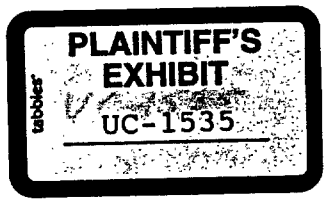
"CALIDRIA" ASBESTOS PELLETS

HEALTH AND OSHA INFORMATION

November 1, 1977

Union Carbide Corporation
Metals Division
"Calidria" Asbestos
Marketing and Technology Department
Niagara Falls, New York



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INTRODUCTION

The Williams-Steiger Occupational Safety and Health Act was passed in 1970 with the stated objective of assuring every American worker a safe and healthy workplace. The first health standard promulgated under this act covered exposures to airborne asbestos and went into effect on June 7, 1972. OSHA proposed extensive revisions of the regulations on October 9, 1975. The proposal has been going through a variety of administrative procedures including feasibility and inflationary impact studies. The revised version is expected sometime in the first half of 1978.

Asbestos has received a great deal of attention and publicity in the last several years. Unfortunately, much of the media treatment of the subject has been emotionally oriented and distorted and, in some cases, bordering on the sensational and untrue. Many users of asbestos and products containing asbestos have been mislead regarding the safety of asbestos and what is needed to comply with the OSHA requirements.

The information presented in this folder has been collected as a service to "Calidria" asbestos users. It is intended to help put both the health and OSHA compliance questions in a reasonable perspective. Included are:

1. A summary of the main provisions of the OSHA Asbestos Standard and a copy of the regulations.

2. Airborne asbestos fiber count data obtained by Union Carbide at a variety of industrial locations during the addition of "Calidria" asbestos pellets to various processes.

3. Two pamphlets, "What You Should Know About Asbestos and Health" and "Asbestos and Health" published by the Asbestos Information Association/North America. The first is an employee oriented discussion of both health and OSHA while the second addresses the health question. Additional copies are available on request.

4. A Material Safety Data sheet and analytical data on "Calidria" asbestos.

OSHA REGULATIONS

Introduction

After extensive public hearings, a Federal standard for Exposure to Asbestos Dust was published in the Federal Register, Volume 37, No. 110 on Wednesday, June 7, 1972. A copy of this standard (1910.1001) is included with the literature at the back of this booklet(1).

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(1) Some states have established their own regulations and enforcement programs and have been certified by OSHA. Generally, these regulations are identical to 1910.1001 but occasionally there are important differences. This discussion applies only to the Federal standard. Information on any particular state is available upon request.

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Basically, the standard can be divided into the following five major categories:

1. Standards:

   Defines the allowable airborne asbestos fiber content in the workplace.

2. Monitoring:

   Defines the method of collecting samples and measuring the airborne fiber concentration.

3. Methods of Compliance:

   Defines acceptable procedures to met the allowable limits.

4. Medical:

   Specifies frequency and type of medical examinations required.

5. Warning Signs and Labeling:

   Specifies when warnings are necessary and the wording of such warnings.

The essential features of these categories are discussed in the remainder of this section. Before looking at these, however, it should be made clear that in the most basic sense the regulations require that every place of employment where asbestos is used must be monitored to determine the exposure level of airborne asbestos fibers. If the levels are well within the allowable limits, the only additional requirements are those relating to medical examinations. If the levels are not clearly within compliance, all provisions of the regulations apply. There has been a great deal of confusion on this distinction, occasionally even with OSHA field inspectors.

Standards

The present OSHA standards set a maximum exposure to airborne asbestos fiber of length longer that 5μ of:

1. An 8-hour, time-weighted average (TWA) of 2 fibers/cc.

2. A ceiling concentration of 10 fibers/cc.

Note particularly the use of the time-weighted average over the 8-hour shift. An operator performing one or two short additions of RG-244 per shift, as is typical of polyester producers, would have his exposure during the dumping time averaged with zero (or a very low background level) for the rest of the shift. This, obviously, tends to greatly reduce the 8-hour TWA.

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Monitoring

The regulations require an initial monitoring to determine whether the workplace meets the required levels. Thus:

> "Within six months of publication of the regulations (June 7, 1972), every employer shall cause every place of employment where asbestos fibers are released to be monitored in such a way as to determine where every employee's exposure to asbestos fibers is below the prescribed limits."

