition of the need for effective emission controls, and our general support of the EPA National Emission Standards for Asbestos.

Thank you.

MR. MEGONNELL: I understand you would like to withhold any questions until Dr. Weill is finished?

MR. ZIMMERMAN: I think that would be better.

MR. MEGONNELL: That will be fine.

STATEMENT BY

DR. HANS WEILL

PROFESSOR OF MEDICINE

TULANE UNIVERSITY SCHOOL OF MEDICINE

DR. WEILL: Mr. Megonnell, gentlemen:

My name is Hans Weill and I am a specialist in Pulmonary Disease and Professor of Medicine at Tulane University School of Medicine. For the past ten years I have been actively engaged in the investigation of pulmonary effects of industrial and community environmental inhalants, including organic and inorganic dusts and toxic irritant gases. For the past two years, we have been carrying out a comprehensive investigation of workers engaged in the

manufacture of asbestos cement and other asbestos-containing construction products. I appreciate the opportunity to provide this statement, following which I will be pleased to attempt to clarify any further questions which you may have concerning the biological effects of asbestos exposure.

Because of the evidence indicating an association between dose of asbestos exposure and its adverse biological effects, it is not surprising that these reactions are most easily recognized in industrial populations where this exposure is highest. It has been appreciated for one-third of a century that excessive occupational exposure to asbestos dust can result in diffuse pulmonary fibrosis or asbestosis. Recent evidence strongly suggests that this hazard can be controlled by reducing industrial dust levels and there is general agreement that even lower community levels of asbestos fiber are not likely to be associated with a fibrosing effect on the lungs.

That an excess risk of bronchogenic carcinoma of the lungs occurs in workers exposed to asbestos was established in the late 1940's and early 1950's. This risk is not the same for all types of asbestos exposure and seems to be associated, perhaps synergistically, with at least one other factor, cigarette smoking. Of great importance

to the purposes of this hearing is the more recent demonstration that reduced asbestos exposure in the plants results in not only a lower risk of developing pulmonary fibrosis but also is associated with a marked fall in mortality for cancer of the lung. This evidence that the increased risk of developing pulmonary neoplasms can be controlled by adequate dust suppresion in the plant comes from two separate studies in the United Kingdom and leads to guarded optimism, not only in relation to the industrial asbestos exposures but, by extrapolation, to the tentative conclusion that the lower general environmental asbestos levels do not constitute a significant risk to the population in terms of the development of lung neoplasms.

If there seems little likelihood that asbestosis or bronchogenic carcinoma of the lung can result from general environmental levels of asbestos fiber, what can be said about the rare but important tumor called mesothelioma which may affect the lining of the chest or abdominal cavities? This complex and interesting story has been evolving during the past decade with interest stemming initially from the reported association of industrial and geographic proximity to the crocidolite mines in the Northwest Cape of South Africa and the appearance of these tumors. Exposures

were not quantitated but were likely to have been quite heavy. Confusion resulted from the observation that similar mines producing blue asbestos in the Transvaal section of South Africa were not associated with cases of mesothelioma in the exposed occupational and geographic populations. While a few cases of mesothelioma have been reported in the surrounding environs of a plant using primarily crocidolite in the United Kingdom, emissions were uncontrolled and likely to have been considerable. In a survey of mesothelioma in Scotland recently reported, it was difficult to separate occupational from residential exposure since most of those working in the asbestos industry lived close to the industrial sites, and only one male case of mesothelioma occurred out of 51 individuals who did not have occupational exposure and who lived within one-half mile of shipbuilding, docks, or asbestos factories. It can be readily appreciated that the evidence supporting an association between mesothelioma and non-occupational residential exposure to asbestos is quite limited, particularly when contrasted to available data which suggests little association between general community asbestos exposure and the development of mesothelioma.

The Mayo Clinic recently reviewed 37 cases of

mesothelioma which had been seen during the previous 22 years. In only ten of these was there a definite or probable occupational exposure to asbestos, while in 27 no history of environmental or occupational exposure was detected. None of these patients lived in major industrial or metropolitan areas and a non-occupational exposure to asbestos fiber seems highly unlikely. The most precise definition and quantitation of asbestos exposure is at present possible only for an industrial environment where significantly lower asbestos dust levels have recently been demonstrated to be associated with a normal or only slightly increased risk for pulmonary or pleural malignancies. If confirmed by continuing studies, this ultimately provides strong evidence that the minimal asbestos exposures in urban communities will have no adverse measurable biologic effects.

Since today our attention is being directed to the portion of the proposed emission standards which prohibits visible emissions of particulate matter from asbestos-containing tailing dumps, let us examine the most pertinent scientific evidence concerning the risk associated with environmental exposures in areas geographically proximate to asbestos mines. Last month at these hearings in New York, Dr. J. C. McDonald of McGill University testified

in some detail about the investigations which he has supervised on the Quebec chrysotile mining and milling industries and the Canadian mesothelioma survey. Because of the importance of these results to the hearings, I would like to briefly summarize the appropriate portions of these studies. In the study of mortality in the chrysotile producing industry of Quebec, a very high follow-up of deaths was achieved which presented strong evidence that even heavy exposure in this industry carried only a modest risk of lung cancer and even a smaller risk of malignant mesothelioma. Again, the evidence that low and moderate asbestos dust levels are not associated with increased risk of developing pulmonary or pleural malignancies in the workers has strong implications concerning that risk in the non-occupationally exposed population. The asbestos-containing tailing dumps in the United States are in chrysotile mines, underlining the importance of Dr. McDonald's findings to this deliberation.

Results of an epidemiologic survey of malignant mesothelioma in Canada are also of interest. Although an association between the development of these [illegible]

cases, after exclusion of occupational and domestic exposures there was no case of mesothelioma occurring in an individual who had a history of ever living within 20 miles of an asbestos mine or mill. This encouraging data concerning chrysotile asbestos health effects, which has been substantiated in chrysotile mining and milling in other portions of the world should be evaluated in view of the facts that all of the asbestos mines and mills in this country produce chrysotile fiber and over 90% of the asbestos used in manufacturing and other utilization is also of this fiber type. Strong consideration must be given to the possibility that some or all of the biological effects of asbestos may result from something other than the fiber itself, possibly a contaminant introduced in processing or manufacturing. This and other unresolved questions will hopefully be answered as the result of intensive research being conducted on this problem.

Because of my interest in maintaining the health of workers and the population in general, I support vigorous efforts in controlling the emission of actual or potential injurious inhalants, even when doses which have been demonstrated to have an adverse biological effect are of a different order of magnitude than those likely to

be encountered in the general environment. I, therefore, support most of the provisions of these proposed emission standards but would suggest that present evidence does not indicate a significant risk from the environmental levels of chrysotile asbestos surrounding these mines. While the technology is being developed to control these emissions, continued health surveillance will provide data which hopefully will confirm these present tentative conclusions.

Thank you.

MR. MEGONNELL: Thank you, Dr. Weill. I have some general type questions.

Would the average physician be able to recognize mesothelioma?

DR. WEILL: There are considerable difficulties in diagnosing both from the physician's standpoint who is treating the patient and indeed from the pathologist who has the tissue in his hand to look at it.

There are studies which show that in a situation where somebody is looking for mesothelioma and reviewing other diagnosis, that revalidation, certain tumors which were called something else eventually fall into the classification of mesothelioma, so the answer to your question is yes, physicians may have difficulty in recognizing it.

MR. MEGONNELL: I get the impression that the whole field of chest diseases is pretty difficult to diagnose, and I know nothing about it except the things I hear.

Is there in your opinion a possibility that there might be selective sensitivity or predisposition to asbestosis or mesothelioma?

DR. WEILL: That is a very interesting question. There is host response of variability for almost any external stimulus that one could think about, and that includes the common infectious agents which produce pneumonia or tuberculosis. Some people get the disease chronically; others are just infected and then develop the disease, and still others are not affected at all.

There seems to be a gradation of variability in response. The most variability, for instance, would occur in conditions where there is an allergic or immunologic basis, so that people with an allergic predisposition would respond to certain allergens. Others would not respond at all.

Where you are talking about inorganic dusts, that variability is on a generally lower level, so that dust such as asbestos or silica, perhaps, would be likely

to have a more uniform effect but, nonetheless, there is just no question that two workers doing the same thing for the same number of years may differ significantly in their biologic response. One will develop the disease and the other one won't, so that there is likely to be a difference in response.

MR. MEGONNELL: I think that is important in our consideration, because throughout your paper I think you carefully stated there was lower risk, but never complete elimination, and, of course, our Act says "the health of any person," so two people would be the minimum.

DR. WEILL: Yes, you are quite right. This obviously was worded carefully in order to be completely in accordance with scientific data which is available now.

The reason, obviously, that we can never eliminate in anything that we are talking of -- I am involved in studying other types of inhalants as well -- the reason we can't ever eliminate it is because the data almost never allows us to say that one person in a million or two million or whatever, may not have an adverse response to a particular environmental exposure.

That becomes pretty philosophical, and there are a lot of discussions along those lines which would

probably not be useful to this hearing, but it is a difficult problem.

MR. MEGONNELL: As I said yesterday, it is pretty easy to write these words into a law, but it still gives you headaches when you are trying to administer it.

DR. WEILL: It certainly does.

MR. MEGONNELL: We found some what I thought were very interesting properties of asbestos, such as the very small amount that could be added to the spray cement and make it fluid.

In view of this, do you think that asbestos fibers are likely to contain some adsorbs or adsorbed gases or liquid materials that might act synergistically?

DR. WEILL: There is an increasing possibility, and it has certainly been suggested. One of the sets of data or facts which would support that sort of concept, tentative at present obviously, is that similar levels of asbestos fiber in different types of industrial applications produced different prevelance and incidence of disease.

It is obvious, for instance, that in mining and milling, even though some exposures may be quite heavy, there is a different order of health problem than there is in some utilizations, such as insulated, and this would

continue on.

We are doing the first major study of the very important asbestos cement industry. We have two years of data now. It is all being worked on by our statistical people. It is in the computer. I wish I had some results for you today, but I don't, unfortunately. Those will be coming down, which suggest that in this industry we are studying we have a different order still, possibly a third, maybe intermediate order between these two extremes. That would suggest that something other than the fiber or an addition to the fiber is playing a role. What it is, of course, I don't know.

We are doing lots of speculations about these things. I indicate that I am in sympathy with this sort of thinking by mentioning it in my statement.

MR. MEGONNELL: Thank you very much, Dr. Weill.

MR. YOST: One question.

MR. MEGONNELL: Yes, Mr. Yost.

MR. YOST: Doctor, you and Mr. Zimmerman both mentioned that there had been no cases of asbestosis or mesothelioma in the vicinity of these piles. Was this statement made on the basis of specific studies in and around those areas, or the fact that nobody just happened

to pop up with these diseases? Which was the case?

DR. WEILL: First of all, let me clarify it.

The statement regarding asbestosis or pulmonary fibrosis was not made by me nor Mr. Zimmerman, I don't believe, because that was not part of the study.

It is generally accepted that general environmental levels of asbestos fiber do not produce pulmonary fibrosis or asbestosis.

Now, the important part that we need to consider is the question of mesothelioma. This is the result, the direct conclusion of Dr. Corbett McDonald's work, which did provide extensive mortality studies on mesothelioma.

What he did was he found all of the cases of mesothelioma in Canada that could be found. Now, obviously, he missed some, but he had a very successful, very vigorous program, where most of the mesothelioma presumably in that country were detected.

He went back and looked for occupational, domiciliary residential associations. He found an association between occupation and the development of this tumor, as I mentioned, not in the mining and milling up there, but in other manufacturing activities. He found no

association between residents of the cases which were detected in the mortality study and mesothelioma -- that is, in somebody who did not have an exposure through occupation, but who merely lived in the area of one of these mines -- no increase, and, in fact, no case of mesothelioma was found.

Now, that, I think, in terms of our own chrysotile mines in this country is extremely pertinent. It may be the only truly germane evidence on this particular point that exists, and I think it should be weighed heavily.

MR. YOST: Thank you.

MR. MEGONNELL: I wonder if I could ask Mr. Zimmerman a few questions?

MR. ZIMMERMAN: Surely.

MR. MEGONNELL: You have made a suggestion, Mr. Zimmerman, about the definition of visible emissions and particulate matter, and I would like to try on you one that I have been kicking around.

First of all, I would propose defining "visible emission" as "the presence in the outdoor atmosphere in finely divided solid or liquid form of usually detectable substances derived from asbestos containing materials."

I realize that it is not fair to ask you at this time.

MR. ZIMMERMAN: I would like to give a study to that, and I assure you we will give an answer, but I realize that I am speaking for the industry here.

MR. MEGONNELL: I understand that. It is something I would like you to think about.

MR. ZIMMERMAN: I would like to study that further.

MR. MEGONNELL: Then we could, I think, eliminate the definition of "particulate matter," completely.

MR. ZIMMERMAN: I think we are getting somewhere.

MR. MEGONNELL: How would you determine the free asbestos fiber content under the definition you propose?

MR. ZIMMERMAN: I think we have got to say that studies have to be made. We have got to make counts. That is the only way we will know what is there and who is going to make them and who is available to make them, sir. I don't know. We are in our industry trying to get qualified people to do this now for us. We are just having one devil of a time.

MR. MEGONNELL: We are right back at the start.

MR. ZIMMERMAN: We sure are.

MR. MEGONNELL: I noticed in your reading of your paper you said you could understand how a decision to

prohibit the spraying of asbestos, but then you deleted it "and we cannot disagree with it." Do you disagree with it?

MR. ZIMMERMAN: Yes. I've got to be honest.

I will talk as a good layman to you, and, I hope a good safety man. In assuming the aspects to the use of a product that may be helpful to the general public, it may not be the thing to get into but, look, you had a fire in Saigon in a big hotel and 153 people died.

Now, I think we have to get our values in this country somewhere straightened around. We have got to have certain things that protect the people.

I don't know -- from the studies and the remarks that Dr. Weill has made -- if we have such a problem or else if we are just going panic-stricken doing a lot of this.

I am being very honest about this. This is my own personal belief. I am not talking for National Gypsum, and I am not talking for the Association. I feel we have to take a close look not only at asbestos but a lot of things that we are running headlong into today and writing standards.

Maybe the true level that is being suggested by those is too low. We don't know these things yet. We, as a manufacturer, certainly don't want to contribute to

these things, but we would like to be on a safe basis with some technology to know where we stand.

MR. MEGONNELL: I think it is an honest difference of opinion. I can't say I agree with all of it either.

MR. ZIMMERMAN: Well, we are up against something, sir, and it is not only the EPA, it is OSHA, and everybody is just all of a sudden putting standards down and rushing into things.

We don't know where we stand. We don't know where to go from day to day on this to be honest with you.

And, boy, we lost the battle of Washington yesterday, I understand, at the OSHA hearings, and there are other problems connected with it.

The suggestion is that you are going to cut the silica standards in half. Maybe Dale knows more about this than I do, but we get wind of these things.

MR. MEGONNELL: That would not be us, but the Department of Labor. We don't have anything to do with that, fortunately.

MR. ZIMMERMAN: I hope they don't have too much influence on you.

MR. MEGONNELL: Well, I don't think that we, at any point, said that use of asbestos for firing insulation was unsatisfactory. It is just the manner of application that the regulations spoke about.

I think your point on the asphalt roofing certainly will require additional study. As a matter of fact, I suspect there was never any intention to include that, but I can't speak for the people who drafted it.

MR. ZIMMERMAN: Well, there is a gentleman here in the audience today, in case you have any questions of the asphalt end of the industry. I am sure he could speak for it. He is much more qualified than I am. Mine is asbestos.

MR.MEGONNELL: I think your proposal for a plan sounds feasible, reasonable and very responsible, and I don't think it is so unorthodox as you suspect it is, this government/industry study. I would prefer getting the facts so that we come up with a reasonable regulation rather than waiting and getting sued after the fact. We are getting sued for a lot of the things we are doing right now.

MR. ZIMMERMAN: We would like to work with you when we can.

MR. MEGONNELL: I must say on behalf of the

people who have been working with you that the asbestos industry in general has been most cooperative. I think their response has been very encouraging, and on behalf of Administrator Ruckelshaus and all the people down at the working level, I want to acknowledge the cooperation publicly on the record.

MR. ZIMMERMAN: Thank you.

MR. MEGONNELL: Thank you very much.

MR. YOST: I have one question.

MR. MEGONNELL: Mr. Yost has a question.

MR. YOST: Mr. Zimmerman, I don't have your paper and maybe there was some addendum attached to it, but you indicated in your remarks that there are certain aspects of milling and some other operations that do emit particulates but do not emit asbestos containing particulates.

MR. ZIMMERMAN: Yes.

MR. YOST: Will you be able to identify those particular operations for us in a later submission so that we can have an idea where they are, because we would like to know where those operations are and, if necessary, we can perhaps readjust the standard to set a specific point.

MR. ZIMMERMAN: Well, I think in the New York meeting, certain members of the industry have opened the

doors of our plants to you, and I think if you come in and see the problems we have and dicuss them, we will be more than pleased to do that.

We made the offer in Atlanta to you at the meetings down there.

I can offer this on behalf of myself: If you want to see tailings piles, come up to Canada, and if you know how to cover those man-made mountains we will take you into business.

MR. MEGONNELL: Did you bring one down?

MR. ZIMMERMAN: Kind of expensive (laughter.)

MR. YOST: I was thinking primarily of the industrial aspects of it, that you indicated there were emissions of particulates.

MR. ZIMMERMAN: With the autoclaves and the things we use, you have got to put the steam on and you are using a wet product in there, and the way it reads now, the way it could be interpreted, we would have a real problem -- a real problem.

MR. YOST: All right. Thank you.

MR. MEGONNELL: I understand that Dr. Thomas J. Smith is here to submit a statement for Mr. K. W. Nelson of the American Smelting and Refining Company.

STATEMENT BY

DR. THOMAS J. SMITH

ON BEHALF OF

K.W. NELSON

DIRECTOR, DEPARTMENT OF ENVIRONMENTAL SCIENCES

AMERICAN SMELTING AND REFINING COMPANY

SALT LAKE CITY, UTAH

DR. SMITH: I am Thomas Smith, an environmental scientist for American Smelting and Refining Company.

I am representing Mr. K.W. Nelson, who was unable to attend the hearing, and I will read a slightly altered version of Mr. Nelson's statement.

Mr. Nelson is the Director of the Department of Environmental Sciences of the American Smelting and Refining Company. He has been in environmental health work for 30 years, 26 of them with American Smelting. Because we have an interest in asbestos production and in all the trace metals associated with our principal products -- cooper, lead, and zinc -- I wish to comment on the proposed national emission standards for asbestos and mercury.

During World War II, as a member of a Navy team assigned to develop industrial hygiene programs in shipyards building ships for the Navy and Maritime Commission,

Mr. Nelson had occasion to observe closely all jobs done in ship construction. One of them was the installation of asbestos insulation, particularly in the boiler rooms of ships. Amosite, chrysotile, and crocidolite forms of asbestos were used.

It was known then that inhalation of excessive asbestos dust over a period of time could cause asbestosis. It was appalling to see that asbestos handling, cutting and application were done almost always without regard to dust exposures. Workmen would literally be covered with dust and visibility in engine and boiler rooms would often be diminished by floating dust. My memories of those scenes are vivid.

Dust control was urged wherever practicable -- which was not often the case then -- and they urged the wearing of respirators approved by the U.S. Bureau of Mines for protection against pneumoconiosis-producing dust. These recommendations were often not followed assidously.

Also during the war Mr. Nelson had occasion to inspect an asbestos textile plant providing Navy goods. Again he saw workrooms with visible dust. Every light fixture or other hanging appurtenance was festooned with fiber masses like trees adorned with Spanish moss. Dust control consisted

of sprays of water mist in the room to keep the asbestos damp and to allay dust. The hanging fiber accumulations were evidence that the control was not very successful.

There is no doubt that the cavalier practices of insulation handlers of 30 years ago and perhaps in ensuing years were responsible for the asbestosis discovered in recent years and for the markedly increased incidence of lung cancer which is apparently the result of cigarette smoking plus massive occupational exposures to asbestos dust.

Mr. Nelson's special interest in mercury began in 1941 when Dr. E.P. Laug and he, working for the Food and Drug Administration in Washington, developed an improved method for determining mercury in biological materials -- a method which is still the official one of the Association of Official Agriculatural Chemists, though there have been developed a number of better and faster methods. Mr. Nelson assisted also in toxicological studies of mercury's effects on animals.

Since those early experiences he has followed with care the expanding scientific literature on asbestos and mercury and their relationships to environmental health.

The first specific comment we have on the proposed national emission standards for asbestos and mercury

is that neither substance, deserves being set aside as an especially hazardous air pollutant. Health effects from excessive exposure to airborne asbestos and mercury have been related almost exclusively to occupational situations which involve exposures far greater than any which the public could experience. An exception may be the "neighborhood" illness cases ascribed to asbestos, but almost certainly such cases resulted from lack of dust collection which would be routine today in order to maintain in-plant airborn fiber levels within occupational health standards.

My point is that almost any substance capable of being airborne and causing "irreversible, or incapacitating reversible, illness" could be classified as a hazardous air pollutant. Carbon monoxide is an obvious example and of course the total national man-hours annually of public exposure to carbon monoxide in significant quantities would far exceed the total man-hours of public exposure to asbestos or mercury. By "significant exposure" I mean one which would be likely to provoke significant physiological change.

My further point is that distinguishing asbestos and mercury as "hazardous" means to the public "extremely hazardou" and arouses unnecessary anxieties. Our environmental anxieties these days may indeed be

overshadowing those more deserving of serious public attention. President Nixon's recent message to Congress on environmental pollution effects on health raised questions about our classifications of hazardous substances. He said, in discussing the identification and distribution of adverse agents, "In some cases the grounds for alarm are well-founded; in others fear goes beyond the evidence. The reasons for inclusion are varied and not always well-founded. There has been little attempt to review the whole range of environmental agents systematically, or to adopt a consistent basis for judging an environmental agent as a hazard."

We would urge the Environmental Protection Agency to reconsider the need for national emission standards for mercury and asbestos on the grounds that fears go beyond the evidence.

Paragraph 61.21,(i), defines asbestos tailings as any solid waste product of asbestos mining or milling operations which contain asbestos. This definition is too broad. In the mining industry the word "tailings" applies to the finely divided product of milling or, less commonly, to the oversize material passing over screens. As defined now, the term "tailings" would mean virtually any material from an asbestos mine. The definition should be modified.

Paragraph 61.22,(a),(3), prohibits visible emissions from any mine road surfaced with asbestos tailings. Under the existing tailings definition any road in an open pit mine surfaced with waste rock from the pit, or not especially surfaced at all, would be surfaced with asbestos tailings. And the rock would in all likelihood contain some asbestos.

Both because of this situation and because we believe it impossible not to have, at any time, some visible emission from tucking on roadways, we belive the visible emission prohibition should be dropped. It is routine practice to prevent dusting of roadways and it would be necessary to meet the OSHA airborne asbestos standard for truck drivers above ground. Air at ground level over precious metal ores has reached 1.5 ug/$m^3$. Again we raise the question of why mercury should be set aside as a hazardous pollutant. It's relative rarity, relatively high cost, and the lack of any observed community air problems argue against its hazardous classification. We may be creating a problem in trying to solve a non-existent one.

The five-pound per 24-hour emission limitation specified in paragraph 61.53 appears to be purely arbitrary. No allowances are made for the concentration of mercury in a

given effluent or for stack height and subsequent dilution. At the very least, an option should be permitted to meet an appropriate ambinet air standard, as in the case of beryllium. What the ambient air standard should be is unknown at present, but 1 ug seems very conservative. In any case, there is surely time to develop and agree upon an ambient air standard. There is no emergency.

The stack testing and record keeping would be eliminated if an ambient air option were available and chosen. Ambient air monitoring should be permitted on a 26-day a year schedule like that followed by the national air sampling network. After two years of such monitoring, permission to discontinue it should be granted, provided satisfactory evidence is submitted to the Administrator that ambient air levels have been satisfactory. Changes in plant practices that would increase mercury emission would automatically mean a resumption of ambient air monitoring.

We appreciate this opportunity to express our views on this proposed legislation.

MR. MEGONNELL: I realize you are a substitute, Dr. Smith. I don't imagine you would mind answering a few questions, though?

DR. SMITH: No, not at all.

MR. MEGONNELL: Mr. Nelson mentions postponing some of this hazardous stuff and work on problems deserving more serious public attention. Like what? $SO_2$?

DR. SMITH: Well, probably. I would suspect that he had in mind some of the more pressing social problems that we are facing.

MR. MEGONNELL: Oh. Well, that is beyond my department's responsibility (laughter).

Does American Smelting and Refining operate asbestos mines?

DR. SMITH: Not in the United States yet. We have some in Canada.

MR. MEGONNELL: I think it is funny -- no, not funny; I don't mean that -- it is odd. You don't operate any asbestos mines in the United States. You are the first industry to come in and object to the asbestos regulations.

Now, it is not your paper and I am not going to hold you responsible for that, but I think it might reflect on American Smelting and Refining's image.

DR. SMITH: I see.

MR. MEGONNELL: With regard to mercury, we hear a lot of talk about the total environmental problem it may be creating. I think that is probably the reason

for some of the concern and the reason we can't sit back and wait until all the necessary studies are done. I think we all admit there are great gaps in knowledge, but we do have a mandated deadline. We are going to try to do the best we can with the data available, and I think these hearings have helped quite a bit.

I wonder if you know what Mr. Nelson meant, on page 6, when he said: "We may be creating a problem in trying to solve a nonexistent one."

DR. SMITH: Well, I believe that he feels that the ambient monitoring and the few cases where there may be problems due to poor controls on a source are not necessarily representative of a large scale, large spread problem, and that perhaps it is an attempt to create a widespread problem where, in fact, really just a localized one exists.

MR. MEGONNELL: He says mercury is relatively rare. That is not the impression I got from some of the figures that were entered into the record yesterday. I think it was in the billions of pounds per year, if I am not mistaken, total from degassing, from coal and oil, from mercury mines and chlor-alkali plants. I wouldn't call it very rare. I think it is relatively common.

DR. SMITH: Thank you.

MR. MEGONNELL: Thank you very much, Dr. Smith.

DR. SMITH: All right, thank you.

MR. MEGONNELL: The next witness is Mr. B.R. Williams of W.R. Grace & Company.

STATEMENT BY

MR. B.R. WILLIAMS

VICE PRESIDENT

CONSTRUCTION PRODUCTS DIVISION

W.R. GRACE & COMPANY

MR. WILLIAMS: Good morning. I am Bruce Williams, Vice President of the Construction Products Division of W.R. Grace & Company.

I would like to read our statement, and this will include some changes to the written statement that we have submitted earlier.

The purpose of W.R. Grace & Co., Construction Products Division ("Grace") in submitting this statement at this hearing of the Environmental Protection Agency ("EPA") is to request the EPA to clarify its proposed National Emissions Standards for Hazardous Air Pollutants relating to asbestos published in the December 7, 1971 issue of the Federal Register so as to clearly establish that the spray

application of plaster fireproofing containing less than 12% asbestos by weight is not a prohibited activity.

It is Grace's belief that proposed standard Section 61.22(e) prohibiting "the spraying of any product which contains asbestos on any portion of a building or structure" or "in an area directly open to the atmosphere" is in reaction to growing concern relating to asbestos emissions from spray-applied asbestos fireproofing.

Grace shares this concern, a concern which it has long held. Grace believes, however, that the proposed standard prohibiting the "spraying of any product which contains asbestos" is much broader than necessary to protect the public from the hazards said to be posed by asbestos emissions and is based on the assumption that "spray-applied asbestos fireproofing" and "the spraying of any product which contains asbestos" mean the same thing. It is therefore important to clearly differentiate between plaster fireproofing containing asbestos and spray-applied asbestos fireproofing.

SPRAY-APPLIED ASBESTOS FIREPROOFING

Spray-applied asbestos fireproofing at which in Grace's judgment the proposed standard is aimed is commonly 33% asbestos by weight. The asbestos is generally

combined with mineral wool fibers and inorganic binders. The fibrous mix is then dumped dry into a hopper which fluffs the dry material. This dry material is then blown in a dry state to the point of application where it emerges from a nozzle which may be 2-3" in diameter. At the nozzle a water spray is introduced and the dry fibrous material is blown through the spray causing the mix to be wetted and propelled to the surface to be coated.

Because of this spray method, the fact that the wetted fibers are lightweight and the spray pattern quite broad, the opportunity for emission of asbestos fiber into the atmosphere in the application of spray-applied asbestos fireproofing is high.

In addition, not only can overspray and rebound of spray-applied asbestos fireproofing become airborne in application, but overspray quickly dries out and it too can become airborne.

We have attached copies of photographs of the application.

MR. MEGONNELL: They will be included in the record as exhibits.

MR. WILLIAMS: Fine.

For about ten years Grace has been promoting

a method of fireproofing buildings with a process in which the fireproof materials are premixed in a slurry from prior to application.

This plaster fireproofing basically is composed of vermiculite, gypsum, and less than 12% asbestos by weight in each 50-lb. bag. Each bag is then placed into a hopped with about 50 quarts of water. The mix is blended into a wet plaster slurry and pumped through a hose to the point of application where it is sprayed in a tight pattern by use of air pressure from a nozzle having a 3/8" to 1/2" diameter orifice onto the surface to be fireproofed. This wet material then sets to a hard plaster having a density of 20 pounds per cubic foot. Likewise because this wet material is three times heavier than spray-applied asbestos fireproofing, any overspray or rebound does not become airborne but falls to the floor and hardens.

In this regard we would like to call attention to the "Background Information -- Proposed National Emissions Standards for Hazardous Air Pollutants" published by EPA in December, 1971 (EPA Background Information). On Page 7 it is stated that: "The proposed ban on the spray application of products that contain asbestos is based upon experience with spray-fireproofing operations wherein

efforts to control emissions by the use of containment and good housekeeping practices have repeatedly failed."

It is our belief that the above statement refers to spray-applied asbestos fireproofing. The reason for our belief is that the rebound and overspray from plaster fireproofing lend themselves to good housekeeping methods because the hardened overspray can simply be gathered into a pile for proper disposal.

ASBESTOS FIBER EMISSIONS
FROM PLASTER FIREPROOFING

On the same day that EPA published its proposed National Emissions Standards for Hazardous Air Pollutants, there appeared in the Federal Register an emergency standard for exposure to asbestos dust published by the Department of Labor pursuant to the Occupational Safety and Health Act of 1970 ("OSHA"). This standard which is Section 1910.93a states in part: "The 8-hour time-weighted average airborne concentration of asbestos dust to which employees are exposed shall not exceed 5 fibers per milliliter greater than 5 microns in length, as determined by the membrance filter method at 400-450 X magnification (4 millimeter objective) phase contrast illumination." In order to determine concentrations of airborne asbestos fibers

during and after the application of plaster fireproofing in the fireproofing of structural steel, observations were made at three construction sites in the San Francisco, California area on May 26, May 28, and June 4, 1970. Consideration was given to the actual and potential exposure of (a) workmen carrying out the spray operation, (b) workers in allied trades nearby, and (c) the general public. These observations were made by the highly respected Tabershaw-Cooper Associates and a report of their air sampling findings appears as Exhibit D to our submission. Substantailly the same methods of asbestos fiber detection recommended by Section 1910.93a of the OSHA emergency standard for exposure to asbestos dust quoted above were employed.

The Tabershaw-Cooper observations indicated that the occupational exposures to workmen who were operating the spray nozzles applying plaster fireproofing were not above the recommended threshold limit values for asbestos published in Section 1910.93a. In fact, of the numerous samples taken, only one sample higher than this level was found. Concentrations dropped off rapidly in the adjacent areas. Tabershaw-Cooper reported that expressed uniformly as fibers per liter, exposures of spray crews in all except the one case mentioned above were well below the threshold limit values; workers in

adjacent areas of the same buildings were exposed to concentrations from 1/10 to 1/5000 of this value; individuals on other floors of the buildings and in the building vicinities had transitory exposures ranging from 1/100 to 1/5000 of the threshold limit value, ambient air levels in the Bay Area were from 1/500 to less than 1/5000 of this value.

