Calidria ASBESTOS

UNION CARBIDE CORPORATION • METALS DIVISION • P. O. BOX 579 • NIAGARA FALLS, N.Y. 14302 • TEL: 716-278-3376

November 21, 1978

(see attached distribution list)

Dear

Enclosed are copies of the following items presented to the Standards Board in connection with the spraying of asbestos-containing materials:

1. Dr. Rhodes' oral testimony.
2. Additional testimony on H. B. Fuller test presented at the Hearing.
3. Additional testimony submitted under a 15-day extension of the Hearing.

These items are in addition to the written testimony sent to you last month.

The Hearing seemed to go well for the products containing wetted and encapsulated fibers. Dr. Rhodes and Mr. Beemer are to be congratulated for their excellent oral presentations and handling of questions. I plan to meet with Dr. Ottoboni the week of December 4 to determine the potential action of the Board, who were reminded during the Hearing that a decision by early in 1979 would be appreciated.

We will keep you informed of any activities concerning the issue, but don't hesitate to call if you have any questions. Harry will be out of town until the first of December.

Very truly yours,

John L. Myers
Marketing Manager

JLM:dal
Enclosures

CC: Dr. H. B. Rhodes

408387

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W. W. Henry Company
5131 Becket Street
Huntington Park, CA 90058

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11401 East Valley Blvd.
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213-579-1276

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National Paint & Coatings Assoc.
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A08388

Calidria ASBESTOS

UNION CARBIDE CORPORATION · METALS DIVISION · P. O. BOX 579 · NIAGARA FALLS, N.Y. 14302 · TEL: 716-278-3376

November 21, 1978

(See Attached Distribution List)

Dear

Enclosed are copies of additional testimony submitted to the California Health and Standards Board in connection with the Hearing on SB-1591.

Please let us know if you have any questions on the enclosed or on the testimony originally sent to you on October 23, 1978.

Very truly yours,

John L. Myers
Marketing Manager

JLM:dal
Enclosures

CC: Dr. H. B. Rhodes

1. Asbestos Fiber Exposure During the Destruction of Maintenance Coatings by Sandblasting,
2. Airborne Asbestos Concentrations from the Grinding of Thermoset Resins Containing 0.8-18% by Weight Chrysotile Asbestos
3. H. B. Fuller Company Presentation

A08389

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ORAL PRESENTATION BEFORE THE CALIFORNIA STATE OCCUPATIONAL SAFETY AND HEALTH STANDARDS BOARD,

NOVEMBER 8, 1978

Mr. Chairman, Members of the Standards Board.

My name is Harrison Rhodes and I am employed by Union Carbide Corporation.

The continued use of certain products wherein the asbestos fibers are wetted and encapsulated is extremely important to a large number of California manufacturers and users. They are represented here today by a number of experts who are prepared to answer any technical or business questions you may have.

You have already received our written testimony and there is little point in reiterating it here today, although we can discuss it more thoroughly at your discretion. My intent is to show you some samples of the products so you can see what we are talking about. These samples show both the products in the form to be sprayed and the final product after cure. I will also summarize a spraying study which appears to be quite relevant and which came to my attention after the written testimony was prepared. A complete copy of this report was submitted to Mr. Rinaldi yesterday and may be in your folders.

Let me emphasize that we are discussing only products where the asbestos fibers are wetted and encapsulated from manufacture through final usage. These include the coating and laminating materials and both types of fibrated roof coatings, that is those manufactured from cold-process cut-back asphalt and those from emulsified asphalt. We are <u>not</u> addressing the Portland cement plaster or the naturally occurring impurity portions of the hearing.

A0839C

As a frame of reference, let us first look at the asbestos-containing spray insulation material of the type that was the principal target of the 1974 legislation (60% mineral wool, 25% asbestos, 15% Portland cement.) This is the material as it was delivered to the construction site and this is what it looks like after application. Notice that I can pull it off with my fingers and crumble it to a powder. To use the Federal EPA definition - it is friable. Excessive dust generation would be expected during field mixing and during renovation or removal. There are no objections to the banning of these materials and any like them.

In contrast to this extremely friable material, all of the products for which we are requesting exemption must perform a protective or structural function which is defeated if they become friable. The first examples are a polyester laminating resin containing about three-quarters of one percent asbestos and a maintenance coating with about 2.5%. The laminating resin is used in conjunction with fiberglass to build up strong, rot-resistant structures such as boats. This is an example of one layer of the cured product. It is normally built up in layers to a thickness of a quarter of an inch or more. This is the finished maintenance coating containing 2.5% by weight asbestos. It is also hard and definitely not friable.

Next are two examples of roof coatings. This one has an emulsified asphalt base and this one uses cutback. They contain about 9 and 7 weight percent asbestos after cure, respectively. Note that the cured coating is slightly flexible or resilient. These products must be formulated this way to allow for the effects of temperature change. A set of roofing product samples containing a much wider range of asbestos contents has been prepared by the W. W. Henry Company and will be described subsequently by Mr. Paul Beemer, the General Manager of that company.

A08391

The spraying test I mentioned earlier, which was not included in our written testimony, was conducted by a consulting firm for the H. B. Fuller Company. This study was submitted by H. B. Fuller as part of their testimony on a proposed Federal EPA regulation on the spraying of asbestos-containing materials.

The materials sprayed consisted of a series of mastics used to provide weather-barrier coatings over soft thermal insulation on tanks, roofs, lines, etc. Asbestos contents were 1.8, 6.6, and 14.3% by weight chrysotile and a mixture of 13.7% chrysotile and 34.9% of Asbestine Fiber #2 talc. It is important to note that although Asbestine Fiber #2 is talc, not asbestos, it does contain a substantial portion of mineral particulate which would have been counted as asbestos by the consultant making this study if it became airborne.

The mastics were sprayed under two sets of conditions; in a closed 20x20 foot room to approximate the worst possible case, although the products are not normally used indoors; and in an outdoor application. The airborne fiber counts found are presented in this figure in the same manner as the other data in Figure 1, page 10, in the testimony. The fiber concentration in fiber/cc longer than 5 microns is shown on the vertical axis. The present DOSHA allowable limits of 10 fiber/cc ceiling, 2 fibers/cc TWA and the 1 fiber/cc maximum TWA set by SB-1591 are shown for reference. The four mastics are arranged in order of increasing mineral content from 1.8 to 48.6% by weight after cure.

The solid circles show the operator breathing zone concentration. These are all in the 0.1 - 0.2 fiber/cc range. The bars show the maximum or ceiling values, the range, and the arithmetic mean for the area samples in the immediate vicinity of the spraying operation. The highest value found was about 0.5 fiber/cc for the non-typical interior spraying of the Hi Mastic. The remaining values were in the zero to 0.2 fiber/cc range. As an added

point of interest, the Gallo Company sprayed 40,000 gallons of the Monolar Mastic containing 6.6% asbestos to insulate the exterior surfaces of wine storage tanks located out-of-doors in Modesto. Air samples were collected on membrane filters. No airborne fibers were detected by microscopic examination.

The important point to note in these data is that the airborne fiber concentrations are all very low with no clearly defined trends with mineral content in the material being sprayed up to a total mineral loading of 48.6% by weight after cure. This result is very similar to the spraying and product removal data given in Figure 1, page 10 of the written testimony, indicating quite conclusively that the airborne asbestos exposure does not change a measureable amount with the asbestos content as long as the fibers are thoroughly wetted and encapsulated. For these products to be commercially useful, they must be wetted and encapsulated.

To conclude, the products with which we are concerned perform a useful and valid service for industry and for the general public. They contain wetted and encapsulated fibers which do not expose workers to fiber levels in excess of those established by DOSHA or SB-1591. We would not be here today if we were not convinced that the products could be used safely and within the confines of existing regulations. We request that continued use of these products be permitted by your action to modify Section 5208, Title 8, as suggested in our written testimony including a maximum allowable TWA exposure of one fiber/cc >5μ.

Thank you very much for the opportunity to express these views. With your permission, Mr. Paul Beemer would like to present the additional samples mentioned earlier.

A08393

SUPPLEMENTAL INFORMATION

FOR

TESTIMONY CONCERNING

POSSIBLE CHANGES IN THE

HEALTH AND SAFETY CODE SECTION 25910

AS PERMITTED BY SB-1591

Cal/OSHA and Union Carbide Sandblasting Comparison

Prepared for a Public Hearing
Before the Occupational Safety
and Health Standards Board
on November 8, 1978 in
Sacramento, California

Prepared by
Union Carbide Corporation
Metals Division
Niagara Falls, New York

BACKGROUND

During the hearings on the 1976 Presley Bill, Assemblyman Fenton asked the Department of Health to collect additional exposure data during the use of the products for which temporary exemptions were granted. A cooperative government-industry effort ensued. The first portion of the data is contained in a letter of June 1, 1977 from Jerome A. Lackner, M.D. to Mr. Fenton. A copy of this letter is attached. These data have been submitted to the Standards Board as part of the record for this hearing.

The initial two tests (see Location 1 and Location 2 in the Lackner letter) involved sandblasting of an asbestos-containing coating from a plaster or a stucco wall. When the results became available, they were higher than anticipated, i.e. 0.5-3 fibers per cc longer than 5μ. The manufacturer of the paints asked Union Carbide to participate in a third test jointly with the DOH. This was quite acceptable to the DOH and a series of paired samples was collected at Location 3. A detailed Union Carbide report on this test is attached.

DISCUSSION

The samples collected in the third test were extremely difficult to count. They were heavily loaded with both fibrous and non-fibrous dust. A lot of particulate was present that met the dimensional criteria of a fiber, length greater than 5μ, length to diameter ratio greater than three but was almost certainly not asbestos. Both counters were experienced and discussed the problem of evaluating filters of this type prior to counting.

The results from the two laboratories are summarized and compared in the following table. The Cal/OSHA data ranged from 0.1 to 7.1 fibers/cc >5μ and the UCC values from 0.0 to 3.3 fibers/cc >5μ.

A08395

COMPARISON OF AIRBORNE ASBESTOS FIBER COUNTS DURING SANDBLASTING OF ASBESTOS-CONTAINING MAINTENANCE COATING

Description of Operation	Sample Data				Fiber Counts						
		Time			UCC		Cal/OSHA	UCC SEM (f/cc)			
	No.	On	Off	Total Min.	100 fields	f/cc	f/cc	Asbestos	Non-Asbestos	Total	Comments
Pretest Controls											
On fence, left side of area to be sand-blasted. ~4 1/2' above ground.	G-16	10:35	10:56	21	2	0.1	0.3				
On fence, ~100' from G-16. ~5' above ground.	F-44	10:42	10:59	17	0	0	0.1				
Personal sample on observer ~25' from fence and moving parallel to fence.	A-86	10:39	10:52	13	2	0.1	0.2				
Observer (During Sand-Blasting)											
Personal sample on observer ~20-30' from fence and moving parallel to fence.	A-81	11:12 11:25	11:18 11:27	6 2 8	1	0.1	0.1				
Same as A-81.	J-89	12:26	12:52	26	1	0.03	0.2				
Area sample on fence. 5' above ground and ~40' downwind. (In lieu of observer)	G-3	1:35	2:00	25	29	0.7	1.9	0.2	0.9	1.1	3 Asbest fibers i 25 field
Helper (During Sand-Blasting)											
Personal sample. Assisting with hoses. Operating sand feeding equipment.	G-48	11:10 11:24	11:18 11:26	8 2 10	15	1.0	1.4				
Same as G-48.	X-8	12:25	12:48	23	28) 45)	1.1	2.2				
Same as G-48.	C-15	1:08	1:22	14	3	0.2	0.5				
Same as G-48.	X-4	1:36	1:58	22	2	0.06	0.2				
Blasting Operator (During Sand-Blasting)											
Personal sample. Operator handling sand-blasting nozzle, standing ~2' from fence.	D-71	11:10 11:24	11:18 11:26	8 2	32	2.2	1.6	0.2	3.9	4.1	1 asbest fiber in 25 field
Same as D-71.	X-14	12:25	12:36	11	43) 58)	3.2	7.1				
Same as D-71.	G-34	12:38	12:46	8	38	3.3	6.6				
Same as D-71 except inside of hood.	X-2	1:08	1:22	14	34	1.7	2.1	0.0	1.1	1.1	0 asbest fiber in 50 field
Same as D-71.	X-3	1:36	1:58	22							

A08396

DISCUSSION (Continued)

For the pretest controls and several of the samples collected on the observer and on the helper, only several fibers were found in the hundred fields examined under the microscope. Blank filters, i.e. those which have never been exposed, will read from 0 to 3-4 fibers per 100 fields, so these results are not significant. The remaining seven pairs ranged from about the same to Cal/OSHA counting about double. Considering that these counts are not from the same filter but from filters that were collected on opposite shoulders, both laboratories felt that the agreement was really excellent.

The corresponding time-weighted averages for the two operators for the time period where sandblasting was actively in progress and for the entire eight-hour day are listed below. The two workers' actual TWA exposures for the particular day were all below 0.5 fibers/cc >5μ.

	Time-Weighted Average Exposures (Fibers/cc>5μ)			
	During Active Operations		8-Hour Day Basis	
	Cal/OSHA	UCC	Cal/OSHA	UCC
Helper	1.1	0.6	0.2	0.1
Operator	4.1	2.2	0.4	0.2

It appeared from the results that non-asbestos material was being included as asbestos in the counts reported. In order to check this further, Union Carbide examined three of the filters with a scanning electron microscope at 1000X. A total of only four chrysotile fibers was found in a hundred fields.

A08397

When these results became available, the problem was discussed with Mr. Heacock at the DOH and it was agreed that another carefully planned large-scale test should be made. A copy of a letter to Mr. Heacock outlining the objectives and protocol for such a test is attached. The report of this test was appended to our written testimony and the results were described therein.

CONCLUSIONS

We believe that the fiber counts reported in Dr. Lackner's letter of June 1, 1977 include a great deal of material that is not asbestos. The subsequent large-scale test is more representative of potential exposure during sandblasting.

(415) 843-7000, Ext. 391

June 1, 1977

Honorable Jack R. Fenton, Chairman
Subcommittee on Occupational Safety
and Health
State Assembly
State Capitol
Sacramento, CA 95814

Dear Mr. Fenton:

This report is in response to the request by members of the Assembly Subcommittee on Industrial Safety for measurements of worker exposures to asbestos during construction operations.

Although industry representatives remained in close contact with staff of the Occupational Health Branch throughout the year, no opportunity arose to witness and evaluate an actual destruction of a previously-applied, asbestos-containing product, either as a paint or a stucco component.

The enclosed report is of worker exposures during staged sanding and sandblasting removal of previously applied protective coatings containing asbestos. The removal was conducted by industry representatives at the direction of Department of Health employees. Industry representatives have since stated the removal does not represent actual practice; Health Department representatives believe it does. As a result of this experience, when suppliers of portland cement plaster containing asbestos could not identify a suitable building about to be demolished, and offered to construct and then stage the demolition of a structure, their offer was acknowledged but not pursued.

I feel that with the recent enactment of stringent reporting requirements on the use of asbestos in all places of employment in California, proper controls will be developed and used for all occupational exposures.

If we can be of further assistance to the Committee, please do not hesitate to contact me.

Sincerely,

Original Signed By
Jerome A. Lackner, M.D.
Director of Health

Jerome A. Lackner, M.D.
Director of Health

408399

Enclosure

bcc: Health and Welfare Agency
Legislative Liaison

JHH:dkm

Public Health Division
Occupational Health Branch
Fred L. Ottoboni, Ph.D.

Report of Employee Exposure to Asbestos During Destruction of Spray Coatings Previously Applied to Buildings or Structures

INTRODUCTION

During 1976 the Occupational Health Branch of the Public Health Division of the California Department of Health agreed to conduct a series of self-initiated studies of worker exposures to asbestos during destruction of spray coatings.

Exposures from two products were to be evaluated; portland cement plaster containing less than one half of 1 percent asbestos and exterior and interior coatings and laminating resins containing encapsulated asbestos fibers previously applied to a building or structure.

Studies were made at three different locations to evaluate employee response to asbestos as follows:

1. On August 31, 1976, a study was conducted at 4801 Exposition Boulevard, Los Angeles. A latex-based paint containing 1 percent Chrisotile asbestos, which had been applied to a plaster wall in an unventilated hallway five feet wide and eight feet long, was sanded for two hours with an electric hand sander. The operator was aware of the purpose of the study and attempted to remove the paint without cutting into the plaster.

2. On November 16, 1976, a study was conducted at 950 South Broadway, Los Angeles. An alkyd-based paint containing about 4 percent Chrysotile asbestos had been applied to a stucco wall. The test was conducted at the rear of the building in an alley, a 20-foot section of the wall was sandblasted to a height of five feet using a commercial sandblasting machine.

3. On December 17, 1976, a study was conducted at Village Grove Park in the city of Corona. An epoxy-based paint containing 1 percent Chrysotile asbestos had been applied to a metal fence. The test was conducted by sandblasting the fence using a commercial sandblasting machine. Samples were taken upwind, downwind, inside and outside the sandblasting hood, at the hosetenders location and in the general area.

All of the airborne samples were evaluated using our Cal/OSHA method which is identical to the OSHA- and NIOSH-approved method specified in the asbestos standard. Material samples were also evaluated to determine the percentage of asbestos in the paint.

The summary of the airborne concentration of asbestos during the sampling period is attached.

The data shows that there is a definite exposure to asbestos when employees or workers sandblast or sand coatings containing asbestos and that this exposure is present in the immediate area. In this case, the immediate area referred to is within a 10-foot radius of the source in the non-windy condition and within a 40-foot radius downwind in windy conditions.

A-08450

In any case, at all three locations there was an employee exposure of at least 1 fiber/cc, and up to 4 fibers/cc as an average. The area samples also showed exposure into the 1 to 2 fiber/cc range. And finally the mixer-hosetender exposure range was from 0.5 to 2.0 fibers/cc.

DISCUSSION

All of the samples collected were of short-term exposures of 10-to-20 minute duration. All showed that free asbestos fibers were released. Dry sanding and sandblasting using dry silica sand may not represent industry-wide practice, but have been witnessed by Health Department representatives at other sites, and with other coatings, frequently.

No studies were made of destruction of portland cement plaster coatings containing asbestos as no buildings were located containing such a coating that were to be demolished.

STANDARD

The Cal/OSHA standard is:

> "The 8-hour time-weighted average concentration of airborne 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 using phase contrast illumination and 400 to 450X magnification. The ceiling or short time concentration to which employees are exposed shall not exceed 10 fibers, longer than 5 micrometers, per cubic centimeter of air."

A08407

Summary of Airborne Concentrations of Asbestos

LOCATION 1 Material - Latex Base Paint (Vinyl-Acrylic) - 1% Chrysotile asbestos bound in matrix. Free fibers released with grinding abrasion.