Monitoring usually is done by the membrane filter/personal air sampler, which can be obtained from a number of manufacturers.

The personal air sampler draws workplace air onto a filter which collects the particulates and fibrous dust in the air. This filter is then placed under a microscope and the number of fibers counted. After the count is complete, the actual fiber concentrations, expressed as fibers per cubic centimeter of air, are calculated by formula.

After the initial monitoring, the regulations state:

> "...samples shall be of such frequency and pattern as to represent with reasonable accuracy the levels of exposure of employees. In no case shall the sampling be done at intervals greater than 6 months for employees whose exposure to asbestos may reasonably be foreseen to exceed the limits prescribed by paragraph (b) of this section."

The section that has been underlined shows that if the initial monitoring give levels that are well below the allowable limits and no change is made in the method of operation which would increase dust levels, no further monitoring is required. It is a good and recommended practice, however, to monitor at regular intervals to make sure that the limits are being met.

It should also be understood that you cannot be cited legally for exceeding the allowable limits on the basis of your own monitoring. OSHA must base any citations issued on their own tests.

Methods of Compliance

If monitoring shows a plant or operation to be in excess of the limits, a number of ways are prescribed to bring it into compliance. These include, but are not limited to, engineering controls such as isolation, enclosure, exhaust ventilation, and dust collection. Certain work and housekeeping practices and waste disposal procedures are specified. Respirators, special clothing, and change rooms are also required under certain conditions.

It is most important to understand that these compliance procedures are required only if the allowable airborne asbestos fiber limits are being exceeded or can be expected to be exceeded under reasonably foreseeable circumstances. They are not automatic requirements that apply wherever asbestos is present.

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Medical Examinations

Preplacement, annual, and termination medical examinations must be provided or offered by the employer for any employee "... engaged in occupations exposed to airborne concentrations of asbestos fibers." These medical records must be kept for 20 years and are available to the employee's physician.

This section has proved to be one of the most confusing in the regulations since it does not define any cutoff level below which examinations are not required. Finally, after five years of urging, OSHA issued a clarification. "Exposure to asbestos" is specified as any exposure which exceeds 0.1 fiber/cc >5μ in an 8-hour time-weighted average or a peak level greater than 0.5 fiber/cc >5μ based on a 15-minute sample period.

Caution Signs and Labeling

The regulations require that:

> "Caution signs shall be provided and displayed at each location where airborne concentrations of asbestos fibers may be in excess of the exposure limits prescribed in paragraph (b) of this section."

Wording for the signs is also specified.

There have been some cases where the OSHA inspectors have taken this to mean signs are required at any location where asbestos is present, regardless of whether or not the exposure limits are exceeded. Although this is clearly incorrect, there has been a tendency to post the signs and not contest the citation.

The regulations also require that:

> "Caution labels shall be affixed to all raw materials, mixtures, scrap, waste, debris, and other products containing asbestos fibers, or to their containers, except that no label is required where asbestos fibers have been modified by a bonding agent, coating, binder, or other material so that during any reasonably foreseeable use, handling, storage, disposal, processing, or transportation, no airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section will be released."

Wording for these labels is also specified.

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AIRBORNE ASBESTOS FIBER COUNTS

Table I shows the airborne asbestos fiber concentrations obtained for two types of manufacturing procedures. The upper portion of the table covers cyclic operations where a moderate amount of asbestos is added to a mixer, such as a Banbury, along with a variety of other dry ingredients. The operator is in the area steadily during a substantial portion of the shift. Air samples were collected across complete cycles and thus approximate time-weighted average concentrations.

The results of the 12 samples collected at three different manufacturing locations ranged from 0.1 to 1.3 fibers/cc. The current allowable level is 2 fibers/cc.

The lower portion of the table shows operations where a substantial quantity of asbestos is handled over a relatively short time only once or a few times during a shift. Samples were collected only during the time while asbestos and the emptied bags were handled and thus represent ceiling concentrations.

The results for eleven samples from nine locations ranged from 0.4 to 7.4 fibers/cc. The highest value was for a three-minute sample. Short sample times tend to give very erratic results. Without this single high value, the range is from 0.4 to 2.4 fibers/cc. The allowable ceiling concentration is 10 fibers/cc.