In addition, Grace itself has taken similar asbestos fiber detection observations at construction sites where plaster fireproofing was being applied. These observations were taken during July and September 1970 at Omaha, Nebraska; Bethpage, New York; and here in Los Angeles, California, using the same recommended membrance filter method. Samples from these locations were analyzed for Grace by Werby Laboratories Inc. of Boston, Massachusetts. The results are also part of our submission.

A review of these results clearly shows that in all cases the fiber counts were considerably below the threshold limit values for asbestos established pursuant to OSHA. We would like to further point out that the fiber count data in the Werby analysis consists of all fibers and is not limited to asbestos alone.

In your proposed "National Emission Standards for Asbestos," Section 61.22(e)(3), it is stated that fibers

may be emitted to outside air if a fabric filter of the type described in Section 61.23(d) is in use. We have been advised that this filter would limit fibers emissions to the atmosphere to approximately 0.5 to 1.5 fibers greater than 5 microns in length per milliliter of air sampled. You will note that in both the Tabershaw-Cooper and the Werby findings set out in Exhibits D and E of our submission, all observations corresponding to outside air sampling are below the fabric filter standards and this in cases where no filters were in use.

As to the question of whether or not there are fiber emissions of asbestos from plaster fireproofing after it has been put in place, we would like to refer you to an analysis of air samples taken by Tabershaw-Cooper Associates at the request of the Bechtel Corp. in San Francisco in September, 1970, in which it concluded:

"The conclusion of the above test program was that the maximum concentrations of asbestos fibers found in the sampling locations were approximately 2 1/2 fibers per liter. As a comparison reference, the normal atmospheric concentration of fibers in the Bay Area varies from 0 to 10 fibers per liter.

"Based upon the enclosed report the concentrations

of asbestos fibers in your building are on the low side of the normal ambient concentrations found throughout the Bay Area."

This report is also an exhibit in our submission.

As to durability of plaster fireproofing, you will note in a test performed by the Boyle Engineering Laboratory for us in April, 1964, plaster fireproofing was exposed to a high velocity air stream (over 100 miles per hour) for 87 consecutive hours and no erosion occurred. This test report is also part our submission.

AVAILABLE SUBSTITUTES

In the EPA Background Information it is stated that asbestos-free substitute materials are available for sprayed asbestos fireproofing for a cost no higher than 15% of asbestos-containing fireproofing materials. Grace does not deny that such materials are available. In fact, Grace itself manufactures and sells substitute materials. However, Grace wishes to point out to you that at least as of this date none of the nonasbestos fireproofing materials approved by Underwriters' Laboratories, Inc. have achieved full equivalency with the asbestos-containing materials previously approved by UL.

The area where full equivalency has not been obtained is in the ability of nonasbestos-containing fireproofing materials of the type here under discussion to remain in place during fire exposure as long as the asbestos-containing materials. The bonding ability is an essential parameter of these types of fireproofing products. In our judgment, the ability of asbestos-containing materials to bond to the structure for a longer period of time than nonasbestos-containing materials gives asbestos-containing materials a certain margin of safety which even if only once required would be worth their use.

At this time we and others are in the process of experimenting with, and researching for, substitutes which will be fully equivalent to asbestos-containing fireproof materials, but having even less asbestos emissions, and, in some cases, no asbestos emissions. Grace's efforts will continue until such time as fully equivalent nonasbestos containing substitute materials are developed.

GENERAL OBSERVATION

Earlier in this statement Grace alluded to the broad scope of the proposed National Emission Standards and in this connection Grace would like at this time to make a general observation.

The aid of the proposed standards as they concern asbestos is to control the level of asbestos emissions. Emission limits are specified to the numerous uses and applications of asbestos. We feel that the EPA activities in this are appropriate. However, we feel strongly that the absolute prohibition of spray application of "any product which contains asbestos" is arbitrarily severe and inconsistent with the objectives of EPA. This is because the proposed regulations would prohibit material otherwise acceptable, simply because they contain asbestos, even though the use of the material would result in airborne asbestos far below the level acceptable for other products formulated with asbestos.

Moreover, by specifying "asbestos" instead of "commercial asbestos" the regulation could even be interpreted as prohibiting the spraying of materials containing minute traces or spray amounts of asbestos.

We feel that it is not the intention of EPA to establish a standard so arbitrarily severe. We believe that the regulation was written in its proposed form because of the failure to differentiate between spray applied asbestos fireproofing and plaster fireproofing.

Grace recognizes and approves of the general

desire to limit asbestos fibers in the ambient air. This desire should be weighed in each instance against the benefit to be gained by prohibiting a specific activity. In our judgment the benefit to be gained by prohibiting the use of plaster fireproofing is not commensurate with the continued benefits to the public in having a plaster fireproofing containing asbestos available for use. Especially is this so in a context where there is no data that defines the excess risk, if any, to the public from exposure to asbestos fibers in ambient air and where asbestos fiber emissions attributable to the use of plaster fireproofing are in our judgment less than the point of references presently established by EPA and OSHA.

Accordingly, Grace hereby proposes the following modification to Subpart B-National Emission Standards for Asbestos:

A new subparagraph (n) shall be added to Section 61.21 as follows:

"(n) 'Plaster fireproofing' means any direct-to-steel fireproofing product containing less than 12% asbestos by weight which is mixed, pumped and spray-applied in slurry form and which after application hardens into a plaster with a density of 18 lbs. per cubic foot or more."

Sections 61.22(e)(1) and 61.22(e)(2) shall be modified by deleting the phrase:

"The spraying of any product which contains asbestos," and inserting in lieu thereof in each case, "The spraying of any product, except plaster fireproofing, which contains commercial asbestos."

Section 61.22(e)(3) shall be modified by deleting the phrase:

"Emissions of particulate matters from spraying of any product which contains asbestos," and inserting in lieu thereof the phrase, "Emissions of particulate matter from spraying of any product, except plaster fireproofing, which contains commercial asbestos."

We thank you for the opportunity you have given us to make our views known, and if there is any other data or information we could submit, we would be glad to do so.

I do have two typewritten revisions to the submission that I will leave.

MR. MEGONNELL: Fine.

(Then Grace Exhibits A through G were submitted for the record and will be contained in the files of the Environmental Protection

from asbestos fiber.

MR. MEGONNELL: I was under the impression it was the opposite. They were concerned about the small fibers. I don't personally know, but maybe we will have somebody on that we can ask these questions of.

I think there was an industrial hygiene sampling with regard to the five microns where you can see them with an optical microscope as opposed to an electron microscope that must be used for very, very small particles.

MR. WILLIAMS: I am certainly not an expert, but it was my understanding that was considered more hazardous for longer length.

MR. MEGONNELL: Maybe we will be fortunate enough to get it.

MR. SLAUGHTER: May I ask, I would like to know if you have any idea of the relationship between the actual numbers of fibers that were in that air and the number of fibers greater than five microns in length that you mentioned.

MR. WILLIAMS: In the tests which we have?

MR. SLAUGHTER: In all these tests that you are discussing, do you have any idea how many fibers were really in the air in comparison to that number of five

microns in length or greater?

MR. MARIO FABARICO: If I may?

MR. MEGONNELL: Identify yourself for the record.

MR. FABARICO: My name is Mario Fabarico. I am attorney for W.R. Grace.

We do have data in there which indicates total fibers and then it is broken out into fibers greater than five microns in length.

In one case, the Tabershaw-Cooper data identifies them as asbestos fibers. In the Werby Lab data they are just identified as gross fibers.

MR. SLAUGHTER: So on the total fibers can you tell me how they determine the total number of fibers?

MR. FABARICO: Well, my understanding is that they used the techniques which were approved for determining that kind of thing. They used a millipour filter, as I understand it. Then I forget if it was 37 or 47 millimeters in diameter, but it was a millipour filter, and after they collected the air sampling they took a pie-shaped cut of it and analyzed it according to what I understand to be approved techniques.

MR. SLAUGHTER: With an optical microscope?

MR. FABARICO: With an optical microscope,

but 430 power, as I understand it, and it was a so-called phase contrast illumination.

MR. SLAUGHTER: There is a lot of published data that indicates often as many as one hundred times more fibers in a particular sample than there are fibers five microns or greater in length. They are only measuring those fibers they can see with the optical microscope.

MR. WILLIAMS: In the Werby, total fibers per cc, and one test was 2.0. Fibers greater than five microns per cc was 1.1. Another one was 1.9, and .7, 1.4, .8, so that it is an extreme.

MR. SLAUGHTER: But those are only those they can see with an optical microscope. You can't detect the smaller particles with an optical microscope. That is enough on that one.

MR. FABARICO: Yes, you are correct on that.

MR. SLAUGHTER: I do have a couple of more questions right on that same page.

On page 7, could you tell me who advised you that a fabric filter would limit fibers' emissions to the atmosphere to approximately 0.5 to 1.5 fibers greater than five microns in length? I would like to have that data, because I have been searching desperately.

MR. FABARICO: We searched too, but we called our safety people and I guess they called somebody in Washington, and I understand someone finally talked to a Mr. Crowder at Dorham, North Carolina (laughter), and this was filtered back.

Now, maybe that is not what Mr. Crowder might have said, but that was filtered back.

MR. MEGONNELL: Even if it is what he said, I would suspect he has no basis in fact.

MR. SLAUGHTER: It is the best data that is available, but we would like to find better data and we were hoping that you had found another source.

MR. FABARICO: No. We tried it at the source.

(Laughter.)

MR. SLAUGHTER: Also, with reference to that same paragraph, my question is what fabric filter standards were you referring to?

MR. FABARICO: The ones in Subsection (d).

MR. SLAUGHTER: Permeability and --

MR. FABARICO: Right.

MR. SLAUGHTER: All right. Thank you.

MR. MEGONNELL: Thank you very much.

I just want to comment, without criticizing

anybody's work, I can point to several questions in some of these laboratory reports, like the total flow through the filter was uncertain, and back here, "filter flows were assumed." Nevertheless, they go on and calculate fibers per cc.

It is suspect, I would say, but they are probably in the right ball park.

MR. FABARICO: Well, it is the best data we have.

MR. MEGONNELL: Thank you very much.

MR. WILLIAMS: You are very welcome. Thank you.

MR. MEGONNELL: At this time, we will have a ten minute break.

(After a short recess.)

MR. MEGONNELL: The next witness is Mr. Robert J. Tucker, Pacific Asbestos Corporation.

STATEMENT BY

MR. ROBERT J. TUCKER

PACIFIC ASBESTOS CORPORATION

MR. TUCKER: May I make some prefatory remarks before I get into the paper?

MR. MEGONNELL: Surely.

MR. TUCKER: I included a brochure of my company's facilities for mining and milling activities so that some of you who have never seen an asbestos mine or mill may have an opportunity through those pictures.

MR. MEGONNELL: That includes me, by the way.

MR. TUCKER: And yesterday, I heard an apology of sorts that troubled me. It came after the mercury presentation and from an EPA member who said to the mercury men, "You say it isn't hazardous. Congress, the public and the press say it is hazardous. The EPA is caught in the middle. What do we do?" That is the end of the quote.

History bears out that at least one man washed his hands and bowed to his congress and to mass hysteria, and I submit he was wrong. We would hope that you would ponder these arguments to the exclusion of political, popular and fourth estate pressures and use the common sense and conscience that God has blessed you with and arrive at just regulations.

It is not the purpose of the following remarks to criticize sound environmental control practices or regulations in the asbestos industry, nor to get involved in a highly technical debate because I am not qualified for that. Rather, it is our desire to help place this controversy in its proper perspective, and in so doing, contribute to

sensible environmental guidelines in the processing and use of asbestos fibers.

To do so, therefore, we must draw from our own experience. Pacific Asbestos Corporation, nee Jefferson Lake Asbestos Corporation, near Coperopolis, California, has been in existence over 10 years. In recent years it has become a viable entity in the mining, milling, and marketing of chrysotile asbestos fibers. Our current marketing is international in scope, and each year witnesses an increasing share of the domestic (United States) market. Our production is geared to 40,000 tons of fiber annually, ranging in length from 4 group to 7 and 8 group (as identified by Canadian standards).

Over the years we have improved our dust control equipment and surveillance, so that today our facilities include complex air systems, baghouses, collectors, hoods, shrouds, ad infinitum. Our interest and our continuing emphasis is to provide as clean and as safe a working environment as is possible and economically practical. We are committed to this, and our efforts are continuing to further improve our environment.

Our payroll numbers in excess of 170 employees for both our mining and milling operations. Those employees

must have an annual medical examination including chest x-rays. Since the inception of our mining and milling, not one... repeat: not one... employee has been found to have any indication of a respiratory or pulmonary disease as a result of exposure to asbestos. This is an important fact to remember: that in over ten (10) years our incidence of adverse health effects is zero.

From the myriads of articles appearing in recent monts about asbestos, and from our understanding of the basic premises of the regulations now in discussion, we gather that (1) the association of asbestos and adverse health effects is based on extremely limited and pre-selected evidence, (2) that most of the research has been restricted principally to occupational exposure, and (3) since by virtue of the above, the assumption is that there might (note: "might") be exposure to the general public and to occupational employees to the extent that adverse health effects could result.

We submit that the jury is still out on the toxicology of Chrysotile Asbestos. We believe that to date the proof for the implication of chrysotile fiber is tenuous, and that other mineral species seem to be worse offenders, especially in regard to neoplasms. The fact that most urban dwellers are found on autopsy to have ferruginous bodies in

their lungs seems to indicate that many other things other than chrysotile fiber may be implicated in the problem. Researchers have reported apparent differences in disease development as a function of the variety of asbestos contacted.

Specifically we would like to quote selected excerpts from various recent literature sources:

The epidemiological evidence is insufficiently precise, -- I am quoting now -- largely because of unknown historical factors, to be able to express quantitatively the relative cancer risk associated with different types of fiber. The trend of more recent research is towards increasing the estimate of the difference in risk between exposure to chrysotile alone and to crocidolite. It appears that the use of chrysotile may carry only a very small risk when the dust control is at a level which is now practicable and economic. This is fortunate, as chrysotile is much the most widely used fiber. Crocidolite is probably the one which should be eliminated wherever possible.[1] (The reference to that remark is on the last page.)

Nagelschmidt noted that the recovery of chrysotile asbestos from lung tissue is always low and recovery of amphibole asbestos generally high for human cases.[2] (That reference is on the last page.)

It would appear that crocidilite and, to a much lesser degree, amosite produce mesotheliomas, while anthophyllite and chrysotile do not.[3] (That reference is on the last page.)

The ability of other fibrous materials to produce asbestos-like bodies makes it necessary for positive identification of asbestos fibers to be made.[4] (That reference, No. 4, is on the last page.)

Talc exposure may result in the presence of bodies which are indistinguishable from "asbestos bodies," and may be due to tremolite, a form of asbestos in talc. Whether "ferruginous bodies" are all due to asbestos has never been adequately shown. Animal experiments are also in progress which thus far show that "ferruginous bodies" can be formed after inhalation of talc, glass fiber, and aluminum hydroxide.[5]

We would hope that the studies of the various researchers would continue, and as more identifiable factual information is made known, the regulations should be commensurate with that knowledge.

But to condemn, restrict, or even eliminate certain segments of an industry based on inadequate, incomplete or questionable factual information does disservice

to the industry, to those who have continually worked for a better environment in a positive and constructive manner, is an injustice, and is certainly contrary to the American way.

Our lack of adverse health effects cannot be refuted. But this is not to say that our mining and milling environment presents a surgical room atmosphere. Far from it. Therefore we remain amenable to those regulations which provide for an ever increasing improvement of both our working conditions and the peripheral environment of our facilities. But we do go on record as opposing those regulations which would ultimately economically preclude us from remaining in business or jeopardize our competitive position.

Our advice had never been solicited prior to December in the development of the regulations, and since the publication of the regulations in December, we have not had time to analyze the potential financial impact of these regulations. Until we can do so, specific suggestions, objections, or concurrence must be withheld.

Now, let me move into another sphere here. Our economic contribution sphere is rather large. Our payroll is in excess of $1 1/2 million per year. Our purchases

from suppliers of goods and services exceed $1 million per year. Our contributions to local, state and federal tax coffers is quite handsome. Our use of transportation facilities is extensive. And the quality of our fibers and our proximity to manufacturers west of the Mississippi allow these manufacturers a competitive advantage that their Eastern counterparts enjoy because of their proximity to Canadian sources.

We hope that at no time was the singling out of asbestos made because of its relatively small economic impact in contrast with more factually documented health hazards presaging far greater economic and political collisions.

And we further hope that the regulations were never intended to remove the production of fiber north across the Canadian border to relieve regulatory, surveillance and environmental problems.

We hope that in the final assessment, the resulting regulations will keep this U.S. industry competitive with its foreign competition. Witness what has happened in recent years in certain industries where foreign imports and intrusion have contributed to joblessness and myriads of other burdensome economic disadvantages. Already our pay scale and benefit schedules are considerably higher than our

foreign counterparts. Overly restrictive, unrealistic, and extremely costly environmental regulations could be detrimental to the perpetuation of this industry, particularly if there is an excessive imbalance of wages and environmental controls between U.S. and foreign sources of asbestos.

That is our story, but there are other pleas to make. One is the arbitrary prohibition of spraying products containing asbestos. Admittedly, the applicators initially contributed to an awareness of a nuisance factor through improper housekeeping. And because of the public's propensity to over-react, eventually the nuisance became a toxicological threat to the general public. And this without irrefutable medical documentation.

So now the regulations would prohibit. (If the products contain asbestos) fire-retardant spraying, accoustical ceiling spraying, stucco and plaster spraying, plastic (or gunite) cement spraying, and asphalt emulsion and cutback products spraying. We suggest that proper spraying and control techniques can be employed to minimize emission into ambient air. We cannot condone the elimination of industries to satisfy an ill-conceived theory.

You speak of substitutes for asbestos, yet the characteristics of asbestos fibers make them uniquely

fitted for countless applications. Their thermal qualities, structure, and tensile strength make it impossible to substitute other products quantitatively, qualitatively and economically. And we're not convinced that some substitutes may not be the causative factors of "ferruginous bodies" anyway.

We do believe that fair, practical regulations can assist and guide American industry toward the esthetic and healthy environment we all want. We hope the resultant regulations will encourage this. And we hope that the myriads of local, state and federal agencies that today seem to overlap in authority, areas of concern, and responsibilities may some day be identifiable in one agency.

We plead for time. Your time. In the popular rush to confront the environmental problem in America today, we feel that irreversible damage and injustice could occur. Inadequate health information and hasty regulations could negate the gains of concerned agencies, industries and people everywhere.

Literature Cited:

1. Wagner, et al., Brit Med. Bull 27 71 (1971)

2. Langer, Selikoff, and Sastre, Arch Envir Health 22 343 (1971)

3. Food Cosmet Toxicol 9 281 (1971)

4. Food Cosmet Toxicol 8 207 (1970)

5. Lewinsohn, Brit Med J. Apr. 13, 1968 120

Background Literature:

Wright, Amer Rev Resp Dis 100 467 (1969)

Weiss, Amer Rev Resp Dis 104 223 (1971)

Gross and de Treveille, Arch Envir Health 15 638 (1967)

The Lancet, January 6, 1968 32

Brit Med J., March 23, 1968 778

McDonald, et al., Arch Envir Health 22 677 (1971)

(Brochure submitted by Pacific Asbestos Corporation was received as an exhibit and will be contained in the files of the Environmental Protection Agency at Rockville, Maryland.)

MR. MEGONNELL: Thank you, Mr. Tucker.

You have ten years of experience now in your plant. I don't know how long it takes for injuries from asbestos to take place, but is it possible that it might show go up some day in these workers?

MR. TUCKER: I guess it is possible.

I made the statement that there has never been

one case at our location in ten years. Now, if there is a time and exposure relationship, conceivably it could develop in later years. However, I think most time and dose related studies have been as a result of thirty and forty and fifty years ago in the asbestos mining industry, and, if so, these studies that relate back thirty, forty and fifty years would then tend to develop regulations that penalized us for an industry that existed thirty, forty and fifty years ago that does not exist today.

MR. MEGONNELL: Well, you say the association of asbestos and adverse health effects is based on extremely limited and pre-selected evidence. I won't argue the point, but we have statements from Dr. Weill, Dr. McDonald and some other doctor in the New York hearing that I think refutes that statement. There seems to be well established totally documented irrefutable evidence that asbestos does cause adverse health effects.

MR. TUCKER: From a totally toxicological standpoint, again getting back to the dosage and time element, that does not refute that statement. That some of the general exposures and general employee occupational exposures, I would refute and question whether there is a toxicological effect or adverse health effect. I can base it only on our

experience, where it has been zero.

MR. MEGONNELL: It is a matter of degree, and I think you are correct.

The assumption is that there might be some endangerment to the general public. Is that wrong? If we must make a mistake, will you consider potential health effects or potential economic effects?

MR. TUCKER: Well, let me qualify it this way: I tend to get violently ill when I have to speak in front of a group. I don't think because of my proclivity towards this that this should eliminate all the hearings at which I might appear.

I think the same thing would apply to the references made earlier today in the proceedings where I think we were trying to relate the incidence and where it might happen to one individual out of a million.

I would cite the recent experience in hexachlorophene as possibly a personal answer for our point of view.

MR. MEGONNELL: I think that in these hearings, Johns-Manville set the stage at New York and all others in the asbestos industry, except your group and American Smelding and Refining, seem to agree with it.

We certainly don't want to drive anybody out of business, and I don't even know if that is a realistic threat, because the other producers all say they can live with them. They don't quite agree perhaps that the risk is as great as we have assumed, but they think it is prudent that we do whatever is practical to eliminate even a minimum risk.

MR. TUCKER: Well, I think I said a number of times in my paper that we are certainly amenable to those regulations which will increasingly improve both our working and the peripheral environment of our facility. I have no objection to that, and since we have not had the opportunity to make a complete study of our facilities and in relationship to the proposed regulations, it would be very difficult for me right now to say no, we can't conform, or we can conform.

MR. MEGONNELL: You, in fact, may right now. I don't have any familiarity with your operations.

MR. TUCKER: I don't know. As I say, I don't think our people do. We have got studies going on now. We have got a lot of people working on it.

MR. MEGONNELL: What would be examples of these more factually documented health hazards that we should

be putting our attention to?

MR. TUCKER: With cigarette smoking, anybody who works in the asbestos industry, I think they have found a pretty direct relationship between what is carcinogen or whatever it is. I think asbestos and cigarette smoking, you would have a hell of a regulation to put in there, such as nobody works in an asbestos mine if he smokes.

MR. MEGONNELL: You have probably got a good idea. Did your plant prohibit smokers?

MR. TUCKER: No.

MR. YOST: Why not?

MR. TUCKER: I would have to be small potatoes. In relation to the asbestos industry, making a step like that, and with the union and all these other problems, and I think there is an educational thing too, how do you tell the union? You know, your hiring practices have to be fairly broad anyway nowadays, and if you eliminate on the basis of smoking, you had better have some guns along with you when you do it, and I think maybe the rest of the people in the asbestos industry should come along and do the same thing simultaneously.

MR. MEGONNELL: Thank you very much, Mr. Tucker.

MR. TUCKER: Thank you.

MR. MEGONNELL: Next is Dr. Stanley Rokaw of the Tuberculosis and Respiratory Disease Association of California.

(There was no response.)

MR. MEGONNELL: Apparently he has not arrived yet.

Mr. J. F. Hunter, BSAF Syandotte Corporation.

STATEMENT BY

MR. JOHN F. HUNTER

CORPORATE MANAGER OF ENVIRONMENTAL CONTROL

BASF WYANDOTTE CORPORATION

MR. HUNTER: Mr. Chairman, ladies and gentlemen:

I am John Hunter, Corporate Manager of Environmental Control for BASF Wyandotte Corporation. As a graduate chemical engineer, I have been employed by my firm for 24 years, the past 17 years of which have been devoted exclusively to pollution control activities. I am pleased to be here before you today to discuss the proposed emission standards currently under consideration by the Environmental Protection Agency. My brief comments

will be limited to a discussion of the proposed mercury standard of 5.0 pounds per day from a single source.

BASF Wyandotte Corporation and one of its predecessor companies, Wyandotte Chemicals Corporation, have produced chlorine and caustic soda by the mercury cell process for 34 years in the United States. Others in the UM.S. have utilized this same basic process since 1895 and its European history dates even further back. In our activities, dating back to 1938, we have operated four such plants in three different locations, Wyandotte, Michigan, Geismar, Louisiana, and Port Edwards, Wisconsin.

It has been our practice -- and to our knowledge standard practice in the industry -- to closely control the loss of elemental mercury in the internal, or working atmosphere of our plants since mercury vapors in sufficiently elevated concentrations were known to represent a potential health hazard to our employees.

In March of 1970, upon the discovery of mercury in certain fish and waterfowl, all waste water losses of mercury from mercury cell chlorine plants were subjected to emergency controls as evidence seemed to indicate a link between these inorganic mercury discharges and the concentration of methyl mercury in certain fish and waterfowl.

The chlor-alkali industry as a whole responded with a massive effort to identify and eliminate all sources of mercury to the aquatic environment from mercury cell process chlorine plants. As you are aware, that effort has been most productive, not just in significantly reducing chlor-alkali losses of mercury to the watershed, but by reducing mercury loss to the total environment. This has not been achieved without considerable expense and dislocation of resources, and in the shutdown of three plants and the resultant loss of jobs. My company alone has spent well over one million dollars in capital and increased operating expense, with another $650 thousand appropriated for this year. We have redirected the activities of teams of scientists, engineers, plant operators and maintenance personnel in achieving substantial control results. Some of our expenditures and efforts were misdirected and later found to be unnecessary -- a waste generated by the desire of everyone concerned to take immediate corrective action on a threat to the environment that was, at best, ill-defined.

This unprecedented effort was undertaken by the industry even though the relative effect of such discharges on the total environmental mercury balance and more specifically the role played by these discharges in

the concentrations found in fish and waterfowl were then, and still are, of considerable scientific debate and study.

While it might be redundant to those here in attendance, I think it is important that the record of this hearing show that the highly publicized cases of human mercury poisoning -- in Japan, at Minamata and Nigata and here in the U.S. in New Mexico -- were isolated incidents of massive ingestion of alkyl mercury contaminated foods which were in no way related to inorganic mercury, especially that which might have entered the environment as discharges from chlorine and caustic soda plants.

First, these cases both involved mercurialism that resulted from human consumption of foods resulting in intakes of alkyl mercury of an entirely different order of magnitude than that under consideration here from human inhalation of inorganic mercury vapors. Secondly, each contaminated foodstuff was directly exposed to alkyl mercury-not inorganic mercury. Further, the toxicity of organic or methyl mercury involved in those incidents is many times greater than that of inorganic or elemental mercury.

This brings us to a very fundamental question regarding the proposed mercury standard which, as previous testimony indicates, was developed assuming an equivalency

in the toxicity of these two very different forms of mercury.

If an emission limit is warranted, we believe that it should be developed upon a more reasonable basis than that indicated in the Background Information document. The derivation from an allowable ambient air level of one microgram per cubic meter, arrived at through an assumed equivalency of mercury vapor exposure to methyl mercury exposure, is questionable in the extreme. The background information document cites, as the sole support for this rationale, the "subtle effects" associated in the R.G. Smith report with exposure to mercury vapor levels which approximate the methyl mercury intakes that Swedish research has characterized as unsafe. It should be noted that these subtle effects were subjective, worker-reported symptoms such as: loss of appetite and loss of weight. Subsequent, objective measurements have failed to substantiate the measurable weight loss factor with exposure. We submit that the reversibility of inorganic mercury vapor exposure effects, its greater excretion rate, and the long history of industrial exposure experience all show it to be considerably less hazardous than methyl mercury.

Aside from arguing the mechanics of arriving at a standard, we feel the need for an inorganic mercury

atmospheric emission standard for chlor-alkali plants is highly questionable. I personally know of no evidence, and there is no evidence available to my company in its long experience in operating mercury cell chlorine plants, that inorganic mercury emissions have caused any human sickness or illness in the general population living in the vicinity of such plants. In fact, to our knowledge, no evidence of such effects has been revealed in the closely monitored population working within chlor-alkali plants who are exposed to concentration levels considerably higher than any to be expected in the neighboring ambient atmosphere. This, in spite of the fact that such plants have been operating for nearly 70 years.

Our objection to the proposed mercury standard then is based on the lack of medical evidence which would identify airborne mercury losses from chlorine plants as even remotely hazardous to public health. The evidence from a practical point of view overwhelmingly refutes such a charge against atmospheric discharges of inorganic mercury -- in fact, as stated before, we know of no cases where such discharges have caused human sickness or illness even among those employed in the operation of the mercury cell chlorine process. We are not citing a hypothetical model, or a

theoretical case, or even a representative sample. We are talking from documented medical histories of thousands of employees who work millions of man hours in these plants -- about thousands of people who live nearby. Surely with that kind of history of exposure, even the most unlikely potential threat would not be a recorded fact.

Perhaps others testifying at these hearings can or will produce previously undisclosed studies or data to the contrary, but we believe that the establishment of the proposed Environmental Protection Agency mercury standard cannot be clearly justified on the basis of medical evidence. There is no demonstrated case for need.

In summary, BASF Wyandotte stands opposed to the proposed EPA standard regarding mercury losses to the environment on the grounds that:

1. The proposed standard is based on an erroneous fundamental principle of toxic equivalency between organic mercury and inorganic mercury.

2. Our industrial hygiene experience and that of the chlor-alkali industry in general indicates that there is no medical justification for the restriction.

We would recommend that EPA defer establishment of a firm emission standard until need is fully

demonstrated.

We, like all responsible industry, recognize, and can have no quarrel, with the need for the establishment of restrictions to our operations in the interest of the public well being. However, in our own self interest and in the interest of the public, who must ultimately bear the cost burden of increased control, we must object to those restrictions which cannot be fully and adequately justified as serving the betterment of man or society.

Thank you.

MR. MEGONNELL: Mr. Hunter, I have heard your statement and I think it is substantially the same as we have heard from the Chlorine Institute and several other of your colleagues, and I won't burden the recorder with asking redundant questions.

Thank you very much.

I understand Dr. Stanley Rokaw has arrived and we will hear from him next.

STATEMENT BY

DR. STANLEY ROKAW

TUBERCULOSIS AND RESPIRATORY DISEASE ASSOCIATION

OF CALIFORNIA

DR. ROKAW: Excuse me for being late. There is an epidemic of delays in the community this morning.

I have some rather general statements to make. I hope the physicians who will follow will be more to the point of numbers.

I think that the substances in question have to be regarded as human health risks, and that is true of each of these entities. I have had clinical experience with some cases. I realize that these are generally individuals who have had exposures beyond that which might be experienced in the community air.

Nevertheless, with beryllium, certainly, this disease has to be managed, and I think this substance has to be regarded with great caution, and therefore, standard setting is by all means indicated.

The problems with beryllium that I have had in clinical practice have been in at least three individuals. That is a fair number for a small town to see in society. Two of these individuals who knew they were working with beryllium and, unfortunately, did not know the risks at the time that they were exposed. They were not acutely ill. They did not develop disease until much later in life, and this is one of the great hazards with this particular substance

which must be kept in mind.

One of the individuals had no idea that he was working in this field, and this brings us to a point which I think may be an omission in the total control concept. This latter person was involved not in the manufacture or the processing of material; he was actually an electrician who was employed by this county on remodeling work, and in this remodeling work, long after fluorescent tubes no longer had beryllium, he was asked to renovate the electrical facilities of one of the buildings in this community, and the process involved his taking out the old fixtures and breaking them up and throwing them away, and in the course of this, I am quite certain this man acquired his beryllium disease, which then became manifest in respiratory failure some fifteen years later.

I went through the problem of lung biopsy to prove the presence of beryllium and proved that this was indeed a source of exposure, and he was given compensation for this. Unfortunately, he did not survive long because of the development of lung cancer, which is one of the complications that has arisen as berylliosis.