Sander f/cc*	Area Samples f/cc*	
1.7	0.3	Both samples simultaneously within 10 ft. of source
1.1	0.9	"
0.5	0.3	"
	0.2	"

LOCATION 2 Material - Alkyd Base - 3-5% Chrysotile asbestos. Free fibers released with sandblasting.

Sandblaster f/cc*	Mixer-Hosetender f/cc*	Area Samples f/cc*	
1.5 (filter outside of hood)	0.4	1.6	All 3 sampled simultaneously
3.5 "	0.7	1.2	"
3.5 "			

LOCATION 3 Material - Epoxy Base - 1% Chrysotile asbestos. Free fibers released with sandblasting.

Sandblaster f/cc*	Mixer-Hosetender f/cc*	Area Samples f/cc*
		0.3 (Stationary Background) Upwind
	Before Blasting	0.2 (Moving Background)
		0.1 (Stationary Background) Upwind
1.6 (Filter outside of hood)	1.4	0.1 (Moving during blasting) Never downwind
7.1 "		
6.6 "	2.2 (Upwind)	0.2 "
3.7 (Filter inside of hood)	0.5 "	
2.1 (Filter outside of hood)	0.2 "	1.9 (Stationary during blasting) Downwind

*f/cc = fibers per cubic centimeter of air greater than 5 microns in length

NOTE: Horizontal lines denote samples collected in the same time frame.

A08402

AIRBORNE ASBESTOS COUNTS

for

Textured Coatings of America, Inc.
(Village Grove Trailer Park, Lots 19 and 20)
Corona, California

Date Sampled: December 17, 1976
Date Reported: April 1, 1977

Samples Collected By: B. L. Ingalls
Union Carbide Corporation

Samples Analyzed By: B. L. Ingalls & G. J. Spencer
Union Carbide Corporation

Reported By: H. B. Rhodes
Union Carbide Corporation

Union Carbide Corporation
Metals Division
Niagara Falls, New York

408403

OBJECTIVE

To measure the airborne asbestos fiber concentrations generated during the removal of an asbestos-containing maintenance coating from a sheet metal fence by sand-blasting.

DESCRIPTION OF OPERATION

The test was run at Village Grove Trailer Park, Lots 19 and 20 in Corona, California. The park was surrounded by a galvanized metal fence about 5' high that had been painted about five years previously. The metal was first primed and then painted with an alkyd-based maintenance coating containing about 5% asbestos. The paint also contained mica, talc (non-tremolitic), fiberglass, and perlite.

The sandblasting was done with a portable unit consisting of a compressor and a blasting unit. The latter had a sand storage tank about 1' in diameter by 3 1/2' long which fed silica sand through a lever operated control device and a heavy hose to a blast nozzle, under the control of the operator. One man handled the blasting nozzle while the other operated the compressor, assisted with the hoses, but primarily operated a lever on the sand delivery unit to keep the sand flowing. The nozzle operator wore a conventional sand-blasting hood with air openings on the sides.

During the blasting operation one man stood about 2' from the fence and moved the nozzle, held about 3-6 inches from the fence, in short arcs until the impinging sand removed the paint down to the base metal. Bonding was excellent and it took at least several passes of the blast to remove the paint. The material removed was finely pulverized. The bottom 1 1/2' of the fence was not hand-blasted to avoid raising extraneous dust from the dry ground at the base of the fence. The weather was clear and warm with a light, variable breeze blowing from left to right in approximately the same direction as the fence.

SAMPLE COLLECTION

The following types of samples were collected during the test:

1. Background samples prior to testing were collected at the fence, ~4 1/2' from the ground about 100' apart. (Spanned the section to be sand-blasted.) (G-16 & F-44)

2. A sample about 40' downwind, on the fence about 5' above the ground, during the last 25 minutes of sand-blasting.(G-3)

3. Personal samples on an observer in an area generally 25-35' from the blasting operation and approximately perpendicular to the blasting. (A-86, A-81, J-89)

4. Personal samples on both the helper and the sand-blasting operator. All operator samples were external to the hood except X-2.

   Helper - G-48, X-8, C-15, X-4
   Operator - D-71, X-14, G-34, X-2, X-3

COUNTING EQUIPMENT AND PROCEDURES

All samples were collected with battery-powered air pumps (M.S.A.), calibrated to 2 liters per minute on Millipore membrane filters of 0.8μ porosity. The samples were mounted and counted in accordance with the procedure of Bayer, Zumwalde, and Brown (Bureau of Occupational Safety and Health, February 1969). Counting was done with a Nikon microscope at 400X utilizing a Poton reticle with a 0.0062 mm^2 field area. One hundred fields were counted for all samples.

These samples proved to be particularly difficult to count. Out of the total of nine personal samples from the blast operator and the helper, six were loaded with dust to a level where filter areas were frequently obscured. When such an area occurred, the counter went on to another field. There is no way to tell how this may have influenced the results. Our normal practice in this situation is to resample, but considering the difficulties this would entail, the filters were used.

In addition to this problem, the nature of the samples puts an extreme strain on the method. Thus:

1. Fiber concentrations were low with 0.58 fibers/field the maximum and 0.2 fibers/field more or less typical. This is well below the 1-5 fibers/field range recommended by NIOSH.

2. The fibers counted were in the 5-15μ range so that the "5μ decision" was a frequent requirement.

3. There were substantial concentrations of mica "chips" present. These can generally be recognized as not asbestos but certain shapes around 5μ in length can become undistinguishable.

These factors of low fiber concentration on the filter, filter size distribution, and potentially interfering "fibers" result in a high degree of operator discretion in the determination of the total number of asbestos fibers counted. When this possible variation is combined with the short sample times substantial variations can result.

In view of these uncertainties, a modification was made in the procedure to report two categories of fiber:

1. Obvious chrysotile asbestos. Either long and curved, or distinctly thin and slightly curved in the 10-20μ range.

2. Probable asbestos fiber: Particles which did not have obvious identifying asbestos features but met the L/D >3, >5μ requirements and were dark and fiberlike under phase-contrast illumination.

When there was any doubt about a fiber's identity it was included in category 1. Particles which were obviously not asbestos were not included. The total of 1 and 2 would be the value ordinarily reported as asbestos.

408405

RESULTS AND DISCUSSION

A description of each sample and the respective fiber concentrations are shown in Table I. The data obtained by Counter A are presented graphically in Figure I. Where paired results are available Counter B was high six times and Counter A three times. The differences, without regard to sign ranged from 0.1 to 1.1 fibers/cc and averaged 0.3 fibers/cc. In view of the counting difficulties on these slides we consider this to be good agreement for operators in the same laboratory counting the same slides.

The operation of the sand-blasting equipment was too erratic to provide a meaningful estimate of operator TWA exposure for normal day's operation. Using just the time periods during the actual blasting operations, the time-weighted averages would be:

$$\text{Operator} - \frac{(10)(2.2)+(11)(3.2)+(8)(3.28)+(14)(1.68)+(22)(1.76)}{(10)+(11)+(8)+(14)+(22)} = \frac{145.68}{65} = 2.2 \text{ fibers/cc } >5\mu$$

$$\text{Helper} - \frac{(10)(1.03)+(23)(1.1)+(14)(0.15)+(22)(0.06)}{(10)+(23)+(14)+(22)} = \frac{39.02}{69} = 0.6 \text{ fibers/cc } >5\mu$$

The measured exposure for the full 8-hour day would be:

$$\text{Operator} - \frac{145.68}{480} = 0.3 \text{ fibers/cc } >5\mu$$

$$\text{Helper} - \frac{39.02}{480} = 0.08 \text{ fibers/cc } >5\mu$$

A08406

TABLE 1

SUMMARY OF AIRBORNE ASBESTOS FIBER COUNTS DURING
SAND-BLASTING OF ASBESTOS-CONTAINING MAINTENANCE COATING

Description of Operation	Sample Data				Airborne Fiber Concentrations (Fibers/cc >5μ)								Comments
					Operator "A"						Operator "B"		
		Time			Obvious Chrysotile		Probable Asbestos		Total Asbestos		Total Asbestos		
	No.	On	Off	Total Min.	fibers 100 fields	f/cc	fibers 100 fields	f/cc	fibers 100 fields	f/cc	fibers 100 fields	f/cc	
Pretest Controls													
On fence, left side of area to be sand-blasted. ~4 1/2' above ground.	G-16	10:35	10:56	21	0	0	2	0.07	2	0.07	-	-	
On fence, ~100' from G-16. ~5' above ground.	F-44	10:42	10:59	17	0	0	0	0	0	0	2	0.08	
Personal sample on observer ~25' from fence and moving parallel to fence.	A-86	10:39	10:52	13	0	0	2	0.11	2	0.11	4	0.21	
Observer (During Sand-Blasting)													
Personal sample on observer ~20-30' from fence and moving parallel to fence.	A-81	11:12 11:25	11:18 11:27	6 2 8	0	0	1	0.09	1	0.09	-	-	
Same as A-81.	J-89	12:26	12:52	26	0	0	1	0.03	1	0.03	-	-	
Area sample on fence. 5' above ground and ~40' downwind. (In lieu of observer)	G-3	1:35	2:00	25	7	0.19	22	0.61	29	0.7	21	0.6	
Helper (During Sand-Blasting)													
Personal sample. Assisting with hoses. Operating sand feeding equipment.	G-48	11:10 11:24	11:18 11:26	8 2 10	1	0.07	14	0.97	15	1.03	9	0.6	
Same as G-48.	X-8	12:25	12:48	23	10 -	0.30 -	18 -	0.54 -	28 45	0.84 1.35	60	1.8	Heavily loaded; hard to count second slide
Same as G-48.	C-15	1:08	1:22	14	1	0.05	2	0.10	3	0.15	-	-	
Same as G-48.	X-4	1:36	1:58	22	0	0	2	0.06	2	0.06	9	0.3	
Blasting Operator (During Sand-Blasting)													
Personal sample. Operator handling sand-blasting nozzle, standing ~2' from fence.	D-71	11:10 11:24	11:18 11:26	8 2	7	0.48	25	1.72	32	2.21	-	-	Heavily loaded, hard to count.
Same as D-71.	X-14	12:25	12:36	11	13 -	0.82 -	30 -	1.88 -	43 58	2.70 3.64	- 75	- 4.70	Heavily loaded; hard to count second slide
Same as D-71.	G-34	12:38	12:46	8	5	0.43	33	2.84	38	3.28	39	3.36	Heavily loaded; hard to count.
Same as D-71 except inside of hood.	X-2	1:08	1:22	14	8	0.39	26	1.28	34	1.68	-	-	" "
Same as D-71.	X-3	1:36	1:58	22	21	0.66	35	1.10	56	1.76	53	1.66	" "

A08407

AIRBORNE ASBESTOS FIBER COUNTS DURING SANDBLASTING

OF ASBESTOS-CONTAINING MAINTENANCE COATING

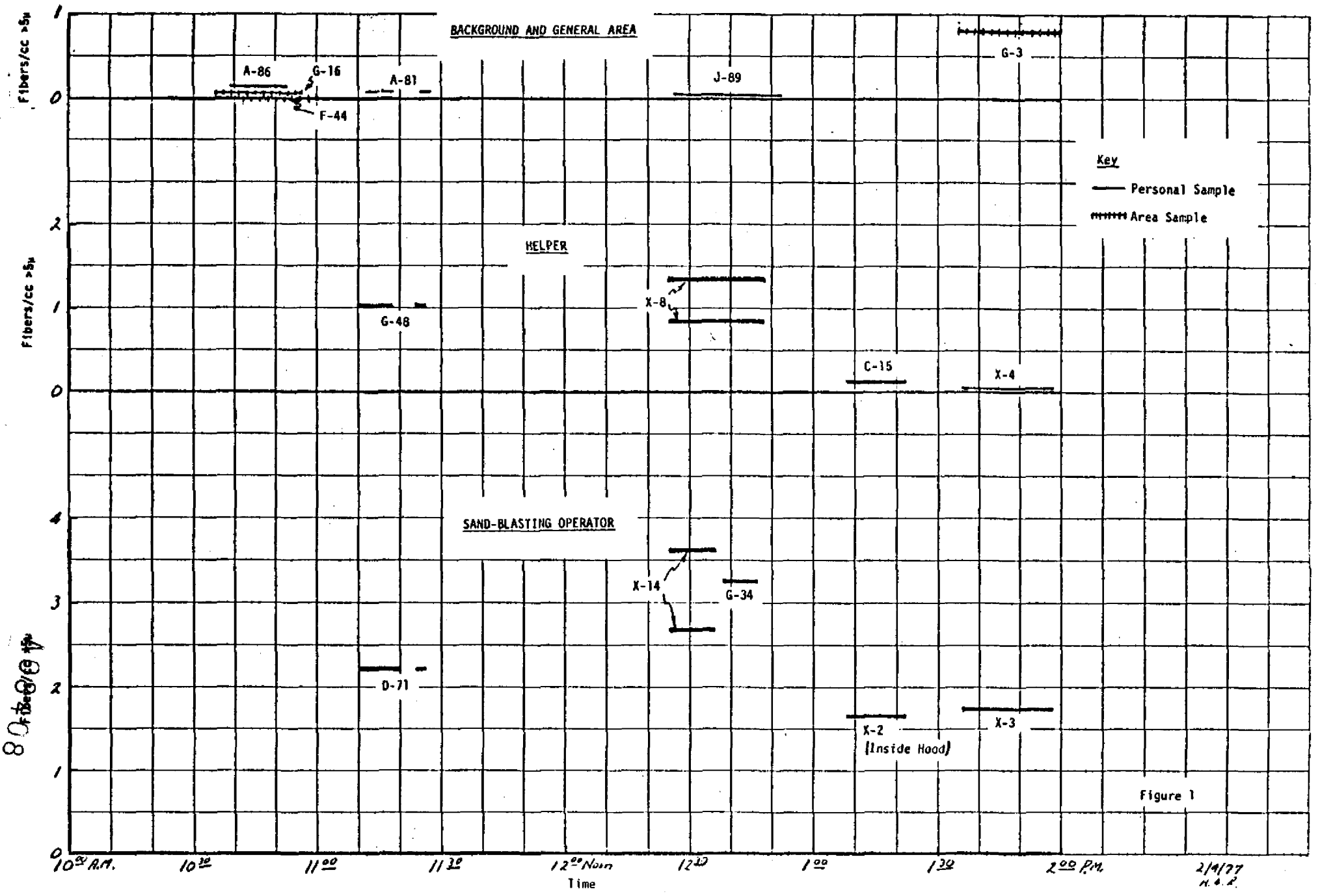


Figure 1

UNION CARBIDE CORPORATION • METALS DIVISION • P. O. BOX 579 • NIAGARA FALLS, N.Y. 14302 • TEL: 716-278-3376

January 13, 1978

Mr. James Heacock
Occupational Health Section
California Department of Health
2151 Berkeley Way
Berkeley, CA 94704

Dear Mr. Heacock:

The suggested protocol for the cooperative test that we discussed in your office is attached. As you requested, it has been set up so that the Department does the actual sample collection.

Plans are well along to conduct the test on one or more large tanks in the Trona area that have been coated with zinc-rich primer. The only hold up is satisfactory verification of composition of the primer. We would like to go ahead and plan to conduct this test during the week of January 23, 1978, preferably on Tuesday the 24th.

Please let me know if this is satisfactory so we can finalize on a date and the other arrangements.

In view of the time that has passed since the original hearings and the number of new people involved, it seems appropriate to comment on two questions relevant to the previous testing results reported in a letter of June 1, 1977 from Jerome A. Lockner, M.D. to the Honorable Jack R. Fenton, i.e.:

1. The appropriateness of sandblasting as a representative test method.

2. The accuracy of the previous counts.

We have been informed by a large manufacturer of the high-performance maintenance coatings of particular interest here that certain of these coatings are sandblasted as a routine procedure. Usually it is a light "brush" blasting to remove rust spots and loose coating but occasionally complete removal takes place. Sandblasting thus represents an extreme condition and should thus be a reasonable way to approximate the upper limits of exposure.

A08409

As we discussed several times, in the test where Cal/OSHA and Union Carbide collected side-by-side samples during a sandblasting operation, both laboratories found asbestos counts of several fibers/cc or more when counting by the routine NIOSH procedure. It is well recognized that the procedure has very serious limitations for dusts of the type generated during sandblasting. Subsequent examination by Union Carbide of several of the filters using scanning electron microscope techniques suggested that both laboratories may have counted substantial numbers of non-asbestos particles as asbestos and that free asbestos fibers were extremely rare.

Over the past year the Federal OSHA Laboratory at Salt Lake City has adopted more sophisticated optical techniques to distinguish asbestos from other particulate matter and are quite possibly the most skilled laboratory in the country in this area. I have discussed our problem with the Director, Mr. Floyd Madsen, and he is agreeable to count a reasonable number of samples. It will be appropriate for you to make a written request for this assistance at the time the samples are submitted.

Please let me know if you have any problems with this proposal. We are looking forward to participating in what appears to be the first carefully defined test of asbestos exposure in this type of application.

It was a pleasure meeting with you and the others in Berkeley.

Very truly yours,

H. B. Rhodes

Harrison B. Rhodes
Technology Manager

HBR/rmm
Attachment

40841C

TEST PROTOCOL

OBJECTIVE

The objective of this test is to measure the airborne concentration of asbestos fibers generated during the removal of a non-resilient maintenance coating by sandblasting. The site selection, test operation, sample collection, and sample analysis will be carefully planned in advance so that meaningful results are obtained.

WORKING ARRANGEMENTS

The selection of the test site and provision for the sandblasting operator and equipment are the responsibility of the Union Carbide Corporation with the choices subject to approval by the Department of Health. It is intended that the Department of Health and Union Carbide will each have at least one qualified person at the site to work out a mutually acceptable sample collection strategy in accordance with the general guidelines under "Sample Collection Strategy".

Sample collection will be performed by the Department of Health. After collection is completed, a validated summary sheet of the collection data will be prepared with a copy for both participants. In order to expedite matters, the cassettes will be packaged and sent immediately by registered mail to:

Mr. Floyd Madsen, Director
OSHA Laboratory
390 Wakara Way
Salt Lake City, Utah 84108

The Department will send a confirming letter to Mr. Madsen requesting them to analyze the samples. He has been alerted and is expecting to receive 10-30 samples. When analysis is complete, the OSHA Laboratory will provide both participants with a copy of the results.

TEST SITE AND OPERATION CRITERIA

The following criteria apply to test site selection:

1. Reasonably representative of a substantial commercial use of the product.

2. Large enough to allow for several hours of dust generation.

3. Reasonably unambiguous definition of the composition of the asbestos-containing material being handled and an asbestos content in the upper part of the range of contents of interest.

4. Sandblasting will be done with regular commercial equipment and materials by a professional operator in a manner that is accepted commercial practice.