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TABLE I

AIRBORNE ASBESTOS FIBER COUNTS

DUMPING OF CALIDRIA ASBESTOS PELLETS

End Use	Asbestos Type	Pounds Dumped	Dump Time (Min.)	Sample Time (Min.)	Airborne Asbestos Fiber Concentration (Fibers/cc >5μ)	Notes
Average Concentrations(1)						
Rubber Compounding	HPP	30	~2	33	0.4	Operator A
" "	"	30	~2	14	0.9	" "
" "	"	30	~2	42	0.9	" "
" "	"	30	~2	32	0.2	Operator B
" "	"	30	~2	10	0.5	" "
" "	"	30	~2	49	0.3	" "
Rubber Compounding	HPP	37	~2	38	1.0	
" "	"	37	~2	60	1.2	
" "	"	37	~2	33	1.3	
" "	"	37	~2	23	1.1	
Paper Manufacture	HPP	25	~1	70	0.1	
" "	"	25	~1	87	0.1	
Ceiling Concentrations(2)						
Roof Coating Manufacture	HPP	200	7	7	1.5	
Paint Manufacture	SG-200X	114	3	3	7.4	
Paper Manufacture	HPP	100	16	16	0.3	
" "	"	50	9	9	0.6	
Ceiling Tile Manufacture	HPP	100	3	3	1.0	
Dumping Test	HPP	500	5	10	2.4	
Oil Well Drilling Mud	SG-200X	500	59	59	0.5	
Oil Well Drilling Mud	SG-200X	1000	26	26	0.4	
Oil Well Drilling Mud	SG-200X	1500	29	29	1.0	
" " " "	"	1500	29	30	1.0	
Oil Well Drilling Mud	SG-200X	1050	15	15	1.4	

(1) Air sample collected during the addition of several ingredients. Asbestos handled for only short period but operator is in the immediate area. The results approximate time-weighted average concentrations during continuing operating cycles.

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(2) Air samples collected only during the direct handling of asbestos and emptied bags. For these uses asbestos is handled at separated intervals. These results are ceiling

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LITERATURE AND REGULATIONS

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ASBESTOS AND HEALTH

Asbestos, used since antiquity, has widespread and important applications in our modern technological society. Approximately 3,000 different products containing asbestos are in daily use throughout the world. Its increased use in the 20th century has lent urgency to the need to cope with occupational health problems related to the excessive inhalation of asbestos dust.

Such problems are not unique to the asbestos industry. Many substances and materials in common use today can be detrimental to the health and safety of industrial workers under uncontrolled conditions. A vital and widely used raw material, asbestos is but one of a number of potentially harmful substances used by industry.

Basically, the known facts about asbestos-related disease can be summed up as follows:

First, asbestos-related health risks today are almost exclusively confined to the occupational setting.

Second, the effects of excessive inhalation of asbestos are both time and dose related. This means that asbestos-related diseases may develop, generally, only after the inhalation of substantial amounts of asbestos dust over a substantial period of time. Thus, there are levels of exposure that will not result in any increased risk of disease.

Third, there is presently no evidence of risk to the general public from exposure to the minute amounts of asbestos that have been found in community air.

Fourth, because of the long latent period of asbestos-related disease, the disease being found today among some long-term industry employees is not an indication of present day conditions, but is a result of conditions existing decades ago, at a time when neither the industry, government, or the medical profession knew very much about the health effects of asbestos and even less about the proper means for their control.

These facts are well recognized by the asbestos manufacturing industry, which has made substantial progress over the years in protecting those who work with asbestos and in eliminating emissions of free asbestos fiber into the community air.

Known and Suspected Occupational Risks

There are three primary diseases known to be caused or exacerbated by prolonged and heavy inhalation of asbestos fibers. They are asbestosis, bronchogenic (lung) cancer, and mesothelioma. Prolonged heavy exposure does not necessarily result in disease and death—but there is little question that risks are significantly increased.

Asbestosis

This is an occupational disease characterized by lung scarring, and is one of the lung diseases called pneumoconioses. It is the most common of the three asbestos related illnesses and is found only among those who have worked regularly and continuously with asbestos under inadequately controlled conditions. The average time span from first exposure to the first clinical signs of asbestosis is 17 years, although some cases have been reported in as few as ten years.