It therefore, I think, becomes important in terms of all the standard setting and control devices,

to worry not about what is currently being produced but what our society has stashed away as a sort of time bomb, where unsuspecting individuals may work in it or in some other fashion receive the benefits of this material.

The same sort of caution, I think, applies to asbestos. The people that I have seen in this community with asbestosis, some have been workers in plants which used asbestos fibers, but others have been involved in the renovation of insulation systems, of construction of systems like this, and in considering the propensity for the use of asbestos in the industries of our society, even if we control the putting up of the material and the spraying and the dust control which has been proposed and, indeed, enforced in some cities, we will have to worry down the road about the destruction of these buildings as the big balls hit the walls and throw the dust up into the atmosphere.

I am concerned about mercury because of the sporadic evidences that I have seen in laboratories where good control of inorganic mercury used in instruments has not been maintained. The material has been spilled, gotten into duct systems and produced levels which seem to be involved in the development of behavioral abnormalities and the early disease state that is associated with mercury.

I think it is important to recognize that inspired mercury, that which enters the system through the respiratory tract, has, as with lead, a greater body burden phenomena than that which is ingested.

It is to these points that I wish to address myself, that these are not innocuous substances, that with beryllium certainly an aspect from a human responsiveness to a given challenge level with this disease exists, that community air pollution with beryllium has been recorded in previous years before controls were well established and the process recognized, but that involved in this is a different susceptibility, if you will, of one individual as against all of his neighbors to this material.

The same concept has to be applied to asbestos and to mercury. Certainly, the individual can potentiate these things by himself, smoking cigarettes, and in a society where we have not knocked down cigarette smoking at all effectively, one has to consider the potentiation of even low levels of these substances in the air from this habit and from the other community air pollutants.

I think that is all.

MR. MEGONNELL: Thank you, Dr. Rokaw.

I tried to make some hurried notes. There was one sentence and I am not sure I have it right. Did you say that it is your opinion that inspired mercury --

DR. ROKAW: I think the body burden of mercury which enters the body through the respiratory tract is greater, greater in lingering time in the system, than that which is ingested.

MR. MEGONNELL: I see. I don't have any particular questions.

I certainly appreciate your coming here and giving us your practical experience.

Do you practice in Los Angeles?

DR. ROKAW: I have a consultant practice in Lynwood which is twelve miles out from downtown, and I have seen these problems as a consultant, and for some of them, unfortunately, they can't be managed.

MR. MEGONNELL: I think you bring in some very interesting things about the possible after effects which you will begin to see with the passage of time.

I have been quite concerned about the demolition of buildings, even though I am pretty firmly convinced that in the application of some of this asbestos insulation we can avoid the problems, but when you tear

the building down and crack up the plaster, I am not so sure.

MR. ROKAW: We have inherited this problem certainly with lead and the paints that have been put on thirty and forty years ago.

Because of the lack of appreciation of the general public or even the small industrial user of a long ticking hazard such as this, I think we need to enforce dust control in that kind of operation.

MR. MEGONNELL: Thank you very much, Dr. Rokaw.

DR. ROKAW: Surely.

MR. MEGONNELL: Next is Dr. John Allen of the Puget Sound Air Quality Control Region.

STATEMENT BY

DR. JOHN D. ALLEN

ON BEHALF OF

AIR QUALITY COALITION

PUGET SOUND AIR QUALITY CONTROL REGION

DR. ALLEN: Gentlemen:

As a member of the Air Quality Coalition of the State of Washington, President of the Washington Thoracic Society, and a concerned internist practicing the subspecialty

of pulmonary disease, I wish to express our hope that your Agency will put meaningful regulations into effect to protect the general public against present hazards posed by asbestos, beryllium and mercury contamination of our air.

Beryllium and mercury may be major health hazards, and our group would strongly endorse the proposed regulations your Agency has set forward as being an early first step needed to begin control of these pollutants in many parts of the country. Our state is not as affected by these as by asbestos, and because of this I will devote my remaining comments to asbestos control.

I will try not to be redundant and repeat the comments of Dr. Rokaw. I think he has presented many of the problems that beryllium and mercury present very well. Perhaps I can comment somewhat more on asbestos, which is more of a problem in our specific area, and although it is rather sophisticated, I would commend for the reading of anyone in the audience that has not done so a nonmedical publication, the New York Magazine dated October 12, 1968, which has an article on page 117 entitled, "Magic Mineral," a rather long article, but as good an article on the problems pro and con that asbestos produces in our community, as I think I have ever seen.

Medical evidence since that time has perhaps emphasized the points as stated, that the levels of tolerable contacts with asbestos are even less than we had thought previously, but, in general, that is an excellent article and I would endorse it.

It is sad that only in the last ten years we have begun to fully appreciate the sizeable danges which low levels of asbestos exposure pose to the individual inhaling this dust over long periods of time. Asbestos has been a very useful material to industry because it is virtually impossible to destroy. But in many ways it is this very quality and its persistence in the human lung for decades after being inhaled which seems the basis for the health hazard which it poses.

Health damage from asbestos may be in the form of lung cancer or in the form of pulmonary fibrosis, a situation in which scar tissue is formed within lung tissues in a gradual and progressive fashion to the degree that it prevents oxygen absorption. Pulmonary fibrosis is the easier health effect to discuss since it seems in large part related to the duration and amount of asbestos exposure. Pulmonary fibrosis is rare in general population groups near asbestos exposure areas, but occurs with all too great a

frequency both among workers working directly with asbestos as well as other workers employed in the immediate vicinity. Concentrations of only one fiber of asbestos per cubic centimeter are felt great enough by the British Occupational Hygiene Society to produce asbestosis in one percent of individuals exposed to this concentration during daytime hours as part of their working life. Obviously, however, standards which apply to middle-aged workers do not apply to children, and standards which apply to a forty-hour week cannot apply to a 24-hour day in terms of relative exposure and cumulative damage in the population at large. Because of these factors, safe limits for the general population may have to be one-tenth those suggested for workers by the British Occupational Hygiene Society.

The other risk posed by asbestos is lung cancer, and unfortunately no safe level of exposure is known for asbestos as it relates to the increased risk of both bronchogenic squamous carcinoma and adenocarinoma of lung. It is known that the exceptionally small amounts of asbestos may lead to pleural thickening and to a type of pleural malignancy known as mesothelioma which is felt by many to occur only in the individual exposed to asbestos. In many studies of asbestos workers, the death rate among

asbestos workers is twice that of the general population, and the difference has been found to be the number of lung cancers occurring in this group of individuals. Since the basic origin of a human cancer would seem to relate to the transformation of a single cell from a normal cell to a malignant one and its progressive proliferation, it may well be that the risk increases with the number of asbestos fibers in the lung but that a single fiber may in specific circumstances be responsible for producing a human cancer. In this sense, there can be no "safe" level of asbestos fibers in the community without risk for the public at large.

Although there is no evidence of asbestos linked disease in the general population at this time, the presence of asbestos in their lungs is disturbing. Electron microscopy of the lungs of urban dwellers has shown the presence of asbestos fibers in as high as 50 percent.

Let me add parenthetically, previous speakers this morning have cast a certain amount of confusion, I think, about ferruginous bodies and asbestos fibers. Ferruginous bodies are visible under the ordinary microscope and are present in patients with asbestos exposure,

but there are occasional other materials which may produce them. Studies, however, in Los Angeles, demonstrating that half of the general population coming to autopsy have asbestos in their lungs, is based on electron microscope studies, and those studies do not have this confusing factor. Electron microscopy is quite definitive in documenting asbestos.

Equally disturbing is the fact that asbestos diseases have a long latent period as Dr. Rckaw has pointed out, twenty years or more may elapse between exposure and the occurrence of disease.

In our home city of Seattle, measurements were made by our local university during construction of a 50-story bank building whose girders were being sprayed with asbestos insulation. Not surprisingly, quite significant amounts of asbestos were present at the street level, swirling around pedestrian walkways unbeknownst to the humans passing by. This type of risk is avoidable and must be stopped. The dumping of asbestos in any area in which the wind can pick it up and carry it for miles until trapped by human lung again presents an indefensible industrial procedure, and should be stopped. It should be stopped not only near road construction, but such dumping should be covered

and not left open to the air wherever it occurs. Ambient air levels surrounding plants which use or produce asbestos should be monitored and levels not greater than 0.1 fiber per cu. mm. should be permitted. Cloth materials of many sorts are made with asbestos fibers, and the amount of asbestos which they contain should be clearly labeled and this Agency should be interested in the frequency with which measurable amounts of asbestos drop out of such cloth materials.

This occurs more frequently with solid materials containing asbestos, but an article in the New England Journal of Medicine, December 2, 1971, documents measurable and distributed levels of asbestos present in ambient air for workers who were sanding asbestos floor tiles.

Lastly, this Agency should investigate and propose to restrict the use of asbestos in automobile brake linings within the next few years. There are millions of automobiles on our highways, and in each traffic jam the squealing of brakes also bears testimony to the pulverizing of a definite amount of asbestos brake lining material which will then be deposited on the roadway in the form of dust, only to be swirled into the air and inhaled by a motorist further down the line. This presumably is the major reason for

the high frequency of discovery of asbestos fibers in urban dwellers, and alternatives to asbestos brake linings should be required with a reasonable period of time by Detroit to find a safe alternative.

A recent report prepared by a National Academy of Sciences panel has called for control of asbestos emissions at the source and for protection of those who are exposed in their occupations as well as for further research on the biologic effects and physical characteristics of asbestos fibers. Such data are strongly and urgently needed. Although we endorse these recommendations, we want to underline the urgent need for technical controls based on existing knowledge now. Since we are dealing with a mineral which produces its damage after a long latent period of twenty years or more, we cannot delay effective control pending such studies, and I strongly advise this Agency to proceed with vigor not only to implement the regulations which you have proposed but to cover the many additional areas wherein asbestos exposure is a present health threat to our citizens.

MR. MEGONNELL: I appreciate very much your statement, Dr. Allen.

You have got some rather sobering sentences

in it, as far as I am concerned. I was of the opinion too that we were concerned about one fiber, and I think your paper does point out that fact.

Is there any official U.S. counterpart position to this British occupational hazard?

DR. ALLEN: Not that I know of. This is a governmental agency in Britain and I think our government does not write medicine quite the way that Britain does.

MR. MEGONNELL: I am sure the National Institute of Occupational Safety and Health must certainly be aware of this.

DR. ALLEN: And the National Academy of Sciences has made the statement, which I quoted, which did not come out with a definite number, but is certainly an area of concern for that group.

MR. MEGONNELL: You suggest, I think, what should be a standard of one-tenth fiber per cubic millimeter. Is that the recommendation of any group such as the Thoracic Society?

DR. ALLEN: The recommendation of our Thoracic Society -- I think that there is nothing magical about this. As you know, as we suggest, one fiber may be enough to produce a human cancer and, as such, we are confronted with a mineral

which has a place in our society and a very real industrial use and you have to weigh the amount of disease which it produces against the health effects which it also produces.

I think that is not easy for a doctor or for this agency to weigh, but I think it is amazing how little information medicine had ten years ago on the health effects of asbestos and how much very hard statistical evidence is available now indicating the dramatic and the really frightening incidence of cancer among people exposed to asbestos. We did not know that ten years ago.

I think it is very troublesome to me to think that we would defer action waiting for additional studies.

The earlier speaker this morning, Mr. Tucker, whose plant has been in operation ten years and has no health effects, of course he has no health effects. He will, but he does not have now.

MR. MEGONNELL: You mentioned brake linings. Are you also concerned about talc, talcum powders?

DR. ALLEN: There is no information to my knowledge on the risk from talc. I think we need some information about what talc does to people, but we don't have any information on that, to my knowledge.

MR. MEGONNELL: It is certainly a ubiquitous

source. That is what concerns me.

DR. ALLEN: Yes.

MR. MEGONNELL: It probably could account for some of the ferruginous bodies.

DR. ALLEN: It may account for the ferruginous bodies in some individuals, but when I say half of Los Angeles has asbestos in their lungs, that is not based on ferruginous bodies; that is based on electron microscope data.

MR. MEGONNELL: Thank you, Dr. Allen. I appreciate it very much.

The next witness is Mr. Robert Lunche from the Los Angeles County Air Pollution Control District.

STATEMENT BY

MR. ROBERT G. LUNCHE

CHIEF DEPUTY AIR POLLUTION CONTROL OFFICER

LOS ANGELES COUNTY AIR POLLUTION CONTROL DISTRICT

MR. LUNCHE: Mr. Megonnell, Mr. Yost: For the record, I am Robert Lunche, Chief Deputy for Los Angeles County.

The Los Angeles County Air Pollution Control District does not have any medical data to offer which will substantiate or refute either the need or the numbers for

emission standards for asbestos, mercury or beryllium.

The Air Pollution Control District remarks are therefore directed to the practical aspects of administering and enforcing standards for those contaminants and pointing out the potential problems.

Even here we do not claim to have discovered all the potential problems, but only a few.

I would like to begin with commenting on the emission standards for asbestos.

The methods available for detecting asbestos admittedly are cumbersome and limited. Nevertheless, those are not sufficient reasons for a nebulous, probably variable standard based upon not exceeding emissions from specific control equipment. In the same issue of the Federal Register, which published the proposed Hazardous Materials Standards, quantitative Occupational Safety and Health Standards for asbestos particles were set by the Department of Labor. I other Federal agencies can set specific limits, EPA also should be able to do so.

As proposed, any discharge no matter how minute or insignificant, must be equipped with a control device whose emission must be measured and somehow compared with the emission probable from another control device.

For example, under the Proposed Standards an air stream containing only one asbestos fiber per cubic foot must be controlled. But to what extent? The Standards do not give any efficiencies for the control devices specified. Instead, they tell us that the emissions must be controlled to some extent as if the air were vented to a specified control device. We submit this control standard is not standard at all. We recommend that EPA adopt a firm, definitive numerical emission standard.

2. No restrictions are imposed on trucks hauling asbestos products. Thus, open trucks carrying asbestos can disperse asbestos along roads and highways with impunity. EPA must control emissions from these mobile sources.

3. No limits are imposed for disposing of asbestos wastes. Wastes may, therefore, be blow into the air, dumped, etc., without restrictions. EPA must restrict these sources.

4. While baghouses are frequently specified as control devices in the Standards, the accumulation of asbestos on the clean air side of a baghouse after repair or bag replacement is not stated to be objectionable or a violation of the Standard. EPA should make such a statement

in their specifications for control devices.

5. The incineration of bags or containers previously used to package asbestos is not prohibited or limited. EPA should prohibit the incineration of these containers.

6. The Standards specify the permeability of filter fabrics used in baghouses. The permeabilities of 40 and 30 are too high except that 30 would be acceptable for felted fabrics. Standard filter fabrics should not exceed a permeability of 20 and a permeability of 15 is deemed more acceptable.

7. Cyclone separators are specified as possible control devices and are required to operate at a 7" pressure drop. This requirement does not insure that the cyclone will yield the requisite efficiency. An otherwise inefficient cyclone can have a high pressure drop if the capacity of the cyclone is exceeded. For that reason, EPA must provide that the cyclones operate below maximum rating.

SPECIFIC COMMENTS ON PROPOSED BERYLLIUM EMISSION STANDARDS

1. The two alternative standards for beryllium emissions give the operator a choice of using ambient air standards or a source emission standard. The ambient air

standard gives the unscrupulous operator an opportunity to locate sampling facilities in a way that apparent compliance is achieved. While EPA theoretically reviews the location of sampling stations, we believe that the judicious choice of location by the operator will easily circumvent the intent of limiting beryllium emissions.

2. Ambient standards allow the use of tall stacks to dilute the emissions without a reduction in total air pollution. Under these conditions, the ambient air concentration at the plant's boundaries may comply with the standard but the downwind concentration may exceed the allowed limits. In our opinion, the choice of ambient or source standards is unacceptable and EPA should enact the source emission standard only.

3. The ambient air concentration allowed under the standard is given as .01 microgram per cubic meter averaged over a 30-day period. If .01 is just below the hazardous level, then the requirement for 30-day averaging will result in situations which are hazardous to the public as well as plant workers. For example, peak readings exceeding the limit by many times are possible for several days, followed by very low readings which result in a complying 30-day average. For this reason, if EPA must enact an ambient

standard, they should revise the averaging time to a much shorter period.

4. The earlier standard, which we reviewed, limited the open burning of all beryllium wastes to a maximum of 4 grams per day. The proposed standards do not restrict open burning at all. EPA should restrict these operations.

SPECIFIC COMMENTS ON PROPOSED TEST METHODS

1. Section 2.1.2 specifies a probe heated to 250°F. Since there is no dry filter preceding the impingers, we believe the heated probe is unnecessary.

2. The test mthod specifies the use of pyrex and stainless steel in the probe and nozzle. This requirement is cumbersome and unnecessary and a single probe will suffice.

3. Sections 2.1.7 and 2.25 are identical. One or the other should be deleted.

4. The sampling train illustrated in Figure 1-1 shows five impingers. Section 4.4.1 specifies the contents of four impingers but gives no information of the fifth inpinger.

5. Section 4.4.2 specifies a 15" Hg vacuum when checking for leaks. We believe that a 6" vacuum will suffice for leak detection.

6. Method 1 (mercury in particulate and gaseous emissions), Section 4.1.2 specifies sampling at a number of points. We do not agree that the minimum number of points specified is a necessity. Such a specification only creates additional duplication, expense and unnecessary work. In most cases our experience dictates that adequate representative samples could be obtained when sampling as few as one to two points representing points of average stack gas velocity. This same observation has been previously submitted to EPA in connection with their particulate sampling method. Only in extreme cases of poor flow conditions would we sample at more than four points for stacks of any diameter.

We note that an acid absorbing tube is used for the sampling train for Method 2 (See Figure 2-1 on Page 23250). Since this is necessary in Method 2, a similar acid absorbing tube must also be included for the particulate sampling train shown in Figure 1-1, Page 23246.

7. Method 2 (mercury in gaseous emissions), section 2.1.2 specifies midget impingers when the full sized Greenburg-Smith impingers will work as well. If the regular size impingers are used, then the condensates can be measured volumetrically as described in paragraph 4.5.1. However, if midget impingers are used, then the condensate

must be measured by gravimetric means. We believe that the larger impingers are preferred. Under 4.5.1 the processing of the silica gel is omitted; this must be described in a similar manner to paragraph 4.6.1 for Method 1. Although the acid absorbing tube has been used in this train, no mention is made of it further under processing or clean-up of equipment.

8. Method 3 (beryllium), Sections 2.1.2 and 2.1.4 describe heated probes and heated dry filters, which are also shown in Figure 3-1 illustrating the sample train. Since all equipment is to be washed and rinsed into sampling containers after sampling, there is no need to employ and dry technique for collection of the particulate matter. It is much less cumbersome and less tedious to employ a wet collection method in the first place, such as the APCD impingement method, and save all the extra steps and labor involved.

9. Method 3 (beryllium), Section 2.1.5 describes modifications in the standard Greenburg-Smith impingers, i.e., replacing of the tips with 1/2" ID tubes, and the use of glass ball joint fittings rather than sampling tube connections. This is not in any way better than using the Greenburg-Smith impingers in their standard form. In the collection of particulate matter, we see no reason for use of glass ball

joint fittings after the entrance to the first impinger, and in most cases this fitting also can be replaced with rubber or plastic connections.

10. Method 3 (beryllium), Section 2.1.7 and 2.2.5 are identical.

11. The processing described under Method 3 (beryllium), Section 4.6.1, can be considerably simplified. For example, containers 1 and 2 can be combined (not using a filter in the first place would simplify things), and the probe washings, of course, must be included with the collected sample. There is an error in 4.6.1 in that EPA does not specify washing the probe surface with water as well as with acetone. As a matter of fact, acetone washings may not be required. As a further suggestion, it might be well to wash all sample-exposed surfaces with nitric acid, if it is suspected that some particulate matter has not been dissolved by washing with water. Under Section 4.7.1, our analytical laboratory recommends that the sample be heated to fumes after addition of concentrated nitric acid to insure the destruction of organic matter. <u>It is extremely important that all organic matter be destroyed before addition of perchloric acid as a serious explosion hazard exists with organic materials in contact with hot perchloric acid.</u> For

this reason the procedures described in Section 4.7.1 and 4.7.2 should be undertaken only by qualified chemists.

MR. MEGONNELL: Thank you, Mr. Lunche. I think we agree with you, we should have a numerical standard. We would like to have a numerical standard for asbestos, but we are just not smart enough to come up with one.

MR. LUNCHE: Our point was to register the occupational standard by the Labor Department which did set numerical standards.

MR. MEGONNELL: It is five particles greater than five microns by optical microscope. We don't think it is good enough. It may be good plant monitoring, but in view of Dr. Allen's testimony, I have serious doubts as to whether it has much meaning in the outdoor atmosphere.

I must agree with you that we should be controlling dust carrying asbestos material from dumping areas. I imagine you are speaking of disposal of demolition debris primarily?

MR. LUNCHE: That, and also any asbestos bags in trucks which leak which can be distributed to the atmosphere.

MR. MEGONNELL: We think we have some control over the beryllium ambient air sampling network. We do have

final approval and, of course, our meteorologists will review the calculations of the applicant and so forth, and we will pretty adequately get into the field of spectrums.

I think there are also some safeguards in levels higher than 0.01 and, for example, four-day schedules, I believe. Some of this, I think, is taken care of, but it is well that you pointed it out.

Now, when you come down to sampling, we thought we were doing just right, because our people are former Los Angeles County employees who specialized in sampling, you know (laughter). I have always myself thought that a little bit too text booky for me. It is fine for research, but I would like to see something a little simpler for enforcement, for routine application, and if you can convince these fellows to cut down the number of sampling points and all that, I am all for you. I will hear from them later.

Thank you, Mr. Lunche.

MR. LUNCHE: Thank you.

MR. MEGONNELL: Mr. Warren Darrell and Mr. P. S. Bettoli of GAF Corporation.

STATEMENT BY

MR. WARREN DARRELL

DIRECTOR OF MANUFACTURING

INDUSTRIAL PRODUCTS DIVISION

GAF CORPORATION

MR. DARRELL: Mr. Megonnell, I would like, in the interest of saving time, to request that the written statement, of which you have a copy, by Mr. Fraser, Vice President of GAF, be entered into the record, and I would like to request that although I have a prepared statement, there will be some departures from the exact text.

MR. MEGONNELL: All right, fine. We will reproduce Mr. Fraser's comments.

MR. DARRELL: Thank you.

My name is Warren Darrell. I am Director of Manufacturing of the Industrial Products Division of GAF Corporation. I have responsibility for the manufacturing operations in fifteen of the GAF plants including five mineral product mining and milling facilities, a paper plant and several textile plants, and an asbestos mining and milling

facility in Hyde Park, Vermont.

Since 1946, I have held supervisory positions in asbestos using manufacturing plants and have also been associated with asbestos mining operations since 1961.

I am here to discuss the proposed emission control standards for asbestos, as well as the results of certain studies dealing with the effects of asbestos on the health of the general public.

As you know, the Federal Clean Air Act of 1970 and the Hazardous Substances Section of said Act authorizes the promulgation of these proposed standards. This Act was passed to protect the health of the general public from certain hazardous elements found in the ambient air. Asbestos, mercury and beryllium were described as hazardous substances during the congressional hearings on said Act.

I am going to skip a piece here.

For purposes of this discussion, it is assumed that there is a need to regulate asbestos dust based upon the medical findings. We request, however, that EPA standards regulating asbestos emissions be based upon all the facts that are presently available to protect the public from hazardous quantities of said material, but that such standards not be so drawn so as to protect against risks

that do not exist and not be so stringent that they cannot be complied with on a technological basis.

These proposed standards in question encompass the following:

The prohibition of emissions from stationary sources except from specified filter media; and the prohibition of visible emissions from dumps, storage areas, external conveyers and tailings dumps. I am prepared to discuss these areas in light of our experience with asbestos.

Emissions From Stationary Sources:

As Mr. Fraser stated, GAF operates an asbestos mine and mill in Vermont. This operation is a key GAF plant. It produces chrysotile fiber for our domestic and foreign customers and also supplies fiber for our own manufacturing of building products. This mine and mill is a typical chrysotile asbestos mine and is representative of some chrysotile asbestos mines in the United States and in Canada.

We have made a preliminary study of this mine and mill in regard to the proposals. As a result of the study, we have concluded that there is technical knowledge available to comply with the filter media requirements. As a matter of fact, GAF has, for the last several years, been

utilizing collectors on certain dryers with success in reducing fiber emission significantly. However, such compliance can be achieved only at great cost to the company. We estimate that it will cost GAF in excess of $800,000 to comply with the proposed standard at the Vermont facility, and this dollar figure applies only to those standards that we know we can comply with or could technologically comply with.

I would just like to digress, in that the dollar figure of itself is not of great importance, except that, as I will point out later, there are certain standards that we feel we cannot comply with, have no way of knowing how to comply with, and the expenditure of $800,000 will be wasted if certain of the standards as proposed go into effect.

Visible Emissions:

On the other hand, we have been unable to conceive of a method to cope with and measure visible emissions, as they are presently defined in the standards, especially from tailings piles. This is based upon a search throughout the industry and known technology, as well as certain governmental surveys which conclude that emissions from tailings piles cannot be reduced to zero with the present

state of technology.

We are, however, continuing to increase our knowledge of tailings and the emissions therefrom. As you know, tailings can be piled several hundred feet high and cover large areas. We are investigating the possible stabilization of tailings piles with vegetation, but these investigations are at a preliminary stage and they could continue for many years.

As an aside, these have also been tried by others with varying degrees of success and lack of success in covering asbestos tailings piles with vegetation. It does not seem possible that we can reduce visible emissions to the prescribed limit of "No visible emissions" within the two year waiver period provided in the regulations.

However, a threshold question as to the treatment of tailings dumps relates to whether in fact they constitute a health hazard. There are relatively insignificant amounts of asbestos in emissions from our tailings. I would say that this is an observation. We run into the same measurement problems you people run into. However, the free asbestos fiber in our tailings constitutes less than one-half of one percent of the material in a tailings dump. The remainder consists mostly of serpentine rock. This

minute percentage of free asbestos is the result of a GAF program in which new equipment was installed in Vermont permitting greater extraction of fiber from the host rock, which host rock eventually becomes the tailings material.

Gentlemen, that is the crux of our business, getting the fiber out of the rock in the first place. That is what we are trying to do.

MR. MEGONNELL: The more you get, the happier you are, I'm sure.

MR. DARRELL: Yes, or have been until some of the comments have been made (laughter).

Furthermore, the forces of nature further reduce emissions of asbestos fiber tailings. The consolidation of the tailings themselves, rain, or a significant snow cover during the long Vermont winters and the entrapment of fibers in the porous rock of the tailings serve to reduce the possibility of emissions.

Therefore, if one takes into consideration the minute percentage of fiber in our tailings, the reduction of emissions due to natural phenomena and the dilution of emissions, one could conclude that any emissions that do occur are not of such significance to constitute a health hazard to the general public.

We seriously question how the minimum amount of asbestos fiber released from our tailings piles could be hazardous to the health of the surrounding community adjacent to our mine.

Page 31 of the report published by the National Academy of Sciences, entitled, "Asbestos -- The Need For and Feasibility of Air Pollution Controls," concludes as follows:

"Industrial experience indicates that there is no likelihood of significant asbestosis in non-occupational exposures."

And further states:

"At present, there is no evidence that the small numbers of fibers found in most members of the general population affect health or longevity."

In addition, the EPA has agreed to the above conclusions, as stated in the background information published by the EPA dealing with these standards. On Page 4 of said report, the following statement was made by the EPA:

"For populations exposed to asbestos only in ambient air, there are no data that define the excess risk, if any, of developing this disease." (Bronchogenic carcinoma.) And further, "It is presently thought that

exposure to asbestos concentrations much larger than those likely to be present in community air is required for the development of clinically significant asbestosis."

Dr. J. C. McDonald's recent testimony submitted to this agency at the New York hearing indicates that mesothelioma was not detected in persons living near the several asbestos mines in Quebec, Canada. The GAF mine is the only one in Vermont and is isolated in the mountains of Vermont far from any large populated areas, as opposed to some of the mines in Canada which are right in the towns surrounded by fairly dense populations. There have been no reports of medical problems made to us by the neighboring population due to the emissions from this mine.

Accordingly, we respectfully request that the visible emission standard be clarified as applicable to GAF in view of the minute percentage of asbestos materials in visible emissions emanating from our tailings, no known technology to alleviate said emissions, and I would like to say no known technology to eliminate completely said emissions, but known technology to reduce -- that is not in here, but I don't feel that statement was quite correct -- and the lack of any medical evidence that the general populations' health is endangered. As the standard now reads, visible

emissions of particulate matter are prohibited even though these emissions are not harmful, and contain little or no asbestos.

We propose that only visible emissions from tailings piles containing "Harmful amounts of asbestos" be prohibited.

It may be necessary for further medical studies to be conducted in regard to what constitutes harmful amounts. Some specific level could be established after sufficient studies are made and the standards could be amended at that time.

In light of the above, the following amendment to the standard is suggested:

Section 61.23(b)(1) should prohibit visible emissions of particulate matter from asbestos dumps, open storage areas for asbestos-containing materials, or asbestos-containing tailings dumps if said emissions contain amounts of asbestos that have been established as harmful to the general public.

In conclusion, GAF reiterates its recognition of the desirability and necessity for effective emission controls. With the exceptions we have discussed, we support the EPA's National Emission Standards for Asbestos.

There is some additional information which I have having to do with the prohibitions of the use of tailings on mine roads and so forth, but they all generally address themselves to the same general point, and I would prefer to turn them in in writing.

MR. MEGONNELL: Fine. They will be included in the record.

I think there is a thread of continuity running through these hearings. There is this common problem of tailings piles, and I think the EPA will have to reconsider that before final promulgation.

I don't quite understand why you say you have trouble measuring visible emissions. Anybody with eyesight can do that.

MR. DARRELL: You could see a visible emission, yes.

MR. MEGONNELL: You meant quantitatively measure.

MR. DARRELL: Yes. It is the same problem. The methods used in plant are not necessarily reliable outside of a plant.

MR. MEGONNELL: Yes. I think anything else I would say would be redundant.

Incidentally, on tailings piles, have you tried chemical sealing?

MR. DARRELL: We have not tried chemically sealing. We have read about it. We have two problems on tailings piles, Mr. Megonnell, and (1) all the areas are relatively consolidated and at the surface are pebble-sized rock, half inch rock, three-eighths inch rock. You can blow pretty hard and you don't see anything coming off those areas of the piles. We think it is going down into the loose gravelly nature of the pile itself, but when you are depositing the material on the pile, it is coming up a conveyer belt and there has to be some kind of a fall from the conveyer to the pile and then some mechanical spreading with a bulldozer or something to keep the pile going, and this is an area where the amount of free-fall can be reduced. In the summertime you might be able to wet it, in the wintertime certainly not, but all those things, and other things that we conceive of, lead us to believe that we could make significant reductions but not complete eliminations to zero, and that is the area we are more concerned with than the other.

I will agree that if a tornado came along, which we don't have, and tore a swath through the hill, then the older portions might be disturbed.

MR. MEGONNELL: I think we would like to, and perhaps be able to write legislation as you suggest here. We can't. It can't be written that way, but we are aware of these tailings problems, and I am sure it will get more consideration.

MR. SLAUGHTER: I want to amplify a little bit. Other than the dumping and the spreading of the tailings, do you have any visible emissions from the tailings dump? Would that part of the regulation be a problem other than the dumping and spreading of the tailings?

MR. DARRELL: Possibly in small areas, depending on freshness. We have had an opportunity to observe another tailings pile from another deposit that was mined prior to 1949 a little ways away, but it is there. This is all eyeball stuff, and we have asked all the older residents at the plant and other people, "Have you ever seen anything blowing off that pile," the unused pile, and the answer has been, "No, we have never seen it." So that does not mean that some day we might not see something and that we might have to do something further to these, what I call, stabilized or consolidated piles, but that does not seem to be a matter of concern to us now. It seems that we don't get any visible emissions at these points.