408411

SAMPLE COLLECTION STRATEGY

As noted previously, it is intended that the Cal/OSHA and Union Carbide representatives at the site work out the most appropriate sampling strategy with the following special provisions to be met:

1. Personal breathing zone samples will be taken on the operator and the helper (if present) that are subject to the highest exposures. In addition to samples collected during the actual operations, a reasonable number of samples will be collected before and after operation to permit an estimate of the 8-hour time-weighted average exposure.

2. Area samples upwind and downwind will be taken before, during and after the dust generation operation.

ADDED NOTE

The Union Carbide Corporation is participating in a national round-robin study of the NIOSH collection and analytical procedure. It has been agreed that we may have an observer wearing a pair of pumps moving in the immediate vicinity of the dust generation operation. Care will be taken that there is no interference with the test. These samples will be entered into the round-robin and since they will be counted by only the standard NIOSH procedure, the results are not relevant to the present tests.

SAMPLE ANALYSIS

All sample cassettes will be shipped unopened to the Federal OSHA Compliance Laboratory at Salt Lake City.

A08412

SUPPLEMENTAL INFORMATION

FOR

TESTIMONY CONCERNING

POSSIBLE CHANGES IN THE

HEALTH AND SAFETY CODE SECTION 25910

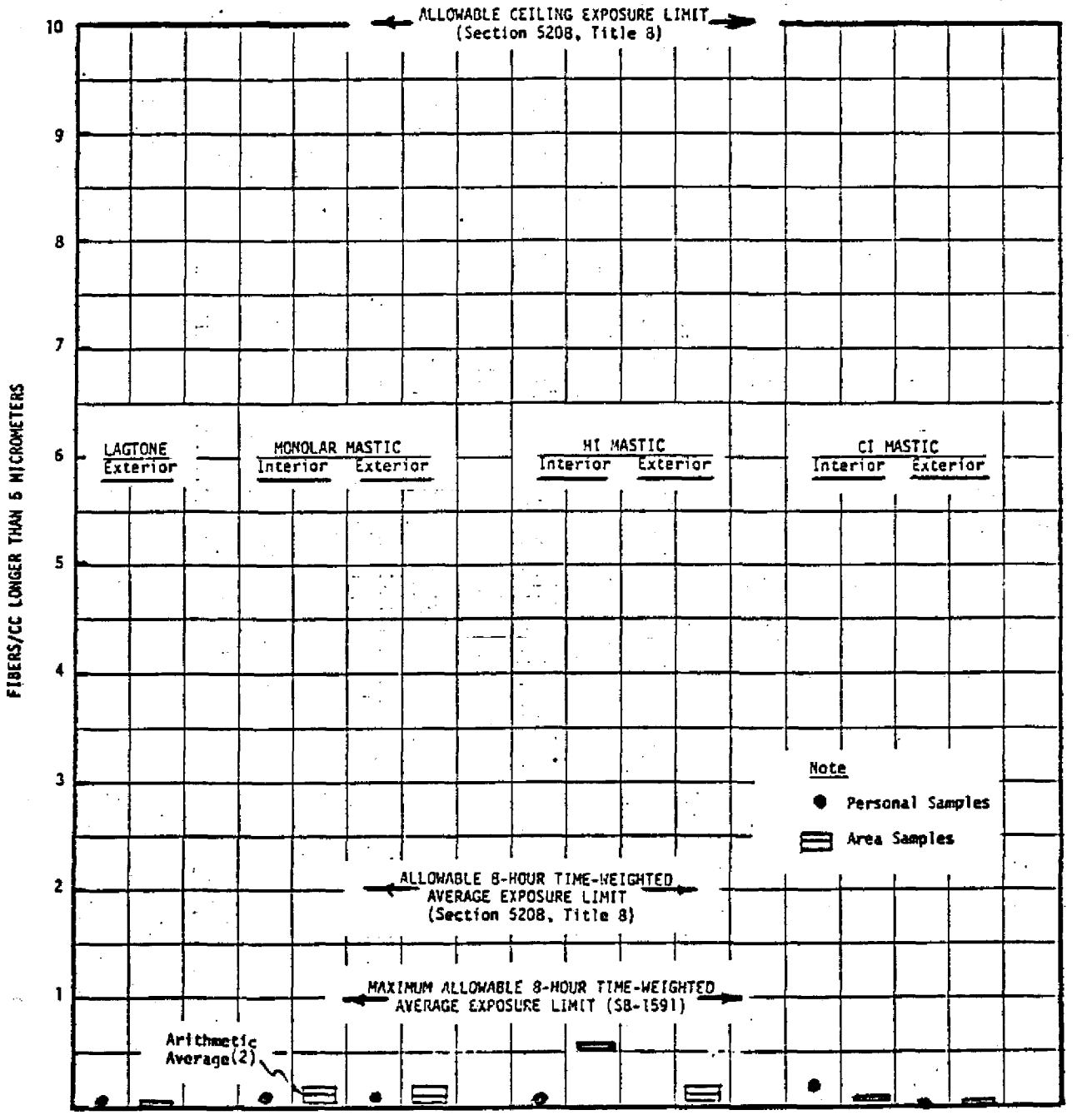
AS PERMITTED BY SB-1591

Prepared for a Public Hearing
Before the Occupational Safety
and Health Standards Board
on November 8, 1978 in
Sacramento, California

Prepared by
Union Carbide Corporation
Metals Division
Niagara Falls, New York

SUMMARY

AIRBORNE FIBER CONCENTRATIONS SPRAYING OF MASTICS(1)



(1) Source: Response of the H. B. Fuller Company to "Changes in the National Emission Standards for Hazardous Air Pollutants" (40 CFR, Part 61) proposed by the EPA (42 CFR No. 41, p. 12122, March 2, 1977).

(2) Arithmetic average of all samples collected for each product group. Since these operations are generally intermittant, the corresponding 8-hour time-weighted averages would be lower.

A08414

SUMMARY OF TABLE I[1]
STEWART-TODD ASSOCIATES, INC. REPORT
SPRAYING OF MASTICS

Product	Wt. % Asbestos[2]	Airborne Concentration (Fibers/cc >5μ)					
		Interior Spraying			Exterior Spraying		
		Personal Sample	Area Samples		Personal Sample	Area Samples	
			Range	Arithmetic Average		Range	Arithmetic Average
Lagtone Coating (30-70)	1.8	-	-	-	<0.06	<0.06-0.06	0.06
Monolar Mastic (60-36)	6.6	0.1	0.05-0.2	0.1	0.09	0.02-0.2	0.1
HI Mastic (90-07)	14.3	<0.07	0.5 -0.6	0.6	-	<0.09-0.2	0.1
CI Mastic (60-26)	13.7 Chrysotile 34.9 Asbestine[3] Fiber #2	0.2	<0.04-0,09	0.07	<0.02	<0.02-0.04	0.03

(1) Pages 5 and 6.

(2) After cure.

(3) Asbestine[(R)] Fiber #2 is an Eastern talc that contains a substantial amount of tremolitic impurity of dimensions that meet the regulatory criteria for a fiber, i.e. length greater than 5μ and length to diameter ratio greater than three. It is extremely controversial whether this form of tremolite is "asbestos" within the meaning of the regulations. For the present test this distinction is irrelevant since any of this type of particulate that became airborne was counted as asbestos.

Response of the H. B. Fuller Company to
"Changes in the National Emission Standards
for Hazardous Air Pollutants" (40 CFR, Part 61)
proposed by the EPA (42 CFR No. 41, p. 12122,
March 2, 1977)

A08416

H B FULLER COMPANY

INTERNATIONAL DIVISION — *foster* PRODUCTS
P.O. BOX 9695 • 4835 W. GIRARD AVENUE • PHILADELPHIA, PA 19131 • TELEPHONE (215) 878-8503
TELEX 84-5141

29 April 1977

Emission Standards and Engineering Division
Environmental Protection Agency
Research Triangle Park
North Carolina 27711

Attention: Mr. Don R. Goodwin

Gentlemen:

Pursuant to the announcement (42FR41) of proposed amendments to the Asbestos Standard (40CFR Part 61), we attach herewith, in triplicate, factual information on the proposals, and our recommendations for changes.

We urge strongly that action to ban spraying of all asbestos-containing materials not be taken; and that specific data be developed on potential emissions hazards of each class or type of such materials upon which to base emission controls.

Yours very truly,

H B FULLER COMPANY

W. P. Ellis

W. P. Ellis, Manager
Foster Products International

WPE:ebg

A08417

STATEMENT BY

THE H.B. FULLER COMPANY

P.O. BOX 9695, PHILADELPHIA, PA 19131

CONCERNING

PROPOSED AMENDMENTS TO ASBESTOS STANDARD 40CFR PART 61 (42FR41)

Section A
Factual Information on Specific Topics Cited in the Proposal

1. Spray-on Materials.

The H.B. Fuller Company manufactures and sells several spray-on weather-barrier mastics (thick coatings) which contain more than 1% asbestos fiber. The range of asbestos fiber content in these products extends from 1.8% to 37.1% by weight of the dry product after application. Attached are technical data sheets describing four such mastics (Attachment 1: 30-70, 60-26, 60-36, 90-07).

These products are applied by spraying over various forms of thermal insulation to protect it from weather, water-vapor migration, mechanical or chemical damage, and other exposures. They are not insulating materials of themselves. Our mastics generally are used at industrial plant sites, such as petrochemical plants and oil refineries, where they are applied on insulated tanks, vessels, structures, structural members, pipes, and conduits. Some of these are specific areas of application which are subject to control in the proposed amendments.

2. Asbestos Substitutes.

The function of asbestos fiber in our mastics is to control flow during application; to prevent cracking during drying; to provide re-inforcement, improved tensile strength, fire resistance, outdoor durability, and package stability. Our Philadelphia laboratory is, and has been, engaged in a project to eliminate asbestos from products such as described above. After numerous experiments we have not yet found acceptable substitutes for asbestos in our products.

3. Technical Impact.

An important technical impact resulting from prohibiting the use of spray-on products containing more than 1% asbestos, as proposed, would be the withdrawal of weather-barrier mastics from the insulation protection market. No suitable replacement protective materials at comparable cost are yet available to provide the water-vapor barrier function which is essential to prevent water condensation within the insulation on low-temperature tanks, vessels, piping and conduits. When under such adverse circumstances, thermal insulation becomes wet it loses its effectiveness. This loss increases significantly the energy consumed to refrigerate process fluids and gases, and makes the control of process temperatures more difficult.

A08418

4. Economic Impact.

The economic impact of the amendments, if imposed, would be to eliminate the sale of weather-barrier mastics; an economic hardship to our company, and to other manufacturers of mastics. Sales of such mastics in 1976 amounted to more than one million dollars for our company alone. Another serious economic impact would be the increased energy consumption in the industrial plants concerned, because of decreased insulation effectiveness. There would be an increase in the cost of maintenance and repair of installed industrial insulation systems. Consequent to the elimination of the weather-barrier mastics production could be labor force reduction, withdrawal of manufacturing units from service, and loss of tax ratables.

5. Magnitude of Potential Emissions.

At our Philadelphia laboratory we have conducted a series of tests to detect and measure emissions of asbestos fiber during spraying of four typical weather-barrier mastics. The tests were monitored by Stewart-Todd Associates of Wayne, Pennsylvania, an experienced firm of consulting industrial hygienists and toxicologists. A copy of the Stewart-Todd report is attached (Attachment 2). The overall conclusion drawn from these tests is that the eight-hour time-weighted concentrations of asbestos fiber did not exceed the current standard of 2 fibers per cc, or 10 fibers per cc ceiling limit, during the spraying of the four mastics tested.

Furthermore, more than 40,000 gallons of our Monolar Mastic, which contains 2.8% asbestos in the dry product, were applied by spraying, almost daily, over a period of several months in 1976, by the E. & J. Gallo Winery, Modesto, California. This mastic was applied to the exterior insulated surfaces of wine-storage tanks located out-of-doors in Modesto. Air quality was monitored by Gallo during the mastic spray application period. Gallo determined that no detectible airborne asbestos fiber was present. (See Attachment 3, Gallo letter dated April 20, 1977, which we are authorized to include with this statement.) This field experience from a large industrial installation confirms the conclusions from the laboratory study described in Attachment 2.

6. Friability of Spray-on Materials.

One of the criteria used in current regulations, and in the proposed amendments, is "friability", which is considered to give an indication of potential inhalation hazard of applied materials containing asbestos. The definition cited in Paragraph 61.21(k) of the standard is inadequate in the technical sense because no standard method of test is referenced, by which the friable nature of a material can be determined with accuracy and uniformity. We believe an improved definition and a test method are needed.

Concerning the weather-barrier mastics described above; at no time during application or during service life are they friable. The mastics are applied in a "wet state" from a semi-fluid or paste-like consistency. After application and drying by evaporation of volatile ingredients, the mastics have the form of thick, leather-like sheets or films which are not friable.

Attached is a specimen of spray-applied Monolar Mastic (Exhibit I) which will demonstrate this point.

7. Renovation or Removal of Friable Asbestos Materials

Because none of our asbestos-containing mastics is friable, there is no hazard associated with their removal where required.

Section B
Comments and Recommendations

1. We do endorse and support the intent of the standard and of the proposed amendments to minimize or prevent an asbestos inhalation hazard. However we believe is is not necessary to prohibit the spraying of all materials containing asbestos in excess of 1% by weight as proposed, because it has not been shown that all such materials do emit asbestos fibers to the atmosphere in unsafe concentrations incident to spraying. In fact, the results of the spray tests reported in Attachment2, together with the field application report of Attachment 3, show definitively that unsafe levels of asbestos particulate matter are not produced during the spraying of the four products tested; one of which contains 37.1% asbestos fibers.

Neither do we believe it is desirable to impose the the ban, for the reasons of adverse technical and economic impacts described in Section A 3 and 4. It is for all these reasons that we recommend deletion from the proposed amendments of the second sentence of Paragraph 61.22(e), which prohibits the use by spraying of products containing 1% or more asbestos.

2. We recommend that the phrase "visible emissions" be deleted from the present standard and from the proposed amendments wherever it appears; and that it be replaced with "asbestos particulate matter". The latter phrase specifically identifies the nature of potentially hazardous emissions. "Visible emissions" may or may not be asbestos particulates.

3. We recommend that the first sentence of Paragraph 61.22(e) of the proposed amendments be revised to read: "There shall be no asbestos particulate matter emissions in excess of the levels established in OSHA Regulations (29CFR1910.1001) to the outside air from the spray-on applications of materials containing more than 1% asbestos on a dry weight basis; except as provided in paragraph (f) of this section." This proposed revision clearly protects the public health by limiting any asbestos emissions to acceptable concentrations.

4. Concerning the term, friability, we recommend the development and adoption of a standard definition and a standard test method. Existing relevant standard tests are ASTM C 367, and ASTM C 421; but some modification of these standards is necessary to make them applicable to spray-on products.

We suggest that either, or both, ASTM Committee E-6 on Performance of Building Constructions, and ASTM Committee E-33 on Environmental Accustics are technically qualified and able to develop suitable modifications of these consensus standards in cooperation with the Environmental Protection Agency.

A08420

We suggest further that this work be coordinated by ASTM Committee E-34 on Occupational Health and Safety Aspects of Materials, Physical and Biological Agents, because Committee E-34 is presently deep into the preparation of a comprehensive asbestos standard.

5. Subpart B of Part 61 does not cite test protocols by which the presence and magnitude of airborne asbestos particulates from spraying operations can be determined. We recommend that this omission be rectified, preferably by referencing current OSHA-NIOSH procedures.

6. Finally, we urge that restrictions on spraying materials containing asbestos not be based on asbestos content, but on emission of asbestos particulate matter: whether in spray operations, or in service, or in renovation or removal activities.

7. H.B. Fuller Company offers to work directly with EPA Emission Standards and Engineering Division, or with other qualified standards-writing bodies such as the American Society for Testing and Materials (ASTM), to implement the suggestions and recommendations made herein. Will we provide gladly any pertinent, non-confidential data on our products, and also the expertise of long experience with their spray application.

29 April, 1977
Prepared by W.P. Ellis

5

A08421

AN EVALUATION OF POSSIBLE AIRBORNE ASBESTOS EXPOSURE FROM WEATHER-BARRIER MASTICS MANUFACTURED BY THE H. P. FULLER COMPANY, INC.

Arthur Neilson
Industrial Hygienist

May, 1977

A08422

TABLE OF CONTENTS

408423

I. INTRODUCTION

Recent proposed standards by the EPA regarding airborne asbestos concentrations in materials containing more than one percent asbestos have caused a degree of concern to manufacturers of Weather-Barrier Mastics for insulation and roofing materials. The standard as proposed, would preclude the use of these compounds if the material has more than one percent of asbestos.

In order to ascertain both environmental and occupational exposures from these materials where the concentration of asbestos anthroboles exceed one percent, a protocol was developed establishing methodology to determine airborne concentrations of asbestos fiber during the spraying application of four (4) representative H.B. Fuller Company Inc. Mastics. Four compounds with concentrations of asbestos varying from 1.8 to 34% bound in asphalt hydrocarbons or vinyl acetate water base products were utilized.

Spraying of these materials was done under two sets of conditions; in a closed room simulating interior usage and outside in the ambient air, simulating roof application or outdoor insulating techniques. The testing was accomplished on two separate days, April 19 and 20, 1977.

II. SUMMARY

A total of 36 samples including controls, were taken for determination of airborne asbestos fiber concentration. Sample times ranged from 10 to 42 minutes. Fiber concentrations were reported using standard laboratory techniques as established by NIOSH (see analytical procedures for detailed procedures used and calculations).

Based upon the current occupational standard of 2 fibers/cc for an 8-hour workday and a ceiling value of 10 fibers/cc for any 15-minute concentration, all of the test spraying application were well below standard. Concentrations ranged from .5 to less than .002 fibers/cc and it should be noted that in many instances that fiber counts are in reality, below detectable limits.

A08425

III. METHOD OF SURVEY

Airborne asbestos samples were obtained utilizing Mine Safety Appliance Gravimetric Sampling Pumps and Millipore Gast Type Continuous Duty Pumps with appropriate critical orfices. Samples were taken on open-faced millipore filter type AA, 0.08 micron, and pumps were calibrated before and after survey utilizing; a Universal Pump Calibrator in the case of the MSA Model G's and an NBS Certified Wet Test Meter for the Gast Type Pumps.

Area and personal sampling was accomplished. The first day's data was obtained while spraying was performed on sheets of paper approximately 4 x 15 feet in length attached to the interior walls of a suitable workroom. Spraying was accomplished by utilizing normal industrially accepted practices as recommended by the manufacturer. Nozzle pressure averaged 2000 PSI.

Area sampling was done at strategically located points in order to obtain maximum coverage and capture maximum concentrations of airborne contaminants. In addition, in each application, the operator's breathing zone was also sampled.

Exterior environmental sampling was accomplished utilizing the same equipment; however, spraying was accomplished on three (3) 4 x 8 sheets of plywood, positioned against an exterior wall. In addition to the vertical characterization, a horizontal spraying operation was done on the ground. Paper was laid out in approximately 30 foot strips.