Asbestosis is neither malignant nor necessarily fatal. Many asbestos workers with minor cases can and do continue to work and lead normal lives without difficulties. The asbestos

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there are other causes of mesothelioma besides asbestos. Unfortunately, what those other causes might be is still unknown. Until these and other equally important factors are thoroughly investigated, the mesothelioma question will remain unresolved.

Other Tumors

Some researchers have reported higher-than-normal rates of gastrointestinal cancer among some heavily exposed industry groups. Other researchers have reported no increase of this type of cancer. The consensus of medical opinion is that the evidence is too scanty for a definitive conclusion.

Asbestos and the General Public

Medical reports of excess asbestos-related disease among occupationally exposed populations have been frequently cited by some writers, environmentalists, politicians and others as "proof" that the health of the general public is endangered by the minute amounts of asbestos dust being found in community air. "Neighborhood" and "household" cases of mesothelioma are cited extensively in this regard, as are the frequent reports of the findings of free asbestos fibers and so-called ferruginous bodies (which sometimes contain asbestos) in the lungs of some city dwellers at autopsy.

The truth is, however, that there is no evidence—either from experience or from scientific research—that anyone in the general public has ever contracted any asbestos-related disease from exposure to these minute amounts of airborne asbestos, which are many times lower than levels which have been demonstrated to result in no excess of disease in occupationally exposed populations.

This conclusion is supported by both the Asbestos Panel of the National Academy of Sciences' Committee on Biologic Effects of Atmospheric Pollutants, and the 33 member Advisory Committee on Asbestos Cancers of the International Agency for Research on Cancer, a division of the World Health Organization.

In its 1971 booklet, entitled "Asbestos: The Need For And Feasibility of Air Pollution Controls," the NAS Asbestos Panel, which consisted of seven of the nation's top experts on asbestos and health, stated that "there is no evidence that persons in the general population—without occupational, household or neighborhood exposures—have any increased risk of neoplasm, even though there may be ferruginous bodies or fibers in their lungs."

Warning against conclusions of the type frequently reached by the uninformed with regard to asbestos, the report further stated: "One cannot extrapolate from the mortality experience of, on the one hand, those who are directly and indirectly exposed to asbestos in their employment to, on the other hand, the general public, who have had moderate or slight exposures from ambient air."

The report concluded with the statement that "there is no evidence that the small numbers of fibers found in most members of the general population affect health or longevity."

The report of the IARC Advisory Committee represents the consensus of present world medical opinion on all aspects of the asbestos-health problem. Meeting immediately after the October 1972 Lyon Conference on the Biological Effects of Asbestos, the Committee, with representation from ten different countries, drafted the following opinions on asbestos-related disease and the general public:

Asbestosis: "There is at present no evidence of lung damage by asbestos to the general public. The amount of asbestos in the lungs of members of the general public is very small, compared to those occupationally exposed."

Lung Cancer: "The evidence . . . suggests that an excess lung carcinoma risk is not detectable when the occupational exposure has been low. These low occupa-

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sponsoring a study at the Harvard School of Public Health on chest ausculation (breathing sounds) as an early detection device in the diagnosis of asbestos-related disease. While this needed additional information and data is being developed, the industry will take all steps necessary to assure a safe working environment for its employees and for applicators and fabricators of asbestos-containing products.

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Title 29—LABOR

Chapter XVII—Occupational Safety and Health Administration, Department of Labor

PART 1910—OCCUPATIONAL SAFETY AND HEALTH STANDARDS

Standard for Exposure to Asbestos Dust

On December 7, 1971, an emergency temporary standard concerning exposure to asbestos fibers was published in the FEDERAL REGISTER (36 F.R. 23207). In accordance with section 6(c)(3) of the Williams-Steiger Occupational Safety and Health Act of 1970, a notice of proposed rulemaking regarding a permanent standard for exposure to asbestos fibers was published in the FEDERAL REGISTER on January 12, 1972 (37 F.R. 466). The notice invited interested persons to submit both orally and in writing, data, views, and arguments concerning the proposal.