MR. SLAUGHTER: Thank you.

MR. MEGONNELL: Thank you.

(The following statement was submitted for inclusion in the record:)

STATEMENT BY

MR. R. POWER FRASER

VICE PRESIDENT

GAF CORPORATION

MR. FRASER: Gentlemen:

My name is R. Power Fraser, and I am Vice President of GAF Corporation. GAF's Industrial Products Division is a major producer of asbestos, although our output represents less than 2 1/2 percent of asbestos fiber consumed in the United States.

GAF appreciates the opportunity to participate in your public hearings on the proposed emission standards for asbestos, beryllium and mercury in industrial and mining operations. We want to cooperate in this important area and to assist in the writing of standards which are both practical and yet protective of the environment.

GAF concurs in general with the testimony given by Johns-Manville Corporation at the EPA hearing in

New York City on January 18th. Along with Johns-Manville, we support the proposed Environmental Protection Agency National Emission Standards on asbestos, with the exception of some modifications that Mr. Darrell and Mr. Bettoli will discuss later. We feel we can adapt the proposed EPA requirements to all our thirteen (13) consuming operations in the United States, with the exception of our Hyde Park, Vermont plant. Mr. Darrell will explain why shortly.

Before he speaks, I would like to give you a brief outline of GAF activities and policies.

GAF Corporation is a worldwide company which manufactures and distributes a wide range of products in five related consumer and industrial market areas. The areas are: chemicals, building materials, photographic film and equipment, office business systems, and industrial products. The common bond uniting the product groups is chemical research and technology, from which GAF's "congeneric" nature evolved. Headquartered in New York City, we employ approximately 20,000 persons.

At its more than 70 manufacturing and processing plants throughout the United States, GAF endeavors to be a responsible member of the business community. In fact, the company's Management Policy specifies that GAF

"will continue to do its utmost...to be a cooperative and useful citizen of the communities in which it operates and to contribute to the progress and welfare of these communities."

We have met pollution control requirements as we have understood them. However, much of what is called pollution is the result of the practices of man over hundreds of years, and solutions are being sought and even expected practically overnight. Sometimes, solutions to the problems must be delayed until the technology of how to solve the problem has been developed.

Overall, GAF spent about $5 million last year and will expend in the neighborhood of $6 million this year on environmental control equipment. I cite these figures only to illustrate that my company is totally committed in its role of a responsible and concerned citizen.

The ever-changing and sometimes conflicting regulations of the many agencies operating in the environmental control field necessitates our having a full staff of corporate environmental engineers to update and modernize our equipment and facilities to meet standards. This effort also includes basic research in those areas where there is presently no technology to combat certain problems.

GAF's industrial product division mines and

processes asbestos. The chrysotile asbestos fiber we mine and manufacture at our Hyde Park, Vermont plant goes into such products as asbestos felts, papers, cement, and wallboard. Contributing significantly to the safety and quality of life in America, asbestos is of vital importance to the textile, automotive, aircraft, plastic, paint, building, filtration, electrical, chemical, and many other industries. Our Vermont mine is one of two mines producing the basic line of chrysotile asbestos fibers in the United States.

The chrysotile variety of asbestos constitutes about 95 percent of world asbestos supply. The Republic of South Africa, Southern Rhodesia, Swaziland, Italy, and the United States, of course, are substantial producers. Small supplies also originate in many other countries. Total world production in 1968 was estimated at 3.5 million tons of all grades and varieties. Of this total, Canada produced about 46 percent and the USSR an estimated 25 percent.

GAF's Hyde Park asbestos plant -- located in northern Vermont about 40 miles west of Burlington -- employs 205 people with an annual payroll approaching $1 1/2 million. Counting their depends and families, some 800 people depend, in part, on that mill for their livelihood. GAF pays $97,000 in local and state taxes there and spends $625,000

yearly for the purchase of supplies and fuels.

Considering these facts, the Hyde Park operation has an enormous -- and favorable -- economic impact on the sparsely populated counties of Lamoille, Franklin and Orleans in the uppermost part of Vermont. Those are the counties that our Hyde Park employees come from. For example, we employ over 3% of the work force in Lamoille County. The economic contribution of Hyde Park to that three-county area of Vermont, while difficult to calculate exactly, would appear to run into millions of dollars.

It is a general consensus that asbestos plays an important part in our technology and economy. Therefore, GAF, as Johns-Manville has already done, would like to express again its continuing recognition of the need for the control of asbestos emissions into the air to the extent such are harmful, and to pledge our determination to do whatever is necessary within the limits of technical feasibility to achieve such controls.

Thank you.

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MR. MEGONNELL: Our next speaker is Mr. Darrell's colleague, Mr. P. S. Bettoli.

STATEMENT BY

MR. P. S. BETTOLI

TECHNICAL DIRECTOR

BUILDING, INDUSTRIAL AND FLOOR PRODUCTS DIVISIONS

GAF CORPORATION

MR. BETTOLI: My name is Philip Bettoli. I am Technical Director of the Building, Industrial and Floor Products Divisions of GAF Corporation. I have obtained a Bachelor of Science in Chemistry from the University of California and have been continually associated with development programs on a variety of asbestos products for 26 years.

I am here to discuss the proposed emission control standards for asbestos as they relate to the asbestos using manufacturing plants of GAF and some field applications.

GAF Corporation has made a preliminary study of our manufacturing plants in regard to the proposals. As a result of the study, it was concluded that we will be able to comply, except in the following respects.

There are visible emissions from certain operations producing asbestos-containing materials at our roofing and flooring plants which we are certain do not contain asbestos particles, since the asbestos is bound into the

products being manufactured at these stages of the operation. Examples of this are asbestos roofing felt saturation and coating and vinyl flooring plastisol fusion.

In these and many other laminating and coating processes, the asbestos fibers are bound together or totally encapsulated by agents that preclude any particle emission.

Strict interpretation of the current draft calls for unwarranted filtration of any associated fumes. We know of no acceptable test method to establish that asbestos fiber is not being introduced into a process gas stream or stack effluent emitted from these and other sources. It is, therefore, impossible to scientifically verify our conclusions. Until such a method can be established, we request that fumes being released from asbestos-containing material in which the asbestos is bound, should be excluded from the definition of particulate matter. We also pledge our full cooperation in helping the EPA establish an asbestos testing method.

In addition, the present definition of particulate matter makes no reference to asbestos material. Accordingly, we suggest that Section 61.21(h) should read as follows:

"Particulate matter means any asbestos-containing material which exists in final form as a liquid or solid, other than uncombined water or fumes being emitted from processing operations in which the asbestos content is bound."

Paragraph 61.23(d) of sub part B defines the woven cotton fabric filters to be utilized to remove particulate matter from certain sources. GAF manufactures filtration fabrics from synthetic fiber felts as opposed to cotton. Many felts are at least equal and in certain service, superior to woven cotton for "dry" filtration purposes. We believe that they reached efficiency equilibrium faster not only initially but after removal. They also will function with a higher permeability rating to give equal mass sufficiency. For certain applications and particularly where high temperature is involved, synthetic fiber felts are superior to cotton. We would be glad to provide comparative and performance data to the EPA.

Paragraph 61.22 - E 1 and 2 states that "The spraying of any product which contains asbestos on any portion of a building or structure, or any area directly open to the atmosphere is prohibited." This broad prohibition eliminates all types of spraying of asbestos-containing products,

including emulsions and cutback bituminous roof coatings, adhesives and other water-proofing compounds which contain minor amounts of asbestos fiber. These roofing and water-proofing components contain less than 10 percent of thoroughly wetted and dispersed asbestos in a liquid binder. They are applied by relatively crude spray nozzles which do not form a fine mist of droplets, but deliver a sheath or solid liquid fan which does not create any emissions of asbestos to the atmosphere. After application, the tailings dry and the asbestos is entrapped and is prevented from entering the atmosphere. Therefore, there is no justification for restricting the application of these sprayed-on roofing components.

We agree that there is a justification to limit the spraying of asbestos-containing compositions that have the potential to liberate harmful amounts of asbestos particles to the ambient air. Accordingly, we suggest an alternate wording of the above section as follows: "The spraying of asbestos-containing products, which <u>emit harmful amounts of asbestos fiber to the atmosphere</u>, on any portion of a building or structure, or any area directly open to the atmosphere, is prohibited."

I think I will eliminate that next paragraph.

I would further suggest that the word "source"

be dfined on a plant basis.

The above recommendations have been discussed with the technical experts from the EPA. We have met with them and will be glad to discuss any other problems with your office in the future.

I also sympathize with the very difficult task they have to do with this with the limited time and measurement technology available, and will assist them in any way possible.

MR. MEGONNELL: I accept your assistance.

MR. BETTOLI: I'm very serious. I really believe we are all trying to do the right thing and we are limited, and the men that I have met in the organization seem to be quite competent, and I've been in the business for 26 years, and I know there are some things that we cannot answer at the present time, nor do I feel that they would necessarily have been aware of certain uses where visible emissions would be, but not at all related to asbestos particles.

MR. MEGONNELL: I think your paper pointed it out. They informed me they are going to better define the parts of the process they are referring to. Perhaps the mixing operation would be covered, but certainly not the saturation part of the process.

I raised the same question you did, why cotton was specified, and I think it would be good to get the data they do have on other types of filter cloths.

As you know, the spraying of roofing and water-proofing components with lower amounts of asbestos is being reconsidered. I have to ask you also, sir, do you have any information on what happens to the roofing asbestos particles during demolition?

MR. BETTOLI: Well, a built up roof is made up of several layers of coating with saturated felt. They are bound together with the spray adhesive or laminating, and they can then pour on top of it additional asphalt or tile and gravel. Normally, those are what they call spaded or spudded up, many years later, maybe twenty years later. They are in the form of a solid mass.

In some cities, they require the wetting down of any demolition, which I think, if there were asbestos free to float around, it would preclude its floating around because of the wetness.

MR. MEGONNELL: It's not a very effective operation when a wrecking ball hits.

MR. BETTOLI: They don't hit the roofing with a wrecking ball. I mean it's not that kind of thing.

You have seen a bituminous membrane or a foundation that has been coated. The mass, the backing, what people generally call tar, the asphalt is still quite tenacious to the fiber, or the fiber is not even visible. It is part of this matrix. It isn't dusty.

MR. MEGONNELL: I can see where the emissions would probably be much less.

MR. BETTOLI: If you take the pipeline to the transcontinental lines which are protected by asbestos paper from corrosion, and these are buried underground, there are fumes emitted, though, because of the enamels that are used when they are wrapping them and bonding it to the pipe, but years later they could be picked out and they wouldn't have any dry nature to them. These are masses.

MR. MEGONNELL: Thank you, Mr. Bettoli.

Mr. Silvan Lutkewitte of Monsanto Industrial Chemicals Corporation.

Sir, I would like to ask you to consider this: I have reviewed this statement. I think it is very well done. I think it is repetitious of The Chlorine Institute's presentation yesterday. If you would like to summarize it, bearing in mind that the entire paper will be reproduced in the record, I would appreciate it, or, if you insist, we

will let you read it all.

MR. LUTKEWITTE: No, I think I would like to summarize it, if I may.

MR. MEGONNELL: Fine.

MR. LUTKEWITTE: After sitting through yesterday's presentations and this morning's, there is quite a bit of redundancy. I will see if I can wind it up in about ten minutes.

MR. MEGONNELL: I would appreciate it.

STATEMENT BY

MR. SILVAN B. LUTKEWITTE, JR.

PRODUCTION SPECIALIST

MONSANTO INDUSTRIAL CHEMICAL COMPANY

MR. LUTKEWITTE: My name is Silvan B. Lutkewitte, Jr. I am a graduate chemical engineer and a technical production specialist for Monsanto Industrial Chemical Company. I've worked in various manufacturing capacities for the past 15 years, the last four of these in chlor-alkali plants.

During this period, I've had the privilege of visiting and consulting with chlor-alkali operators in five countries with responsibilities for manufacturing in three

of these countries.

Our objective in submitting this statement is to be critical ... constructively.

WHO ARE WE?

"We" are Monsanto Company, and we produce chlorine from the chlor-alkali facilities at our William G. Krummrich Plant, Sauget, Illinois. These facilities utilize DeNora mercury cells. Relative to similar facilities, we are not a large operation. But because chlorine, caustic, and hydrogen are essential building blocks in the economic manufacture of products at that plant, the chlor-alkali department is a very important segment of its continued operation. As an example of what I mean by building blocks, these products are used to make rubber chemicals, gasoline additives, detergents and liquid soaps, bleach products, agricultural products and miscellaneous products as herbicides, insecticides, perfume and medicinal bases in our plant.

OUR FIRST OBJECTIVE: TO BE CRITICAL

No responsible corporation wants to see or have a hand in producing the effects of methyl-mercury poisoning.

No responsible corporations wants to oppose scientifically based standards for the control of mercury or

any other "pollutant."

No responsible corporation should react negatively and blindly to any and all proposed EPA standards.

And this is not our purpose in presenting this statement.

What we wish to do is to present our critique of the methods used to develop the proposed emission standards for mercury. Based on this critique, we then question the validity of the proposed allowable emission levels.

We further wish to present a constructive approach to this proposed rule.

The method used to develop the proposed emission standards for Mercury.

The key passage to explaining this methodology, we found, is on page 16 of the "background Information" brochure of the U. S. Environmental Protection Agency. We quote:

> "In order to determine the level of mercury in the ambient air that does not impair health, the airborne burden must be considered in conjunction with the contribution of mercury from water and food. Swedish experts have concluded that an intake of 30 ug/day of methyl mercury is

> safe. An intake of ten times that amount, or 300 ug/day, of methyl mercury can be expected to produce symptoms in the most sensitive humans. In a study of occupational exposures, a similar intake of mercury vapor was found to have some subtle effects, such as loss of appetite and loss of weight. Because similar intakes of methyl mercury and mercury vapor appear to produce detrimental effects, exposures to methyl mercury (diet) and mercury vapor (air) will be considered equivalent."[1]

There are some inaccuracies that must be pointed out. What the Swedish report actually said was, "The acceptable daily intake of <u>Me Hg through fish</u> would correspond to about 0.03 mg Hg or about 0.4 ug Hg/Kg body weight (pg 30).[2] (Italics mine.)

We think this approach compares apples and oranges. An analogy would be to compare the effects of a glass of 100-proof alcohol and a glass of beer on an individual, and to state that "because similar intakes of 100-proof alcohol and beer appear to produce similar effects, exposures to both will be considered equivalent." Through personal experience, individuals are well aware of the dif-

ference.

Methyl mercury and elemental mercury are two entirely different chemicals. The effects of the former are very, very serious, while the effects of exposure to mercury in air is very, very inconclusive. The effects of the former are medically, visibly, conclusively documented; the effects of elemental mercury are not, as we shall see.

The most crucial segment of the EPA approach, we feel, is this statement: "In a study of occupation exposures, a similar intake of mercury vapor was found to have some subtle effects such as loss of appetite and loss of weight." (1)

Let's go to that study itself, and see what it says:

> "The results of our study can be summarized by stating that in all major respects, the employees examined were in good health and in no way distinguishable from the control population with respect to such basic matters as impairment of the cardio-respiratory, gastro-intestinal, or hepato-renal systems. Most measurable properties including laboratory hematological data, chest x-rays, EKG, were found to be completely normal.

The clinical picture that does emerge, however, is one of a group of workers who apparently exhibit a dose-related response to mercury exposure by evidencing somewhat higher incidences of a number of neuropsychiatric symptoms ... Although the findings are largely based on subjective responses, the initial awareness that the central nervous system was expected to be affected by sufficiently high concentrations of mercury makes it logical to believe the findings.

"It is easy to see, however, that individuals displaying the symptoms found to be more prevalent with increased mercury exposure would be hardly distinguishable from other employes exhibiting similar symptoms for a variety of reasons unrelated to exposure to mercury.

"The implications of the results of this study on the current threshold limit value of 0.1 $mg/m^3$" -- I might comment that this was in 1970 -- "are to some extent dependent on matters of judgment rather than fact. The data indicate that with respect to most of the symptoms, the dose-response relationship does not exhibit sufficiently high

incidence to warrant concern until the present threshold limit value is exceeded. In a few instances, such as weight loss and loss of appetite, there does not appear to be any threshold defined by our data, and almost in every instance the uncertainties attending the observations and the calculations of TWA's make it possible to express some reasonable doubt as to significance."(3), (Underlining our own.)

What this statement says to us is that, yes, it is possible that loss of appetite and loss of weight could result from exposure to mercury. But it's also entirely possible that these symptoms (the only ones of a number of possible symptoms under study) could have resulted from entirely unrelated reasons. Add to this the fact that these were subjective responses, nor objective findings, and we certainly feel a "reasonable doubt" exists concerning the effects of mercury.

For these reasons, it is impossible to scientifically state that: (1) the same standard should be applied to mercury as to methyl mercury, and (2) it is valid to conclude that "similar intakes of methyl mercury and mercury vapors appear to produce equivalent detrimental effects."

The Proposed Allowable Level of Emissions

Proceeding from the 30 ug/day "safe" limit for methyl mercury and mercury vapors, the "Background Information" brochure then proceeds to point out that persons intake about 10 ug/day through average diets ... and that assuming inhalation of 20 cubic meters of air per day, the air should contain an average daily concentration of no more than 1 ug $Hg/m^3$.

The report continues: "Because chronic health effects occur with long-term exposure, emission standards should be designed to restrict air concentrations to a daily concentration averaged over 30 days, of 1 ug $Hg/m^3$."

We have already questioned the method by which this standard was determined. We also know of no "chronic health effects" which have occurred with long-term exposure to mercury vapors.

There is absolutely no evidence to indicate the air emissions of mercury from all chlor-alkali plants constitute a public health threat to their respective communities.

And we therefore question the validity of the standard thus proposed.

OUR SECOND OBJECTIVE: TO BE CONSTRUCTIVE

It's easy to be critical. It's much more difficult to come up with something better.

But with this in mind, we do recommend the following:

-- that the EPA follow the recommendations advocated by a special report to the Secretary's Pesticide Advisory Committee, DHEW, November 1970, Hazards of Mercury.

"Specific recommendations for further research are based on the gaps which must be filled in order to properly delineate the role of airborne mercury in environmental contamination.

(These include:)

1.) Determine the chemical and physical forms of mercury in the air both near to and remote from known sources.

2.) Determine the quantitative and qualitative aspects of transformation of mercury and its compounds in air and the controlling circumstances.

3.) Determine chemical or physical forms in which mercury is emitted to the air from

soil, water, vegetation, and man-made sources; how much is emitted from each source; and which are significantly large sources.

4.) Determine a total budget for the environmental distribution of mercury including sources, transport, transformation, deposition, and fate."

--- The above is obviously an ambitious, time-consuming, but we feel necessary approach to determining realistic controls. In the interim, we recommend this reasoning for setting mercury-vapor standards:

1.) Use the .05 $mg/m^3$ figure recommended by the American Conference of Governmental Industrial Hygienists and accepted by OSHA for cell room concentrations.

2.) If the use of the above concentration is felt inadequate to control emissions impose an arbitrary value for hydrogen and end-box vents which could be set by use of best available technology. I'm sure the EPA in their development of control techniques for mercury emissions are knowledgeable of what these can be.

The perspective we ask the Board to maintain is that (1) the .05 $mg/m^3$ TLV is considered a very safe level for industrial workers, this level is substantiable with data based on actual findings, (2) there have been no objective findings that the exposure of any individual to mercury at that level (or even higher levels) has been injurious to health, and (3) the attempt to measure cell room exit air velocities and correlate to a meaningful contribution to the atmosphere is realistically impracticable and totally unnecessary as long as the concentration in the house is safe for industrial workers, and (4) that the largest quantities of mercury added to the environment are released by the burning of natural fuels and the natural degassing of the earth's crust, not from facilities processing ore to recover mercury and facilities using mercury chlor-alkali cells to produce chlorine gas.

Monsanto will continue to support and do everything rationally and scientifically sound for the good of our employees and our community.

Thank you.

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(1) Background Information

Proposed National Emission Standards for

Hazardous Air Pollutants - Asbestos, Beryllium and Mercury U.S. E.P.A.

(2) Nordisk HYGIENISK TIDSKRIFT Supplementum 4

(3) Occupational Exposure to Chlorine and Mercury in Cell Rooms - Results of the Wayne State University - Chlorine Institute Studies - Ralph G. Smith, Ph.D., presented at the Chlorine Institute, New York City, February 4, 1970.

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MR. MEGONNELL: Thank you very much, sir. I think you present, again, some thought provoking material that we are going to have to think about. I will make no prediction what we will do about it.

DR. PLUMLEE: Mr. Megonnell, may I ask a question?

MR. MEGONNELL: Surely.

DR. PLUMLEE: I may have misunderstood you, but I thought you said that you recommended that EPA follow the recommendations of the special report to the Secretary's Pesticide Advisory Committee on Hazards of Mercury, and I note that on Page 8 of that Special Report, under "Recommendations," they state "All industrial users of mercury, particu-

larly those operating chlorine and alkali production plants and those using mercury catalysts, should be required to reduce their discharges of mercury into the environment to levels approximating background levels."

MR. LUTKEWITTE: A very worthy statement, if all of you knew what background levels were. That article, of course, also includes the four items that I did not include: (1) To determine the chemical and physical forms -- excuse me; let me back up. I quote:

"Specific recommendations for further research are based on the gaps which must be filled in order to properly delineate the role of airborne mercury in environmental contamination."

I take this to mean we really don't know what it is now, and towards this end you are right, there were a number of recommendations, which included:

1.) Determine the chemical and physical forms of mercury in the air both near to and remote from known sources.

2.) Determine the quantitative and qualitative aspects of transformation of mercury and its compounds in air and the controlling circumstances.

3.) Determine chemical or physical forms in which mercury is emitted to the air from soil, water, vegetation, and man-made sources; how much is emitted from each source; and which are significantly large sources.

4.) Determine a total budget for the environmental distribution of mercury including sources, transport, transformation, deposition, and fate.

MR. MEGONNELL: My attempt to cut down your statement didn't work (laughter). That question just filled in everything he omitted.

MR. LUTKEWITTE: Not quite, but I would be happy to read the rest into the record, if you like.

MR. MEGONNELL: The entire statement will be reproduced in the record.

MR. LUTKEWITTE: There is one more thing. Through yesterday's proceedings and today's proceedings, we have alluded to a number of times -- in fact, I believe some people have mentioned it -- that there does appear or there is in fact a method whereby all elemental mercury can be methylated. I thought this rather interesting. I haven't heard anything to the contrary.

I ran across some research which does state

to the contrary, and I would like to just offer this on -- it was also sent to some fifty people knowledgeable and doing research on mercury in water.

There are no comments on this. I would like to offer this for whatever it is worth.

MR. MEGONNELL: Do you want to submit it for the record, you mean, or just briefly summarize it?

MR. LUTKEWITTE: Just for your study. I am not sure that you do have a copy of this.

MR. MEGONNELL: We would like to have anything you have.

MR. LUTKEWITTE: I think this gentleman's work deserves review.

MR. MEGONNELL: We would very much appreciate it. We will put this in as an exhibit to the record.

MR. LUTKEWITTE: Very good. Thank you.

(The document referred to above was received as an exhibit, and will be contained in the files of the Environmental Protection Agency at Rockville, Maryland.)

MR. MEGONNELL: We have one more request to be heard this morning. Mrs. Cecile Rosenthal asked if she could get on before one o'clock.

STATEMENT BY

MRS. CECILE ROSENTHAL

CONSERVATION CHAIRMAN

ANGELES CHAPTER, SIERRA CLUB

MRS. ROSENTHAL: My name is Cecile Rosenthal. I am the conservation chairman of the Angeles Chapter of the Sierra Club and I appreciate the opportunity to testify in support of the standards proposed for the control of the hazardous air pollutants, Asbestos, Beryllium and Mercury, which were published in the December 7, 1971 issue of the Federal Register.

The above mentioned pollutants are clearly hazardous within the meaning of the 1970 Clean Air Amendments. The literature on these three substances very clearly points to the fact that they may cause, or contribute to, an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness.[1,2] It is therefore most appropriate and necessary that standards for control of these substances be set. In some cases information on possible sources of these hazardous pollutants is not available in sufficient detail to permit the establishment of emission standards covering all sources of emissions

at this time. This problem should be given continuing scrutiny and emission standards should be set for these sources as soon as possible. Ultimate use or disposal of hazardous materials needs to be researched. Hazards involved in renovation or demolition of old structures must be considered and allowed for in setting of standards.

Also at this time there may be a certain amount of controversy concerning some of these standards and the exact level at which they should be set. In these cases the error should always be on the side of human health. The cost of implementation of these standards is minimal and does not place an undue burden on the industries involved. Social and medical costs of not having adequate standards have to be considered.

There apparently is no satisfactory means of testing asbestos emission levels at this time and the implementation of the alternate strategy of required control practices that will limit emissions is to be applauded. Source control is the only practical means of control and should be rigorously applied.

Occupational exposures to asbestos have been related to asbestosis, bronchial cancer, and mesthelioma; mesothelioma has also been linked to non-industrial exposure.

Control of emissions from asbestos mining and milling and from manufacturing facilities for asbestos-containing products are adequately reflected in the proposed standards. Perhaps in the future, more control of the many end uses of asbestos-containing products will have to be achieved. Automobile brake linings in large cities should be given further scrutiny.

Beryllium is a highly toxic metal which accumulates in the lungs of exposed industrial workers to produce berylliosis, which is often a fatal disease. This disease has been documented in those who have had no industrial exposure. Beryllium is used extensively as a hardening agent in alloys, and beryllium oxide dusts and fumes are emitted in the production of alloys and in the process of refining scrap alloy. Beryllium use increased five-fold in the twenty years preceding 1968.[3] Industrial smoke and incineration is probably the source of airborne beryllium.[4] We support the standards for beryllium but suggest that perhaps 30% of this substance is used in electronics and we need to keep better track of this substance and its ultimate uses.

The effects of chronic exposure to mercury or limited exposure to large amounts of mercury has been documented again and again.[5] Work has recently been done and is now being performed which adequately pinpoints the

sources of mercury in our environment. Power plants, incinerators, chemical plants, hospitals and laboratories appear to be significant sources.[6,7] Mercury is extremely mobile in the environment and creates particular problems when it falls into water, as methyl mercury, a particularly lethal form, often results. We support the standards for control of mercury as outlined in the Federal Register but urge that future research look very carefully at other emitters.

Thank you for this opportunity to testify.

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1. "A sensible Look at Air Pollution by Metals," Archives of Environmental Health, vol. 21, pp 798-806.
2. "Metals in the Air," Environment, vol. 13, no. 8, pp 18-32. October 1971.
3. "CEQ Toxic Substances Report," Environmental Science and Technology, July, 1971.
4. "Metals..." op. cit.
5. "Mercury in Man," Environment, vol. 13, no. 4, pp 2-15, May 1971.
6. "Mercury in the Environment," Environment, vol. 13, no. 4, pp 16-23, May 1971.
7. "Mercury in the Air," Environment, vol. 13, no. 4, pp 24-33, May 1971.

MR. MEGONNELL: We appreciate your coming, Mrs. Rosenthal. We recognize the concern of the Sierra Club.

We want to point out, of course, that we are well aware that these proposed standards are nothing more than a first step. They are based on inadequate knowledge on different sources. Although we know there are other sources, we don't have quantitative information, and it will be a continuing process to fill in the gap and supplement the regulation as we get the necessary data.

Thank you very much.

MRS. ROSENTHAL: I would like to support the first step in that process.

MR. MEGONNELL: I appreciate that.

We will take a luncheon recess at this time until 2:15.

(Thereupon, at 12:45 p.m., a luncheon recess was taken.)

AFTERNOON SESSION

2:15 P.M.

MR. MEGONNELL: The hearing will please reconvene.

Our first witness is Mr. Lawrence F. Williams, representing the Oregon Environmental Council, Oregon-Washington Citizens for Clean Air, and Oregon Students Public Interest Research Group.

Mr. Williams.

STATEMENT BY

MR. LAWRENCE F. WILLIAMS

EXECUTIVE DIRECTOR

OREGON ENVIRONMENTAL COUNCIL

MR. WILLIAMS: Thank you, Mr. Chairman.

I am Lawrence F. Williams, Executive Director of the Oregon Environmental Council. The Council maintains an office at 4315 S. W. Corbett Avenue, Portland, Oregon. We are a coalition of 78 conservation, planning sportsman and health organizations and approximately 1800 conservation-minded Oregonians. I am also representing today the Coalition

for Clean Air. The Coalition represents 31 groups in Oregon and Washington and has been active for over 15 months in promoting air pollution abatement.

My comments fall in three general areas: (1) the meaning of the term "hazardous to public health," (2) Oregon experiences regarding the three pollutants discussed today, and (3) administrative aspects of the proposed regulations (Federal Register, December 7, 1971).

The word "hazardous" means something different to every person - it represents the judgment resulting from a personal cost-benefit analysis sometimes based on incomplete information, untrue facts or emotional bias. Members of the OEC believe that airborne asbestos, beryllium and mercury are hazardous. However, we also believe that the recognized incomplete knowledge of sources, exposure paths, and effects requires that (1) standards be modified to limit emissions from any source to levels "as far below as practicable," the numbers or conditions presently proposed, (2) regulations should require reporting of any known airborne release whether by the presently identified sources or not and (3) a comparative evaluation to be performed to place the extent of uncertain hazard from asbestos, beryllium and mercury in perspective with the other involuntary hazards

of life today.

As additional support for broadening the proposed regulations, on all three pollutants, I would like to submit for inclusion in the record a New Yorker column (October 23, 1971, pp 147-154) which lists some other interesting exposure hazards related only to asbestos.

MR. MEGONNELL: This will be included as an exhibit.

MR. WILLIAMS: Thank you, sir.

Included are such things as hazardous substitute materials, asbestos released in building demolition, office building and air plenums and asbestos filters in food and pharmaceutical industries.

To introduce my second area, I would like to remind you that Oregon was once the second largest mercury producing state in the country. It presently boasts the "exotic metals capitol of the world," in Albany, Oregon, but only this past year has seen the construction of a 40-story bank building complete with sprayed asbestos fire insulation and an unseasonable white chalky snow over the business district of Portland.

We like to think of Oregon as being "environmentally aware" but such is not the truth. In smaller towns

and rural areas, the dominant local industry effectively blinds us. Thus, in only the past two years have we learned (1) that the Willamette Valley has worse meteorological conditions than the Los Angeles basin, (2) that 20% of the recent federal mercury dumping suits were brought in our area where only some 2% of the Nation's population lives and (3) of a private timber company's decision to clearcut and sell stumpage on 25,000 acres of prime forest leaving a town's economy in shambles. Really, we are "babes" in the woods." We need effective federal regulations to bring to public light the environmental effect of local mills. In the case at hand, the State of Oregon Department of Ecology and Mineral Industries, in the January 1972 issue of The Ore Bin stated for the first time that mercury production figures "cannot be disclosed." As for the industry of refining and fabricating metals including beryllium, no production figures are provided in the Department's annual report other than to say its annual value would exceed $630 million - almost twice our annual state government budget.

Information on asbestos use is limited to a listing of some 200 distributors (small part manufacturers) and installation contractors. With this sparce information, we would be presumptuous to estimate the extent to which the

proposed emissions standards would benefit public health. Our problem is that we do not know we may have a problem. Again, our needs call for a broadening of the reporting requirements in proposed regulations.

The final aspect of our review concerns the exact wording and implementation of the regulations. We have been involved in several pollution abatement exercises and our experience may be of benefit in issuing standards for these pollutants. Comments are referenced to proposed paragraphs of 40 CFR 61:

(1) 61.01 The words "owner or operator" should be clarified to avoid passing the responsibility between two persons in such a way that reporting or compliance is effectively avoided.

(2) 61.02(g) Modification of operations should be determinable. Detailed written procedures should cover the approved operations.