Weather conditions for these tests were as follows: ambient temperature 64 degrees F. to 70 degrees F.; wind was from the North, 3-5 miles per hour. Area sampling was accomplished and all sampling stations down-wind of the spray operations in order to obtain maximum fiber concentrations.

408426

IV. TEST RESULTS AND PHOTO MICROGRAPHS

H.B. FULLER COMPANY, INC.

TABLE I

MATERIAL	TYPE OF SAMPLE	SAMPLE	TOTAL FIBERS	FIBERS/CC	TOTAL/CC
Monolar Mastic 60-36 4/19/77 Interior Spraying (solvent base)	Area	4097	3.2×10^3	.08	36788
	Area	4104	3.2×20^3	.05	63716
	Area	4097	3.2×10^3	.049	64430
	Personal	4096	7.9×10^3	.123	63716
	Area	4078	1.3×10^4	.20	63308
C.I. Mastic (solvent base) 60-26 D-9115 4/19/77	Area	4087	Less 1.6×10^3	.002 < 0.04	36788
	Area	4086	3.2×10^3	.087	36448
	Personal	4078	1.3×10^4	.202	64328
H.I. Mastic 90-07 (Water base)	Area	4088	6.3×10^3	.528	11918
	Area	4075	7.9×10^3	.566	13936
	Personal	4102	Less 1.6×10^3	.006 < 0.065	24596
Monolar Mastic 60-36 (solvent base) 4/20/77 Exterior Application	Area	4082	3.2×10^3	.041	76383
	Area	3538	9.5×10^3	.121	74579
	Area	4034	1.4×10^4	.190	73636
	Area	4076	1.6×10^3	.002 0.023	73964
	Personal	4081	6.3×10^3	.009 0.09	69413

TABLE I (continued)

MATERIAL	TYPE OF SAMPLE	SAMPLE	TOTAL FIBERS	FIBERS/CC	TOTAL CC
CI Mastic	Area	4036	3.2×10^3	.004 0.012	78246
60-26-D 9115	Area	4058	less 1.6×10^3	>.002 <0.02	76398
4/20/77	Area	4032	less 1.6×10^3	>.002 <0.02	75432
(solvent base)	Area	4037	less 1.6×10^3	>.002 <0.02	75768
exterior application	Personal	4031	less 1.6×10^3	>.002 <0.02	71106
White Lagtone	Area	4074	1.6×10^3	.057	27945
30-70	Area	4057	less 1.6×10^3	<.057	27285
4/20/77	Area	4033	less 1.6×10^3	<.057	26940
(water base)	Area	4093	1.6×10^3	.057	27105
exterior application	Personal	4038	less 1.6×10^3	<.057	25395
HI Mastic	Area	4063	3.2×10^3	.172	18630
90-07	Area	4035	1.6×10^3	.085	28290
(water base)	Area	4059	3.2×10^3	.017	17960
exterior	Area	4039	less 1.6×10^3	.086	18040
application	Personal	Void			

Note - Arithmetic corrections in fibers/cc made on the basis of Total Fibers and Total CC reported, 11/3/78, H. B. Rhodes.

TABLE II

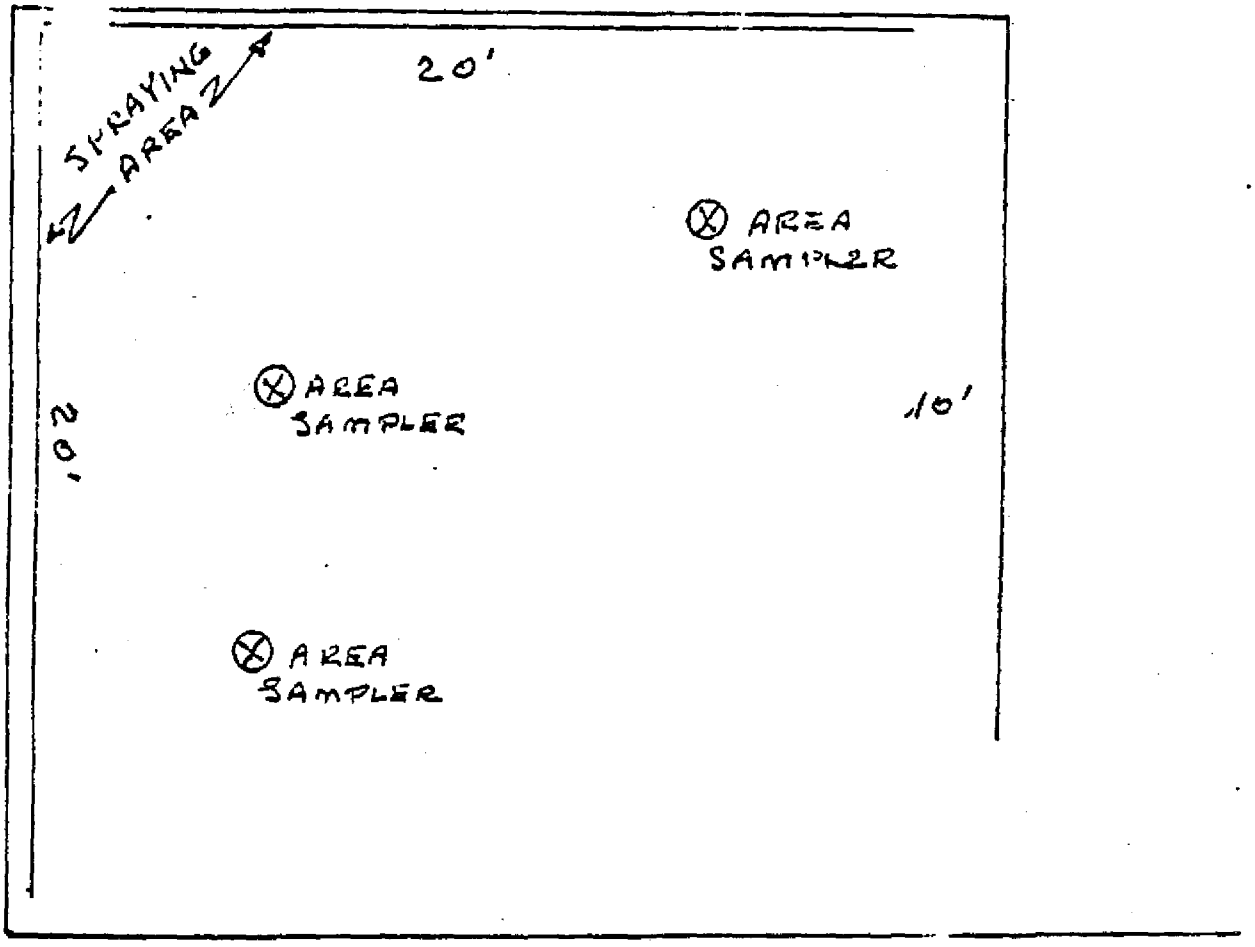
Bulk Sample Asbestos Type and Percentage Analysis by X-ray Diffraction.

DRY[1]	
CI Mastic	38% chrysotile
~~7.8%~~ ~~30-70~~	34% amosite (anthopolite)
48.6 < 13.7 60-26	
34.9 TALC	
HI Mastic	13% chrysotile
~~13.7%~~ ~~60-26~~	
14.3 90-07	
Monolar Mastic	No detectable asbestos.
~~2.8%~~ 6.6 60-36	Small talc peak.
Lagtone Coating	No detectable asbestos.
~~14.3%~~ 30-70	
1.8	

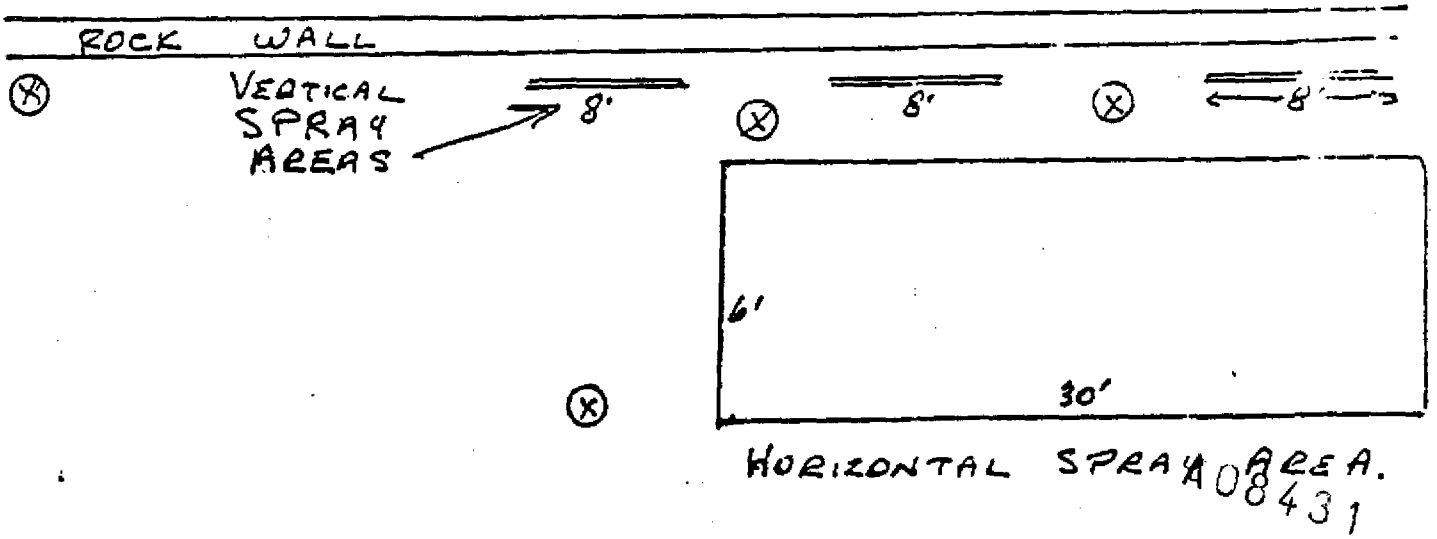
1.) Asbestos contents on the basis of the cured products. Corrections supplied by Mr. W.P. Ellis on 11/2/78. H.B. Rhodes

A08430

INTERIOR SPRAYING AREA



OUTSIDE SPRAY AREA



HORIZONTAL SPRAY AREA.

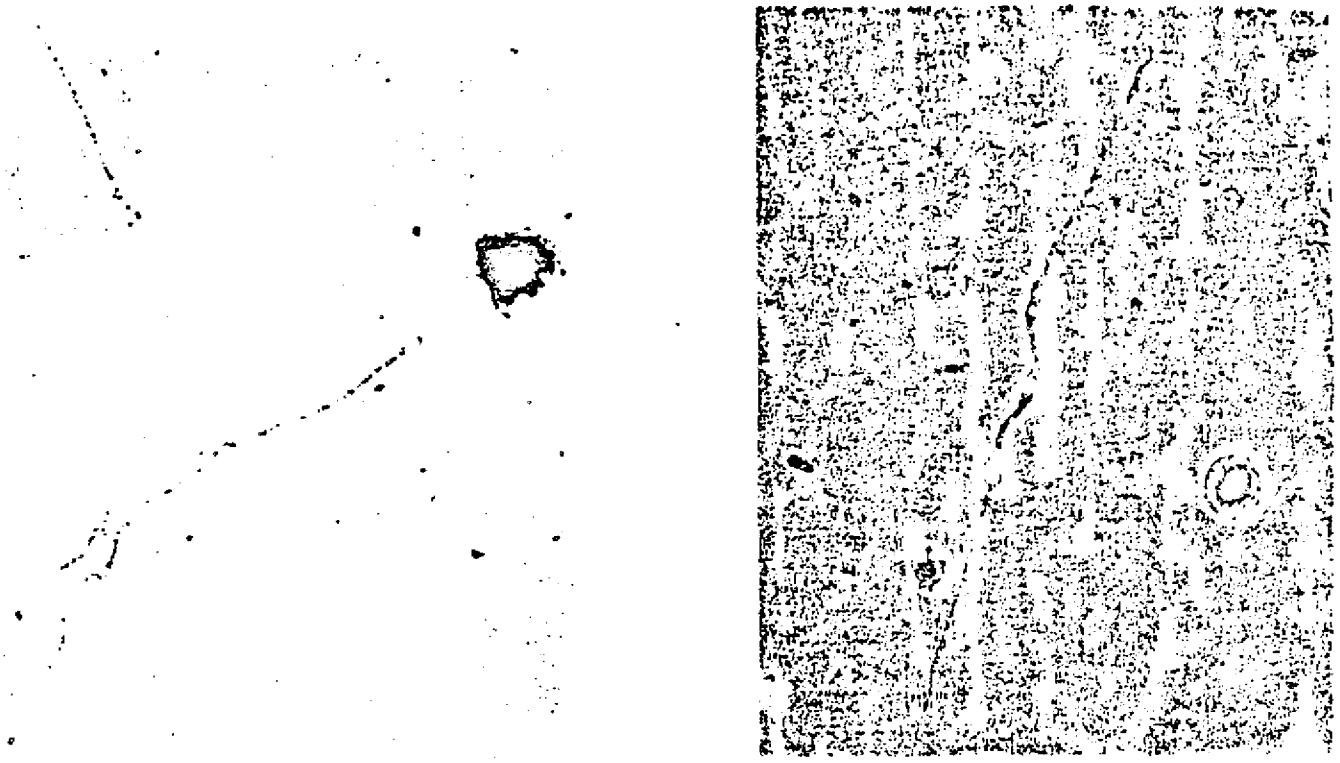
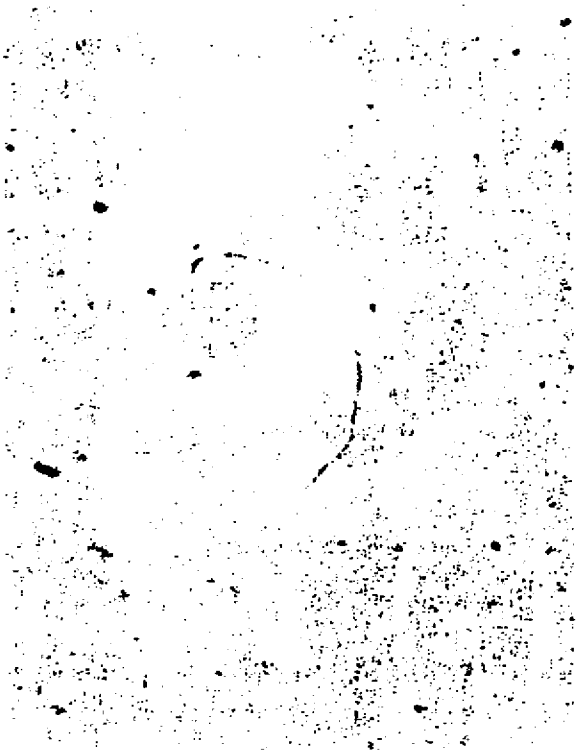


Fig. 1 and 2 (above) Sample 3538 (400X Magnification)
Fig. 3 (below) Sample 4031 (400X Magnification)

A08432



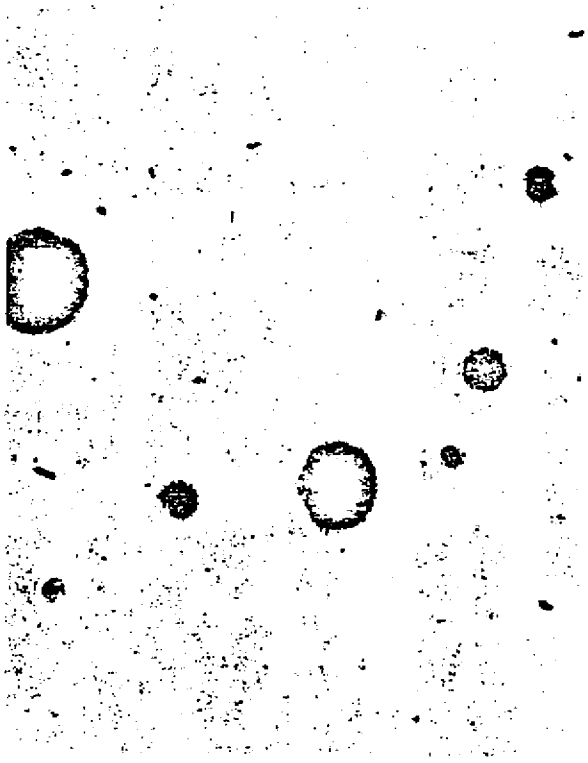
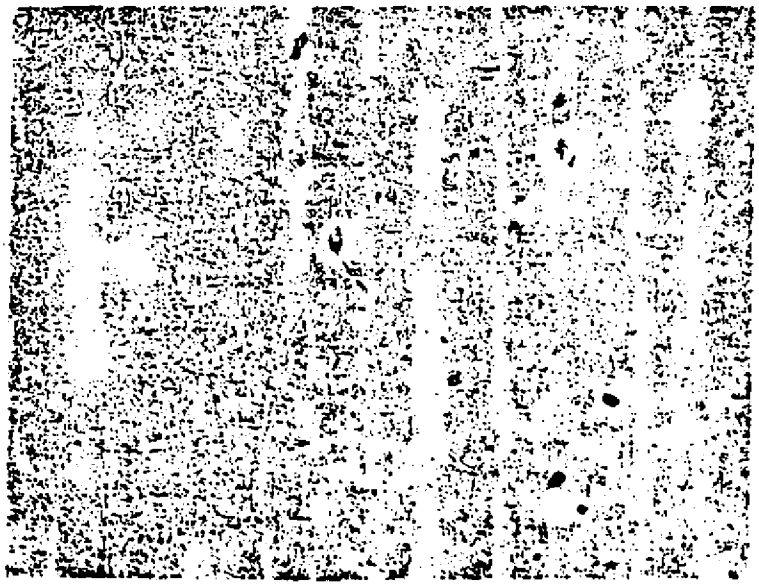


Fig. 4 (above-left) Sample 4037 - 400X Magnification
Fig. 5 (above-right) Sample 4057 - 400X Magnification
Fig. 6 (below) Sample 4063 - 400X Magnification



408433

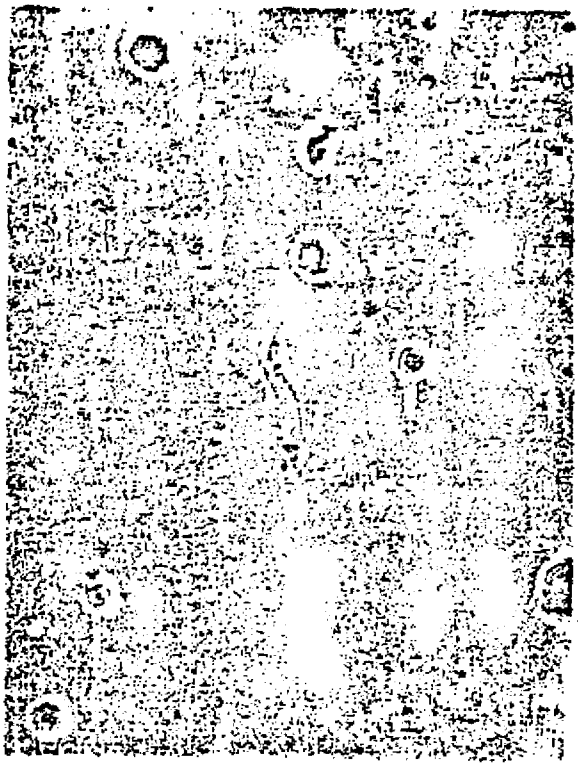


Fig. 7 (above-left) Sample 4075 - 400X Magnification
Fig. 8 (above-right) Sample 4078 - 400X Magnification
Fig. 9 (below) Sample 4088 - 400X Magnification

A08434

V. ANALYTICAL PROCEDURES

Enumeration of Asbestos Dust on Membrane Filters

Apparatus and Reagents

1. Mixture of Diethyl Oxalate + Dimethyl Phthalate; 50-50 mixture, mixed in a large graduated cylinder.

2. 0.14 grams of millipore filter type MF with pores >0.8μ is used per 2 ml of solution.