On or about January 24, 1972, the Advisory Committee on Asbestos Dust was established and requested to make written recommendations with regard to the proposed standard on asbestos. On or about February 1, 1972, the Department of Health, Education, and Welfare transmitted to the Secretary of Labor a criteria document containing Recommendations for an Occupational Exposure Standard for Asbestos by the National Institute for Occupational Safety and Health (NIOSH). Public notice was given of the receipt of the recommendations and their availability for inspection and copying. On or about February 25, 1972, the Advisory Committee on Asbestos Dust submitted its written recommendations to the Assistant Secretary of Labor for Occupational Safety and Health.

Pursuant to the notice of rule making, a hearing was held on March 14 through 17, 1972, for the purpose of receiving oral data, views, and arguments concerning the proposed standard. On or about March 31, 1972, the presiding hearing examiner certified to the Assistant Secretary of Labor for Occupational Safety and Health the record of the proceeding. The record includes prehearing written comments, a transcript of the oral presentations made at the hearing, and numerous exhibits received during the course of the hearing or within the period allowed after the close of the hearing.

The proposed standard dealt with (1) permissible concentrations of asbestos fibers; (2) methods of compliance; (3) warning signs; (4) monitoring; (5) medical examinations; and (6) recordkeeping. Each of these major proposals elicited comments, arguments, objections, and counterproposals. They all have been examined and considered.

1. *Acceptable concentrations of asbestos dust.* The proposed standard would limit occupational exposure to 8-hour time-weighted average (TWA) airborne concentrations of asbestos dust not exceeding five fibers longer than five micrometers per milliliter. Concentrations above five fibers but not to exceed 10 fibers (ceiling concentration) would be permitted up to 15 minutes in an hour, but for not more than 5 hours in any one 8-hour day.

NIOSH in effect has recommended that the five-fiber TWA and 10-fiber peak concentrations be permitted only for 2 years; thereafter, TWA concentrations should be not more than 2 fibers per cubic centimeter ($cm.^3$) of air, and peak concentrations should not exceed 10 fibers/$cm.^3$, with no time restriction. Numerous objections and counterproposals have been made, with regard to both the limits of asbestos fiber concentrations and the time periods to comply with them. Some, for example, have recommended return to a 12-fiber standard of an earlier day; i.e., a level adopted under the Walsh-Healey Public Contracts Act in 1969. Others have recommended a two-fiber standard to become effective in 6 months, then a one-fiber standard for 2 years, and finally a zero-fiber standard after 3 years. These recommendations give a fair indication of the wide spread of the counterproposals.

No one has disputed that exposure to asbestos of high enough intensity and long enough duration is causally related to asbestosis and cancers. The dispute is as to the determination of a specific level below which exposure is safe. Various studies attempting to establish quantitative relations between specific levels of exposure to asbestos fibers and the appearance of adverse biological manifestations, such as asbestosis, lung cancers, and mesothelioma, have given rise to controversy as to the validity of the measuring techniques used and the reliability of the relations attempted to be established. Because of the long lapse of time between onset of exposure and biological manifestations, we have now evidence of the consequences of exposure, but we do not have, in general, accurate measures of the levels of exposure occurring 20 or 30 years ago, which have given rise to these consequences. There are also controversies concerning the relative toxicity of the various kinds of asbestos, and varying hazards in different workplaces.

It is fair to say that the controversy has centered in the area between a two-fiber TWA concentration and five-fiber TWA concentration, with variations on the time needed for compliance. Many employers support a five-fiber TWA. Most medical opinion is divided between a two-fiber standard and a five-fiber standard.

In view of the undisputed grave consequences from exposure to asbestos fibers, it is essential that the exposure be regulated now, on the basis of the best evidence available now, even though it may not be as good as scientifically desirable. An asbestos standard can be re-evaluated in the light of the results of ongoing studies, and future studies, but cannot wait for them. Lives of employees are at stake.

It is concluded that there should be one minimum standard of exposure to asbestos applicable to all workplaces exposed to any kind, or mixture of kinds, of asbestos. Reasons of practical administration preclude a variety of standards for different kinds of asbestos and of workplaces. Also, while the evidence tends to show that crocidolite, for instance, is more harmful than chrysotile, the evidence is not sufficient to establish separate standards for varieties of asbestos.