(3) 61.02(k) The meaning of words "or may emit" is not clear. Practically, how shall the small machine shop which only rarely handles beryllium comply with these standards?

(4) 61.08(b) Reference to proper operation of equipment begs the issue of operator qualification examinations and

periodic re-examination.

(5) 61.09(a)(3) A "brief description" of the pollutant source is not judged adequate basis for enforcing submittal of "changes" as required in the following paragraph. Instead, the applicant should submit detailed technical specifications which identify minimum equipment availability, operating limits, (equipment set-points) and maintenance schedules.

(6) 61.35 Any waiver of periodic stack sampling and report requirements should be preceded by adequate public notice.

(7) Equation 3-1 in the method appendices should read like equation 1-1. Apparently it is an editorial error which you may have caught. 3-1 is incorrect according to our engineer who went through the calculation.

MR. MEGONNELL: It may well be.

MR. SLAUGHTER: We know what you mean, yes.

MR. WILLIAMS: All right. Finally, in all method appendices, measurement accuracies should be accompanied by a precision limit (e.g. 95%).

We appreciate the opportunity to provide these comments and hope you will let us know how they are resolved or incorporated.

Thank you, and we hope our comments will be of some value to you.

MR. MEGONNELL: I am sure they will. I know, and I think the staff realizes, that they will have to go at it carefully further.

I have no questions, and thank you for appearing.

MR. WILLIAMS: Thank you.

MR. MEGONNELL: Mr. Jerome Brown, Idaho Tuberculosis and Respiratory Disease Association.

(There was no response.)

MR. MEGONNELL: Mr. Harry L. Tate, Arizonans in Defense of the Environment, Inc.

(There was no response.)

MR. MEGONNELL: Mr. Ronald Barstad, Arizona Sierra Club.

(There was no response.)

MR. MEGONNELL: We're going to get through faster than we thought.

Dr. Hector Blejer, California Department of Public Health, Bureau of Occupational Health Hazards.

(There was no response.)

MR. MEGONNELL: Dr. Harold Brown, American

Conference of Governmental Industrial Hygienists, Local Section.

(There was no response.)

MR. MEGONNELL: Mr. Al Klascius, American Industrial Hygiene Association. Are you with the local chapter?

MR. KLASCIUS: Yes, the Southern California Section of the American Industrial Hygiene Association.

STATEMENT BY

MR. AL KLASCIUS

SOUTHERN CALIFORNIA SECTION

AMERICAN INDUSTRIAL HYGIENE ASSOCIATION

MR. KLASCIUS: As far as my qualifications, I am employed by the California Technology Jet Propulsion Laboratory as Environmental Hygienist and have been for the last fifteen years, and I just merely wanted to make a few comments for our organization.

Primarily, what we are looking for in this Act as to how to regulate public exposure of asbestor or mercury or beryllium is numbers that we can use -- in other words, like a number we can take and take an instrument and go to the property line of the plant on the downwind side

and measure what the levels are and determine whether we are within legal emissions or we are not. This is the kind of thing we are really looking for.

And are the emissions related to ambient background, and to what extent? In other words, just as an example, in the case of mercury there was a survey made by the Department of the Interior Geological Survey people of mercury content in soil throughout the United States at approximately fifty mile apart intervals all over the United States, and the average was 71 parts per billion over the whole survey that they made, and yet we find places like Summit County, Utah, where they found almost 5,000 parts per billion and places in Florida where they found 3500 parts per billion. Then in those same states there are areas where it is down to 10 parts per billion, so the thing is, in other words, if you want to put a mercury finding plant in that area, if the ambience is up near the limit, what I mean is that you would not be able to put up a plant, or you put out any contaminants whatsoever, and these types of things should be taken into consideration in the process of setting up these levels, as to how they are to be interpreted, and also the fact that they have specified in a lot of the areas there a specific method for analyzing.

Now, there are several methods for measuring mercury and beryllium rather than just like the ones specified, and it should be put in there that it should be that method plus any other method which is approved by the EPA.

MR. MEGONNELL: I think it is intended to be in, and it probably will be added.

MR. KLASCIUS: Those are really the primary things I just wanted to bring out.

As industrial hygienists, we are looking for something that we can work with primarily.

MR. MEGONNELL: I can understand your desire for that.

MR. KLASCIUS: Because you have other things, like in beryllium, for example, you can have a concentration of 0.01 parts per million in the air or not more than ten grams emission for a 24-hour period. Well, it depends on how you are going to correlate this. In other words, as you emit ten grams in a 24-hour period, could that do more harm than keeping the concentration to a 0.01 parts per million in the ambient air?

MR. MEGONNELL: I don't know.

MR. KLASCIUS: You have the pros and cons on this, where you can find people that say a large emission

of one can do more harm than you find the average would. Then there are people on the other side who say that you can average it out from a large emission, and thereby it would give you the same safety factor.

We have this same situation not only in these areas here, but we have it in microwave radiation, laser radiation and many other fields with the continuous impulse this relates to, whether you do far more in a continuous exposure or what you average out, and does the body know how to do it.

MR. MEGONNELL: I share your desires. I doubt very much that we will be able to have the answers for some time.

MR. KLASCIUS: Well, yes, but I presume it will take a certain amount of time to analyze all the information and try to come up with some reasonable approaches to this problem.

MR. MEGONNELL: Thank you very much, Mr. Klascius.

MR. KLASCIUS: Okay.

MR. MEGONNELL: Is Dr. Gale Billings here?

(There was no response.)

MR. MEGONNELL: Dr. Oscar Balchum?

(There was no response.)

MR. MEGONNELL: I understand that Dr. Hector Blejer has arrived from the California Department of Public Health, Bureau of Occupational Hazards.

STATEMENT BY

DR. HECTOR BLEJER

HEAD, OCCUPATIONAL HEALTH

DEPARTMENT OF PUBLIC HEALTH

STATE OF CALIFORNIA

DR. BLEJER: I won't go through the usual salutations.

My name is Hector Blejer. I am an occupational physician who is board qualified in that specialty, and I am with the Bureau of Occupational Health and Environmental Epidemiology in the State Department of Public Health, representing this department together with Mr. Schneider, who will share part of what I have to say or the other part of what we have to say.

I am not sure whether we are representing the California Attorney General's office, since they submitted the same comments in addition to the proposed emission standards. I am not sure whether these reached you from our

Attorney General, Mr. O'Brien.

MR. MEGONNELL: I don't think we received them.

DR. BLEJER: Well, I received a copy of the proposed letter of Mr. O'Brien. I can show you that if you are interested. If he didn't send it, obviously it isn't official.

Did you receive ours?

MR. MEGONNELL: I didn't have anything from the California Department of Public Health.

DR. BLEJER: Well, they were mailed February 3rd special delivery to Washington, as well as to San Francisco, and an appropriate number of copies.

MR. MEGONNELL: They will get there.

DR. BLEJER: So rather than go through the specifics of what we said, which are or should be in the record at sometime soon, I would like to just approach a few areas that I know through some of my colleagues have been mentioned already.

Obviously, any proposed standard of any environmental contaminant is laudible, just by its own intention. On the other hand, for proposed emission standards, even though they may be the beginning, they are not good

enough and won't be good enough until we develop what is necessary, and these are ambient air quality criteria specifically for the three substances that you are considering in these hearings and in these proposed standards, in addition to many others, notably cadmium, arsenic and a few others that need your considering.

One of the things that is missing throughout your proposed standards is a definition of the ambient or the environment. You could not talk about any of these things and know how much should go into what unless you describe and specify the ambient. This is not in any way, in any form, anywhere in your definitions.

Ambient at the smokestack or emission source is not the same ambient as it is for those living things like us and others on this planet.

Now, you may wonder, why these standards? And I am not talking about emission standards -- the ambient standards.

Let me also add that I am a member of the American Conference of Industrial Hygienists which is based in Cincinnati, and I know that many references have been made to TLV's, and possibly I could shed some light on some of the questions that have been asked in the past, if you

so wish.

Now, one of the things is in terms of the non-degradable environmental contaminants. Definitely, asbestos is non-biodegradable, beryllium is non-biodegradable and neither is mercury. Our body burden certainly has proven with the exposure to this pollution is increasing specifically in terms of lead. We now have arrived at a point, for those who want people to actually die of these things before something is done, where babies are being born certainly in this area with already a measurable body burden of lead.

I am trying to make the comparison now to -- obviously, beryllium, not likely -- mercury, most likely. I don't know of any such study, but if it is not being done, it should be done -- and maybe asbestos.

I do know there is a new piece of work coming out of Britain that talc and asbestos particles have been found in the cores of primary tumors of the ovary, of the cervix, of the uterus, that is, and the endometrial body of the uterus, and also, if this is so, then what prevents asbestos from going through the placental, the uterine wall, the placental barrier, and possibly reach the fetus and eventually the newborn human or another animal?

So what I am trying to say is that we have

an ever-increasing body burden of many of these substances.

I don't think the three that we are discussing today are an exception to lead -- this is for those who want mortality and sickness prior to doing anything. In fact, do we need such a thing, such evidence? And, secondly, are we not going to reach it in due course if the environmental pollution keeps even at the present level or perhaps with more possible increases?

Now I would like to refer to the threshold limit values. In industry, the National Committee of Safety and Health, under the mandate of the new William Steiger Act of 1970, published its first list of known toxic materials or toxic contaminants used in industry. There are about 9,000 listed in that first effort. It is by no means complete. It is by no means even fairly complete.

We have altogether some -- let's exaggerate a bit -- 280 such threshold limit values. These were designed for and are developed for industrial exposures, hoping to have a margin of safety so that the worker will not be infected.

Any reference to such TLV's to the general community is inapplicable for a variety of reasons. Except for a few that have ceiling limits to them, the TLV's are

devised for an eight hour a day, forty hour work week, although there are variations where they are time-weighted, and they do not apply to the general population.

Secondly, again you must divide by three, and then you get what the others would get in 24 hours, or you can divide then by whatever it is, five-sevenths, because there are only five work days, and all that jazz, until you could arrive at some number.

But the populations in question are totally different. We are not dealing with babies who are more susceptible to the effects of lead, for example, than the adult is. We are not dealing with old people in industry, by and large, since they usually retire at 65 or some other mandatory age. Therefore, in any approach of using this TLV or any reference to it, although it may give some indication of some degree of severity of hazard, it is not applicable.

Such standards for general environmental pollutants, especially those that are not biodegradable, as the ones we are discussing today, can be very inaccurate and give you a very bad figure to compare with. Those for the general environment, obviously, for a variety of reasons, should be much stricter, and also because of the other factors

that are at work. Many of these substances are additive, at least, in their effects.

Again, using some other examples, if we take lead and we say that it does interfere with hemoglobin metabolism and produces anemia, it is hitting at a part of the respiratory system which is obviously the hemoglobin that puts forth the oxygen, or it interferes with the hemoglobin transportation, and so, in another sense does ozone and nitric oxides, because they profuce inflammation and irritation of the respiratory tract.

So altogether we are dealing with many substances that in many different ways are hitting at one large system, which is the respiratory system, which is not just some pipes to get the air in and out, but obviously we have what happens at the cellular level where the respiratory mechanisms as such occur.

So we have a lot of at least additive effects of many substances, and these apply to the three substances in question today.

We also have, in some cases, synergistic effects which make the action greater than any individual action, and we may have, as it does occur, some antagonistic effects of some substances. These are relatively few. I

only know of one as far as the toxic effects are concerned. I am sure there are others, but I am not aware of them.

There was some mention in the last two days of mercury mines in California and lack of illness due to mercury amongst the millers. Our bureau studied about every one of these mines when they were in full operation a few years ago. I could show you apaper from the Journal of Occupational Health published by two people from my specific bureau that shows an enormous number of the millers in these mines where some can be permanently damaged, and one that I know if is a vegetable in a hospital.

Similarly, in relation to the mercury mines and lack of pollution from them -- that is, the environmental pollution -- I believe that, and in fact I know the figures came from your agency, with respect to one of the ponds from the drainage area of one of these mines, and I have been in this particular mine, and I found out about this other thing in a rather disconnected way from a forest ranger who tried below part of the stream to get his own little fish pond or whatever, and the present fish have mercury in the water of that pond that later would flow downstream to a reservoir that I believe, although I am not sure, was used for irrigation of agricultural areas, and the concentrations in that

specific pond which was artificial reached -- I am not sure of the figures, but they could be found -- something like 80,000 parts per million. If you were to translate this into parts per billion, obviously it means 80,000,000 parts per billion.

The proposed Federal drinking standard for water is 5 parts per million, so even the pollution that occurred downstream here was a source of contamination that at least some people in your agency have documented.

How I found out about it is a long story and not without its humor.

I also heard some references to asbestos mines in California. I happen to have been in them. There is one up north, and I won't mention it by name because there is no need to. There are only two, so if you know which one is in the north, you know which one I'm talking about.

The basement of that mill looks like the Sahara, and if you walk on it you will go into asbestos knee-deep or further. I didn't try it after I went ankle deep. They have the secondary threshold outside, which goes to the fifth floor of the mill, which is almost totally of metal structure. As such, even though I heard that they maintained that they have had no cases of asbestosis yet or any asbestos-

related cancers, I wonder how many are going to have in twenty years, since it usually takes twenty to thirty years for the asbestos-related cancers to show up.

In fact, this was not just a matter of being exposed to asbestos in the air of, let's say, two or five fibers more than five microns of a cubic millimeter, but there was a rainfall of asbestos from the fifth level of that mill all the way to what I call the Sahara-like basement.

Now, the specifics of what we recommended are in the two letters that we have sent you, and at this point, unless you have some questions, that is all I have to say.

MR. MEGONNELL: I would certainly like to have the article as an exhibit in the record, please.

DR. BLEJER: Yes. We also have, if you are interested, copies of the documentation of the threshold limit values, because I believe you have had some confusion as to why certain levels have been set lower or otherwise modified, and these give the reasons for these particular things in terms specifically of asbestos, beryllium and cadmium.

MR. MEGONNELL: Did you mean cadmium or mercury?

DR. BLEJER: I'm sorry; mercury. I happen to have a fetish for cadmium (laughter).

There is one very important thing that I would like to remark. In your applicability for asbestos -- I think this is particularly important -- you did not include fireproofing materials.

Now, insulating materials and fireproofing materials are two totally different things. I hope this has come up already. But insulating asbestos-containing materials are not at all the same as asbestos fiber fireproofing materials used in construction. As such, if you omit these, you will be missing some major portion of about 63 percent of all the use of asbestos in the United States. It isn't just a technical thing; it is a highly practical thing that could be remedied.

I think I have taken up my time, so thank you.

MR. MEGONNELL: Thank you very much, Dr. Blejer. I particularly appreciate your coming as a member of the ACGIH TLV Committee. I think you have said with much more authority some of the things that I was at least implying yesterday.

Thank you very much.

DR. BLEJER: Then we have one more thing. Some of the data for the mercury TLV came from industrial experience -- possibly the same industry that told you that they were working above that level.

MR. MEGONNELL: Thank you.

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(The following letters were submitted for inclusion in the record by Dr. Blejer.)

STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH
BUREAU OF OCCUPATIONAL HEALTH
& ENVIRONMENTAL EPIDEMIOLOGY
P.O. Box 30327, Terminal Annex
Los Angeles, California 90030

February 3, 1972

Administrator, Environmental Protection Agency
5600 Fishers Lane
Rockville, Maryland 20852

Attention: Hearing Officer
Hazardous Materials Emissions Standards

Gentlemen:

Our Department has reviewed the proposed National Emissions Standards for both asbestos and beryllium, and the following are recommendations which we are submitting for consideration at the hearing on February 15, 1972 in Los Angeles:

Subpart B--National Emission

Standards for Asbestos

61.20 Applicability

Add:

1. "...or asbestos fiber fireproofing materials;" after "...asbestos insulating products;"
2. "Braking, clutching or power transmission devices on any public or private vehicle."

61.21 Definitions

Add:

Appropriate wording to define, where needed, above additions.

61.22 Emission Standards for Asbestos

Add:

(d)(1) "Emissions of particulate matter from disposal of asbestos from repair, remodeling, or demolition of structures; or from repair, remodeling or demolition of equipment shall be controlled in accordance with subsection (h).

(g) "Emissions of particulate matter from operations involving the disposal of containers used to store or transport asbestos; or

asbestos-containing products; or asbestos wastes shall be controlled in accordance with subsection (h)."

(h) "Notwithstanding any other standards contained in this section, no source shall cause an appreciable increase of asbestos particulate matter in air to exceed background levels when measured directly downwind of the source."

Subpart C--National Emission Standards for Beryllium

61.30 Applicability.

Add:

1. "Public or private, stationary or mobile disposal services collecting and disposing of beryllium wastes;"

2. "Braking devices used on any type of public or private vehicle."

31.31 Definitions.

Add:

Appropriate wording to define, where needed, above additions.

REASONS FOR RECOMMENDED ADDITIONS

A. Asbestos:

Section 61.20: Items 1 and 2 constitute factual, significant sources of asbestos emissions, directly (fireproofing, brakes) or indirectly (from transmission components shedding their asbestos abrasions into oil).

Section 61.22: (d)(1) and (g) are obvious emission sources not covered in the subject regulations.

(h) provides some quantitative standard absent in the subject regulations.

B. Beryllium:

Section 61.30: Items 1 and 2 constitute significant sources of beryllium emissions presently uncontrolled by regulation; e.g., the braking systems of the new, larger aircraft contain beryllium as a heat-sink device.

Cordially yours,

/s/ Hector P. Blejer, M.D., D.I.H.
Hector P. Blejer, M.D., D.I.H.
Head, Occupational Health
Southern California

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STATE OF CALIFORNIA
DEPARTMENT OF PUBLIC HEALTH
BUREAU OF OCCUPATIONAL HEALTH
& ENVIRONMENTAL EPIDEMIOLOGY
P.O. Box 30327, Terminal Annex
Los Angeles, California 90030

February 10, 1972

Administrator, Environmental Protection Agency
5600 Fisher's Lane
Rockville, Maryland 20852

Attention: Hearing Officer
Hazardous Materials Emissions Standards

Gentlemen:

Subject: National Emission Standards for Hazardous Air Pollutants - Proposed Standards for Asbestos, Beryllium, Mercury.

Reference: Letter from H. P. Blejer, M.D., D.I.H., from this Department to Administrator, EPA, dated February 3, 1972, Subject: "Asbestos and Beryllium; EPA Proposed Regulations and Public Hearings"

The complete text of the subject proposed standards-- previously unavailable to us -- has been reviewed by this Department, and the following is an addendum to the referenced letter:

Part 61--National Emission Standards

For Hazardous Air Pollutants

Subpart A--General Provisions

61.01 Definitions

Ambient is not defined. Ambient should be defined

as the environment into which the source discharges the pollutant.

Subpart C--National Emission Standards for Beryllium

61.32(a)

This emission standard should be eliminated, since it is covered in 61.32(b).

61.32(b)

Should be changed to read: "Outplant concentration of 0.01 micrograms of beryllium per cubic meter of air...measured at the property line and immediately downwind of the source and in accordance with a sampling network approved by the administrator."

61.42(a)

Should be reduced from 75 microgram minutes to an ambient air concentration as defined in 61.32(b) as amended herein.

61.42(b)

Is redundant, since they are covered by 61.42(a), as amended herein. This paragraph should be deleted.

61.53 <u>Emission Standard for Mercury</u>.

This paragraph should be eliminated and should

have as a substitute the following:

"Emissions to the ambient atmosphere from sources subject to this subpart shall not exceed 1 microgram of mercury per cubic meter of air at any time."

The rationale for the above-recommended changes is as follows:

1. Ambient must be defined to include the atmospheric environment surrounding the source, since the vagaries of local meteorology are such that individuals inside a plant and immediately adjacent to a plant discharging hazardous pollutants can be subject to acute or chronic low level air concentrations of toxics. In addition, pollutants, such as asbestos, mercury, and beryllium, do not degrade biologically when introduced into the environment and can readily be subject to transfer processes that ultimately result in human insult or health damage from the toxicant.

2. Paragraph 61.32(a) is a meaningless requirement, since the ultimate test of pollution should be the measurement of the ambient concentration close to the source, as redefined by our recommendation for a change in the wording of Paragraph 61.32(b).

3. The recommended reduction from 75 microgram minutes per cubic meter to 0.01 micrograms per cubic meter is based upon the fact that the literature on the toxicolory of beryllium indicates that dosages of a "very few micrograms of beryllium compounds," have elicited cases of fatal chronic beryllium disease in some individuals (Stokinger, H. E., Editor, Beryllium: Its Industrial Hygiene Aspects, Academic Press, New York, 1966, p. 241). Therefore, the 0.01 micrograms/cubic meter of air standard set by the AEC, defined in Paragraph 61.32(b) as amended herein, should be the standard for any outplant emission of beryllium and its components.

4. Paragraph 61.42(b) is again meaningless in view of the superseding requirements of Paragraph 61.42(a) as amended herein, and should be eliminated.

5. Based upon the above cited recommendations, Paragraph 61.53 is meaningless and should be deleted.

Your very truly,

/s/ Hector P. Blejer, M.D., D.I.H.
Head, Occupational Health
Southern California

/s/ Meier Schneider, P.E.
Industrial Hygiene Engineer

MR. MEGONNELL: I understand that Mr. Meier Schneider would also like to speak for Dr. Harold Brown and for Dr. Klejer's group.

STATEMENT BY

MR. MEIER SCHNEIDER

INDUSTRIAL HYGIENE ENGINEER

DEPARTMENT OF PUBLIC HEALTH

BUREAU OF OCCUPATIONAL HEALTH

& ENVIRONMENTAL EPIDEMIOLOGY

STATE OF CALIFORNIA

MR. SCHNEIDER: Mr. Megonnell, I want to make it clear that while I am here representing Dr. Brown, who is the Southern California Section President of ACGIH, I am not intending to speak for the national organization since I have no authority to speak for them.

I am an industrial hygienist. I am a registered professional chemical engineer in California. I am a chemist by training and I am certified in the chemical aspects and the comprehensive practice of industrial hygiene by the American Academy of Industrial Hygiene.

My present position is Industrial Hygiene Engineer with the Bureau of Occupational Health & Environmental

Epidemiology, stationed in Los Angeles.

I have had about five and a half years experience in the field of air pollution control in Los Angeles, and so I feel I have a fairly good work experience in this area.

Dr. Blejer spoke to you somewhat about asbestos, and one of the points that we made in our letter to you was that there should be some sort of an emission standard for asbestos, and I am sure other people have said this too, and we have 0.01 standard that we set down for your consideration.

Whatever we have to say here is strictly for consideration. It is not meant to be a hard and fast position. We think it will stimulate some discussion and hopefully arrive at some sort of a conclusion in terms of control of these materials.

I came up with a definition of "ambient" in this letter, which we find should be "of the environment in which the source discharges the pollutant."

Now, I admit that this is a rather rigorous definition of the word "ambient." However, we feel that some definition is necessary if you are going to discuss tentative standards, such as one microgram per cubic meter

of mercury as an ambient.

MR. MEGONNELL: I'm sorry; I didn't quite follow that.

MR. SCHNEIDER: Well, on Page 239 of the Federal Register, under "Proposed Rule Making," you refer to "ambient concentration level," not causing the ambient concentration level to exceed one microgram per cubic meter of air for mercury, so that I say one must have some sort of definition of what ambient is all about if you are going to call out numbers.

I am not saying these numbers are numbers to be accepted, but I am just saying there are numbers here.

MR. MEGONNELL: But your definition of "ambient" is "the environment in which the source discharges the pollutant"?

MR. SCHNEIDER: Right.

MR. MEGONNELL: So at the point of discharge --

MR. SCHNEIDER: That's the ambient now. That's the environment.

MR. MEGONNELL: I see.

MR. SCHNEIDER: Let me give you a rationale for this, by the way. I have this in the letter to you. I say that ambient must be defined to include the atmospheric

environment surrounding the source, since the vagaries of local meteorology are such that individuals inside a plant and immediately adjacent to a plant discharging hazardous pollutants can be subject to acute or chronic low level air concentrations of toxics.

In addition, pollutants, such as asbestos, mercury and beryllium do not degrade biologically when introduced into the environment and can readily be subject to transfer processing that ultimately result in human insult or health damage from the toxicant.

Now, the reason I made this point is that if you are allowing a discharge of a certain amount of mercury in a 24 hour period of time, we could assume that this could occur in less than an hour, and if meteorological conditions were such that a person almost immediately adjacent to the stack gets this right in the face, you can imagine what can happen with toxics of this severity.

We are not talking about nuisance type particulates or inert type dust, such as most of the air pollution control districts are dealing with in terms of their control of courses. They are looking at emissions in terms of opacity and so many pounds process weight per hour, and that sort of thing. We are not looking at that. We are

looking at relatively high toxic materials, and I think we have to take a little different look at them, is what I am really trying to say.

Referring back to the National Emission Standards for Beryllium, Paragraph 61.32(a) says that "Total emissions to the atmosphere," and so forth, "shall not exceed 10 grams of beryllium," and I say that that should be eliminated since it is covered in 61.32(b), which calls out a 30 days period, over a 30 day period, an outplant concentration of 0.01 micrograms of beryllium per cubic meter of air, and the reason I said that was that going back to another emission standard that you set up for a rocket motor test site in which you allowed 75 micrograms per cubic meter of air for up to one hour, I also feel that that is too high and that this should be reduced to the 0.01 micrograms per cubic meter for the 30 day period, simply because dosages of a very few micrograms of beryllium have elicited cases of fatal chronic beryllium disease in some individuals according to a book edited by Dr. Stokinger called "Beryllium -- Its Industrial Hygiene Aspects" -- This is Academic Press in New York, 1966, Page 241.

Beryllium is a very bizarre material, and some people are very hyper-susceptible to it, and a few

micrograms can cause chronic fatal beryllium disease, and therefore I don't think you can look at these emissions in the matter in which they are looked at, saying you can put out this amount, because somebody just downwind of that can get that right in the fact again, and then, what do you have? You have a hyper-susceptible individual and you may have a death on your hands.

I have several other recommendations which are contained in the letter and there is no point in covering them here.

I think that the sampling in the back part of this proposed rule-making is taken primarily from the work that has been done in the past by air pollution control districts in particulate matter sampling, and, as such, I don't think it really should be considered with these particular contaminants, simply because their order of toxicity is much higher than what this type of sampling is designed to do, and, therefore, I think if you want to look at sampling, sample the ambient. In effect, you are really saying you can't put out of your stack any concentration higher than ambient.

I am not sure this is feasible. I am only saying this as a concept that I am putting forth for your

consideration.

MR. MEGONNELL: Mr. Schneider, I for one am going to have to wait to get your letter, because I am not following what you are saying. I feel you are really right in what you are saying, but maybe I'm just tired from lunch.

MR. SCHNEIDER: All right. Do you have any questions?

MR. MEGONNELL: I have not. Mr. Slaughter?

MR. SLAUGHTER: Could I clarify one thing? On the rocket firing, the maximum we could ever have is 10.5 micrograms, and if you multiply this out --

MR. SCHNEIDER: It's 75, it says right here.

MR. SLAUGHTER: This is accumulated over a period of not less than 10 nor more than 60 minutes, not more than once every two weeks, so if you multiply it all out, you will find that is below 0.01 micrograms per cubic meter averaged over 30 days.

MR. SCHNEIDER: This says to me, and I am a former chemical officer and I have handled microgram minute concepts -- this says to me that in one minute you can have 75 micrograms per cubic meter of air as it is written in this 61.42. That is the way I read it.

MR. SLAUGHTER: In 10 to 60 minutes. Not less than 10 nor more than 60 minutes.

MR. SCHNEIDER: That is a time-dose relationship, and that is 75 microgram minutes per cubic meter. That means 75 micrograms in any one minute per cubic meter.

MR. SLAUGHTER: Absolutely not.

MR. SCHNEIDER: Then somebody should clarify it.

MR. MEGONNELL: I think maybe we twisted the words around.

MR. SLAUGHTER: We called some very eminent people of the National Academy of Sciences. I've had another person who was very confused on that point.

MR. SCHNEIDER: It is confusing, because it is a dose-time relationship that is used in chemical warfare quite a bit.

MR. SLAUGHTER: Then on the ambient, do you mean that you want that to be the emission at the stack?

MR. SCHNEIDER: I would say that would be the emission at the stack, I think, because of this fact that you can have somebody close to that source exposed to a relatively high concentration for a very short period of time or relatively low concentrations for a very long period

of time, and you are not dealing with dust now; you are dealing with fairly toxic materials on a relative basis, and that's why I say it for these only. I wouldn't say that for other things. I wouldn't say it for nuisance dust. Obviously, that would be very impractical.

MR. MEGONNELL: Thank you very much.

Dr. Oscar Balchum has arrived, Associate Professor of Medicine, Coordinator of Chest Diseases, University of Southern California, School of Medicine.

STATEMENT BY

OSCAR J. BALCHUM, M.D.

HASTINGS PROFESSOR OF MEDICINE

UNIVERSITY OF SOUTHERN CALIFORNIA

SCHOOL OF MEDICINE

LOS ANGELES, CALIFORNIA

DR. BALCHUM: Cancer of the peritoneum (lining of chest and abdomen), of the bone marrow, of the lung (bronchogenic carcinoma or lung cancer) and perhaps of the stomach is significantly higher in workers exposed to asbestos, such as insulation workers. Pulmonary fibrosis with disability due to lung scarring may occur in 50% after thirty to forty years of work.

Characteristically it may take twenty to twenty-five years for shortness of breath, changes on the chest x-ray, or the various kinds of cancer to develop. At that point it is often difficult to determine intensity of exposure, because of this long lag period.

At autopsy the lungs of city dwellers who have died of various illnesses contain asbestos fibers, in almost all instances in one study, and presumably in 25% of individuals in others.

Asbestos should not be allowed to escape into general urban air because of increased risk of pulmonary asbestosis, lung cancer, and mesthelioma. All possible measures in using asbestos should be taken to prevent any increase in background levels.

In this regard, I would like to point particularly to asbestos and the problems that have arisen with exposures of individuals.

This experience so far has mainly been with men who were mainly insulation workers handling asbestos insulation, and the fact is that various kinds of cancer have arisen in these individuals, mainly cancer of the lining of the chest and abdomen called mesothelioma, and lung cancer, bronchogenic carcinoma and cancer of the stomach.

The problems in dealing with asbestos are that there is a long life period, sometimes twenty or thirty years, although lung scarring or fibrosis may occur as early as five years, probably depending on the intensity of the exposure, but certainly men who have worked with asbestos for thirty or forty years, about 50 percent are disabled or may die of one of these kinds of effects.

Therefore, it is difficult to pinpoint intensive exposures that occurred twenty or thirty years before, or even total exposures.

The second kind of evidence that is important here, I think, in regard to quality of air is that asbestos fibers have been found in routine autopsies of individuals who have died for any reason and have been autopsied and the lung searched for asbestos fibers, and the number of individuals varies in various cities throughout the United States from about 25 to 50 percent who have been found to contain asbestos fibers in their lungs, and they have died for various reasons, but some of them at least have died of cancers of various kinds.

The problem then in trying, at least from the point of view of a chest physician, to determine how much may cause an illness is very difficult since the

exposures are cumulative.

Asbestos fibers find their way not only to the lungs, but into various parts of the body. For example, they are not confined to the lungs, and they get down into the abdominal cavity and various other parts of the body. Presumably, they stay there. They are not excreted in any form, and one has to assume that the exposure, therefore, is cumulative throughout whatever lifetime the individual has.

In contact with general air -- urban air, for example -- we cannot hypothesize a threshold yet. There is just no knowledge as to how much will be non-hazardous at all. We just don't know, and one of the reasons we don't know, as I pointed out, is that it may be cumulative, and over this long period of time, indeed even a small amount could give rise to a cancer of some kind.