This produces a viscous solution having an index of refraction of 1.47 (slightly below that of asbestos fiber).

Procedure (1)

A drop of this mounting is placed on a microscope slide and a wedge of membrane filter usually 1cm x 2 cm is placed on the drop, and # 1.5 coverslip placed on top. This is allowed to stand 15 to 25 minutes, while the filter clears. All glassware used should be thoroughly rinsed in double-distilled water, and dried with low lint paper. All samples should be counted within 24 hours for uniformity. The fibers tend to migrate to the edges of the cover slip with time.

(1) Annals of Occupational Hygiene, Pergamon Press, Vol. II, 1968.

A08435

Optical System

Phase contrast microscope ----- 4mm hidry acromatic lens and 10x ocular with a portion reticle mounted stationary left or right ocular, depending on the microscope, at the level the limiting diaphram should be used. The left half of the reticle should be calibrated according to the formula of:

in microns: $L \times 2^n$ n= porton dot number.

Limits of visibility with this system are around 0.3 microns and the resolving power for differences is about 0.5 microns. It is recommended that counting be done by categories according to the porton reticle with the number 1 dot usually being around 1 micron. Thus the category will include all fibers with diameters less than one micron rather than stating the exact diameter, e.g. 0.5 microns. The illumination for this system should be on a ribbon filament illuminator adjusted to Kohler illumination and a green filter with a neutral density of 0.9.

Counting Technique

At least 20 fields should be observed. All of the fibers longer than 5 microns counted. Because some clients may wish all the fibers to be counted it is wise to set up a category for total fibers, i.e., all fibers having an aspect ratio of at least 3 to 1. After counting has been completed, the following formula is used to compute the fibers/cc concentration:

$$\text{Fibers/cc} = \frac{\pi r^2 n}{L_W n V}$$

where:

πr^2	=	area of membrane
L_W	=	area of microscopic field obtained by stage micrometer
N	=	numbers of fibers observed
n	=	number of fields observed
V	=	volume of air in cc

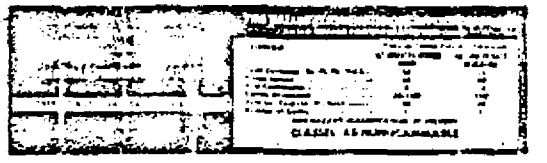
408436

foster® / COATINGS SEALANTS ADHESIVES

PRODUCT DATA
30-70
31-90

H.B. FULLER COMPANY ASSEMBLY Products DIVISION

FOSTER LAGTONE® COATINGS



PROPERTIES

COLORS (ASTM D1729-69)
30-70 White
31-90 Gray

APPLICATION CONSISTENCY (ASTM D2507-70)
Brush or spray

WEIGHT PER U.S. GALLON (ASTM D1475-60)
11.4 pounds (1.4 kg/liter)

AVERAGE NON-VOLATILE (ASTM C461-64)
43% to 44% by volume
(depending on color selected)

THICKNESS AND COVERAGE (FSTM 71)
Dry Thickness: 0.017 to 0.007 inch (.43 to .18mm)
Equivalent Wet Coverage: 0.032 inch to 0.016 inch (.81 to .41mm), 50 to 100 sq. ft. per gallon (1.2 to 2.5m^2/liter) on smooth non-porous surfaces. Porous or rough surfaces may require higher gallonage to attain required dry thickness.

DRYING TIME (ASTM C461-64)
Touch: 1 hour
Through: 4 hours

SERVICE TEMPERATURE LIMITS (FSTM 70)
(Temperature at coated surface)
Minus 50°F to 180°F (minus 46°C to 82°C)

WATER VAPOR TRANSMISSION (ASTM E96-66)
3.0 perms at 0.028 in. dry thickness

SAFETY
Wet Flammability (ASTM D93-72)
Non-flammable
Dry Flame Spread (ASTM E84-70)
30 on 1/4 in. Asbestos Cement Board
(The flame spread may vary at different product thicknesses and/or when applied over surfaces other than asbestos cement board.)

FOSTER LAGTONE® COATING is an emulsion type polymeric protective coating. It forms a tough, flexible finish which can be used on all types of thermal insulation, including the expanded polystyrene and polyurethane foam insulations.

Use LAGTONE® COATING as a combination adhesive and coating for cementing and sealing light weight factory applied fabrics such as 8 ounce canvas or muslin.

Use LAGTONE® COATING over hard asphalt weathercoats to provide color and additional weather resistance. Some flame spread resistance is added to an insulation system when LAGTONE® COATING is applied in 2 coats with 20 X 20 white glass cloth over existing asphalt weather-coats. LAGTONE® COATING is suitable for coating over asbestos-cement board and masonry to blend with adjacent coated insulations.

LAGTONE® COATINGS are resistant to dilute acids and alkalies, solvents, and water. They have a mild odor during application.

30-70 and 31-90 comply with Rule 66 for Los Angeles County Air Pollution Control District.

LIMITATIONS
Protect from freezing. Do not apply below 40°F (4°C) or above 100°F (38°C). Do not apply over other paints. Certain soft asphalt mastics papers or fabrics saturated with asphalt may bleed.

These products are classified by Underwriters' Laboratories, Inc.

FSTM: Foster Standard Test Method
® Trademark
10/74-11-5M

BFN-188; BFO-614/622; LFN-1113

408437

UCC 013917

H. B. FULLER COMPANY
FOSTER PRODUCTS
5220 Main Street N.E.
Minneapolis, Minnesota 55421
800-328-7207

foster®

COATINGS
SEALANTS
ADHESIVES

PRODUCT DATA
60-25 / 26 / 28

FOSTER C. I. MASTIC®

Foster C. I. MASTIC® is a tough, durable vapor barrier asphaltic coating. Because of its flexibility and low vapor permeance, it is an ideal surface coating for low temperature insulating applications where the insulation used is not affected by mild solvents.

C. I. MASTIC may be used on heated lines, vessels and equipment in intermittent or dual temperature service to prevent the entrance of water vapor into the insulation during off periods or on cold cycles Porous, dusty insulation surfaces should be primed with STACKFAS® Concrete Curing Agent 51-06 prior to application of mastic. Insulation must be dry before mastic application.

C. I. MASTIC is an effective protective coating for metal. Priming is not necessary but adequate surface preparation is always desirable to obtain optimum results. A coat of an industrial oxide-chromate primer will prevent spread of rust from points of physical damage.

C. I. MASTIC 60-25 may be used as adhesive for vapor barrier jackets on pipe and duct insulation.

C. I. MASTIC 60-25 meets the requirements for water proofing mastics in the TRI-SERVICE SPECIFICATION for UNDERGROUND HEAT DISTRIBUTION CONDUIT SYSTEMS.

C. I. MASTICS 60-25 and 60-26 meet Military Specification MIL-C-82052.

LIMITATIONS
Do not use in food storage applications where odor might affect food flavors and tastes. Do not use on polystyrene foam. Allow at least 30 days curing before top coating with water base coatings.

FOR INDUSTRIAL USE ONLY BY TRAINED AND QUALIFIED CRAFTSMEN.

PROPERTIES

COLOR
Black

APPLICATION CONSISTENCY
60-25 Trowel
60-26 Spray
60-28 Spray(Low Temperature Grade)

WEIGHT PER U.S. GALLON(ASTM D1475-60)
9.3 to 9.5 pounds (1.12 to 1.14 kg/litre)

AVERAGE NON-VOLATILE (ASTM C461-60)
64% by volume (60-25 & 60-26)
58% by volume (60-28)

THICKNESS & COVERAGE (FSTM 71)
(Subject to nature of material being coated). Wet coverages shown below are for smooth non-porous surfaces. Porous or rough surfaces may require higher gallonage to attain required dry thickness.
TACK COAT: 60-25, 60-26
Dry Thickness: 0.020 to 0.041 inch (0.5 to 1.0 mm)
Equivalent Wet Coverage: 0.031 to 0.0625 inch(0.8 to 1.6 mm), 2 to 4 gal. per 100 sq.ft.(0.8 to 1.6 liter/m^2) on smooth non-porous surface.
FINISH COAT: 60-25, 60-26
Dry Thickness: 0.061 to 0.081 inch (1.5 to 2.1 mm)
Equivalent Wet Coverage: 0.094 to 0.125 inch(2.4 to 3.2 mm), 6 to 8 gal. per 100 sq.ft.(2.4 to 3.2 liter/m^2) on smooth non-porous surface.
NOTE: 60-28 Use 10% more material for equivalent dry thickness.

DRYING TIME (ASTM C461-64)
Touch: 1/2 to 6 hours
Through: 36 hours

SERVICE TEMPERATURE LIMITS(FSTM 70)
(Temperature at coated surface)
Minus 20°F to 200°F(-29°C to 93°C)

WATER VAPOR TRANSMISSION(ASTM E96-66)
0.00 Perm at 1/8 inch dry film thickness
(0.00 metric perm at 3.2 mm)

HAZARD
Wet Flammability (ASTM D93-73)
Flash Point 100°F (38°C)
Surface Flame Spread(dry)(ASTM E162-67)
145 on 1/4 inch(0.63 cm) asbestos cement board.
(The flame spread may vary at different product thicknesses and/or when applied over surfaces other than asbestos cement board.)
Threshold Limit Value for solvent vapor (FSTM 73) T.L.V. 100 ppm

A08438

SEE APPLICATION GUIDE ON REVERSE SIDE

UCC 013918

FOSTER DIVISION
AMCHEM PRODUCTS, INC.
AMBLER, PA. 19002

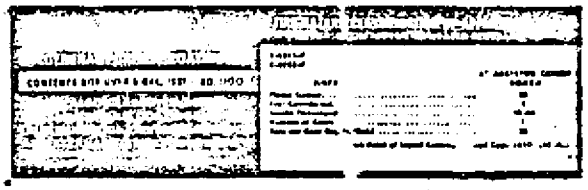
foster® / COATINGS SEALANTS ADHESIVES

PRODUCT DATA

60-36

H.B. FULLER COMPANY ASSEMBLY PRODUCTS DIVISION

FOSTER MONOLAR® MASTICS



FOSTER MONOLAR® Mastic based on duPont Hypalon® is a tough, flexible, fire-resistive finish for protection of thermal insulation. It is also used as a vapor barrier coating for fittings. It is excellent for indoor or outdoor use where chemical resistance and durability are required.

PROPERTIES

COLOR
60-36 White (Spray)
60-29 Gray (Spray)
60-61 Black (Spray)
Other colors available on special order

APPLICATION CONSISTENCY
Rubber glove, trowel or spray

WEIGHT PER U.S. GALLON (ASTM D1475-60)
9.3 to 9.7 pounds (1.11-1.16 kg/liter)

AVERAGE NON-VOLATILE (ASTM C461-64)
30% by volume

THICKNESS AND COVERAGE (FSTM 71)
(Subject to type of surface being coated)
Total Dry Thickness: 0.030 inch (0.76 mm) minimum
Equivalent Wet Coverage: 0.096 inch (2.4 mm) (6 gal./100 ft.^{2}) (2.44 liter/m^2) on smooth, non-porous surface. Porous or rough surfaces may require higher gallonage to attain required dry thickness. See Guide Specification for detailed recommendations.

DRYING TIME (ASTM C461-64)
Touch: 3 hours
Through: 2 days

SERVICE TEMPERATURE LIMITS (FSTM 70)
(Temperature at coated surface)
Minus 20°F to 250°F (Minus 29°C to 121°C)

WATER VAPOR TRANSMISSION (ASTM E398-70)
0.08 perm at 30 mils dry (0.05 metric perm)

HAZARD
Wet Flammability (ASTM D93-73)
Flash Point 100°F (38°C)
Dry Flame Spread (ASTM E84-70)
20 on ¼ in. Asbestos Cement Board
(The flame spread may vary at different product thicknesses and/or when applied over surfaces other than asbestos cement board.)
Threshold Limit Value for solvent vapor
(FSTM 73) T.L.V. 100 ppm

SPRAYED POLYURETHANE FOAM INSULATION
Foster MONOLAR® Mastic provides outstanding weather barrier and vapor barrier protection for sprayed polyurethane foam in outdoor locations. It is a one-component, high film strength product, usually applied in a single coat with standard airless spray equipment. Consult the MONOLAR® Brochure and Guide Specifications for further information.

APPROVALS:
Underwriters' Laboratories, Inc., Classified, UL 732 & UL 790.
ICBO Report No. 2763.

LIMITATIONS
Do not store over 100°F (38°C). Do not apply below 40°F (4°C) or above 100°F (38°C). Use within six months for best application properties.

Some plastic foams may be attacked by the solvent in this product. The user should establish by his own test that this will not occur.

Wet or uncured MONOLAR® Mastic may be discolored by sulphide atmospheres, but the discoloration will bleach out after exposure to sunlight. Avoid crushing cellular glass when troweling on MONOLAR® Mastic.

FSTM: Foster Standard Test Method
®Trademark of HB Fuller Co.
7/75-12
LFN 870/871

FOR INDUSTRIAL USE ONLY BY TRAINED AND QUALIFIED CRAFTSMEN

A08439

UCC 013919

H.B. FULLER COMPANY
FOSTER PRODUCTS
5220 Main Street N.E.
Minneapolis, Minnesota 55421
800-328-7307

foster® / COATINGS SEALANTS ADHESIVES

PRODUCT DATA
90-07
90-10

H.B. FULLER COMPANY ASSEMBLY PRODUCTS DIVISION

PROPERTIES

COLOR (FSTM 4)
Black

APPLICATION CONSISTENCY
Trowel or spray

WEIGHT PER U. S. GALLON (ASTM D1475-60)
9.4 pounds (1.13 kg/liter) (Average)

AVERAGE NON-VOLATILE (ASTM C461-64)
40% to 45% by volume

THICKNESS & COVERAGE (FSTM 71)
(Subject to nature of material being coated). Wet coverages shown below are for smooth non-porous surfaces. Porous or rough surfaces may require higher gallonage to attain required dry thickness.

Dry Thickness: 0.080 to 0.106 inch (2.0 to 2.7 mm)
Equivalent Wet Coverage: 0.19 in. to 0.250 in. (4.8 to 6.4 mm) (12 to 16 gallons per 100 sq. ft.) on smooth non-porous surface.

Tack Coat:
Dry Thickness: 0.040 to 0.053 inch
Equivalent Wet Coverage: 0.094 in. to 0.125 in. (6 to 8 gallons per 100 sq. ft.) on smooth non-porous surface.

Finish Coat:
Dry Thickness: 0.040 to 0.053 inch
Equivalent Wet Coverage: 0.094 in. to 0.125 in. (6 to 8 gallons per 100 sq. ft.) on smooth non-porous surface.

DRYING TIME (ASTM C461-64)
90-07: Touch: 1 hour at 73°F (22.8°C)
Through: 8 hours at 73°F (22.8°C)
90-10: Touch: 8 hours at 60°F (15.6°C)
24 hours at 20°F (minus 6.7°C)
Through: 7 days at 20°F (minus 6.7°C)

SERVICE TEMPERATURE LIMITS (FSTM 70)
(Temperature at coated surface)
0°F to 200°F (minus 17.8°C to 93.3°C)

WATER VAPOR TRANSMISSION (ASTM E96-66)
3.0 perms (min.) at 1/8 in. dry film thickness
(2.0 metric perms at 3.2 mm)

HAZARD
Wet Flammability (ASTM D93-73)
No flash to boiling (210°F, 99°C)

Dry Flame Spread (ASTM E162-67)
135 on ¼ in. Asbestos Cement Board
(The flame spread may vary at different product thicknesses and/or when applied over surfaces other than asbestos cement board.)

FOSTER H. I. MASTIC®

FOSTER H. I. MASTIC® is a highly durable, protective weather coat for use over thermal insulation where an economical breathing mastic is required.

H. I. MASTIC® is a fibrated asphalt emulsion, made from a blend of prime asphalts, special colloidal clay filler, and carefully selected asbestos fibers, which will not shrink or crack (particularly at the critical right angle bends) during curing. It has exceptional weathering stability and develops with its final set a firm, durable surface with good resistance to acids, alkalies, abrasion, and other abuses typical of outdoor industrial conditions. It has no heat flow, remaining hard and stable under all normal operating temperatures.

The following grades are available:
90-07 H. I. Mastic® (Standard)
90-10 H. I. Mastic®, Low Temperature Grade

U.S.D.A. (M.I.D.) chemically acceptable.
90-07 and 90-10 comply with Rule 66, Los Angeles Air Pollution Control District.

LOW TEMPERATURE GRADE H. I. MASTIC 90-10 may be applied during freezing weather when temperature is above 20°F (minus 6.7°C).

LIMITATIONS (Standard Grade only)
Protect H. I. Mastic® from freezing in storage. Exposure to severe freezing conditions during application, or between application and full cure, may cause cracks in the cured film.

As with all asphalt emulsion products, application over insulations containing soluble salts may show efflorescence or white salt deposits on the surface if water is present in the insulation. Efflorescence may be removed by normal rainfall or washing after mastic is dry but may recur if water continues to be present in the insulation.

® Trademark
FSTM—Foster Standard Test Method
Form No. 3155-27b
4/75-12-BF-243, 268; BFO-953, 954
LFN-1110, 1112

FOR INDUSTRIAL USE ONLY
BY TRAINED AND QUALIFIED CRAFTSMEN

A0844C

UCC 013920

H. B. FULLER COMPANY
FOSTER PRODUCTS
5220 Main Street N.E.
Minneapolis, Minnesota 55421
800-328-7307

COPY

E. & J. GALLO WINERY

Modesto, California

April 20, 1977

Mr. Irving Steltz
Foster Division
H. B. Fuller Company
P.O. Box 625
Spring House, PA 19477

Dear Irv:

Attached is an outline of the asbestos test which I described to you over the telephone on April 14. We could not find any airborne fibres using this method.