Because there must be one standard governing exposure to all varieties of asbestos, and in workplaces apparently more hazardous than others; because some present employees with regular exposure to asbestos have probably already accumulated great doses of asbestos fibers, due to higher levels of exposure in the past; because it appears that levels of exposure which may be safe with regard to asbestosis are not safe with regard to mesothelioma, because the statute requires the protection of every employee, even of one who may have regular exposure to asbestos during a working life which may reach, or even exceed, 40 years; and because of several other considerations which have been urged and are reflected in the record of the proceeding, the conflict in the medical evidence is resolved in favor of the health of employees. As of July 1, 1976, TWA concentrations of asbestos fibers longer than 5 micrometers will not be allowed to exceed two fibers/cc., with a ceiling value of 10 fibers/cc. The current TWA concentrations of five fibers, and

NOTE: The preamble to the "permanent" asbestos standard, issued June 7, 1972, is reproduced for information. It was not included in the republication of the standard on June 27, 1974, but directly relates, providing background considerations for OSHA's exposure to asbestos dust regulation.

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Title 29
Code of Federal Regulations
Parts 1900 to 1919

Revised as of
July 1, 1979

§ 1910.1001 Asbestos.

(a) *Definitions.* For the purpose of this section, (1) "Asbestos" includes chrysotile, amosite, crocidolite, tremolite, anthophyllite, and actinolite.

(2) "Asbestos fibers" means asbestos fibers longer than 5 micrometers.

(b) *Permissible exposure to airborne concentrations of asbestos fibers*—(1) *Standard effective July 7, 1972.* The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed five fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method prescribed in paragraph (e) of this section.

(2) *Standard effective July 1, 1976.* The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed two fibers,

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(i) *Air purifying respirators.* A reusable or single use air purifying respirator, or a respirator described in paragraphs (d)(2) (ii) or (iii) of this section, shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average airborne concentrations of asbestos fibers are reasonably expected to exceed no more than 10 times those limits.

(ii) *Powered air purifying respirators.* A full facepiece powered air purifying respirator, or a powered air purifying respirator, or a respirator described in paragraph (d)(2)(iii) of this section, shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average concentrations of asbestos fibers are reasonably expected to exceed 10 times, but not 100 times, those limits.

(iii) *Type "C" supplied-air respirators, continuous flow or pressure-demand class.* A type "C" continuous flow or pressure-demand, supplied-air respirator shall be used to reduce the concentrations of airborne asbestos fibers in the respirator below the exposure limits prescribed in paragraph (b) of this section, when the ceiling or the 8-hour time-weighted average airborne concentrations of asbestos fibers are reasonably expected to exceed 100 times those limits.

(iv) *Establishment of a respirator program.* (*a*) The employer shall establish a respirator program in accordance with the requirements of the American National Standards Practices for Respiratory Protection, ANSI Z88.2-1969, which is incorporated by reference herein.

(*b*) See § 1910.6 concerning the availability of ANSI Z88.2-1969 and the maintenance of a historic file in connection therewith. The address of the American National Standards Institute is given in § 1910.100.

(*c*) No employee shall be assigned to tasks requiring the use of respirators if, based upon his most recent examination, an examining physician determines that the employee will be unable to function normally wearing a respirator, or that the safety or health of the employee or other employees will be impaired by his use of a respirator. Such employee shall be rotated to another job or given the opportunity to transfer to a different position whose duties he is able to perform with the same employer, in the same geographical area and with the same seniority, status, and rate of pay he had just prior to such transfer, if such a different position is available.

(3) Special clothing: The employer shall provide, and require the use of, special clothing, such as coveralls or similar whole body clothing, head coverings, gloves, and foot coverings for any employee exposed to airborne concentrations of asbestos fibers, which exceed the ceiling level prescribed in paragraph (b) of this section.

(4) Change rooms: (i) At any fixed place of employment exposed to airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section, the employer shall provide change rooms for employees working regularly at the place.

(ii) Clothes lockers: The employer shall provide two separate lockers or containers for each employee, so separated or isolated as to prevent contamination of the employee's street clothes from his work clothes.

(iii) Laundering: (*a*) Laundering of asbestos contaminated clothing shall be done so as to prevent the release of air-borne asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section.