I think from this one would have to say that certainly there is a background of asbestos fiber concentration in the urban areas, and very little is known about this because it is difficult to identify asbestos fibers amongst all the other kinds of fibers that one may sample, even though one would try to sample, but very little of this has been done in the atmosphere of the cities, so

that one can't even now specify background exposure or background content of concentration of these asbestos fibers in the air. By "background," I mean away from any known source, but in the atmosphere not near any known source.

From this, I think one has to say, due to its real hazard to giving rise to cancers and lung scarring, that one should certainly make all possible attempts to keep the level of exposure at least at background, and not any higher than that, until perhaps some threshold is established or some non-hazardous levels established.

With regard to the latter, I don't know of any pollutant where a safe level has actually been established, so I am not very hopeful that we can ever arrive at a sure point and say this level is non-hazardous.

Because of all these difficulties, the main problem being accumulation and a long lag period between exposure and effect, which may be twenty or thirty or forty years, I think one has to regard it as a very toxic material. In spite of the very low levels, it is very toxic because it is cumulative, and I think we should avoid any unnecessary release or use where there is either a worker or a person breathing the air into which asbestos may have been released. I think we have to avoid any

inhalation of asbestos actually.

MR. MEGONNELL: Thank you, Dr. Balchum.

I have just one question. In your opinion, is this erosion of brake linings which releases asbestos to the atmosphere a problem?

DR. BALCHUM: I don't think one can scientifically say or accurately say. There are various opinions on this, and this includes the vinyl asbestos tile that we walk on, as to how much is released and then in the form in which it is released. Is it the same as breathing asbestos of the insulation workers, the unmodified form, you might say?

I would think, because it is a mineral and is retained indefinitely, it safer to assume that it is just as hazardous as asbestos from insulation.

MR. MEGONNELL: It keeps coming up, and from what little reading I have done on the subject, I think there was one study that says it is altered or destroyed by the heat of friction.

DR. BALCHUM: Yes, into a different non-asbestos form in the sense of a crystalline form of asbestos. I know of that statement too, but nobody has proven that that substance is innocuous either, so that it may occur,

but I don't think we know what it means.

MR. MEGONNELL: Well, thank you very much. I appreciate your coming.

Mr. Yost?

MR. YOST: Doctor, you indicated that pulmonary fibrosis may evidence itself earlier than some of the other things?

DR. BALCHUM: Yes.

MR. YOST: And maybe as soon as five, eight or ten years perhaps. Is that identifiable by x-ray under normal circumstances?

DR. BALCHUM: One can do a fairly good job of identifying with that history of exposure, putting together how it looks on the x-ray and the history of exposure. There are certain features that one can bring together, namely, that the scarring is in the lower parts of the lungs, and knowing exposure and how the function testing results are, one can do a fairly good job of identifying it.

However, in all these instances we do a lung biopsy and try to identify the asbestos fiber in the lung, or search for it in the sputum, or usually both, and identify that asbestos fibers are present.

MR. YOST: The other forms of disease

resulting from the inhalation of asbestos, are they normally detectable by x-ray technique also?

DR. BALCHUM: Yes, ultimately. The cancers of the lining of the abdominal cavity and the chest cavity are almost unique and can be told from the x-ray, but, again, we identify them by biopsy or procedure under the microscope.

MR. YOST: Thank you.

MR. MEGONNELL: Thank you very much.

We will take a ten minute break, please.

(After a short recess.)

MR. MEGONNELL: I understand Mr. Harry Tate from the Arizonans in Defense of the Environment is here.

STATEMENT BY

MR. HARRY L. TATE

ARIZONANS IN DEFENSE OF THE ENVIRONMENT, INC.

MR. TATE: Mr. Chairman, I would like to preface my remarks very briefly and change them from the prepared text to the extent of about two minutes.

We have heard discussions this morning of the competitive position of United States industry, and I think everyone in the room would agree that that is worth

at least two minutes (laughter).

We have heard comments about the competitive position of U. S. smelters, of U. S. autos, and now of the U. S. asbestos industry.

We have in Arizona an emission standard of 10 percent. Japanese smelters constructed between 1962 and 1965 emit a total of not more than 5 percent of input sulfur. We are not so totally unreasonable as to expect that our Arizona smelters could do as well as the Japanese, especially since some of them are older, but some smelters being built as late as 1969 and 1970 for a starting date claim they cannot meet a 10 percent emission standard. We think it is indeed regrettable that a five year lead time is not sufficient -- not, mind you, to copy the Japanese, but to do half as well.

Secondly, we are dismayed when we hear the major U. S. auto manufacturers say that they must have a one year extension in order to meet the standards set forth in the Clean Air Act Amendments of 1970, and can't probably meet them even then, and the manufacturers in Japan say, "We will meet the standards in 1975, and no extension needed, thank you," and likewise some British manufacturers, including, interestingly enough, the British branch of G.M.

Now, this morning we heard a discussion about the competitive advantage enjoyed by some processers of asbestos because the material was near at hand and at least they were not put at a competitive disadvantage to their eastern counterparts.

Next we hear a discussion of whether or not the proposed restrictions on asbestos emissions might cause a displacement of the industry to Canada. Is it that Canada is that much closer, or is it that the competitive advantage or disadvantage involved in transportation is not that great?

Perhaps some of the experts in the room can answer this, but I find it most perplexing, especially when I read that the average cost of cleaning up would be of the order of 1 percent or less of the sale price of asbestos. It is very confusing to a layman, I assure you.

MR. MEGONNELL: It is to some of us who aren't supposed to be laymen either (laughter).

MR. TATE: I would like to say that apparently Senator Goldwater doesn't agree with all of these observations, because only last night, despite the protestations of these various industries, he issued the statement that the smelter industry should clean up, no matter what

the cost, and that the auto industry should clean up, no matter what the cost.

I hope that constitutes at least a partial answer to those who have spoken of the problem or the necessity of addressing ourselves to the larger industries than those with considerable economic and political clouds.

This is my statement:

My name is Harry Tate. I reside in Tempe, Arizona, and I represent Arizonans in Defense of the Environment, Inc.

The cost of cleaning up must be a part of the cost of doing business. U. S. industries, including governmental projects, must be competitive from a standpoint of environmental protection as well as from the standpoint of economic and engineering competence. But the cost of cleaning up should be minimized, not maximized. The public can be expected to pay all or a part of the cost of cleaning up, but the public cannot be expected to subsidize prolonged managerial incompetence. Efficient environmental protection involves planning to incorporate the best available preventive and recovery equipment in early -- repeat, early -- planning stages. To delay unnecessarily in pre-planning environmental protection is to court economic disaster in

both the corporate and the public sector.

President Nixon has recently proposed a pollution tax of 15 cents per pound of sulfur emitted in the form of air contaminants. Implicit in such a position is recognition of the absolutely fundamental principle that no one and no concern, private or public, has the right to pollute the air. For those few leaders of industry and of technology who lack sufficient foresight to incorporate absolute respect for this principle in their planning, we urge the EPA to extent protection from themselves while simultaneously protecting the public against unnecessary expenditure of public monies. The public is becoming increasingly concerned with, and exponentially better informed about, the uses to which public monies are put. Rocketry need not go the way of the SST -- if sufficient foresight is used in careful planning. But the engineering of today must incorporate optimal environmental protection.

At this time I wish to read into the hearing record two brief statements by professionals in the field of public health, who were unable to come to Los Angeles for this hearing. The first statement is by Mrs. Hazel Bennett, R.N., and it reads as follows:

"Administrator William D. Ruckelshaus
Environmental Protection Agency
Washington, D. C.

"Dear Mr. Ruckelshaus:

"Asbestosis, a disease of the lung, results from the inhalation of airborne asbestos particles and dusts. Once imbedded in lung tissue, these particles decay very slowly, if indeed, at any measurable rate, during the life of the patient. Asbestosis has also been correlated with increased incidence of cancer of the lung and cancer of the lining of the lung (mesothelioma).

"Investigations of the toxic effects of beryllium upon human beings are, in many cases, in the preliminary stages. Prolonged inhalation of $BeSO_4$ at low levels (a few ug of Be/ce. meter) by rats was reported to result in pulmonary tumors that metastasized to other organs and were transplantable, according to a study by G. W. Schepers, T. M. Durkan, A. B. Delahant, and F. T. Creedon as reported in A.M.A. Arch. Ind. Health, 15, 32 (1957).

"Voluminous literature is available concerning the toxic effects of mercury, but investigation of the effects of airborne mercury are far from complete.

"Because of the known harmful effects of these substances and possible harmful effects still under

investigation, the Arizona State Nurses' Association urges that every available means be employed to keep their airborne levels at an absolute minimum. In particular, we ask that the spraying of asbestos be prohibited, except where the spraying is done indoors under conditions which permit and require that the air be cleansed before being released to the atmosphere and before inhalation by human beings.

"Sincerely,

"Hazel Bennett, R.N."

The second statement I wish to read is by Dr. Robert E. Westfall, and it is as follows:

"Environmental Protection Agency
Washington, D.C.

"Gentlemen:

"This statement is addressed to the problem of asbestosis.

"I am a practicing chest physician in the City of Phoenix, Arizona and I am also currently President of the Arizona Thoracic Society. My comments are for your consideration as you formulate your guidelines for asbestos emission control.

"Asbestosis is a disease of the lungs that results from inhalation of asbestos dust and particles into the lungs. The disease appears years after exposure or

only after years of repeated low-dose exposure. It results in scarring of the lung and produces shortness of breath in its victims. Patients afflicted with asbestosis are also at risk of developing thickening and calcification of the lining of the lung, malignant tumors of the lining of the lung, as well as cancer of the lung.

"Asbestos exposure is now widespread, having been incorporated into many substances now used in construction and in the home. Chrysotile asbestos fibers have been found in the lungs of people who have not had industrial asbestos exposure. The exact relationship that this finding will ultimately have in relationship to the later development of lung disease remains to be seen.

"I ask of your Agency that they consider the above clinical problems when they formulate the guidelines for establishing emission controls of asbestos. Certainly workers in the immediate vicinity of asbestos dust and fiber are at greatest risk and are the ones who are in greatest need of having the benefit of control measures.

"Sincerely,

"Robert E. Westfall, M.D., F.A.C.P., F.C.C.P."

Returning to the statement of my citizens' organization, Arizonans in Defense of the Environment, Inc.,

we do not intend to pose as experts, but we do have a few observations bearing on today's proceedings.

ASBESTOS

1. Asbestos fibers are virtually indestructible, although they may be broken down into smaller particles which only increases their potential for harm.

2. As a result, the amount of asbestos brought to the surface of the earth appears to be cumulative or nearly so.

3. Asbestos particles which are inhaled and then imbedded in lung tissue do not appear to decay during the life of the patient, but form asbestos bodies. This clearly suggests that the effects of repeated or continued inhalation of asbestos particles followed by inclusion in the lung tissue (rather than exhalation) is likely to be cumulative. The lag-times, ranging up to decades for damaging effects, have already been cited, and, again, by expert testimony today.

Concerning the proposed standards we have the following specific recommendations and comments:

1-- Visible emissions of asbestos fibers into the atmosphere, or into any air body which people must breathe, should be strictly prohibited.

2-- Spraying of asbestos materials, including fireproofing and insulation, should be strictly prohibited unless the spraying is done within an enclosed air supply which is not breathed by human beings. It should be required that the enclosed air be cleaned of asbestos fibers before release to any air body which is breathed by human beings.

3-- Filters should be used to clean gases from processes involving the mining, milling, manufacturing and fabrication of asbestos-containing materials. I will amend the statement to say that we are willing to allow leeway in the case of less than 1 percent.

The costs of complying with the above requests, in most cases, average less than 1% of the selling price of domestically produced asbestos, and this cost is eminently reasonable for the protection of human health. We would consider a cost of 10% obviously less agreeable but nonetheless necessary.

As a starting point, we support the standards which the EPA has proposed for asbestos. We further urge a vehicle-braking mechanism be sought which does not involve abrasion and release to the atmosphere of asbestos, or which, at the very least, cuts down on the immense

tonnages presently released from the brakes of motor vehicles.

BERYLLIUM

1. Research indicates that damage may depend upon other factors than the amount of beryllium present. These other factors include the physical form of the beryllium compounds and which compounds of beryllium are present. The fluoride, at least in some instances, seems to be more damaging than the sulfate or the oxide when equal amounts of beryllium itself are present. Any standards based upon total beryllium present must then be based upon the most damaging physical and chemical forms.

The present standards for beryllium are said to be designed to protect the public from exposures to atmospheric concentrations greater than an average of .01 micrograms per cubic meter of air over a 30-day period, or a short-term exposure of 25 micrograms per cubic meter of air for a maximum of 30 minutes. We feel that the latter standard may not be stringent enough.

The American Conference of Governmental Industrial Hygienists adopted a limit of 2 micrograms of beryllium per cubic meter for an 8-hour average. This was based on observation of apparently satisfactory prevention

of beryllium-related disease in plants with this limit.

AIDE, Inc., is aware that this standard is still subject to much quibbling:--whether it is stringent enough, or whether a less stringent standard such as 5 micrograms per cubic meter might be satisfactory. For the present, we request protection corresponding to an 8-hour standard no less stringent than the 2 micrograms per cubic meter level. The view, "If you don't know about it, try it and see what happens," may be all right for some areas of human endeavor, but this approach is not customary where toxic or dangerous substances are concerned.

Mr. Chairman, we don't want to try it. We might not like it (laughter).

Before any standards which would permit levels higher than 2 micrograms per cubic meter of beryllium for an 8-hour average are adopted, the burden of proof that such standards are not harmful should be upon such standards' advocates. It should be clear that there can be no justification for ambient standards less stringent than industrial standards. Emphatically, we do not mean to imply that in-shop conditions should subject workers to second-class environmental protection. With this one reservation only, we support as a starting point the beryllium standards proposed

by EPA.

MERCURY

We have no comments on the effects of airborne mercury at this time, but may wish to submit written comments within the next few days. As a starting point, we support the standards which EPA has proposed for mercury.

We wish to emphasize that in supporting the proposed standards for the three hazardous substances under consideration today, we support them only as the maximum limits which are tolerable. Since these substances are injurious to human health, and since the effects of long-term or repeated exposures to low concentrations is admitted by all to be at best partially understood, we maintain that the levels of these substances in the ambient air should be kept as low as possible. We will submit additional comments and documenting material in written form later.

Thank you for this opportunity to testify.

MR. MEGONNELL: Thank you, Mr. Tate.

I have only one question, or maybe just something that puzzles me. This short-term exposure of 25 micrograms per cubic meter of air for a maximum of 30 minutes, do you know where this is?

MR. SLAUGHTER: This is part of the industrial hygiene standard for beryllium. The only place it comes into effect is in the rocket firing part of the beryllium standard.

MR. MEGONNELL: That is 25 micrograms per minute?

MR. SLAUGHTER: It is sort of based on the 25 micrograms per cubic meter 30-minute exposure. Is it listed -- I'm not sure -- it must have been in the blue document, the background document; is that correct?

MR. TATE: I have some photostatic material which I will be happy to leave now for the record. I was planning on just mailing it in. We would like you to look it over, and perhaps submit additional comments of my own, but we will be glad to hand you this material, if you like.

MR. MEGONNELL: You may do that, because the record of the hearing will be open until the 3rd of March, and the Federal Register comments may be submitted to the 6th of March.

MR. TATE: Thank you.

MR. MEGONNELL: Thank you very much.

Mr. Arthur Harvey, representing the Izaak Walton League of America.

STATEMENT BY

MR. ARTHUR L. HARVEY

CHAIRMAN

NATIONAL AIR COMMITTEE

THE IZAAK WALTON LEAGUE OF AMERICA

MR. HARVEY: Thank you, Mr. Megonnell.

My name is Arthur L. Harvey, representing The Izaak Walton League of America, a conservation organization known nationwide.

I am a systems engineer in navigation and guidance. I don't mean to imply that I am an expert in the field of asbestog, beryllium or mercury, but as Chairman of the National Air Committee, I have a deep-felt interest in air pollution and abatement of all types of pollutants.

Throughout time, civilization has been guilt on an orderly system of relationships linking man to nature. Physiologically and emotionally, the fundamental requirements of mankind are still today what they have always been. Certain qualities of the environment are essential to man's well being, and indeed, to his survival, because he developed this association during the revolutionary past, and acquired a dependence upon them. Clean air,

comfort, beauty, and dignity are the things man cannot quickly outgrow.

Through knowledge gained from research, and applied, we know that the wildlife of our land forms an essential link in the ecological chain, which insures our own survival. And, knowing this, we take little comfort from the fact that some forty (40) species of birds and mammals have been eliminated in the United States, and that seventy-eight (78) additional species (including reptiles, fish and amphibians) are on the endangered list.

Who knows? Perhaps if we had as many expert veterinarians out there who had as much knowledge on chest diseases and things of this nature, perhaps they were also endangered by the air pollutants that we have.

Contaminated air is not just a city problem, but a universal problem carried by the winds to threaten all forms of life, everywhere. Therefore, it is not reasonable to set standards to accomplish the needs of today without first taking into consideration the needs of tomorrow. Future increased demands for cleaner air are inevitable; therefore, air conservation improvement programs of reduced emission concentrations are necessary for future quality of the atmosphere.

The League urges total and efficient waste material disposal and its related waste material handling and siting. Recovery and reuse must be considered in all instances.

In closing, the League wishes to commend the Environmental Protection Agency, the industries, the processing plants, the designers and manufacturers of new and efficient air cleaning, detection and monitoring equipment, and all who have demonstrated early, effective and voluntary emissions reduction.

However, the League reaffirms that the maintenance of clean air is a public necessity, and that no man or agency, whether public or private, has the right to degrade the vital air resource.

Thank you, very much, for this opportunity.

MR. MEGONNELL: Thank you, Mr. Harvey, for taking the trouble to come.

Is Mr. Jerome Brown here?

(There was no response.)

MR. MEGONNELL: Dr. Gale Billings?

(There was no response.)

MR. MEGONNELL: If not, that exhausts the list of people who have asked to be heard. I do, however,

have some written materials which I want to submit for the record.

One is a February 15, 1972 unsigned statement from the Stucco Manufacturers Association, Inc., of Sherman Oaks, California; the second is a February 14, 1972 letter addressed "To Whom It May Concern from the Laine Research & Development Company; and the last, one of the most mysterious of all, a very fancily bound document entitled "A Statement from a Drywall Sundries Manufacturer," Signed "A Drywall Sundries Manufacturer" but we will accept it for the record anyhow (laughter).

(The documents above referred to, submitted for the record, read as follows:)

STUCCO MANUFACTURERS ASSOCIATION, INC.
14006 Ventura Boulevard - Suite 204
Sherman Oaks, California 91403

February 15, 1972

The Stucco Manufacturers Association strongly urges defeat of any proposal which would lay down a blanket prohibition against spray application of materials containing asbestos in the construction industry.

This would bring wall and ceiling construction to an immediate halt. And to no purpose.

Basecoat portland cement plaster, stucco

finish coats, wallboard taping compounds, and texturing materials all incorporate small amounts of asbestos. For the most part proportions are in the range of from 1/2 of 1% to 2%. Ceiling textures may run as high as 5% asbestos content.

Formulation of all of these products is such that there is no possibility of asbestos in dry form becoming airborne. Materials are sprayed damp, and use of binders insures that any asbestos present remains within the matrix. Removing the asbestos would necessitate re-engineering of application equipment, a time-consuming process.

We understand the necessity for establishing dust emission control standards in manufacturing plants. At its present state of technology, however, the industry has no acceptable substitute for asbestos. It will require considerable time to develop new formulations and processing machinery.

- - - - -

LAINE RESEARCH & DEVELOPMENT CO.
P.O. Box 3219
Fullerton, California 92634

February 14, 1972

TO WHOM IT MAY CONCERN:

My name is Tauno Laine, residing at 1406 Longview Drive, Fullerton,California. I am a research chemist with thirty-five years experience in industrial chemistry in Europe and United States, of which the last seventeen years have been exclusively devoted to research and formulation work in stucco and drywall industries. During this time I have thoroughly researched and formulated all of the various products manufactured by this industry, such as exterior and interior stuccos, concrete finishes, accoustical and fireproofing plasters, dry and premixed tape joint compounds, tile setting materials, ceiling and wall textures, etc.

Tens of millions sacks and containers of products, exclusively based on my formulations, have already been sold in this country and abroad.

Based on this experience, I can testify that, excluding interior white coat which represents only a fraction of the total amount of finishing products, the other stucco and drywall products must contain certain

amount of asbestos fiber.

It is my professional opinion that within the present state of technology it is impossible to formulate a stucco or drywall product, applicable with the existing tools and spray machinery, without utilizing asbestos fiber. Prohibiting the use of asbestos fiber in these products would paralyze the industry completely.

I would definitely like to emphasize that the amount of asbestos in most of the products, such as exterior stucco, is very minute: approximately 0.35 percent. In all of the products it is combined with many other ingredients and strong adhesives, and the mixture is sprayed as a heavy watery slurry with very limited air pressure. The product comes out of the nozzle in coarse jelly-like droplets; and there is absolutely no chance that airborne asbestos particles could be generated.

Stucco and drywall industry is fully aware of the cust problem involved in the manufacture of its products. Completely new mixing and sacking procedures have to be developed. Certain length of time and sizeable capital expenditure is involved before the industry could

be ready to comply with the new regulations.

Respectfully submitted

/s/ Tauno Laine

- - - - - - - -

February 15, 1972

To Whom It May Concern:

In regards to the proposed rule making in the Federal Register Vol. 36, No. 234, Item 61.22 on Emission Standards for Asbestos, Item (E)(1) states, "The spraying of any product which contains asbestos on any portion of a building or structure is prohibited."

Our industry produces several products which contain very small but very vital percentages of asbestos. These products are sprayed on the ceilings and walls of houses, apartments, offices, etc. in a wet slurry.

Spraying in this manner, affords all of the asbestos and other compounded materials in these products to adhere to the ceilings and walls in mass and does not allow any of the product to float or be released to the atmosphere.

Asbestos has been used by the building industry for many years, because it adds slip and mechanical

characteristics that cannot be found in any other product. It is very vital to the building industry and if it is banned, could bring the industry to a halt.

We in this industry are as ecology minded as anyone in the nation and would like to provide a better world to live in but do it in a logical, sensible manner.

We feel that Item 61.22, Section E-1 was written to impair the fireproofing of steel structures that are sprayed in a dry form over a city and use high percentages of asbestos. While accomplishing this, the writer has encompassed everyone in the Building Industry, many of whom use very small percentages of asbestos and binders and proper formulating procedures to inhibit this type of pollution.

In conclusion, let us that that Item 61.22, Section E-1 should be deleted or rewritten to allow the largest proportion of the Building Industry to perform their function in building better homes in our communities and to allow the people in our cities to buy better homes through better building products to give the longevity to their homesites that we could all be proud of.

Sincerely,

A DRYWALL SUNDRIES MANUFACTURER

MR. MEGONNELL: I want to thank everybody for your kind attention and decorum throughout the proceedings, for the excellence of your statements, and, generally, for participating in this very important matter of controlling hazardous air pollutants.

The record, as I said, will be open until March 3rd. Any materials postmarked on or before that date will be accepted for the record; and you may submit them to Durham, in accordance with the Federal Register notice, until March 6th.

Thank you very much.

The hearing is adjourned.

(Thereupon, at 3:55 p.m., the hearing was duly adjourned.)

ENVIRONMENTAL PROTECTION AGENCY

PUBLIC HEARING

ON

NATIONAL EMISSIONS STANDARDS

FOR HAZARDOUS AIR POLLUTANTS

Los Angeles, California

APPENDIX

STATEMENTS SUBMITTED FOR THE RECORD

Zimmer Reporting Service
150 Nassau Street
New York, N. Y. 10038
BArclay 7-2314

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William F. Briney, M.D.
Box 88, V. A. Center
Prescott, Arizona 86301

12 February 1972

Administrator, EPA
Attn: Presiding Officer
Hazardous Emission Standards Hearings
Room 17-70
5600 Fishers Lane
Rockville, Md. 20852

Dear Sir:

My remarks are chiefly concerned with the environmental effects of the element beryllium and its compounds. The health effects of asbestos and its recognition as an important occupational and environmental hazard are well known to all.

The mechanism by which toxic beryllium compounds act on cells and tissues is unknown. However, it is well known to aerospace workers and others that inhalation of beryllium compounds causes chronic pulmonary damage and they must be considered as potential environmental contaminants.

Furthermore, there is strong suspicion by some investigators, that since beryllium has been shown to be carcinogenic in experimental animals it may well be carcinogenic in man.

Since the threshold levels for any elemental

air contaminant or its compounds that cause chronic disease are not known, any appreciable concentration in air represents a potential hazard. Beryllium, as such, is usually undetected in air but when present it can be controlled. When present, beryllium should be treated as the most toxic of the known metallic air pollutants. Those responsible for health maintenance in industry have the responsibility for the use of poisonous substances and proof of their safety.

Beryllium, therefore, along with asbestos, must be considered a hazardous air pollutant. I would urge the EPA to press for the strictest possible standards for control of these emissions and I request that these remarks be made part of the official record of these hearings.

Very truly yours,

/s/ William F. Briney
President
Prescott Chapter
Izaak Walton League

- - - - -

# TESTIMONY ON PROPOSED NATIONAL EMISSION STANDARD FOR ASBESTOS

Heart of America TB & RD Association
Kansas City, Missouri

The announcement of hearings on hazardous air pollutant emission standards carried in the Federal Register, December 7, 1971, specifically requested information pertinent to the health effects of asbestos, beryllium, and mercury. Responding to that notice, we have enclosed survey data relating to the effects of asbestos on occupationally exposed workers in the Kansas City area.

This association has cooperated with Local 27 of the International Association of Heat and Frost Insulators and Asbestos Workers in assembling death certificate records of men who have worked in the union and died since 1947. All thirty-six men in that category were identified and their death certificates obtained. In addition the results of a pulmonary function study conducted with Local 27 in 1968 by a local respiratory specialist are included. Taken together they form a powerful statement in support of controls on asbestos spraying in the construction industry.

We have consulted with the union on the nature of their exposure to asbestos dust and toured construction

sites where the material is being applied. This area is in the midst of a construction boom and a master plan for redevelopment of the downtown loop has been approved, which in turn will generate more new construction. It is therefore to be expected that the potential for use of asbestos insulation will continue to increase through this decade.

At present there are no air pollution control regulations in the region controlling the use of asbestos nor any plans to adopt same in the near future. Considering all these factors and the results of research conducted elsewhere we believe that the best interests of the citizens of this area would be served by adopting the asbestos emission standards as proposed.

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INTERNATIONAL ASSOCIATION ` HEAT AND FROST INSULATORS

AND ASBESTOS WORKERS, LOCAL 27

SUMMARY OF DEATHS: 1947-1972

| Case | Date of Death | Age | Cause of Death |
|---|---|---|---|
| 1 | 11/8/47 | 58 | cancer of the colon |
| 2 | 2/21/48 | 71 | cancer of the bladder |
| 3 | 8/7/48 | 55 | sympathetic oblastoma, thorax and abdomen |
| 4 | 3/20/50 | 68 | lung cancer |
| 5 | 4/30/50 | 60 | lung cancer |
| 6 | 4/22/53 | 63 | cause unknown |
| 7 | 11/23/54 | 58 | pulmonary emphysema, fibrosis, asthma, ASHD |
| 8 | 3/11/55 | 69 | coronary occlusion ASHD |
| 9 | 12/27/56 | 79 | cerebral hemmorhage cardio-vascular disease |
| 10 | 6/29/57 | 58 | gunshot wound |
| 11 | 3/22/59 | 65 | blood loss, hemmorhage cause unknown |
| 12 | 7/6/59 | 33 | suicide |
| 13 | 2/10/61 | 65 | duodenal ulcer, severe hemmorhage |
| 14 | 4/18/61 | 80 | pneumonia, chronic brain syndrome |
| 15 | 4/26/61 | 57 | lung cancer |
| 16 | 10/4/61 | 61 | generalized metastatic carcinomatosis |
| 17 | 12/8/61 | 66 | pulmonary TB |
| 18 | 8/18/64 | 62 | cancer of the pancreas |
| 19 | 4/3/65 | 67 | lung cancer |
| 20 | 6/8/65 | 35 | factory accident |
| 21 | 7/23/65 | 56 | astrocytoma, brain |
| 22 | 11/9/65 | 68 | mesothelioma with widespread metastasis |
| 23 | 6/3/67 | 89 | pneumonia, urinary cystit hip fracture |
| 24 | 9/14/67 | 85 | congestive heart failure |
| 25 | 10/29/67 | 43 | myocardial infarction ASHD |
| 26 | 3/16/68 | 65 | cancer of the mandible wi widespread metastasis |
| 27 | 5/1/68 | 48 | auto accident |
| 28 | 2/9/70 | 65 | ASHD, emphysema |
| 29 | 5/28/70 | 51 | cerebral hemmorhage |
| 30 | 6/15/70 | 71 | congestive heart failure ASHD |
| 31 | 10/16/70 | 50 | myocardial infarction ASHD |
| 32 | 11/11/70 | 57 | lung cancer |
| 33 | 12/11/70 | 75 | myocardial infarction |
| 34 | 2/17/71 | 55 | lung cancer |
| 35 | 4/19/71 | 57 | cancer of lungs and brain |
| 36 | 6/17/71 | 75 | cerebral vascular accident ASHD |

# INTERNATIONAL ASSOCIATION OF HEAT AND FROST INSULATORS AND ASBESTOS WORKERS, LOCAL 27

## SUMMARY OF DEATHS: 1947-1972

| Case | Age | Years Worked at Trade | Case | Age | Years Worked at Trade |
|---|---|---|---|---|---|
| 1 | 58 | 8 | 19 | 67 | 25 |
| 2 | 71 | 29 | 20 | 35 | 18 |
| 3 | 55 | 29 | 21 | 56 | 20 |
| 4 | 68 | 40 | 22 | 68 | 35 |
| 5 | 60 | 30 | 23 | 89 | 40 |
| 6 | 63 | 12 | 24 | 85 | 40 |
| 7 | 58 | 31 | 25 | 43 | 17 |
| 8 | 69 | 38 | 26 | 65 | 40 |
| 9 | 79 | 30 | 27 | 48 | 25 |
| 10 | 58 | 37 | 28 | 65 | 12 |
| 11 | 65 | 21 | 29 | 51 | 20 |
| 12 | 33 | 12 | 30 | 71 | 30 |
| 13 | 65 | 48 | 31 | 50 | 30 |
| 14 | 80 | 22 | 32 | 57 | 35 |
| 15 | 57 | 26 | 33 | 75 | 15 |
| 16 | 61 | 22 | 34 | 55 | 33 |
| 17 | 66 | 30 | 35 | 57 | 20 |
| 18 | 62 | 30 | 36 | 75 | 25 |

Average Age at Death -- 62.2

Average Years Worked at Trade -- 27.1

| | |
|---|---|
| Total Deaths | 36 |
| Death by Natural Cause | 32 |
| Cancer, All Types | 15 |
| Lung Cancer | 7 |
| Heart Disease | 6 |
| Other Respiratory Disease | 3 |

# SUMMARY OF PULMONARY FUNCTION STUDIES
# DONE IN JUNE 1968 FOR
# INSULATION AND ASBESTOS WORKERS
# KANSAS CITY, MISSOURI

Total Number of Ventilatory Studies done: 61

Total number normal ----- 32
Total number abnormal --- 29
Of the abnormal studies the following break down was noted:
Restrictive change only -------- 8
Obstructive change only -------- 8
Combined obstruction-restrictive 13
(of this combined group 10 studies would suggest that the restrictive change was more pronounced than the obstructive change.)

Historical Data:
Total number smokers ---------- 44
(of this number 24 had abnormal ventilatory studies)
Total number non-smokers --------- 17
(of this number 5 had abnormal ventilatory studies)
Total number with complaint of cough ---------- 34
Total number without complaint of cough ---------- 27

Total number with shortness of breath ---------- 13
Total number without shortness of breath ---------- 48

Total number with wheezing noted in chest ---------- 31
Total number without complaint of wheeze ---------- 30

Age Difference:

| Age groups | No. in Group | Ventilatory studies No. abnormal | No. normal |
|---|---|---|---|
| 20-29 | 6 | 1 | 5 |
| 30-39 | 14 | 4 | 10 |
| 40-49 | 23 | 10 | 13 |
| 50-59 | 13 | 9 | 4 |
| 60 and over | 5 | 5 | 0 |

ISSUE?