Equipment Used: Bendix battery operated air pump.

Procedure:
1. Set at 1.8 to 2 liters per minute.
2. Run for one hour.
3. Observe membrane under microscope using Light Field Technique.
4. Count glowing particles.

Presently the Federal Regulation allows 2 fibres per cc of air; however, a new Regulation is pending which does not permit more than 0.5 fibres per cc of air.

Sincerely yours,

E. & J. GALLO WINERY

Donald C. Bettencourt
Manager - Cellar Operations

DCB:jp

A08441

25Apr'77 IS

SUPPLEMENTAL INFORMATION

FOR

TESTIMONY CONCERNING

POSSIBLE CHANGES IN THE

HEALTH AND SAFETY CODE SECTION 25910

AS PERMITTED BY SB-1591

Airborne Asbestos Concentrations from the Grinding of Thermoset Resins Containing 0.8-18% by Weight Chrysotile Asbestos

Prepared for the Occupational Safety
and Health Standards Board
Sacramento, California
November 15, 1978

Prepared By
Union Carbide Corporation
Metals Division
Niagara Falls, New York

A08442

SUMMARY

Union Carbide Corporation has published the results of a study of methods to detect chrysotile asbestos in the airborne dust generated during the grinding of thermosetting resins. As a part of this study, resin plaques containing 0.8 to 18% by weight of asbestos were abraided with a powered disc grinder. The operation was carried out in a closed, 8-1/2' x 8-1/2' x 8' room. Airborne dust samples were collected and counted by the standard NIOSH/OSHA procedure.

The personal samples showed concentrations ranging from 0.0-0.7 fiber/cc >5μ and the area samples varied from 0.0-1.2 fiber/cc >5μ. There was no relationship between the asbestos content of the plaque and the airborne asbestos content that resulted from grinding.

These data are a small part of an extensive study, the balance of which is not related to the Standards Board hearing. In order to provide convenient reference, the relevant portions of the paper have been assembled on the following page. A complete copy of the paper is also attached.

A08443

Detection of Chrysotile Asbestos in Airborne Dust from Thermosetting Resin Grinding

REFERENCE: Faulring, G. M., Forgeng, W. D., Kleber, E. J., and Rhodes, H. B., "Detection of Chrysotile Asbestos in Airborne Dust from Thermosetting Resin Grinding," *Journal of Testing and Evaluation*, JTEVA, Vol. 3, No. 6, Nov. 1975, pp. 482–490.

Sample Preparation and Description

Resin plaques containing 0.8 to 18% chrysotile were ground with a power-driven hand grinder equipped with a 7-in. (177.8-mm) diameter, 16-grit abrasive disk simulating the fabrication operations found in boat yards and the automobile industry. Compositions of the plaques are listed in Table 1. The grinding was carried out in a thoroughly cleaned, closed, 8½ by 8½ by 8-ft (2.6 by 2.6 by 2.4-m) room. The plaque, approximately ½-in. (12.7-mm) thick by 1 by 2 ft (0.3 by 0.6 m), was clamped to a bench 30 in. (76.2 mm) from the floor approximately in the center of the room. The edge was ground for a period of 4–5 min with the grinder rotating in a direction to throw the heavy particles toward the floor.

In addition, individual samples were collected before, during, and after each grinding operation by aspirating at the rate of 2 litres per min through Type AA membrane filters (0.8 μm pore size).

TABLE 1—*Compositions of chrysotile-bearing plaques.*

Sample No.	Resin Type	Resin Weight, %	Chrysotile Type*	Chrysotile Weight, %	Fiber Glass Weight, %	Sisal Weight, %	Limestone Weight, %	before	during	during*	after
								No. fibers/cm³ of air			
1	polyester	79.2	RG-244	0.8	20.0	...	...	0	0	0	0
2	polyester	99.2	RG-244	0.8	...	...	...	0.01	0	0	0
3	polyester	98.0	RG-244	2.0	...	...	...	0.01	0.2	0	0.01
4	polyester	96.0	RG-244	4.0	...	...	...	0.01	1.2	0.7	0.02
5	epoxy	76.0	RG-144	4.0	20.0	...	...	0.06	0.1	0.1	0.05
6	polyester	35.0	RG-110	5.0	10.0	10.0	40.0	0	1.2	0.6	0.02
7	polyester	35.0	RG-110	10.0	10.0	10.0	35.0	0	0	0	0
8	polyester	30.0	SG-200	18.0	...	2.0	50.0	0.03	0.9	0.3	0.06

* Types RG-110 and RG-144 are opened fibers; SG-200, pelletized; RG-244, silica coated (Union Carbide Corporation designations of refined California chrysotile, commercial products).

* Breathing zone.

AU8444

TESTIMONY CONCERNING

POSSIBLE CHANGES IN THE

HEALTH AND SAFETY CODE SECTION 25910

AS PERMITTED BY SB-1591

Prepared for a Public Hearing
Before the Occupational Safety
and Health Standards Board
on November 8, 1978 in
Sacramento, California

Prepared by
Union Carbide Corporation
Metals Division
Niagara Falls, New York

SUMMARY AND CONCLUSIONS

In 1974 a bill prohibiting the spraying, after July 1976, of any substance containing any amount of asbestos in or upon a building or other structure during its construction, alteration or repair was passed by the legislature. A single exception, for cold process cutback asphaltic roof coatings, was provided. A second bill, enacted in 1976, provided a two-year exemption from the ban for Portland cement plaster containing less than one-half of one percent asbestos and for certain products similar to cold-process cutback asphaltic roof coatings which contained encapsulated asbestos fibers bound within the finished product from manufacture through application. Finally, a third bill (SB-1591) was adopted this year which directs the Occupational Safety and Health Standards Board to consider whether exemptions should be continued and, if so, to promulgate appropriate regulations.

This presentation addresses only the questions in the Notice of Hearing which relate to asphaltic coatings and products with encapsulated fibers. The widespread uses and valuable contributions made by the products are described. Airborne asbestos fiber concentrations are presented from 34 locations covering spraying, removal, and abrasion operations for a variety of products. These data demonstrate that the ceiling concentrations are far below the 10 fiber/cc >5μ allowed, and the time-weighted average concentrations are well below the more stringent maximum limit of 1 fiber/cc >5μ imposed by SB-1591.

Documentation is presented that extensive and generally unsuccessful efforts have been made to find substitutes for asbestos. It is also shown that the value of the products affected is about $9,000,000 per year, so the economic impact of a ban would be substantial.

On the basis that these products are useful and valuable to our society, that the potential worker exposures have been shown to be well within the limits specified by SB-1591 (as well as within the limits permitted for other non-sprayed asbestos-containing products under present DOSHA Asbestos Regulations), that there are no suitable substitutes generally available, and that the economic effect of a ban would be substantial, it is requested that the continued use of asphaltic-based coatings and other products containing encapsulated asbestos fibers be permitted.

Specific wording suggesting a maximum allowable TWA exposure of 1 fiber/cc >5μ and incorporating the other provisions of SB-1591 into Section 5208, Title 8 is presented for consideration by the Standards Board.

408446

TABLE OF CONTENTS

* * * * *

Appendices

408447

A. BACKGROUND

In 1974 a bill introduced by Senator Marks was enacted which prohibited, after July 1, 1976, the "spraying of any substance containing any amount of asbestos in or upon a building or other structure during its construction, alteration or repair." This bill was prompted by the spraying of asbestos building insulation materials in the San Francisco Bay area.

For this type of application, dry asbestos mixed with other mineral ingredients was delivered to the construction site in bags. It was then applied to the structure in two ways:

1. Sprayed in the dry form with a simultaneous spray of water so that it was deposited as a wet mat on the surface.

2. Premixed with water and sprayed as a thick slurry.

By either method, the handling of the dry asbestos-containing materials produced clouds of airborne dust in the immediate vicinity of the mixing operation and in the general area of the building being insulated. After the insulation material dried, it became friable, i.e., could be reduced to a powder by hand pressure. It is highly possible that substantial concentrations of airborne fiber would be released during maintenance, renovation or demolition operations of buildings and structures insulated in this manner.

No one objected to the banning of this particular use of asbestos. Exposures were difficult to control, could be high, and under certain conditions, could occur during the service life of the product. The Federal Environmental Protection Agency promulgated a similar ban on the spraying of friable asbestos insulation materials in April of 1973. Manufacture of such products had generally ceased prior to the Federal action.

The Marks bill was so broadly drawn that it banned not only this inappropriate use of asbestos but also a number of other important construction products wherein the asbestos fiber is wetted and encapsulated in a permanent binder or is present only in very small amounts. Fiber released during application and subsequent use of these latter types of products is non-existent or extremely small. It is worth noting that the Marks legislation contained one exception, cold process cutback asphalt roofing products, which is a typical example of the kind of products covered by this presentation.

As more information showing very low worker exposure became available in 1975 and 1976 attempts were made in the legislature to modify the Marks bill to permit the continued use of these important products containing bound and encapsulated asbestos. In 1976 a bill introduced by Senator Presley was passed which provided a two-year exemption (until July 1978) from the ban for certain of these products and for Portland cement plaster that contained less than one-half of one percent asbestos. The two-year limit was a compromise to allow the manufacturers more time to search for substitute materials and for the Department of Health and others to obtain more definitive exposure data. The manufacturers of the affected products agreed at that time to provide suitable sites for DOH testing of fiber release.

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A. BACKGROUND (Cont'd.)

The subject of exemptions was again addressed in the legislature in late 1977 and early 1978. It soon became evident that the legislature was a difficult place for objective consideration of this complex technical issue. The Standards Board, who has technical resources and capabilities, was clearly a more appropriate agency to act on the matter.

A compromise bill, SB-1591, co-authored by Senators Marks, Gregorio, and Presley, was passed which transfers responsibility for the matter to the Standards Board. SB-1591 places certain specific limitations, beyond those already contained in Section 5208, Title 8, on regulations relating to exempted products, as follows:

1. The maximum allowable 8-hour time-weighted average exposure cannot exceed one-half of the present level of 2 fibers/cc longer than 5 micrometers, i.e., 1 fiber/cc >5μ.

2. The fiber concentration restriction applies not only to the spray application of the product but also throughout its use and disposal.

B. SCOPE OF THIS PRESENTATION

SB-1591 relates to three different types of products:

1. Portland cement plaster containing less than one-half of one percent asbestos.

2. A variety of products where the asbestos is wetted and encapsulated in a permanent binder. These fall into two related groups:

   a. Interior and exterior coatings and laminating resins containing encapsulated asbestos fibers bound within the finished product from manufacture through application.

   b. Cold-process cutback and emulsified asphalt coatings.

3. Any substance which contains less than one-quarter of one percent asbestos which occurs solely as a result of naturally occurring impurities in the substance or its components.

This presentation covers the encapsulated products in Item 2 above and will address questions 3, 4, and 5 in the Notice of Public Hearing dated August 8, 1978, as follows:

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B. SCOPE OF THIS PRESENTATION (Cont'd)

"3. If exemptions for any substances containing asbestos are granted by the Board, at what level should the time-weighted average concentrations limits or ceiling concentration limits be set? (Section 25910(b)(3);(c)(3); and (d)(3).)

4. Upon what basis, if any, should products containing "encapsulated asbestos fibers" be exempt? (Section 25910(c)(1).)

5. Upon what basis, if any, should "cold-process asphalt roof coatings" be exempt? (Section 25910(c)(1).)"

The applications, characteristics, and quantities of the various products of interest are described and the status of the search for substitute materials is shown. Airborne fiber exposure data collected at 34 locations are presented to demonstrate that the fiber counts are consistently below both those allowed for other asbestos-containing products under DOSHA regulations and the more stringent limitations imposed by SB-1591. On this basis, suggested changes to Section 5208, Title 8, to permit continued use of these products are presented.

C. PRODUCT USE INFORMATION

a) Roof Coatings

Many commercial and industrial buildings constructed today are topped with "built-up" asphaltic roofing. In the installation of these roofs a layer of hot tar or asphalt is mopped or brushed onto the roof and covered with a layer of building felt. The process is repeated until the required number of layers has been installed. The roof joints and flashings are sealed with thicker asphaltic-based "plastic cement" applied with a trowel.

In this type of installation the asphaltic compound generally does not contain asbestos or other mineral additives. The building felt may or may not include asbestos, and the trowelable sealer will generally have asbestos as an important viscosity control additive.

For proper application, the asphalt is heated to 450-500°F and is then hauled to the roof in drums or pails. It is difficult and dangerous to handle and is too hazardous to spray. The heating is done in kettles which may emit smoke and fumes that are potentially harmful to the environment. Environmentally acceptable kettles are expensive and difficult for the smaller contractors to obtain.

As an alternative to heating, cold asphalt can be diluted or "cutback" with a solvent or emulsified with water to reduce the viscosity so that the material can be spread on the roof. Such products are termed "cutback" or emulsified asphalt coatings. These products require no heating and can be applied by spraying or rolling. They were used in the past mainly for maintenance and repair of existing roofs; but, with increased labor costs and improvements in spray equipment, they

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C. PRODUCT USE INFORMATION (Cont'd.)

a) Roof Coatings (Cont'd.)

are now finding much wider use in new construction. Spraying is about ten times as fast as hand application, gives a more uniform coating and permits pumping of material to the roof instead of using drums or pails of hot asphalt.

The amounts of the various roofing products sold in California in 1975 are listed in the table below. Of the 8,042,000 gallons used, it is estimated that most of the black emulsions and cutbacks and about one-half of the aluminized products contain asbestos, that is, about 4,300,000 gallons. Product value for this portion of the total is about $5,000,000 per year. Most of these materials are sprayed.

1975 SALES DATA[1]
(in thousands of gallons)

Company	Black Cutbacks	Black Emulsions	Primers	Aluminum Pigmented	Plastic Cements	Other
A	214	Neg.	143	165	33	1328
B	412	138	19	291	737	-
C	160	1800	35	140	290	420
D	150	0	40	75	250	30
E	67	941	0	37	127	0
Totals	1003	2879	237	708	1437	1778

"(1) Consideration of Model Organic Solvent Rule Applicable to Architectural Coatings, State of California Air Resources Board, June 1977, Table VII-7, p-61."

The asbestos content of these products varies from 4-13% by weight. The base asphalt is in the form of an emulsion containing about 45% water or cutback which contains about 40% organic solvent. The water or solvent evaporate during cure to leave an asbestos content ranging from about 6-20% by weight in the cured coating.

b) High-Performance and Specialty Industrial and Trade Coatings and Resins

This broad group includes a wide variety of high-performance and/or corrosion resistant coatings generally applied to metal, concrete, or wood. High-build vinyl, epoxy, and epoxy-coal tar based coatings, zinc-rich primers and block and foundation coatings are typical of this group. Some typical formulations of high-performance industrial coatings are shown in Table I in the Appendix.

These products are used in shipyards, power plants, oil refinery and building construction and maintenance, oil and gas storage tanks, barges, off-shore drilling rigs, and in general, on almost any

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C. PRODUCT USE INFORMATION (Cont'd.)

b) High-Performance and Specialty Industrial and Trade Coatings and Resins (Cont'd

structure that is subject to corrosion or requires water resistance. In addition to the main types of sprayed materials just described, there are a variety of polyester resins used to provide such things as corrosion resistant linings for chemical process tanks and in the manufacture of fiberglass boats, tub-and-shower stalls, and similar glass-reinforced products.

Approximately $4,000,000 per year of asbestos-containing coatings of the type described are used in California each year. These coatings are generally applied by spraying due to the nature of the surfaces coated and the high labor costs for other application methods. Typical application rates are shown below and it is evident that the use of a brush results in a very substantial addition to the cost.

Conventional Air-Supported Spraying	-	1000 $ft.^2/hr.$
Airless Spraying	-	2000 $ft.^2/hr.$
Brush	-	200 $ft.^2/hr.$

The products described in this section contain 0.5-3% asbestos by weight as sprayed and up to 5% by weight in the cured coating.

D. AVAILABILITY OF SUBSTITUTE MATERIALS

In developing regulations for the control of potentially harmful materials, an important consideration is the availability of substitutes. However, substitutes must be proven harmless (or clearly less harmful) and economically competitive, and must perform the functions of the original material and impart the desired properties to the final product. It is equally important that any substitute whose use is, in effect, mandated by regulation be generally available and be thoroughly demonstrated as practical in actual commercial operations.

Asbestos consists of fine, hair-like fibers which, when dispersed in a liquid, form a loosely-connected network which could be described as a three-dimensional spiderweb. This network initially thickens the liquid; but, when the liquid is pumped through a spray nozzle, the network comes apart and the liquid is thin enough to pass easily through the nozzle. When the liquid spray reaches a solid surface, the fiber network immediately reforms and thickens the liquid to prevent sag or run-off. The asbestos fiber network in the sprayed product also provides a bridging effect over irregularities in the base surface, adds strength and toughness to the cured coating, and imparts a certain amount of fire resistance in some compounds. There are no generally recognized and acceptable substitutes for asbestos fibers which so effectively perform the functions described above.

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D. AVAILABILITY OF SUBSTITUTE MATERIALS (Cont'd.)

Since many fillers are less expensive than asbestos, the search for alternatives has been ongoing for many years, not necessarily prompted by the asbestos/health question or regulatory activity. However, these factors have clearly intensified the evaluation of substitutes in recent years.

Some organic thickeners have been evaluated as asbestos replacements, but most work has been concentrated on other naturally-occurring fiber-like materials and man-made fibrous products such as fiberglass and mineral wool. Efforts to replace asbestos have been largely unsuccessful because the substitutes usually cause a substantial loss of functional properties and/or an increase in product or installation cost. Few manufacturers of the products under consideration desire to use asbestos in the present climate of concern over the asbestos/health relationship if a suitable substitute is available. An asbestos-free product with even approximately equivalent cost/performance would have a considerable advantage in the marketplace. The lack of such products is prime evidence that asbestos is an important and necessary raw material.

Five specific statements on substitutes are provided in Attachment I. Three of these, including the conclusions of the Federal EPA, relate to a recent rulemaking on spraying of asbestos-containing materials and were obtained from the official record of the EPA proceedings. Two were prepared specifically for this hearing.

E. WORKER EXPOSURE TO AIRBORNE ASBESTOS FIBERS

Exposure to asbestos in the workplace is measured in terms of the concentration of asbestos fibers longer than five micrometers per cubic centimeter of air. To make the measurement, the fibers are collected on a filter and are counted with a microscope at 400 to 450X magnification.

a) Sources of Exposure Data

Data on worker exposure during spraying and renovation or demolition operations involving the products described herein are available from a variety of sources. These include:

1. Responses to a Federal Environmental Protection Agency proposal to modify spraying regulations (CFR-42, No. 41 - Wednesday, March 2, 1977).

2. A paper presented to the Society of Plastics Engineers.(1)

3. A cooperative Government-Industry study on sandblasting of a maintenance coating which was carried out by the California State Department of Health and is reported as Attachment II.