(*b*) Any employer who gives asbestos-contaminated clothing to another person for laundering shall inform such person of the requirement in paragraph (d)(4)(iii)(*a*) of this section to effectively prevent the release of airborne asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section.

(*c*) Contaminated clothing shall be transported in sealed impermeable bags, or other closed, impermeable containers, and labeled in accordance with paragraph (g) of this section.

(e) *Method of measurement.* All determinations of airborne concentrations of asbestos fibers shall be made

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asbestos fibers, or to their containers, except that no label is required where asbestos fibers have been modified by a bonding agent, coating, binder, or other material so that during any reasonably foreseeable use, handling, storage, disposal, processing, or transportation, no airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section will be released.

(ii) *Label specifications.* The caution labels required by paragraph (g)(2)(i) of this section shall be printed in letters of sufficient size and contrast as to be readily visible and legible. The label shall state:

CAUTION

Contains Asbestos Fibers

Avoid Creating Dust

Breathing Asbestos Dust May Cause Serious Bodily Harm

(h) *Housekeeping*—(1) *Cleaning.* All external surfaces in any place of employment shall be maintained free of accumulations of asbestos fibers if, with their dispersion, there would be an excessive concentration.

(2) *Waste disposal.* Asbestos waste, scrap, debris, bags, containers, equipment, and asbestos-contaminated clothing, consigned for disposal, which may produce in any reasonably foreseeable use, handling, storage, processing, disposal, or transportation airborne concentrations of asbestos fibers in excess of the exposure limits prescribed in paragraph (b) of this section shall be collected and disposed of in sealed impermeable bags, or other closed, impermeable containers.

(i) *Recordkeeping*—(1) *Exposure records.* Every employer shall maintain records of any personal or environmental monitoring required by this section. Records shall be maintained for a period of at least 20 years and shall be made available upon request to the Assistant Secretary of Labor for Occupational Safety and Health, the Director of the National Institute for Occupational Safety and Health, and to authorized representatives of either.

(2) *Employee access.* Every employee and former employee shall have reasonable access to any record required to be maintained by paragraph (i)(1) of this section, which indicates the employee's own exposure to asbestos fibers.

(3) *Employee notification.* Any employee found to have been exposed at any time to airborne concentrations of asbestos fibers in excess of the limits prescribed in paragraph (b) of this section shall be notified in writing of the exposure as soon as practicable but not later than 5 days of the finding. The employee shall also be timely notified of the corrective action being taken.

(j) *Medical examinations*—(1) *General.* The employer shall provide or make available at his cost, medical examinations relative to exposure to asbestos required by this paragraph.

(2) *Preplacement.* The employer shall provide or make available to each of his employees, within 30 calendar days following his first employment in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination, which shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 × 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(3) *Annual examinations.* On or before January 31, 1973, and at least annually thereafter, every employer shall provide, or make available, comprehensive medical examinations to each of his employees engaged in occupations exposed to airborne concentrations of asbestos fibers. Such annual examination shall include, as a minimum, a chest roentgenogram (posterior-anterior 14 × 17 inches), a history to elicit symptomatology of respiratory disease, and pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second ($FEV_{1.0}$).

(4) *Termination of employment.* The employer shall provide, or make available, within 30 calendar days before or after the termination of employment of any employee engaged in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination which shall

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Union Carbide trial exhibit UC-1535: Union Carbide Metals Division, "Calidria" Asbestos Pellets: Health and OSHA... Published by AsbestosClaims.Law
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UNION CARBIDE

Material Safety Data Sheet

September 1, 1978

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TELEPHONE: (716) 278-3378

PRODUCT: Chrysotile Asbestos **CHEMICAL FORMULA:** $Mg_6(OH)_8Si_4O_{10}$

TRADE NAMES: "Calidria" Asbestos

I. PHYSICAL DATA

BOILING POINT AND MELTING POINT: Not Pertinent

SPECIFIC GRAVITY (H_2O = 1): 2.45

VOLATILE CONTENT: Absorbed Water 1 – 4% By Weight. Structural Water Approximately 13% by Weight.

APPEARANCE: Pellets or Fine White Powder. No odor. Very Slight Solubility in Water.