INTERESTED IN SAVING SOUTHERN UTAH'S ENVIRONMENT

Post Office Box 728

Cedar City, Utah 84720

February 14, 1972

Administrator of the Environmental Protection Agency
Attn: Presiding Officer
Hazardous Emission Standards Hearings
Room 17-70
5600 Fishers Lane
Rockville, Maryland 20852

Dear Sir,

We were unable to send a representative to today's hearing in Los Angeles on Hazardous Emissions Standards. And while we are in no way expert on these questions, we would appreciate it if our comments were entered into the hearing report.

Significant work has been conducted by many scientists regarding the potentially hazardous nature of the substances under discussion -- mercury, beryllium, and asbestos. Dr. Charles L. Hyder of the Goddard Space Flight Center, for instance, believes that airborne mercury from the Four Corners Plant is responsible for rising mercury concentration in game fish in Navajo Lake.

We understand that the American Medical

Association has found links between airborne asbestos particles and lung cancer.

And while we know little about beryllium, we know it to belong to that group of heavy metals which seem to be so hazardous to human health.

Since we are in no position to determine for ourselves what constitutes acceptable levels of these substances, we ask that the Environmental Protection Agency use its very best judgment in protecting us from the industrial sources of these contaminants.

Thank you.

Sincerely,

/s/ Lloyd Gordon
Executive Director

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JAN LIEBEN, M.D.
1617 John F. Kennedy Blvd.
Philadelphia, Pa. 19103

February 17, 1972

Environmental Protection Agency
Attention: W. H. Megonnell, Director
Division of Stationary Source Enforcement
Room 17-70
5600 Fishers Lane
Rockville, Maryland

Statement of Jan Lieben, M.D.

E.P.A. Public Hearings on Hazardous Air Pollutants

Los Angeles, February 15, 1972

Mr. Megonnell, my name is Jan Lieben. I was Director of the Division of Occupational Health of the Commonwealth of Pennsylvania from 1955 - 1968, and also was in charge of air pollution for several years. I extensively studied beryllium disease in Reading, Pa. and in Connecticut over a period of 16 years. During this time I published jointly with others 12 papers on beryllium and its effects.

In a statement before this Agency on February 15, 1972 at Los Angeles, Mr. Edmund M. Velten, Vice President of Kawecki Berylco Industries, Inc., one of the two primary beryllium producers in the United States, quotes

extensively from these papers and utilizes them to justify the suggestion that beryllium emissions be limited by requiring ground level concentrations to conform to an ambient air quality standard of 0.01 microgram of beryllium per cubic meter of air as a monthly average.

I should like to state herewith that, based on my extensive experience, I do not believe that a monthly average standard of this magnitude is safe. In Mr. Velten's presentation questions are raised regarding the existence of several cases of berylliosis for which no cause other than air pollution could be found. In examining evidence and people many years later, it was, and still is, extremely difficult to verify exposures to a hazardous substance. The fact remains that in the area beryllium concentrations were at least as high and higher than the 0.01 microgram per cubic meter on many occasions. While in some of these cases evidence of beryllium exposure other than air pollution has been found, there still remain cases where this has not been possible. Study of our entire papers will confirm the fact that there is at the present still no knowledge on how much beryllium will cause beryllium disease in those susceptible to the illness. Under those circumstances I do not think the averaging of 0.01 micrograms of beryllium per cubic meter

of air on a monthly basis should be permitted. Concentrations should be kept to the minimum, and the 0.01 micrograms per cubic meter should be a ceiling value.

Furthermore, again based on past experience, to measure 0.01 micrograms of beryllium in the ambient air as a monthly average is extremely difficult, inaccurate, and costly. I should, therefore, advocate and suggest that stack monitoring would be the best available means at the present time.

Below is a list of the papers on Berylliosis:

Beryllium Oxide Poisoning - Industrial Medicine and Surgery, November 1952.

Berylliosis in Connecticut - Connecticut Health Bulletin, September, 1954.

Chronic Pulmonary Disease Associated with Beryllium Dust - Pennsylvania Medical Journal, April, 1957.

Epidemiological Findings Associated with Beryllium Extraction - Industrial Hygiene Journal, Vol. 20, No. 6, December, 1959.

An Air Pollution Study of a Community Surrounding a Beryllium Plant - Industrial Hygiene Journal, Vol. 20, No. 6, December, 1959.

Respiratory Disease Associated with Beryllium Refining and Alloy Fabrication - Journal of Occupational Medicine, July, 1961.

Community Cases of Beryllium Disease - Air Engineering, November, 1961.

Qualitative Beryllium Studies in Post Mortem Lungs - A.M.A. Archives of Environmental Health, August, 1963.

Chronic Beryllium Disease -- A Follow-Up Study - Journal of Occupational Medicine, April, 1964.

Probable Berylliosis from Beryllium Alloys - Archives of Environmental Health, Vol. 4, p. 473-477, October, 1964.

Significance of Beryllium Concentrations in Urine - Archives of Environmental Health, Vol. 12, March, 1966.

Respiratory Disease Associated with Beryllium Refining and Alloy Fabrication (1968 Follow-Up) - Journal of Occupational Medicine, Vol. 11, No. 9, September, 1969.

Respectfully submitted,

/s/ Jan Lieben, M.D.

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THE CHLORINE INSTITUTE, INC.
342 Madison Avenue
New York, N.Y. 10017

February 28, 1972

Mr. William H. Megonnell
Presiding Officer
Hazardous Emission Standards Hearings
Environmental Protection Agency
Rm 17 - 70
5600 Fishers Lane
Rockville, Maryland

Dear Mr. Megonnell:

This is in connection with testimony presented by the writer at the Los Angeles hearing on February 15. At that time it was stated that supporting references would be provided concerning the photochemistry of elemental mercury vapor in air.

Testimony presented, in part, reads as follows:

> "The statement is made (by EPA)[a] that '...most mercury compounds degrade to elementary mercury under the action of sunlight.' This quotation is out of context as the author[b] was discussing photolysis of organomercury compounds; such compounds do indeed decompose to elemental mercury when exposed to ultraviolet light (c,d).

"The reactions of elemental mercury vapor with oxygen and water vapor under the influence of ultraviolet light have been well documented[e-g]. The product formed is mercuric oxide. This can be readily demonstrated in an ultraviolet absorption cell. (Noyes, for example, notes that a mercuric oxide film formed on the window of his cell.)[f]

"Reactions which are photochemically initiated only proceed more rapidly, but not in an energetically unfavorable direction. The reaction of mercury vapor with oxygen to form mercuric oxide is highly favorable*. All the physiochemical evidence now available indicates that mercury vapor rapidly converts to inorganic salts, chiefly mercuric oxide, in the presence of ultraviolet, ozone and oxides of nitrogen (e,g,j,k)..."

As indicated by Wallace et al[1] the photolysis of dimethylmercury to mercury vapor and ethyl and methyl radicals also is well known. It would appear that only under very specialized conditions would the rate of methylmercury formation exceed the rate of methylmercury

decomposition. [These authors also point out that certain bacteria are apparently capable of converting just about all types of mercury compounds into metallic mercury vapor.] Thus, mercury and mercury-containing compounds are widely interconverted in nature and the rate of formation of any one -- such as methylmercury -- vs. the rate of decomposition should be an important consideration.

Yours very truly,

THE CHLORINE INSTITUTE

/s/ Edmund J. Laubusch

---

* Using thermodynamic values published[h]

$$Hg_{(g)} + 1/2\ O_{2\ (g)} \quad - HgO_{(c)}$$

$$\Delta H_f = -37 \text{ kcal/mole}$$

$$\Delta G_f = -22 \text{ kcal/mole}$$

Thus, both the enthalpy and free energy favor the reaction of elemental mercury vapor with oxygen to form mercuric oxide.

REFERENCES

(a) Background Information - Proposed National Emission Standards for Hazardous Pollutants, Technical Report

No. 3 - Mercury, p.15, Environmental Protection Agency, Office of Air Programs, Research Triangle Park, North Carolina, December 1971.

(b) Mercury in the Natural Environment: A Review of Recent Work, p. 12, I. R. Jonasson, Paper 70-57, Geological Survey of Canada (1970).

(c) Radiolysis of Liquid and Solid Dimethyl Mercury, C. J. Wolf and J. Q. Walker, J. Phys. Chem., 72(10), 3457-3462 (1968).

(d) Photochemical Studies XLI, The Photochemistry of Dimethyl Mercury, R. Gomer and W. A. Noyes, J. Amer. Chem. Soc., 71, 3391-3394 (1949).

(e) Advances in Photochemistry, 1, ed. W. A. Noyes, G. S. Hammond and J. N. Pitts, 225-227, 273, Interscience, New York (1963).

(f) Photochemical Studies VI. The Photochemical Reaction Between Oxygen and Mercury Vapor at Relatively Low Pressures, W. A. Noyes, J. Amer. Chem. Soc., 49(12), 3100-3106 (1927).

(g) Primary Processes in Reactions Initiated by Photoexcited Mercury Isotopes, H. E. Gunning, Can. J. Chem. 37, 89-95 (1958).

(h) Selected Values of Chemical Thermodynamic Properties, Circular 500, National Bureau of Standards (1952).

(i) Mercury Exposures in Dry Battery Manufacture, C. R. Williams, M. Eisenfad and S. E. Pihl, J. Ind. Hyg. Tox., 29, 378-381 (1947).

(j) Photochemical Studies XIV. The Decomposition of Nitrous Oxide Sensitized by Mercury Vapor, W. M. Manning and W. A. Noyes, J. Amer. Chem. Soc. 54(10), 3907-3917 (1932).

(k) The Photochemical Decomposition of Nitric Oxide, P. J. Flory and H. L. Johnston, J. Amer. Chem. Soc. 57(12), 2641-2651 (1935).

(l) Mercury in the Environment: The Human Element, Robin A. Wallace et al. Oak Ridge National Lab., Contract No. 7405 - eng. 26 (reprint March 1971).

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CLEAN AIR NOW
P. O. Box 5682

Riverside, California 92507

February 17, 1972

Mr. William E. Megonnell, Director
Division of Stationary Source Enforcement
Environmental Protection Agency
Washington, D.C. 20460

Dear Mr. Megonnell:

The Board of Directors of Clean Air Now, a citizens' group formed to fight air pollution in Riverside and San Bernardino Counties has authorized me to write you concerning the emission standards proposed by the Environmental Protection Agency for three hazardous air pollutants: asbestos; beryllium; and mercury. We were unable to have a representative at the February 15th hearings in Los Angeles, but, we would like to have this statement entered as hearing testimony.

Clean Air Now would like to go on record as supporting tight standards for asbestos, beryllium, and mercury. It should be remembered that the intent of the Clean Air Act and Amendments is to protect the health and welfare of the citizens of this country. That is the

stated purpose of setting standards. We ask that Environmental Protection Agency officials not be swayed by industrialists who complain of the added cost of emission control, even if they are valid costs. The public will absorb these additional expenses anyway, and although it is a cliche by now, there is no point in having healthy, profitable industries if there aren't healthy human beings first.

Our medical consultants have assured us that there is medical evidence about the harmful effects of asbestos, beryllium, and mercury. Because we have been absorbed in numerous other projects and because we felt that the Environmental Protection Agency would have better access to all the medical testimony on these pollutants, we are not now enclosing specific citations. If, however, you feel that it would help you to have us do this, we will be glad to comply.

Thank you for allowing us this opportunity to speak for citizens in asking that the highest priority be the protection of the public health.

Sincerely yours,

/s/ William E. Wybourn
William E. Wybourn
President

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STATE OF CALIFORNIA - HUMAN RELATIONS AGENCY
DEPARTMENT OF PUBLIC HEALTH
Bureau of Occupational Health
& Environmental Epidemiology
P.O. Box 30327, Terminal Annex
Los Angeles, California 90030

February 18, 1972

Administrator, Environmental Protection Agency
5600 Fishers Lane
Rockville, Maryland 20852

Attention: Mr. William H. Megonnell, Hearing Officer
Hazardous Materials Emissions Standards

Gentlemen:

Reference: EPA Hearings in Los Angeles, California on February 16, 1972 Relating to "Proposed Standards for Asbestos, Beryllium and Mercury"

During the referenced hearings, a question arose regarding the interpretation of the meaning of Paragraph 61.42(a) of the proposed standards for asbestos, beryllium, and mercury. This paragraph reads as follows:

> "Emissions to the atmosphere from sources subject to this subpart shall not cause atmospheric concentrations of beryllium to exceed 75 microgram minutes per cubic meter of air within 10 to 60 minutes, accumulated during 2 consecutive weeks, measured anywhere

beyond the property line of such source or at the nearest place of human habitation."

This wording is confusing with respect to the interpretation of its meaning.

I have enclosed some material from TM 3-215 Military Chemistry and Chemical Agents, 1963 edition, that may help clarify the concept of dosage, as I understand it to be implied in the above quoted paragraph.

I trust that the enclosed material will serve to clarify the concept of dosage, as it is being applied by the EPA to the control of exposure of humans to a toxicant, such as beryllium.

Cordially,

/s/ Meier Schneider
Meier Schneider, P.E.
Industrial Hygiene
Engineer

- - - - - -

(Enclosure)

CHAPTER 1

INTRODUCTION

1. Purpose and Scope

a. This manual provides an adequate source of practical information on chemical agents --- their classifications, physical and chemical properties and

physiological effects, use in the field, detection and identification, and decontamination. Individual and collective protective items are also discussed. (For detailed information on munitions employed; techniques of employment; and effects of weather, terrain, and other factors on operations, see FM 3-10.)

b. The material presented in this manual is applicable to nuclear and nonnuclear warfare.

2. Definitions

The following terms are defined as they apply to military chemistry and chemical agents:

a. Aerosol -- a liquid or solid, comprised of finely divided particles, suspended in a gaseous medium. Examples of common aerosols are mist, fog, and smoke. Aerosols usually are not visible.

b. Atropine -- an alkaloid obtained from atropa belladonna. It inhibits the action of the craniosacral division of the autonomic nervous system. Used to relieve the symptoms of nerve agents.

c. Casualty Agent -- an agent capable of producing serious injury or death when used in field concentrations.

d. Chemical Agent -- a solid, liquid, or

gas, which, through its chemical properties, produces lethal or damaging effects on man, animals, plants, or material, or produces a screening or signaling smoke.

e. Chemical Agent Casualty -- a person who has been sufficiently affected by a chemical agent to die or require evacuation or one who suffers a marked loss of effectiveness in performing his military duties for a significant period of time.

f. Chemical Agent Symbol -- the U.S. Army code designation of any chemical agent. This is a combination of one to three letters or letter-number combinations; it must not be confused with the chemical formula.

g. Chemical Operations -- employment of chemical agents by weapon systems to produce casualties or damage.

h. Chemical Weapons System -- an integrated relationship of chemical agents, munitions or spraying devices, and carrier vehicles alined to conduct chemical operations.

i. Concentration -- the amount of a chemical agent present in a unit volume of air. Usually expressed in milligrams per cubic meter ($mg/m^3$).

j. Contaminate -- the act of applying a toxic chemical agent on a person, object, or area.

k. Contamination -- the presence of a toxic chemical agent on a person, object, or area. Contamination density is usually expressed in $mg/m^2$, or pounds per hectare.

l. Decontaminating Material -- any substance used to chemically destroy, physically remove, seal in, or otherwise make harmless a chemical agent.

m. Decontamination -- the process of making any contaminated object, person, or area safe for unprotected personnel by chemically destroying, physically removing, sealing in, or otherwise making harmless the chemical agent on or around it. (In general, only areas of materiel contaminated by agents which have a long duration of effectiveness need be decontaminated, since agents with a short duration of effectiveness are quickly evaporated.)

n. Dosage.

(1) Ct. Product. The Ct product expresses in a single figure the interrelationship of concentration and the duration of exposure of personnel to toxic chemical agents which exert their effects in vapor or aerosol form. These two factors --

concentration and time -- determine the effectiveness of an agent. Since Ct is a combination of two factors, for the most toxic chemical agents the same effect can be attained by exposure to a high concentration for a short time or to a lower concentration for a longer time. For example, exposure to a phosgene (CG) concentration of 320 $mg/m^3$ for 10 minutes or 3,200 $mg/m^3$ for 1 minute. (Factors causing variation are noted in (4) below.)

(2) Dosage (Ct). Dosage (Ct) is the concentration of chemical in the atmosphere multiplied by the time the concentration remains, expressed as $mg\text{-}min/m^3$. The dosage received by a person depends upon how long he is exposed to the concentration. That is, the respiratory dosage in $mg\text{-}min/m^3$ is equal to the time in minutes an individual is unmasked in an agent cloud multiplied by the concentration of the cloud. The skin dosage is equal to the time of exposure in minutes of an individual's unprotected skin multiplied by the concentration of the agent cloud. (This is generally understood as being the effect upon the whole body.) The physiological effectiveness of skin and respiratory aerosol dosages are influenced by particle size as well as time and concentration, since retention by the lungs and impingement upon the skin are functions of particle

size. They are usually expressed in mg-min/$m^3$ for a particular size. Dosage is usually expressed as median lethal dosage ($LCt_{50}$). (See par. 24 for further information.)

(3) Liquid contamination. The weight of liquid agent received by a person on his skin is usually expressed as median lethal dose ($LD_{50}$) in milligrams of contaminant per kilogram of body weight (mg/kg).

(4) Restrictions. Actually an individual may receive an amount of chemical agent that is less or more than expected for a given dosage (Ct), depending upon some of the following variables:

(a) How long the breath was held during short exposures.

(b) Speed with which mask was donned.

(c) Ability to fit mask and other mask leakage factors.

(d) Whether the chemical agent was also absorbed through the skin.

(e) Whether the chemical agent stimulated rate of breathing.

(f) Rate and depth of breathing of individual at time of exposure.

(g) Amount of physical exertion of the individual at time of exposure.

(h) Rate of detoxification, especially if exposure was long. For tabulation purposes such variables are ignored; and the Ct values are assumed to measure the amount of chemical agent received by an individual breathing at a normal rate in a temperate climate with average humidity. These values provide a basis of comparison for the chemical agents.

o. Harassing Concentration -- a concentration of a toxic chemical agent which requires masking or other protective measures. Such concentrations may be insufficient to kill, but sufficient to interfere with normal operations.

p. Incapacitating Agent -- an agent that produces temporary physiological or mental effects, or both, which will render individuals incapable of concerted effort in the performance of their assigned duties.

q. Incendiary -- a chemical agent used primarily for igniting combustible substances with which it is in contact by generating sufficient heat to cause ignition.

r. Persistency -- an expression of the duration of effectiveness of a chemical agent. This is dependent on physical and chemical properties of the agent, weather, methods of dissemination, and conditions of terrain.

"Persistent" and "nonpersistent" should not be used to denote classes of chemical agents.

s. Riot Control Agent -- an agent that produces only a temporary irritating or incapacitating effect when used in field concentrations.

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THE STATE OF WISCONSIN

DEPARTMENT OF JUSTICE

MADISON 53702

March 2, 1972

Mr. William H. Megonnell
Presiding Officer
Hazardous Emission Standards Hearings
Room 17-70
5600 Fishers Lane
Rockville, Maryland 20852

Dear Mr. Megonnell:

I am submitting this statement and the enclosed exhibits for the record in the hearing on National Emission Standards for Hazardous Air Pollutants over which you are presiding officer. I have examined some of the statements presented at the hearings, particularly those of the Chlorine Institute and of Dr. Leonard J. Goldwater.

Despite the protestations of the chloralkali industry, there was no information presented at the hearing which tends to clearly establish that mercury is not a hazardous air pollutant. Under section 112 (b) (1) (B) of the Clean Air Act the Administrator must set emission standards within 180 days after he determines that a substance is a hazardous air pollutant unless information presented at the hearing clearly shows that it is not.

An examination of Dr. Goldwater's lengthy testimony does not support the contention that mercury is not a hazardous air pollutant within the meaning of the Clean Air Act. At the outset, Goldwater concedes the danger of methylmercury and in no way supports any discharges of mercury in this form. Rather, he questions whether mercury discharge can be regulated as total mercury because the toxicity varies so widely according to the chemical form in which it is present. At the same time, he questions the reliability of current methods for measuring methylmercury in low concentrations.

Regulation of total mercury is exactly what is required under the Clean Air Act. In the first place, mercury is toxic in all its forms. More significant, in light of Goldwater's comments, is the fact that mercury in

its less toxic forms can be converted to highly toxic methylmercury compounds through the action of bacteria under anaerobic conditions. See Wood, J.M., Scott, F. and Rosen, C. G., "Syntheses of Methyl Compounds by Extracts of Methanogenis Bacterium." Nature, Vol. 222, p. 173 (1968). Goldwater seeks to minimize and even discredit the effect of methylation by stating that the Swedish scientists are too sure of themselves. This is hardly a scientific basis for selecting between two groups of scientists acknowledged to have by far the greatest expertise on the subject of mercury in the world scientific community. Indeed, there is no cogent reason for selecting between these groups of scientists. The phenomena of methylation has been well studied and accepted by Japanese scientists as well. See Exhibit V, which is a report given by K. Tonomura at a joint U. S.-Japanese Seminar, held in Oiso, Japan last October under the auspices of the National Science Foundation and the Japanese Academy for Science. That report found that methylation occurs widely under anaerobic conditions, and raises the question of whether it occurs within the bodies of animals as well.

The chemistry of at least one methylation reaction was discussed in Bertilsson, L., and Neujahr, H.J.,

"Methylation of Mercury Compounds by Methylcobalamin," Biochemistry, Vol. X, No. 14, p. 2805 (June 1971). Methylcobalamin, a form of vitamin B12, was demonstrated to be capable of methylating mercury ions even in the absence of enzymes. This phenomena was also observed by Japanese researchers, and suggests that the reaction may be chemical rather than enzymatic. See Exhibit VI, which is a report given by T. Ukita at the above-mentioned joint Japanese-U. S. Seminar in Oiso. Both of these exhibits are soon to be part of a book entitled Environmental Toxicology of Pesticides edited by F. Matsumura, G. M. Boush, and T. Masato to be published by Academic Press, New York, N. Y.

An examination of the University of Wisconsin studies cited by Goldwater where methylation failed to occur shows that the studies were carried out under aerobic conditions, whereas methylation observed in the authorities cited above occurred under anaerobic conditions. These studies were reported in an article in Science, Vol. 173, pp. 49-51, July 2, 1971, which Goldwater for some reason fails to mention. I was also able to track down the study referred to on p. 115 of the transcript where organic mercury compounds were supposedly detoxified by algae. The phenomena observed in that experiment turns out to be simple

absorption by the algae rather than detoxification. No attempt was made in the rather crude experiment to determine what form the mercury compounds were bound up in, and what happened when the mercury-absorbing algae died. It is unlikely that this particular study will ever be published.

Goldwater's testimony clearly fails to support the declassification of mercury as a hazardous air pollutant from a legal standpoint. His "go slow" approach is contrary to the legislative intent of section 112. Congress clearly wants action not paralysis, unless a substance listed by the Administrator is clearly shown not to be hazardous. In other words, the burden of proof under this section is shifted to the polluter. Goldwater concedes the toxicity of mercury in both organic and inorganic forms. Lack of knowledge of how mercury exists in the air supports the inapplicability of an ambient air standard -- one of the tests for a hazardous air pollutant under section 112 (a) (1). Finally, Goldwater supports regulation of large discharges of mercury vapor from point sources. See Transcript p. 123, 141, 142, and 143. This is exactly what the Act requires and the proposed standards purport to accomplish.

I have little to say about the statement

of the Chlorine Institute other than the observation that, in general, they were guilty of many of the very things they criticized the EPA background statement for: unsupported assumptions, conclusions that do not follow, irrelevancy, and inconsistency. As with Goldwater, their discussion of how little is known about mercury in the ambient air is not relevant other than to the fact that mercury is a pollutant for which no ambient air standard is applicable under section 112 (a) (1) of the Clean Air Act. The stringency and skepticism with which they view their own industrial hygiene study raises real questions as to their sincerity when they note the lack of reported cases of illness elsewhere. They state that they should not be regulated until an unprecedented effort is made to determine the environmental distribution of mercury, but they do not say who is to bear this cost, or how that cost relates to the cost of pollution control equipment, or whether the need for such an unprecedented mobilization of talent and resources would be obviated if mercury discharges from industrial sources were minimized or eliminated in the meantime. Like Goldwater, the Institute misses the point that Congress has required the agency to act immediately unless industry brings forward clear evidence that mercury is not a hazardous pollutant.

In addition to the above statement regarding certain of the testimony in the hearing, I am submitting for the hearing record certain additional information and data, contained in Exhibits I to VI. Exhibit I is entitled "Public Intervenor's Report on Mercury Air Pollution," and was prepared and released by the Wisconsin Department of Justice in August, 1971. It contains information and data which tends to establish that the emission of elemental mercury vapor into the ambient air may cause or contribute to an increase in mortality, or an increase in serious irreversible or incapacitating reversible illness. The report also contains an analysis of data obtained by several Wisconsin state agencies on mercury concentrations on the air, soil, snow, water runoff and humans in the vicinity of the BASF Wyandotte chloralkali plant located at Port Edwards, Wisconsin. Analysis shows that airborne mercury emissions from a point source such as a chloralkali plant will cause elevated levels of mercury in the air, snow, water and the hair of humans living in the vicinity of that source (Public Intervenor's Report, pp. 7-15, 32-80). Note that the Wyandotte Plant had been in operation for only 45 months prior to the publication of the report. In addition, it shows that emission controls sufficient to reduce mercury vapor

levels to less than 1 $ug/m^3$ in the vicinity of point sources are necessary in order to provide a reasonable margin of safety with respect to the public health (See Public Intervenor Report, pp. 22-29 and p. 127).

Exhibit II is a copy of an article translated from Russian on the effects of mercury vapor inhalation in experimental animals. Kurnosov, V. M., "Supplemental Data on the Accumulation and Distribution of Mercury in the Organism of Experimental Animals," in U.S.S.R. Literature on Air Pollution and Related Occupational Diseases; B. S. Levine ed., Volume 9, p. 47. (National Technical Information Service Pub. No. TT 64-115 74). This article is enclosed because it is discussed on page 23 of the Public Intervenor's Report, but is not generally available in English. Parenthetically, I note that most of the industries' statements, as well as that of Dr. Goldwater, refer primarily to unpublished reports, many of whose validity is questionable from their titles without more detailed examination.

Exhibits III and IV are reports submitted to the Wisconsin Department of Justice from consultants hired to monitor mercury concentrations in the ambient air. As Exhibit I also contains such reports, a chronological

discussion of these surveys might be in order. The Wisconsin Department of Justice has collected data on several occasions regarding the levels of mercury and found in the ambient air in the vicinity of the Wyandotte Chemicals Plant at Port Edwards. Chronologically, these are:

a. February 11, 18 and 19, 1971 -- 3 ground level surveys of total mercury in the ambient air. See Public Intervenor's Report, pp. 37-48.

b. February 18, 1971. A comprehensive aerial survey for mercury vapor above ground level. See Public Intervenor's Report, pp. 49-71.

c. July 29, 1971. A spot check aerial survey for mercury vapor. See Exhibit III and discussion below.

d. November 4, 1971. A ground level survey for mercury vapor concentrations. See Exhibit IV and discussion below.

As mentioned above, Exhibit III reports the results of a spotcheck aerial survey was made of the Wyandotte Chemical Plant at Port Edwards, Wisconsin on July 29, 1971, by the Wisconsin Department of Justice. This unannounced survey was made to determine to what extent the pollution control equipment installed by the company in

response to a state order had eliminated measurable mercury vapor concentration in the air in the vicinity of the plant. On or about the 1st of July, 1971, the Wyandotte Chemical Company had completed the installation of mercury pollution control equipment on its hydrogen and end box fume vent process streams. This equipment was designed to reduce the total mercury emissions from these two process streams to 0.9 lbs. per day, as was required by an order of the Wisconsin Department of Natural Resources. Order No. 1A-70-17U-1A (Public Intervenor's Report p. 126). A discussion of the equipment installed is contained on pp. 88-97 of the Public Intervenor's Report.

The results of that spot check are summarized in Exhibit III. Aerial concentrations of up to 5.5 $ug/m^3$ were detected in a well-defined plume 160 feet above the ground and 140 meters downwind from the plant. Mercury vapor levels of 0.5 $ug/m^3$ were detected hovering near ground level at 640 meters downwind. The higher levels found in a discernible aerial plume clearly indicate that mercury vapor was being carried in the bouyant hydrogen stream a considerable distance further than is estimated in the meteorological assumptions contained in the EPA Background Information (p. 25). This points out even more clearly the

need for adequate mercury vapor controls on all chloralkali plants that exhaust hydrogen to the ambient air.

Data from the Wyandotte Chemical Company's monitoring program indicates that their control equipment on the hydrogen stream was not functioning well that day, so the spot check may not indicate the levels of mercury vapor concentration present when the control equipment installed by Wyandotte is in full operation.

On November 4, 1971, a ground level survey of mercury vapor concentrations was made at the Wyandotte Chemicals Company Plant at Port Edwards, using a mercury vapor detector installed in a station wagon. This was the same detector that had been previously used in the aerial surveys. Readings were specifically noted for 8 points on the grounds of the plant, and for 10 points outside of the plant itself and in the general vicinity. A summary of the data is contained in Exhibit IV. The survey found mercury vapor concentrations up to 3.0 $ug/m^3$ on the plant grounds. Outside the plant, mercury vapor concentrations were detected up to 1.2 $ug/m^3$ at a point 880 feet downwind. The average concentration at that point was 0.6 $ug/m^3$ . Levels of mercury vapor concentrations generally decreased with distance, but there was a point almost two miles away where

readings as high as 0.25 $ug/m^3$ were observed.

I believe that the above data shows that information is available regarding the presence of mercury vapor in the ambient air in the vicinity of chloralkali plant and regarding whether or not such plants discharge in amounts that would create ambient air concentrations in excess of 1 $ug/m^3$ in the vicinity of these plants.

In closing, I reiterate that the hearing record lacks any information which tends to clearly show that mercury is not a hazardous pollutant within the definition contained in sec. 112 (a) (1) of the Clean Air Act. The industry's testimony against such a classification is either unsupported assertion or is based primarily on unpublished, unavailable and therefore insufficient information. The strongest testimony on their behalf, that of Dr. Goldwater, actually supports the regulation of these industries. The industrial hygiene study of Dr. Ralph Smith, contracted by the industry itself, establishes that workers can be affected by elemental mercury vapor at the 100 $ug/m^3$ level. Despite the protestations of the industry statements that the conclusion was not based on objective facts (this is not to say that the study was not objective), the industrial response to the study was to cut the TLV in half.

Persons in the vicinity of mercury vapor point sources may be subjected to mercury vapor for 24-hours a day, seven days a week, as opposed to the workers' 40 hour a week exposure. Those persons may be elderly, ill, pregnant or very young, any of which may make them more susceptible to any adverse effects of mercury vapor, as testified to by Dr. Horton. Transcript p. 25. See also the general discussion of safety factors on pp. 25-28 of the Public Intervenor's Report.

The Public Intervenor's Report was submitted, in part, to show that a substantial number of responsible scientists believe that mercury is a hazardous air pollutant whose emission to the air must be severely restricted or eliminated. I intend to present further scientific testimony to that effect at a hearing before the Wisconsin Department of Natural Resources on March 22-23, 1972, and I will forward to you a copy of the hearing transcript as soon as it becomes available, in the hopes that it may be timely enough to aid in the consideration of the final standards to be issued by the Administrator. In the meantime, I thank you for your consideration of this statement and the enclosed

materials.

Sincerely yours,

/s/ Steven M. Schur
Steven M. Schur
Assistant Attorney General

SMS:lh

Enc.