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(1) "Consumer Safety in Plastics Systems Containing Bound Asbestos Fibers," H. B. Rhodes, Union Carbide Corporation. Presented at the Society of Plastics Engineers, Inc., NATEC Meeting, Denver, Colorado, November 9, 1977.

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E. WORKER EXPOSURE TO AIRBORNE ASBESTOS FIBERS (Cont'd.)

a) Sources of Exposure Data (Cont'd.)

All of the data presented are results from personal samples collected in the worker's breathing zone, and most were obtained under routine commercial operations.

b) Presentation of Results

The airborne asbestos fiber counts for over 100 individual samples collected at 34 locations are listed in Tables II through VII and in Attachment II. These results are summarized in the table below and are shown graphically in Figure 1.

For this summary, the data have been grouped by two main product types, Roofing Materials and Coatings and Resins. Each type is further subdivided by the operation being tested, i.e., spraying or tear-off or abrasion of the cured products. The range of fiber counts and arithmetic average are shown for each product type. The arithmetic average represents actual exposures during equipment operation and would be the maximum exposure if the operation was performed by the same worker for an entire eight-hour shift. However, spraying, as an example, is a very rapid operation covering 1000 to 2000 square feet per hour. A worker would normally perform this operation for only a few hours, or less, in a working day. Therefore, a worker's actual TWA exposure would be reduced by whatever fraction of the day the equipment is not in operation. For purposes of this presentation, it was considered appropriate to use the arithmetic average (which would be the higher number) rather than calculate TWA's for the entire shift.

c) Discussion of Results

It is clearly evident from Figure 1 that none of the individual samples even remotely approach the allowable ceiling limit of 10 fibers/cc >5μ. The highest value of 1.6 fiber/cc >5μ occurred during the sandblasting test and the next highest value was only 0.6 fibers/cc >5μ, a factor of nearly 20 below the established limit. Similarly, the arithmetic average values were well below the 2 and 1 fiber/cc >5μ limits prescribed by DOSHA and SB-1591 respectively.

The sandblasting study reported in Attachment II is particularly important to the present rulemaking since it represents an extreme test of the extent of fiber release from non-resilient coatings.(1) The entire coating is removed and reduced to a powder by the high-energy action of the blasting.

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(1) Note: Sandblasting is not applicable to resilient materials such as roof coatings which must be removed by other means.

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SUMMARY

AIRBORNE ASBESTOS FIBER CONCENTRATIONS - SPRAYING AND ABRASION OF PRODUCTS CONTAINING WETTED AND BOUND ASBESTOS FIBERS

	Weight % Asbestos		Number of Locations Tested	Number of Samples Collected	Airborne Asbestos Concentration (Fibers/cc >5μ)		Data Reference
	As Sprayed	After Cure			Range	Arithmetic Average	
ROOFING MATERIALS							
Spraying							
Cutback Asphalt	5.8-7.7	9.7-12.8	3	5	0.003-0.09	0.04	Tables II & III
Asphalt Emulsion	2.8	5.1	2	3	0.01-0.3	0.1	Table II
Tearoff & Replacement	(1)						
Built-up Roofing	-	-	8	<13	0.0-0.6	0.1	Table IV
	2.8-7.7	5.1-12.8	13	<21+	0.0-0.6		
COATINGS AND RESINS							
Spraying							
Epoxy and Epoxy-Coal Tar Coatings	1-1.5	1.3-1.9	3	5	0.0-0.2	0.1	Table V
Chemical Resistant Polyester Coatings	0.7-1.4	0.7-1.4	2	5	0.0-0.4	0.3	Table V
Alkyd Solvent Coatings	6	10	1	2	0.0-0.05	0.03	Table V
Vinyl and Acrylic Latex Coatings	0.6-3.7	1.1-6.7	3	8	0.0-0.2	0.04	Table V
Polyester Laminating Resins	0.5	0.5	3	7	0.0-0.6	0.2	Table VI
	0.5-6.0	0.5-10	12	27	0.0-0.6	0.15(2)	
Abrasion							
Polyester Laminating Resins - Grinding	0.5-3.0	0.5-3.0	5	12	0.0-0.4	0.2	Table VII
Vinyl Latex Coating - Sanding	0.6	1.1	1	4	0.0-0.3	0.1	Table VII
Epoxy Maintenance Coating - Sandblasting	-	2.1	1	39	<0.1-1.6	0.3-0.4 (0.1-0.3)(3)	Attachment II
	0.6-3.0	1.1-3.0	7	55	0.0-1.6		

(1) Results include both the tear-off of old roofing and replacement with the asphaltic materials applied by spraying techniques.

(2) Overall average of 27 samples.

(3) Eight-hour time-weighted averages.

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E. WORKER EXPOSURE TO AIRBORNE ASBESTOS FIBERS (Cont'd.)

c) Discussion of Results (Cont'd.)

The subject of this test was a 40 foot diameter by 25 foot high metal tank that was spray painted in 1973 with an epoxy-based primer containing 2.1% by weight asbestos. The test was carried out in January 1978 so the coating was thoroughly cured. Two professional sandblast operators removed all of the paint on the vertical surfaces, one blasting for nearly six hours and the other for about two hours. They were assisted by a hose tender who kept the blasting equipment filled with sand and helped in the movement of the hoses. In accordance with California regulations, the two blasting operators wore respirators with an external air supply in addition to full protective hoods. Therefore, the data do not represent their actual asbestos exposure but only what it would have been without the required protective equipment.

Even under these extreme conditions the maximum concentration found at any time was only 1.6 fibers/cc >5μ. The arithmetic average concentrations were only 0.3 to 0.4 fibers/cc >5μ and eight-hour time-weighted averages, which are more directly related to statutory requirements, were even lower at 0.1 to 0.3 fiber/cc. As might be expected, the values obtained in the other sanding and grinding operations, where the rate of energy input was lower, gave considerably lower peak and average values. (0.4 ceiling, 0.1-0.2 arithmetic average.)

The arithmetic average dust counts show a generally random variation between a virtually undetectable level and 0.4 fibers/cc >5μ. There does not appear to be any trend with the amount of asbestos in the product, the type of product, of the type of operation. The asbestos content of the product does not appear to be critical as long as the asbestos is sufficiently wetted and is encapsulated.

F. BASIS FOR CONTINUED USE OF PRODUCTS

As noted earlier, the Standards Board has specifically requested comments on what basis should be used for product exemption and, if exempted, appropriate ceiling and time-weighted average exposure limits. The air sampling data for a wide variety of products and operations show that these products consistently result in exposures that are both well below those allowed for non-sprayed asbestos-containing products by the present DOSHA Asbestos Regulations and also well below the more stringent requirements set by SB-1591. These data demonstrate that special regulations for these products are not needed.

Extensive and generally unsuccessful attempts have been made to find substitutes for asbestos. Economic considerations are substantial in that about $9,000,000 per year of such products are manufactured and used in California.

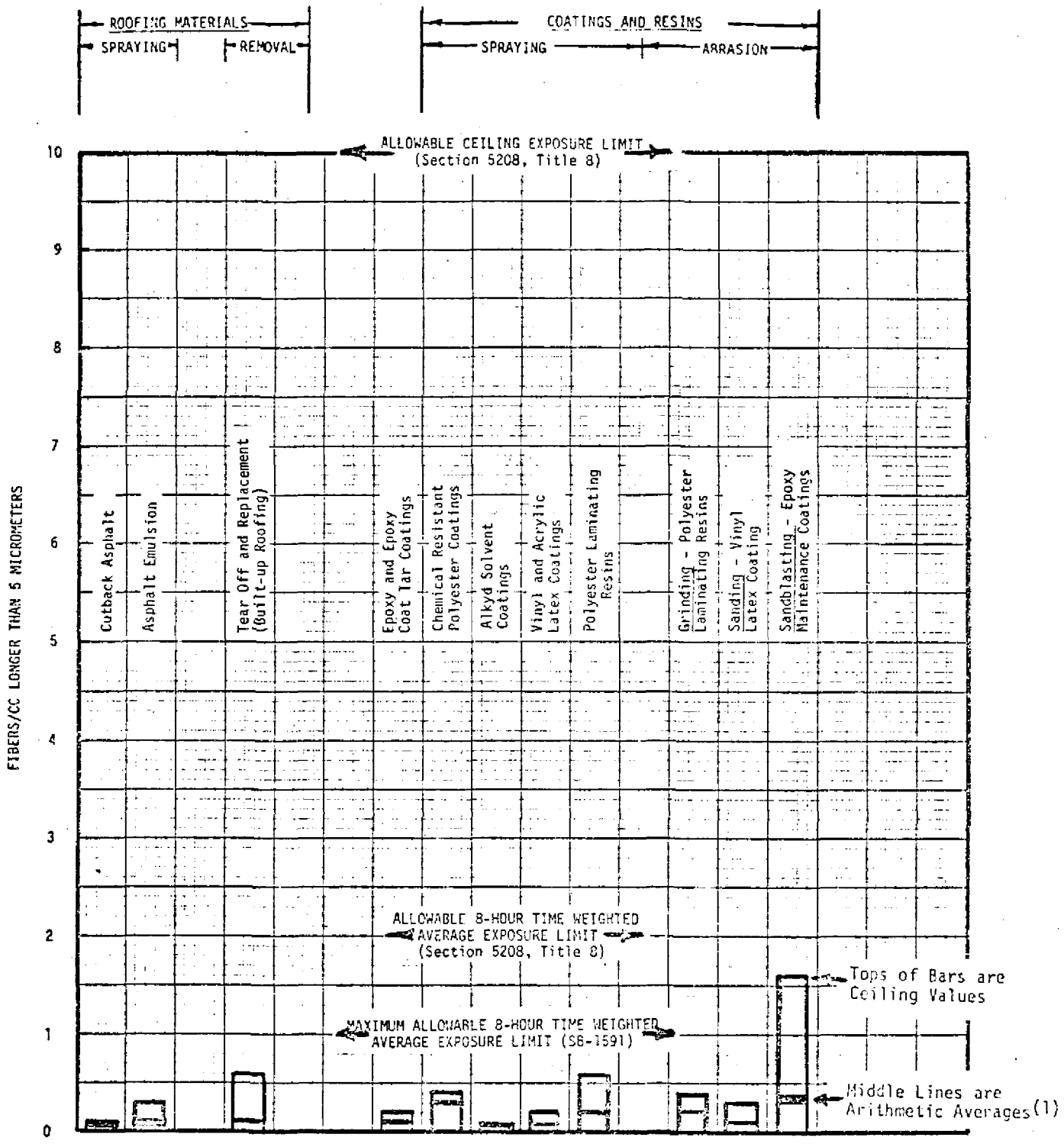
A08456

SUMMARY

AIRBORNE ASBESTOS FIBER CONCENTRATIONS -

SPRAYING AND REMOVAL OF PRODUCTS

CONTAINING WETTED AND BOUND ASBESTOS FIBERS



No. of Locations	3	2	8	3	2	1	3	3	5	1	1	34
No. of Samples	5	3	>13	5	5	2	8	7	12	4	39	103
% Asbestos by Wt.												
As Sprayed	5.8 - 7.7	3	--	1 -1.5	0.7-1.4	6	0.6-3.7	0.5	0.5-3	0.6	--	0.5-7.7
After Cure	9.7 - 12.8	5	--	0.7-1.4	0.7-1.4	10	1.1-6.7	0.5	0.5-3	1.1	2.1	0.5-12.8

(1.) Arithmetic average of all samples collected for each product group. Since these operations are generally intermittant, the corresponding 8-hour time-weighted averages would be lower.

FIGURE 1

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F. BASIS FOR CONTINUED USE OF PRODUCTS (Cont'd.)

In answer to questions 3, 4, and 5 posed by the Standards Board, exemptions should be continued for the types of products discussed herein because:

1. They perform a valid and useful service.
2. They can be used at exposures well within those specified by the legislature.
3. No suitable substitutes are generally available.
4. Substantial economic considerations are involved.

G. SUGGESTED CHANGES IN SECTION 5208, TITLE 8

A suggested format to incorporate the legislation contained in SB-1591 into the present asbestos regulations in Title 8 is presented in this section. This format is compatible with a similar treatment of the other two product categories under consideration in the manner indicated. Specific recommendations are confined to the product types covered in this presentation.

A new subparagraph (1) is added to Section 5208 as follows:

(1) Spraying of Asbestos-Containing Materials.

(1) Except as provided in subdivisions (2), (3) and (4) of this subparagraph, no person shall cause or permit the spraying of any substance containing any amount of asbestos in or upon a building or other structure during its construction, alteration or repair.

(2) Insert wording to provide a specific exemption for Portland cement plaster (if the Board decides that such an exemption is appropriate.)

(3) Exterior and interior coatings and laminating resins containing encapsulated asbestos fibers bound within the finished product from manufacture through application, and asphalt roof coatings, shall be exempt from the prohibitions of subdivision (1) of this paragraph.

(4) Insert wording to provide a specific exemption for substances containing asbestos which occurs solely as a result of naturally occurring impurities in the substance or its components(if the Board decides that such an exemption is pparopriate.)

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G. SUGGESTED CHANGES IN SECTION 5208, TITLE 8

(5) During any use, spraying, application, handling, storage, repair, disposal, processing, or transportation of such products, the person who causes or permits such acts pursuant to an exemption granted in subdivisions 2, 3 or 4 of this paragraph, shall comply with the provisions of Section 5208, Title 8, California Administrative Code as it exists on the effective date of the amendments to this paragraph enacted by the Statues of 1978 or may, thereafter be amended. The time-weighted average concentration limits for employee exposure to airborne asbestos fibers arising from any use, spraying, application, handling, storage, repair, disposal processing, or transportation pursuant to exemptions granted under subsidivisons 2, 3, or 4 of this paragraph shall be no higher than the level contained in Subparagraph (A), paragraph (1), subdivision (g) of Section 5208, Title 8, California Administrative Code, as it exists on the effective date of the amendments to this section enacted by the Statutes of 1978 or as such regulations may, thereafter, be amended.

A08459

TABULAR DATA

Tables I - VII

A08460

TABLE I

REPRESENTATIVE FORMULATIONS (1)

HIGH PERFORMANCE INDUSTRIAL COATINGS

	High-Build Vinyl Maintenance Paints				Primers		Coatings		Zinc Rich Primers	
	Red Lead Primer	Shipbottom Antifouling	White Anticorrosive Primer	White Topcoat	With Vinyl	With Vinyl & Epoxy	Roof or Flat	General Purpose Vertical	Alkyl Silicate	Vinyl
BINDERS										
Vinyl Resin	13.18	2.49	21.90	15.66	12.8	8.8				9.02
Coal Tar					12.8	8.8	51.02	27.97		
Epoxy Resin						5.9	10.20	20.12		
Polyamide Resin						3.0		9.26		
Rosin		9.75								
Silicate									8.20	
SOLVENTS	63.49	18.80	52.51	54.57	42.5	40.5	35.71	15.68	30.10	44.36
ASBESTOS (As sprayed)	1.96	1.39	0.92	1.05	0.3	0.6	0.52	1.21	0.67	0.21
PLASTICIZERS AND OTHER NON-VOLITALE ORGANICS	1.36	2.27	3.92	4.17	3.2	2.6	2.55	1.01	-	0.34
MINERAL FILLERS										
Zinc Dust									61.03	45.42
Red Iron Oxide										0.65
Talc					28.4	29.8				
Red Lead	20.01									
Cuprous Oxide		63.30								
TiO_2			11.53	10.95						
Zinc Phosphate			9.22							
Magnesium Silicate								24.75		
Clay				13.60						
(1)Wt. % Asbestos - After Cure	5.37	1.71	1.93	2.31	0.52	1.01	0.81	2.84	0.96	0.38

TABLE II

AIRBORNE ASBESTOS FIBER CONCENTRATIONS SPRAYING OF FIBRATED ROOF COATINGS (1)

Date	Binder	Approximate Wt. % Asbestos		Airborne Concentration (Fibers/cc >5μ)		
		As Sprayed	After Cure	Total	(2) Background	From Spraying
9/25/74	Cutback Asphalt	7.7	~12.8	0.023	0.02	0.003
				0.026	0.02	0.006
10/9/74	Cutback Asphalt	7.7	~12.8	0.11	0.038	0.072
				0.065	0.038	0.027
12/10/74	Asphalt Emulsion	2.8	~5.1	0.16	0.15	0.01
				0.17	0.15	0.02
5/19/76	Asphalt Emulsion	2.8	~5.1	0.80	0.50	0.3

(1) Data from a response by the Flintkote Company to "Changes in the National Emission Standards for Hazardous Air Pollutants" (40 CFR, Part 61) proposed by the EPA (42 CFR No. 41, p. 12122, March 2, 1977. Commercial conditions simulated.

(2) Background before start of spraying test.

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TABLE III

AIRBORNE ASBESTOS CONCENTRATIONS
SPRAYING OF CUTBACK ASPHALTIC*

Binder	Weight % Asbestos As Sprayed	Cured	Sample Time (Hours)	Airborne Asbestos Concentrations (Fibers/cc 5)
Cutback Asphalt	~5.8	9.7	5.7(1)	0.09(2)
Cutback Asphalt	~5.8	9.7	7.2	0.15(2)

(1) 260-265 gallons sprayed.

(2) Sample possibly contaminated with background non-asbestos fibers from the roof.

*Data from response by Texas Refinery Corporation to "Changes in the National Emission Standards for Hazardous Air Pollutants" (40 CFR, Part 61) proposed by the EPA (42 CFR No. 41, p. 12122, March 2, 1977.