II. HAZARDOUS INGREDIENTS

Asbestos contains no hazardous ingredients. However, the material itself can be hazardous under certain conditions. (See V below.)

III. FIRE AND EXPLOSION HAZARD DATA

NON-COMBUSTIBLE MATERIAL: No Fire or Explosion Hazard.

IV. REACTIVITY DATA

INERT MATERIAL: No Decomposition or Polymerization Conditions.

V. HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE TO AIRBORNE CONCENTRATION:

The current Occupational Safety and Health Standard (CFR 29, 1910.1001) contains the following exposure limits:

"The 8-hour time-weighted average airborne concentrations of asbestos fibers to which any employee may be exposed shall not exceed 2 fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the membrane filter method at 400-450 X magnification (4 millimeter objective) phase contrast illumination. No employee shall be exposed at any time to airborne concentrations of asbestos fibers in excess of 10 fibers, longer than 5 micrometers, per cubic centimeter of air, as determined by the method just noted."

EFFECTS OF EXPOSURE: CAUTION: Breathing asbestos may cause serious bodily harm.

EMERGENCY AND FIRST AID PROCEDURES: No acute toxicity. Use respirator if airborne asbestos fiber concentration exceeds OSHA limits.

VI. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: Avoid inhalation of dust. Remove spilled material by vacuum cleaner or by water wash.

WASTE DISPOSAL:

Bags and waste and scrap materials should be disposed of in a manner which will avoid airborne concentrations of asbestos, such as the use of dust-tight trash bags or containers. Ensure that disposal complies with all applicable federal, state or local regulations.

Union Carbide Corporation assumes no responsibility and makes no warranty, expressed or implied, representation, promise, or statement as to completeness, accuracy, or currency of any data provided.

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CALIDRIA ASBESTOS - TYPICAL CHEMICAL ANALYSIS

Component	Weight %
MgO	41.9
SiO_2	41.8
Al_2O_3	0.5
Fe	1.4
Ca	0.075
Co	0.012
Cr	0.15
Cu	0.005
Ni	0.22
Se	<0.001
Loss on Ignition (CO_2 & H_2O)	13.5

CALIDRIA ASBESTOS - TYPICAL SPECTROGRAPHIC ANALYSIS

Component	Detection Limit, Wt. %	Analysis, Wt. %
Ag	0.001	0.0002-0.002
Al	0.003	0.08-0.8
As	0.01	N.D.(2)
Au	0.002	N.D.
B	0.006	N.D.
Ba	0.003	N.D.
Be	0.001	N.D.
Bi	0.005	N.D.
Ca	0.002	0.008-0.08
Cb	0.006	N.D.
Cd	0.01	N.D.
Co	0.01	0.008-0.08
Cr	0.003	0.02-0.2
Cs	N.A.(1)	----
Cu	0.001	0.004-0.04
Fe	0.006	0.8-8.0
Ga	0.01	N.D.
Ge	0.005	N.D.
Hf	0.03	N.D.
Hg	0.02	N.D.
In	0.03	N.D.
Ir	0.03	N.D.
K	N.A.	----
La	0.01	N.D.
Li	0.1	N.D.
Mg	0.001	Major
Mn	0.003	0.008-0.08
Mo	0.003	N.D.
Na	0.03	N.D.
Ni	0.003	0.08-0.8
Os	0.03	N.D.
P	0.08	N.D.
Pb	0.003	N.D.
Pd	0.005	N.D.
Pt	0.005	N.D.
Rb	N.A.	----
Re	0.03	N.D.
Rh	0.02	N.D.
Ra	0.03	N.D.
Sb	0.01	N.D.
Sc	0.01	N.D.
Se	----	<0.001(3)
Si	0.001	Major
Sn	0.002	N.D.
Sr	0.01	N.D.
Ta	0.01	N.D.
Te	0.05	N.D.
Th	0.03	N.D.
Ti	0.003	0.004-0.0
Tl	0.2	N.D.
U	0.1	N.D.
V	0.003	N.D.
W	0.01	N.D.
Y	0.01	N.D.
Yb	0.01	N.D.
Zn	0.02	N.D.
Zr	0.006	N.D.

(1) N.A. - Not analyzed.

(2) N.D. - Not detected.

(3) By chemical analysis.

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