P.S. Enclosed as Exhibit VII are the two most recent Section of Occupational Health, Wisconsin Department of Health and Social Service's Reports on concentrations of mercury found within the BASF Wyandotte chloralkali plant in Port Edwards, Wisconsin. These reports on occupational exposure to mercury, taken with a third study conducted at the Wyandotte plant (Public Intervenor's Report, p. 12 and Appendix A-8), show that all chloralkali plants may not be meeting the industrial TLV standards for occupational exposure to airborne mercury.

Furthermore, the TLV standard is inappropriate in itself, as a means of limiting the amount of discharge because the concentration levels are controlled primarily by varying the air flow rates through the cell room rather than by controlling emissions from the cells themselves.

Consequently, the TLV standard for

occupational exposure to mercury is irrelevant in considering the establishment of emission standards in the chloralkali industry under the Clean Air Act.

(The exhibits referred to above are contained in the files of the Environmental Protection Agency, Division of Stationary Source Enforcement, Rockville, Maryland.)

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SUPPLEMENTARY STATEMENT TO THE ENVIRONMENTAL PROTECTION AGENCY REGARDING THE PROPOSED NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS

on behalf of

The Oceanic Society
Northern California Committee for Environmental Information
Stanford Committee for Environmental Information
Monterey Committee for Environmental Information
Fresno Committee for Environmental Information
Rodney Beard, M.D., Professor of Community and Preventive Medicine, Stanford Medical School
R. Gordon Gould, Ph.D., Associate Professor of Biochemistry, Department of Medicine, Stanford

by Dr. Selina Bendix

President, East Bay Chapter, Oceanic Society
Communications Subcommittee, Northern California Committee for Environmental Information

Beryllium. It is not surprising that the beryllium industries wish the elimination of the standard in Section 61.32(a). Under Section 61.32(b), which calls for an outplant concentration of 0.01 ug Be/$m^3$ of air, in fact an unlimited amount of beryllium can be emitted simply by increasing the volume of air carrier.

Mr. Kossack's suggestion[1] that centerline sampling is adequate seems to ignore the fact that turbulence within the stack will cause a variation in concentration of any measured substance at different points on a cross-section of a stack. This is undoubtedly what EPA had in mind in stipulating traverse patterns for circular and rectangular ducts which give some indication of cross-sectional variation in flow.

In view of the potential hazard to downwind residential areas, careful study should be made of further restrictions upon rocket firing, possibly the most hazardous beryllium use from a public health standpoint, as rocket misfire may result in release of large amounts of beryllium in a brief period of time. The rules of the Santa Clara County, California, health department should be examined, as they deal with the public health problems incident to major beryllium users. I believe that they have

stipulated that one company may not test-fire rockets with beryllium fuel on days when the prevailing wind is towards San Jose.

Since a great variation in concentration can be covered by a 30 day average, a provision for an absolute ceiling on acceptable beryllium concentration for any single determination should be added to Section 61.32(b).

We agree with Robert Lunche[2] that standards governing the open burning of beryllium should be added to the proposed regulations.

Asbestos. We wish to dispute the statements of Lindell[3] and Nelson[4] that the general public is not normally at risk of asbestos exposure. The spraying of asbestos fire-proofing and the circulation of building air past such fire-proofing has exposed unknown numbers of people to high asbestos levels. In urban areas it is common rather than exceptional to find asbestos fibers in the lungs of those who do not contact asbestos occupationally. It is not wise to extend the statistics from the 380 men employed in the U. S. asbestos industry[5] to the 3.5 million construction workers or to the general urban public. Effects which are not statistically measurable on the smaller sample may prove to be formidable in a large sample. McDonald's study

of nearly 12,000 Quebec asbestos miners born between 1891 and 1920 involves many asbestos exposures retrospectively estimated, as no dust measurements were available prior to 1946. This study is dependent upon the accuracy of old medical and mine records and of 40 year old memories of mine conditions. Therefore, it cannot be expected to show the effects of low asbestos exposures because, despite the size of the sample, it is not precise enough to reveal small effects.

Tucker's[6] report of no medical problems in 10 years at Pacific Asbestos Corp. tells us nothing about the cancer incidence due to asbestos in these workers, as a 20 year induction period is expected between asbestos exposure and cancer appearance. It is interesting that Pacific Asbestos' recent description of their mining operation makes no mention of provisions for dust control to protect their workers[7].

Lindell's[3] and Weill's[8] dubious comments about the association of mesothelioma and asbestos should be balanced against the editorial of Selikoff et al in the American Journal of Medicine[9] which lists six "other large collections of mesothelioma of the pleura and mediastinum associated with exposure to asbestos." There seems to be a

great deal of evidence for this causal association. Understanding of the medical effects of asbestos will be aided by theoretical studies such as that by Choi and Smith[10].

We agree with Robert Lunche[2] that a definitive numerical emission standard for asbestos is desirable. This would also provide a solution to the requests of various representatives of the asbestos industry that specific types of products be exempted from the provisions of Section 61.22(e), banning the spraying of asbestos-containing material on buildings or in the open air. This section could then be modified to provide that no material which releases to the air more asbestos than permitted by the asbestos standard could be sprayed. Granted, methods for testing such materials would then have to be specified, but this seems preferable to blanket exemption of categories of asbestos-containing materials.

Mercury. Emery's statement[11] ignores the evidence for conversion of elemental mercury to methyl mercury. One of his "recent" references, Goldwater, was published in 1964, before the existence of biological methylation of mercury was known, hence is irrelevant to the discussion. Moreover, mercury does not have to be methylated to cause environmental problems. A 50% reduction

in photosynthesis in the giant kelp Macrocystis pyrifera is caused by 0.05 ppm mercuric ion.[12] Crabs (Maia squinado) accumulate mercuric chloride in their gills and blood.[13] Mercuric ion inhibits galactolipid synthesis in algal and higher plant chloroplasts at 0.5 mM.[14] A survey of the inhibition of various chloroplast reactions by phenyl mercuric acetate has been performed at Purdue by Honeycutt and Krogmann, who found substantial effects at 3 $x10^{-6}$ M.[15]

Since the first determination that microorganisms could methylate mercury by Jensen and Jernelov,[16] it has been shown that methylation of mercury is association with the vitamin $B_{12}$ analog methylcobalamin,[17] and finally, Wood has concluded that "All microorganisms capable of vitamin $B_{12}$ synthesis are capable of methyl mercury synthesis.[18] Although we are used to think of mercury methylation as a hazard associated with bacteria in sediments,[19] it is well to remember that ruminants get substantially all of their vitamin $B_{12}$ from their rumen bacteria,[20] and man gets some of his vitamin $B_{12}$ from his intestinal bacteria,[21] so it would not be surprising to find that mercury can be methylated in man. This possibility adds a new dimension to concern over environmental pollution with mercury in any form.

Since, at the present time, no one claims that there is a significant mercury source in food other than in fish (the principal exception being game birds which have fed on mercury treated grain; this should become infrequent as such seed treatment is phased out in many countries), I cannot understand Laubusch's[22] quibble over the wording of Horton's quote of the Swedish Expert Group. For all practical purposes, methyl mercury intake is equivalent to methyl mercury in fish intake.

Gasque[23] asserts that "Even with an elevated methyl mercury intake from fish, no abnormal signs or symptoms were noted," but gives no indication that incidence of congenital neural damage was compared to that of the population at large. In view of the fact that in utero neural damage may be expected to be the first sign of excess mercury exposure to a population, data on the incidence of congenital neural damage in children born to women exposed to different ambient mercury levels are necessary before his assertion can be substantiated. Mercury levels in blood and hair of fish eating people have been found "approaching those associated with symptoms of poisoning."[36] The significance of increased leucocyte chromosome abnormalities indicate that low levels of mercury might be

associated with increased incidence of genetic malformation, miscarriage, leukemia and other cancers.

North[25] states that "Mercury was ruled out of seed grain although it rendered the seed far more effective and produced much more grain per acre at the same cost." In fact, in Sweden, where agricultural use of methyl mercury has been drastically reduced since 1965, crop yields were not affected.[26] Although only small amounts of organic mercury compounds are usually absorbed and translocated by plants from seed treatment residues in soil or foliar sprays, substantial mercury contents may occasionally result from such uses. It seems undesirable to proliferate methyl mercury sources in the diet, in addition to the problems of environmental contamination from such use. The uptake of mercury compounds by plants has been exhaustively reviewed by Smart.[27]

There appears to be an implication in North's statement that only the Huckleby family has been poisoned by inadvertent ingestion of seed treated with mercurial fungicides. Tragic events have also occurred in Iraq, West Pakistan, Honduras, Mexico, and Guatemala when people have accidentally eaten such treated seed and have been killed by the hundreds or blinded.[28]

Surely, Mr. Bailey,[35] and the Detroit investigators he quotes as being "astounded that so little investigation had been reported relative to mercury content of human tissues," are unaware of the extensive Scandinavian work on this subject,[30] much of which was in print at the time of publication of the Detroit study.

Data on the "decrease" in mercury content of human tissues have to be evaluated very carefully. Without extensive information about eating habits, residence patterns, occupational exposure, and medical history, and/or large sample sizes, it is difficult to evaluate the significance of such data. What fraction of the population eats fish regularly? How should sampling be done to evaluate the risks of mercury exposure to this part of the population? Do all regular fish eaters have equal access to fish with high mercury levels? (We would think not.) In view of our lack of knowledge about individual variation in sensitivity to mercury toxicity and the nonspecificity of the neural damage from mercury toxicity, which doubtless leads to under-reporting of mercury effects except in cases of obvious heavy occupational exposure, it would seem that present data on mercury content of human organs is of very limited value in making public health judgments.

Gasque[23] misinterprets the conclusions of Weiss et al.[31] They say "The variety of activities of man that result in greater exposure of the earth's crust through alteration of terrestrial surfaces allows more mercury vapor and more gaseious compounds to enter the atmosphere." Although industrial uses of mercury may not directly contribute to a meaningful increase in the total atmospheric mercury content, they certainly do contribute to the need for "alteration of terrestrial surfaces" and to local increases in ambient mercury (not considered by Weiss) which may be of great biological significance.

Widing's comment[32] "that it is difficult for man-made sources to significantly change the world mercury burden resulting from natural crustal emissions" ignores several key facts: (1) mercury does not instantly dissipate into uniform worldwide concentration, hence the diluting capacity of the atmosphere is irrelevant to a discussion of standards which will be applied locally; (2) excess local concentrations of mercury are toxic to man until they are dispersed; and (3) he accepts the fact that atmospheric mercury will eventually come to the surface of the earth, but does not recognize the potential for biological concentration of man-made local concentrations of mercury.

Benton Bailey[35] states that no one has ever air sampled for mercury near California mercury mines. I believe that such measurements may be obtained from Dr. Anders F. Jepson,[33] if EPA does not already have them. I think that his data also include some information on ambient air monitoring for mercury near a recently shut down chlor-alkali plant. The Barringer correlation spectrophotometer used in this work, as well as the instrument used by Williston[34] in his atmospheric mercury surveys, are specific for elemental mercury. (We understand that Williston has extensive unpublished information on mercury in air and in soil samples.) These data do not eliminate the possibility that mercury exists in other chemical forms in the air, but in view of the substantial amounts of elemental mercury found by these methods, they tend to disprove Laubusch's assertion[22] that it is not safe to assume that atmospheric mercury is chiefly elemental mercury.

Last year I was told by Anders Jepson that an attachment was being designed for their instrument which would permit conversion of gaseous mercury compounds to elemental mercury. If this effort is, or has been, successful, it should be possible to get a quantitative figure for the amount of mercury in the air in bound form.

Mr. North[25] seems to feel that mercury emissions from California mercury mines are negligible. In fact, a publication by the California Department of Public Health states "Studies conducted by Federal and State Occupational Health Agencies have shown that excessive exposure to mercury in the mills of California's mercury mines is prevalent and that many workers show high levels of mercury excretion. Cases of mercury poisoning are being reported."[29]

Repeated industry claims that no problems of excess mercury exposure occur, because of their exemplary industrial health practices, are contradicted by the 1971 Public Health Service, Bureau of Occupational Health, finding at the Allied Chemical Chlorine manufacturing plant in Moundsville, West Virginia, of 0.44 - 0.84 ug $Hg/m^3$ air in the cell room area. Workers at this plant suffered from sore gums, chronic fatigue and extreme nervousness. The Labor Department issued the first citation under the then new Occupational Safety and Health Act in this case.[24]

A report on 340 man years of mercury exposure over a period of 24 years is equivalent to a report on 14 long-term employees, or a slightly larger number, allowing for employee turnover. Surely, Gasque[23] cannot expect a public health standard to be based upon such a small sample

and realizes that it is customary to introduce a sizeable safety factor between industrial safety standards and standards for community exposure? Since the workers studied were all presumably male, we have no opportunity to assess the effect of the 110 $ug/m^3$ exposure on the developing fetus.

Edgar Conant[37] is concerned about the difference between occupational exposure standards and the proposed EPA community standards because "present standards have protected employees' health." I wonder how many pregnant women have worked in Stauffer's mercury-cell chlor-alkali plants? Certainly not enough to evaluate the spontaneous abortion rate. Adequacy of a standard to protect an adult male from toxicity is no indication of adequacy of such a standard for community use, since mercury is known to concentrate in the fetus. The workers in any particular industry represent a selected group of people able to work under the prevalent conditions. Those most sensitive to the pollutants of any given situation leave. Segments of the population which would not normally hold industrial jobs, such as those with circulatory problems, might be at greater risk, as mercury tends to concentrate in erythrocytes.

We should like to see medical and dental uses of mercury regulated; it seems illogical to permit such

activities to endanger health through misuse of mercury. One hospital in San Francisco has been reported to pour 80 pounds of mercuric chloride from Zenker's solution into the city's sewer annually. A method for precipitation of mercury from waste Zenkers is now being circulated by the University of California Association of Interns and Residents.[38] The California State Department of Health estimates that dentists in the Los Angeles area alone use 30,000 pounds of mercury/year "of which about 10% cannot be accounted for and may be entering sewers and rubbish cans."[39] The Council on Dental Materials and Devices of the American Dental Association has expressed concern over mercury hazards associated with ultrasonic amalgam condensation.[40]

We should like to conclude by saying that, in view of the fact that some power plants and incinerators have been estimated to emit 5,000 pounds of mercury to the air annually and concentrations above 1 $ug/m^3$ have been observed over such installations,[41] and of the fact that the amount of mercury released to the air by coal burning is estimated to be over ten times the amount released by weathering,[42] it is crucial that mercury surveillance not be limited to chlor-alkali plants and mercury mines.

1. Kossack. W. C. Statement at EPA Public Hearing, February 15, 1972.

2. Lunche, Robert G. Statement at EPA Public Hearing, February 16, 1972.

3. Lindell, Robert G. Statement at EPA Public Hearing, February 15, 1972.

4. Nelson, K. W. Statement at EPA Public Hearing, February 16, 1972.

5. May, Timothy C. & Lewis, Richard W. Asbestos, Mineral Facts and Problems, Bureau of Mines Bull. 650 (1970).

6. Tucker, Robert J. Statement at EPA Public Hearing, February 16, 1972.

7. Leney, G. W. & Loeb, E. E. The Geology and Mining Operations at Pacific Asbestos Corp., no date, presented at AIME Meeting, San Francisco, Feb. (1972).

8. Weill, Hans. Statement at EPA Public Hearing, February 16, 1972.

9. Selikoff, I. J., et. al. Am. J. Med. 42: 487-496 (1967).

10. Choi, Inkap & Smith, Ross W. Kinetic Study of Dissolution of Asbestos Minerals in Water, presented at AIME meeting, San Francisco, Feb. (1972).

11. Emery, D. L. Statement at EPA Public hearing, February 15, 1972.

12. Clendenning, Kenneth & North, W. J. in Pearson Ed. Waste Disposal in the Marine Environment, Pergamon (1960).

13. Wiber, Charles G. The Biological Aspects of Water Pollution, Thomas (1969).

14. Chang, S. B. & Matson, R. S. Fed. Proc. 30:1305Abs. (1971).

15. Fed. Proc. 30 (1971) Abstract.

16. Nordforsk Biocid-information 10:4 (1967).

17. Imura, Nobuma et al. Science 172:1248 (1971).

18. Environment 14:34 (1972).

19. Langley, D. G. Mercury Methylation in an Aquatic Environment, presented at 44th Annual Conf. of WPCF, San Francisco, 6 Oct. (1971).

20. Metabolism, FASEB Handbook (1968).

21. Tuttle, W. W. & Schottelius, B. A., Textbook of Physiology, Mosby (1965).

22. Laubusch, Edmund J. Statement at EPA Public Hearing, February 15, 1972.

23. Gasque, MacRoy. Statement at EPA Public Hearing, February 15, 1972.

24. Occupational Health & Safety Letter 1 (1971); Environmental Health Letter, June 1 (1971).

25. North, Morgan. Statement at EPA Public Hearing, February 15, 1972.

26. Lofroth, Goran, Ecological Research Comm. Bull. #4, Swedish Natural Sciences Research Council (1969).

27. Residue Reviews, 23 (1968); see also Debrun, Jervis R. et al. Mercury Residues in Canadian Foods, Fish, Wildlife. Summary of Progress. National Health Grant Project 605-7-510, University of Toronto, 1970.

28. Beye, Thomas JAMA 215:287 (1971); Ephraim Kahn, M.D., Chairman California Interagency Committee on Mercury in the Environment, personal communication.

29. Medical Supervision for Employees in Mercury Mines and Mills, Tech. Bull. for Physicians, State of Calif., DPH, Bureau of Occupational Health, Sept. (1967).

30. Lofroth, Goran. Working Group on Environmental Toxicolory, Ecol. Res. Comm. of the Swedish Nat. Sci. Res. Council, Stockholm, March 20 (1969); Methyl Mercury in Fish, a Toxicological and Epidemiological Evaluation of the Risk, Report by a Group of Experts, Nord. Hyg. Tidsk. Supp. 3 (1970); etc.

31. Science 174:692 (1971).

32. Widing, R. E. Statement at EPA Public Hearing, February 15, 1972.

33. Environmental Measurements, Inc., 215 Leidesdorff St., San Francisco, CA 94111.

34. Williston, S. H. Eng. & Mining J., May (1964).

35. Bailey, Benton B. Statement at EPA Public hearing, February 15, 1972.

36. Joint FAO/WHO Expert Committee on Food Additives, WHO Technical Rept. Series #462, Geneva (1971).

37. Statement at EPA hearing February 15, 1972.

38. Young Doctor's Forum. Vol. 1 #1, August (1971).

39. Minutes of 11th mtg. of Calif. Interagency Comm. on Mercury in the Environment, Sept. 24 (1971).

40. JADA 82:553 (1971).

41. Mercury in the Air, Environment Staff Rept. Environment 13:32 (1971).

42. Joensum, Oiva I. Science 172:1027 (1971).

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Hamilton County Council of
Parent-Teacher Associations
325 East Central Parkway
Cincinnati, Ohio 45202

February 20, 1972

Environmental Protection Agency
Washington, D.C. 20460

Dear Mr. William H. Megonnell:

Since the National PTA Board members consider the environmental problems to be an area in which PTA action is needed, our Council would like to comment on the proposed emission standards for asbestos, beryllium and mercury.

Since annually several tons of asbestos are sprayed on the steel beams of high rise buildings and an estimated 50% escapes into the air, millions of people are exposed to this free floating asbestos. Have: 1) adequate surveys been made to determine if this asbestos coating on the steel beams is an effective fire retardant worth the health risks, and 2) alternative means of coating the beams, painting or factory spraying under ventilator hoods, been attempted?

In Modern World News, April 24, 1970, Dr. Morris Fishbein stated, "Investigations have shown that people who live within half a mile of an asbestos factory, or even in the household of an asbestos worker, may inhale enough asbestos dust to develop asbestosis. This is contrary to

the Asbestos Information Association's statement, "existing evidence does not show that asbestos in its major and essential uses constitutes a threat to the general environment or to public health..."

With adult autopsies showing one-fourth to one-half the industrial populations having asbestos in the lung tissue, the extent of health damage cannot be estimated. Therefore, standard emissions of asbestos should be zero.

Since chronic berylliosis, often resulting in progressive loss of respiratory function, may result from only a brief exposure to beryllium, public health could be endangered by a short term rise in beryllium. In addition the repeated low level emissions of beryllium caused berylliosis in some Reading, Pennsylvania residents; this indicates the general public would suffer from low level continual emissions.

Organic mercury compounds are used in herbicides, fungicides, chemical slime control in paper mills, medicines, and in certain chemical processes. Added to this is the mercury which escapes from the coal burning power plants. In view of mercury's accumulative effect, we must curtail the amount of mercury entering the environment. We do not have information on the safe levels of mercury.

We should limit or ban the products containing organic mercury and place a tax on emissions of mercury from power plants. The federal standards for emissions of mercury should be zero.

Sincerely,

/s/ Carol Menefee
Carol Menefee
Chairman of Environmental Control
Hamilton County Council PTA
Executive Board.

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OFFICE OF THE ATTORNEY GENERAL

DEPARTMENT OF JUSTICE

STATE BUILDING, LOS ANGELES 90012

February 11, 1972

Administrator
Environmental Protection Agency
Hazardous Materials Emission Standards
5600 Fisher's Lane
Rockville, Maryland 20852

Attention: Hearing Officer

Dear Sir:

We are taking this opportunity to comment on the Environmental Protection Agency's proposed regulations on National Emission Standards for Hazardous Air Pollutants. The proposed regulations were issued on December 7, 1971,

and published in the Federal Register with an invitation to interested parties to contribute suggested changes or additions.

Our Environmental Unit has concurred in the findings of the California Department of Public Health that the following additions to the National Emission Standards are needed in controlling asbestos and beryllium pollution:

Subpart B--National Emission Standards for Asbestos

61.20 Applicability.

Add:

1. ". . . or asbestos fiber fireproofing materials;" after ". . . asbestos insulating products."

2. "Braking, clutching or power transmission devices on any public or private vehicle."

61.22 Definitions.

Add:

(d)(1) "Emissions of particulate matter from disposal of asbestos from repair, remodeling, or demolition of structures; or from repair, remodeling or demolition of equipment shall be controlled in accordance with subsection h."

(g) "Emissions of particulate matter from operations involving the disposal of containers used to

store or transport asbestos; or asbestos-containing products; or asbestos wastes shall be controlled in accordance with subsection (h)."

(h) "Notwithstanding any other standards contained in this section, no source shall cause an appreciable increase of asbestos particulate matter in air to exceed background levels when measured directly downwind of the source."

Subpart C--National Emission Standards for Beryllium

61.30 Applicability.

Add:

1. "Public or private, stationary or mobile disposal services collecting and disposing of beryllium wastes;"
2. "Braking devices used on any type of public or private vehicle."

61.31 Definitions:

Add:

Appropriate wording to define, where needed, above additions.

We hope you will consider the suggestions

at the public hearing scheduled for February 15, 1972, in Los Angeles.

Very truly yours,

EVELLE J. YOUNGER
Attorney General

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SUPPLEMENTAL COMMENTS TO

BERYLLIUM STATEMENT PRESENTED AT

FEBRUARY 15, 1972 HEARING

BY BRUSH WELLMAN INC.

As stated in Los Angeles, we believe the ten gram per day emission standard is both unnecessary and undesirable for the reasons given in that paper. The following comments, to the extent they are applicable to that standard, are offered in the event EPA chooses to retain that standard.

The first portion of this supplement offers general comments and explanations to provide an understanding of our position. This section is then followed by specific recommendations for language changes to implement our comments and suggestions.

The two major objections we have to the proposed standards are:

1. The sense of urgency indicated by the time limits on analyses and reporting, and
2. The complicated sampling involved in Method 3.

The sense of "imminent hazard" implicit in Sections 61.34 and 61.37 are not justified by the experience

of the past twenty years. There has never been an acute non-occupational beryllium illness reported in the United States. There is no reason to believe a single exposure in excess of .03 is significant. During the past two years we have exceeded .03 on seven occasions and have exceeded the .01 monthly average only once. We have exceeded the .01 monthly average only four times in the past 15 years. If the individual sample exceeded .03 due to being contaminated we would never know that and, therefore, we would be unable to explain why it happened. If it were due to a malfunction of equipment it might be weeks before we could find it and months before we were certain it was corrected.

It is unrealistic to assume that fabricators or foundries can have analyses reported back to them in five days. We know of no consultant who can assure this service. Nor can we in the refineries routinely meet a 24 hour limit. In any event, both time limits are as unnecessary as they are unrealistic.

The requirement to change filters every four days is also too arbitrary. At our Elmore plant we have in the past used a four day sampling period but at our Utah plant, we normally change once a week. The Utah area is subject to dust storms, however, and we might change filters

daily if an accumulation of dust packed the filter to the point of impeding the air flow. The operator should be given the flexibility to determine the best time period subject to EPA audit and approval.

With respect to Method 3, we believe that the type of beryllium particulate to be sampled in machine shops and foundries simply does not require the elaborate equipment and procedures of Method 3. We appreciate the desire of EPA to devise a single, all purpose sampling tool but we feel this imposes on small fabricators or processors an inordinately expensive operation with no real health benefit to justify it.

We sampled a foundry customer of ours, who has no control equipment, by placing a Hi Vol Staplex sampler directly in the airstream and calculated a maximum emission rate of about two grams per day. This foundry has eight emission points. We made a cursory engineering estimate and believe it would cost at least $20,000 to install a manifold stack system and about $5,000 each quarter to sample the system. This is more than many of our customers purchase from us in a given year. The measurement we made would be in error on the high side. Accordingly, we see no reason to impose such a financial burden on a small operator in the

interests of theoretical precision.

We feel a simple test, such as the above, should suffice to eliminate many of the low level emitters from further sampling requirements and avoid very expensive installations only to prove they were unnecessary in the first place.

We also feel simplified sampling such as described in the following references would be adequate for the remainder of the emission sampling of beryllium required under the standards:

1. ASTM Standard D-2928-71 "Standard Method for Sampling Stacks for Particulate Matter"
2. Bulletin WP-50 "Methods for Determination of Velocity, Volume, Dust and Mist Contents of Gases," Joy Manufacturing Company, Western Precipitation Division, Los Angeles, California
3. Air Pollution Source Testing Manual, Air Pollution Control District of the County of Los Angeles, California
4. Industrial Gas Cleaning Institute, Inc. "Test Procedure for Gas Scrubbers," Publication No. 1
5. ASME Power Test Code 27-1957 "Determining Dust Concentrations in a Gas Stream."

## Proposed Language Changes

Section 61.02(h)

Definition should be revised as follows: "Modification" means any physical change in, or change in the method of operation of, a stationary source which increases by at least 10%, the amount of any . . . . . etc (balance of definition is unchanged).

Section 61.12(a)

Insert after the word "methods" the following "(or equivalent methods)".

Section 61.32(a)

Delete "in accordance with Method 3 in the appendix" and insert in lieu thereof "in accordance with the methods set forth in the appendix or any other method considered equivalent by EPA."

Section 61.33

Delete all references to Method 3

Section 61.34(d)

Delete "within 5 working days" and insert in lieu thereof, "within 30 working days."

Section 61.37(b)

Delete entirely

Section 61.37(e)

Delete everything prior to the words "the determination of . . ."

Method 3

Analysis by Morin Method or Spectrographic analysis should be as acceptable as atomic absorption techniques. In addition, new techniques may be developed with advantages over the above methods.

The sampling train specified is too involved for beryllium.

It would be far more practical and just as effective to put together in an uncluttered manner the means of measuring the amount of beryllium in the stream and the volume of the stream in a 24 hour period.

This would require first of all, a vacuum producer capable of overcoming line loss and producing a reasonable flow at the sampling point.

The second requirement is a sampling probe that has a known opening with knife entry and a means of measuring the air sampling stream as near the probe as practical, but in any event, ahead of the vacuum producer to avoid pump leakage. In most cases measurement of beryllium particulates can be accomplished in a simple, closed filter

holder with glass millipore or Whatman filter paper. Impingers or other accessories can always be added if required by filter media breakdown or stoppage.

Thirdly, the measurement of stack volumes can be accomplished quite readily with standard traverse measurements using a pitot tube. From a simple air flow profile, the point of average velocity can be determined and from there a single isokinetic sample can be taken. The pitot can be left adjacent to the sampling probe to monitor the air flow so that the isokinetic condition can be maintained and the stack flow checked.

The engineering exercises of adjusting all measurements for temperature and moisture content (except under extreme conditions) seem quite superfluous since the total effect on the final answer would not be as large as the personal judgment factors involved in one gauge reading.

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DEPARTMENT OF PUBLIC HEALTH

Bureau of Occupational Health
& Environmental Epidemiology
P. O. Box 30327, Terminal Annex
Los Angeles, California 90030

February 10, 1972

Administrator, Environmental Protection Agency
5600 Fishers Lane
Rockville, Maryland 20852

Attention: Hearing Officer
Hazardous Materials Emissions Standards

Gentlemen:

Subject: National Emission Standards for Hazardous Air Pollutants - Proposed Standards for Asbestos, Beryllium, Mercury

Reference: Letter from H. P. Blejer, M.D., D.I.H., from this Department to Administrator, EPA, dated February 3, 1972, Subject: "Asbestos and Beryllium; EPA Proposed Regulations and Public Hearings"

The complete text of the subject proposed standards -- previously unavailable to us -- has been reviewed by this Department, and the following is an addendum to the referenced letter:

Part 61--National Emission Standards
For Hazardous Air Pollutants

Subpart A--General Provisions

61.02 Definitions

Ambient is not defined. Ambient should be defined as the environment into which the source discharges the pollutant.

Subpart C--National Emission Standards for Beryllium

61.32(a)

This emission standard should be eliminated, since it is covered in 61.32(b).

61.32(b)

Should be changed to read: "Outplant concentration of 0.01 micrograms of beryllium per cubic meter of air...measured at the property line and immediately downwind of the source and in accordance with a sampling network approved by the administrator."

61.42(a)

Should be reduced from 75 microgram minutes to an ambient air concentration as defined in 61.32(b) as amended herein.

61.42(b)

Is redundant, since they are covered by 61.42(a) as amended herein. This paragraph should be deleted.

61.53 Emission Standard for Mercury

This paragraph should be eliminated and should have as a substitute the following:

"Emissions to the ambient atmosphere from sources subject to this subpart shall not exceed 1 microgram of mercury per cubic meter of air at any time."

The rationale for the above-recommended changes is as follows:

1. Ambient must be defined to include the atmospheric environment surrounding the source, since the vagaries of local meteorology are such that individuals inside a plant and immediately adjacent to a plant discharging hazardous pollutants can be subject to acute or chronic low level air concentrations of toxics. In addition, pollutants, such as asbestos, mercury, and beryllium, do not degrade biologically when introduced into the environment and can readily be subject to transfer processes that ultimately result in human insult or health damage from the toxicant.
2. Paragraph 61.32(a) is a meaningless requirement, since the ultimate test of pollution should be the

measurement of the ambient concentration close to the source, as redefined by our recommendation for a change in the wording of Paragraph 61.32(b).

3. The recommended reduction from 75 microgram minutes per cubic meter to 0.01 micrograms per cubic meter is based upon the fact that the literature on the toxicology of beryllium indicates that dosages of a "very few micrograms of beryllium compounds," have elicited cases of fatal chronic beryllium disease in some individuals (Stokinger, H.E., Editor, Beryllium: Its Industrial Hygiene Aspects, Academic Press, New York, 1966, p. 241). Therefore, the 0.01 micrograms/cubic meter of air standard set by the AEC, defined in Paragraph 61.32(b) as amended herein, should be the standard for any outplant emission of beryllium and its compounds.

4. Paragraph 61.42(b) is again meaningless in view of the superseding requirements of Paragraph 61.42(a) as amended herein, and should be eliminated.

5. Based upon the above cited recommendations, Paragraph 61.53 is meaningless and should be deleted.

Yours very truly,

/s/ Hector P. Blejer, M.D., D.I.H.
/s/ Meier Schneider, P.E.