A08463

TABLE IV

AIRBORNE ASBESTOS FIBER CONCENTRATIONS

TEAR-OFF AND APPLICATION OF BUILTUP ROOFING(*)

Date	Location	Operation	Airborne Asbestos Concentration (Fibers/cc >5μ)
3/14/74	Wisconsin	New Application	0.2 - 0.6
4/10/74	Indiana	Tear-off	0.1 - 0.4
5/21/74	Pennsylvania	Tear-off and Replace	0.0 - 0.2
7/25/74	Indiana	Tear-off and Replace	0.1 - 0.3
11/20/74	Colorado	New Application	0.1 - 0.2
12/16/75	Colorado	New Application	<0.1
8/16/76	Indiana	Tear-off and Replace	0.0
8/16/76	Indiana	New Application	0.0

(*) Data from response by the Johns-Manville Corporation to "Changes in the National Emission Standards for Hazardous Air Pollutants" (40 CFR, Part 61) proposed by the EPA (42 CFR No. 41, p. 12122, March 2, 1977)

A08464

TABLE V

AIRBORNE ASBESTOS FIBER CONCENTRATIONS

SPRAYING OF HIGH-PERFORMANCE INDUSTRIAL AND TRADE COATINGS

Sample Designation	Commercial Application	Date	Binder	Approx. Wt. % Asbestos As Sprayed	Approx. Wt. % Asbestos After Cure	Spray Gun Type	Operation	Sample Time (Min.)	Airborne Asbestos Concentrations (Fibers/cc >5u)
A. Epoxy									
K-3	Ship coating.	10/2/74	Epoxy	1.5	1.9	Airless	Operator spraying outside & under a ship.	33	0.2
K-10	"	"	"	1.5	1.9	"	"	8	0.2
M-45	Coating dry dock	10/1/74	Epoxy + Coal Tar	1	1.3	Airless	Operator spraying side of dry dock from suspended platform.	11	0.2
M-1	"	"	"	1	1.3	"	Operator spraying side of dry dock from fixed scaffold.	38	0
K-3	Coating pipe interiors.	"	"	1	1.3	Air-supported wand.	Operator spraying interior of 3", 6" and 12" diameter pipe.	37	0.1
B. Chemical Resistant Polyester									
J-21	Fiber-glass pipe manufacture. (Mandrel coating)	8/13/74	Chemical resistant resin	1.4	1.4	Airless	Operator adjacent to automatic spray machine coating 28' mandrels.	23	0.1
H-26	"	"	"	1.4	1.4	"	Operator wiping mandrels. In area near spraying.	14	0.4
J-5	Below waterline. Ship coating.	10/3/74	"	0.7	0.7	Air-supported wand.	Roll-out man. In spray area about 1/4 of time.	65	0.4
J-7	" "	"	"	0.7	0.7	"	Operator spraying ship hull in drydock.	41	0.4
M-28	" "	"	"	0.7	0.7	"	"	23	0.0

TABLE V (Continued)

AIRBORNE ASBESTOS FIBER CONCENTRATIONS

SPRAYING OF HIGH-PERFORMANCE INDUSTRIAL AND TRADE COATINGS

Sample Designation	Commercial Application	Date	Binder	Approx. Wt. % Asbestos As Sprayed	Approx. Wt. % Asbestos After Cure	Spray Gun Type	Operation	Sample Time (Min.)	Airborne Asbestos Concentrations (Fibers/cc >5μ)
C. Alkyd Resin									
H-7	Painting building exterior.	10/6/74	Alkyd resin	6	10	Airless gun.	Operator spraying building exterior wall.	9	0
M-35	"	"	"	6	10	"	"	5	0.06
J-11	Painting[1] building interior.	3/8/77	Vinyl-Acrylic Latex	0.6	1.1	Airless gun.	Operator spraying interior walls.	23	0.03
J-7	"	"	"	0.6	1.1	"	"	23	0.06
J-87	Painting[1] building exterior.	"	"	0.6	1.1	"	Operator spraying exterior walls.	16	0.00
F-48	"	"	"	0.6	1.1	"	"	16	0.04
D. Latex Based									
H-5	Wall and Roof Spray.	10/4/74	Vinyl latex	3.7	6.7[2]	Air supported.	Operator spraying vertical wall panel.	15	0.0
J-3	"	"	"	2.8	5.1[2]	"	"	12	0.2
M-43	Roof Spray.	9/30/74	Acrylic latex.	0.7	1.3[2]	Airless	Operator spraying downward onto a large roof.	28	0.0
M-49	"	"	"	0.7	1.3[2]	"	"	14	0.0

(1) Commercial conditions simulated.

(2) Calculated on the basis of 45% water loss or cure.

"Consumer Safety in Plastics Systems Containing Bound Asbestos Fibers," Paper presented at the Society of Plastics Engineers, Inc. NATEC Meeting - Denver, Colorado, November 8-10, 1977 by Harrison B. Rhodes.

TABLE VI

AIRBORNE ASBESTOS FIBER COUNTS - SPRAYING OF LAMINATING RESIN

Sample Designation	Commercial Application	Date	Binder	Approx. Wt. % Asbestos As Sprayed	Approx. Wt. % Asbestos After Cure	Spray Gun Type	Operation	Sample Time (Min.)	Airborne Asbestos Concentration (Fibers/cc >5μ)
69	Boat Manufacture	12/7/72	General pupose polyester resin	0.5	0.5	Air-supported chopper	Operator spraying resin and chopped fiberglass.	24	0.6
L-13	Boat Manufacture	10/31/74	General purpose polyester resin	0.5	0.5	Air-supported chopper	Operator spraying resin and chopped fiberglass.	16	0.1
N-28	" "	"	"	"	"	"	"	5	0.4
N-30	" "	"	"			"	"	4	0.4
N-34	Boat Manufacture	10/8/75	General purpose polyester resin	0.5	0.5	Airless	Operator-spraying resin only. No fiberglass.	55	0.0
N-40	" "	"	"	"	"	"	"	53	0.03
I-12	" "	"	"	"	"	"	"	35	0.1

"Consumer Safety in Plastics Systems Containing Bound Asbestos Fibers," paper presented at the Society of Plastics Engineers, Inc. NATEC Meeting, Denver, Colorado, November 8-10, 1977 by Harrison B. Rhodes.

TABLE VII

AIRBORNE ASBESTOS FIBER COUNTS-

GRINDING AND SANDING OF POLYESTER RESIN-BASED SYSTEMS CONTAINING ASBESTOS

Sample Designation	Commercial Application	Date	Asbestos Type	Asbestos Approx. Wt. % As Sprayed	Asbestos Approx. Wt. % After Cure	Operation	Sample Time (Min.)	Possible Airborne Asbestos Fiber Concentration (Fibers/cc est.)
1. THERMOSET RESIN (Polyester)								
1929-82-3	Fabrication of reinforced fiberglass pipe.	2/27/73	RG-144	2-3	2-3	Operator pulls pipe along line. Saws off end with circular saw.	19	0.1
1929-82-4	"	"	"	2-3	2-3	Same operation as 1929-82-3.	49	0.1
1929-82-5	"	"	"	2-3	2-3	Operator removing end of pipe with scarfing machine.	45	0.04
I-13	"	8/13/74	RG-244	1.4	1.4	Operator shaping end of pipe with bell & spigot machine.	16	0.3
I-6	"	"	"	1.4	1.4	Operator cutting off pipe end and light grinding on exterior surface.	17	0.2
I-26	Fabrication of FRP tanks and pipe.	8/13/74	RG-244	1.5	1.5	Operator grinding inside of 13' I.D. x 26' tank.	16	0.4
G-8	"	"		1.5	1.5	Continuation of same operation as I-26.	5	0.3
I-39	"	"		1.5	1.5	Operator grinding edges of miscellaneous small parts.	25	0.3
1929-84-4	Production of artificial bricks.	3/8/73	RG-244	2.0	2.0	Operator cutting with sabre saw.	44	0.1
1929-84-5	"	"	"	2.0	2.0	Operator trimming with sabre saw.	39	0.2
N-20	Production of fiberglass boats.	11/26/74	RG-244	0.5	0.5	Operator grinding inside of boat hull.	11	0.0
N-25	"	"	"	0.5	0.5	Operator grinding.	4	0.0
B. VINYL LATEX RESIN(2)								
J-33	Sanding of vinyl latex paint.	3/8/77	T-135	0.6	1.1	Operator handsanding overhead panel.	12	0.3
R-43	"	"	"	0.6	1.1	"	11	0.06
J-35	"	"	"	0.6	1.1	Operator handsanding wall panel	16	0.1
J-4	"	"	"	0.6	1.1	"	16	0.0

(1) Consumer Safety in Plastics Systems Containing Bound Asbestos Fibers," paper presented at the Society of Plastics Engineers, Inc. NATEC Meeting, Denver, Colorado, November 8-10, 1977 by Harrison B. Rhodes.

(2) Commercial conditions simulated.

A08468

ATTACHMENT I

Statements on the Availability
of Substitutes for Asbestos

A08469

ITEM I

Excerpts from response by the Johns-Manville Corporation to "Changes in the National Emission Standards for Hazardous Air Pollutants (40 CFR, Part 61) proposed by the EPA (42 CFR No. 41, p. 12122, March 2, 1977):

"Asbestos is used in asphalt coatings for three reasons. First, to add body or enhance the rheology of the coating, especially the thixotropic characteristics. Other fibers, such as fibrous glass, do not have sufficient bulk to serve as an adequate substitute. Second, since many of the applications for asphalt coatings involve outdoor exposure, the fibrous nature of asbestos provides superior weather resistant characteristics. Third, the low cost of asbestos in relation to the value added is superior to other mineral fillers, and essential in the manufacture of asphalt coatings, which are generally low cost products. A J-M Technical Bulletin describing the use of asbestos fiber in asphalt coatings has been provided as Attachment I."

A08470

Chrysotile Asbestos Fiber
Chrysotile Technical Bulletin

Asphalt Coatings

Asphalt coatings represent a line of products which have a variety of end uses in the industrial, automotive and construction industries. They are produced for such varied uses as protective coatings for metals and tanks, insulation for pipes and tanks, sound deadeners, sealants and undercoatings for automobiles and roof coatings, flashing cements and tile cements in construction. One type is made from an asphalt cut back with kerosene or mineral spirits used as a solvent and the other with an asphalt emulsion in water.

Purpose of Asbestos

The primary purpose of asbestos in coatings is to enhance the rheology of the system and especially the thixotropic characteristics. Since many of the uses involve outdoor exposure the excellent weathering resistance imparted to the coating by asbestos is essential and its fibrous nature provides the desired viscosity characteristics. The low cost of asbestos in relation to the value added is essential in these low cost products.

Formulations

Because of the variety of products and the number of producers there are unlimited formulations. The major components are:

Cutback Products

Cutback Asphalt	—30-80%
Asbestos	—10-15%
Limestone or Slate Fluor	—15-30%
Dispersant	— 1%

Emulsion Products

Emulsion Asphalt	—55-80%
Asbestos	—10-15%
Limestone	— 5-15%
Dispersant	— 1%

Aluminum paste is added to give a reflective coating; granulated cork for insulation.

Manufacturing Process

The manufacturing process consists of mixing and packaging and the sophistication will depend on the size of the operation. Mixing is accomplished in horizontal mixers of the helical type or vertical or horizontal mixers with paddle blades. Most of the time the dry ingredients are added to the cutback asphalt and mixing is continued until a homogeneous mix is obtained. In some cases the order of mixing may be reversed or only some of the dry ingredients mixed initially.

When mixing is complete the unit is emptied into packages which may vary from one and five gallon pails to barrels. Some products, especially those used in airless spray operations, require straining before packaging.

Recommended Fiber Grades

7M05	7RF02
7R05	7TF1
7T05	7TF02
7MF5	

CAUTION
Contains Asbestos Fibers — Avoid Creating Dust — Breathing Asbestos Dust May Cause Serious Bodily Harm

ATTACHMENT I

408471

UCC 013951

Johns-Manville
Asbestos Fiber Sales • P.O. Box 5108 • Denver, Colo. 80217 • (303) 770-1000
Canadian Johns-Manville Co., Ltd. • Asbestos Fiber Division • P.O. Box 1500 • Asbestos, Quebec, Canada J1T 3N2 (819) 879-5433

ITEM 2

Excerpts from the response by Texas Refinery Corporation to "Changes in the National Emission Standards for Hazardous Air Pollutants" (40 CFR, Part 61) proposed by the EPA (42 CFR No. 41, p. 12122, March 2, 1977):

"These coatings are used in spray applications because of convenience, safety and the ability to get a uniform coating. Spray application of these coatings is convenient since the containers of coatings are left on ground level and pumped through hoses to the spray nozzle on the roof. It takes fewer persons to spray a roof than to apply it by hand in the same time period, and containers do not have to be lifted to the roof, emptied by hand and the empty containers lowered from the roof along with other equipment necessary to apply by hand. Spray applications are safer due to the fact, as mentioned previously, that the only appratus needed to be raised to the roof is the spray hose and nozzle while the heavy containers of coatings are left on ground level; not as many workers are needed up on the roof and therefore are not taking risks of falling; and less waste is generated since no rags or brushes are used. Also, most roofs develop low spots during aging which will result in a heavier deposit of coating in the low spots than in the high spots when the coatings are applied by hand. These heavier deposits will cause problems with the efficiency of the roof which will result in workers having to return to the roof for patching work. This in turn results in added expense and re-exposure of workers to safety hazards. A spray application usually results in a uniform layer of coating over the roof regardless of any indentions or low spots on that roof.

Our company has investigated several types of asbestos substitutes for use in these coatings and found none to be satisfactory. Several types of clay thickeners, including Attapulgite, ground cork, styrofoam, ground rubber, vermiculite and Feldspar have been investigated and found to lack the characteristics necessary to impart strength to the coating. Polyethylene fiberous powders were tried and found to dissolve in the solvent system and/or not to impart fire resistance or strength necessary to the coating. Hemp and other organic fibers were investigated and found not to impart biological resistance necessary to prevent attack of the coating or fire resistance. A ceramic fiber was tested and found to give strength, fire resistance and biological resistance to the coatings. However, a problem with settling of the coatings over a period of time was noted; the ceramic fiber is not widely available and is very expensive. The ceramic fiber we have tested from Babcock and Wilcox is selling for $0.80 per pound in carloads while asbestos is obtained in carloads at $0.0955 per pound. Also, since this branched, soft, fairly long ceramic fiber has only been found available from the one supplier, it is doubtful whether or not supply would be adequate for complete substitution - industry wide. Substituting the ceramic fiber for up to 10.5% asbestos used in these coatings, cost increase to these products would be substantial. If the coating materials which we produce have to be deleted from the line due to no acceptable asbestos replacement, figures from fiscal year 1976 show that 5,588 million dollars in revenue will be lost annually by our company."

A08472

ITEM 3

Excerpts from "Amendments to Asbestos Standard" (40 CFR, Part 61) promulgated by the EPA (43 CFR, No. 118, p. 26372, 26373, June 19, 1978):

"Several commenters, however, requested that EPA exempt from the spraying restrictions certain bituminous- and resinous-based asbestos-containing coatings. These coatings are typically used as roofing compounds, waterproofing of insulation exposed to the weather, automobile undercoatings, and industrial maintenance coatings.

Based on information supplied by the commenters, there are no acceptable substitutes available for these uses of asbestos. Among the most likely substitutes which have been investigated are glass, cotton, wood cellulose, mineral wool, hemp, and other types of inorganic and organic fibers; gelling and thickening agents; clay thickeners, including attapulgite; ground cork; styrofoam; ground rubber; vermiculite; feldspar; polyethylene fibrous powders; and ceramic fibers. Generally, these substitutes have been found to be unacceptable because of unsatisfactory durability; insufficient bulk; unsatisfactory qualities related to fibrous reinforcing, homogeneity, and adhesiveness; agglomeration during spraying; and settlement in the container over time. Furthermore, if asbestos fibers are released during application of the coatings, during their service life, or during demolition or renovation, the fibers will not remain airborne because they are encapsulated by droplets of the binder and are too heavy to remain suspended.

Because there do not appear to be acceptable substitutes available and any beneficial environmental impact resulting from the prohibition of this use of asbestos would be negligible, the spraying of materials in which the asbestos fibers are encapsulated by a bituminous or resinous binder and which are not friable after drying is exempt from the provisions of §61.22 (e) of the promulgated amendments."

A08473

FLINTKOTE

INTER-OFFICE CORRESPONDENCE

ITEM 4

DATE March 8, 1978

SUBJECT C-13-C4 WITH & WITHOUT ASBESTOS

TO Mr. Jim Hay FROM John Tamanen

Asbestos is used in asphalt emulsions to provide reinforcement and aid in fire retardancy. Asbestos has high water or oil absorption, does not melt and will not burn or contribute to a fire.

Organic fibers such as cellulose, polyethy lene, nylon or polyester as well as fiber glass or mineral wool, can be used to make fibrous asphalt emulsion products. They can be used in combinations or alone but none have the same characteristics as asbestos. Organic and some mineral fibers will melt or burn at elevated temperatures, generally have a low water or oil absorbancy and can contribute as fuel to a fire.

We have made a few samples of C-13-C4 using blends of fiber glass and organic fibers. They do show some promise as far as manufacturing procedures and workability are involved. Further work is needed to determine storage stability, weathering characteristics and fire retardancy.

John Tamanen

JT:rb

cc: Mr. W. Bradley

408474

FORM 682 M

ITEM 5

Chevron Research Company
A Standard Oil Company of California Subsidiary
576 Standard Avenue, Richmond, CA 94802

J. H. Macpherson
Vice-President

September 19, 1978

Mr. Harrison B. Rhodes
Union Carbide Corporation
Metals Division
P.O. Box 579
Niagara Falls, New York 14302

Dear Mr. Rhodes:

We understand that you plan to testify at the November 8, 1978, public hearing of the Occupational Safety and Health Standards Board relating to asbestos-containing products. In response to your request for information on substitutes for asbestos, we have the following comments:

For several years now we have been actively searching for an asbestos replacement in our asphalt-based coatings. We have evaluated a variety of materials, but so far have found none that has the same cost/performance effectiveness as asbestos in our products.

Asbestos fibers serve two purposes in our coatings:

1. It gives the freshly applied coating a thixotropic consistency that allows the buildup of a thick film without sagging.

2. It reduces the alligatoring of the asphalt film.

We have tried various pigments and gelling agents. Pigments, such as mica, talc, slate flour, and carbon black, by themselves do not provide the thixotropic characteristics desired. Thickening agents do impart thixotropic structure to the liquid; but they do not give the same sag resistance and film build.

Polyethylene and polypropylene fibers also have been evaluated. These are advertised as asbestos substitutes. However, some of them could not be mixed into the coatings because of incompatibility. Others did not have the required

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sag resistance. The storage stability of the coatings made with these materials was also a problem. Due to cost and application problems, asphalt-polymer combinations have been eliminated as practical coatings.

We expect to continue the evaluation of various materials as asbestos substitutes. However, at present we have no practical substitute for asbestos in our coatings.

Very truly yours,

J B Macpherson

A08476

ATTACHMENT II

California Department of Health
Report on Sandblasting of a Maintenance
Coating Containing Asbestos

A08477

Due to logistics problems the final version of this report was not received in time to be included. It will be submitted directly to the Executive Officer of the Standards Board for attachment to this report.

SUPPLEMENTAL INFORMATION

FOR

TESTIMONY CONCERNING

POSSIBLE CHANGES IN THE

HEALTH AND SAFETY CODE SECTION 25910

AS PERMITTED BY SB-1591

Asbestos Fiber Exposure During The Destruction of Maintenance Coatings By Sandblasting

Prepared for the Occupational Safety
and Health Standards Board
Sacramento, California
November 15, 1978

Prepared By
Union Carbide Corporation
Metals Division
Niagara Falls, New York

SUMMARY AND CONCLUSIONS

The air monitoring test during sandblasting at Corona, California that was reported in the October 30, 1978 DOSHA letter to the Standards Board was a cooperative study wherein Union Carbide Corporation and DOSHA collected simultaneous paired samples on the workers. A report of the Union Carbide results is provided herein. The UCC counts ranged from about the same to about one-half of those found by DOSHA. Considering the nature of the samples, both laboratories were in accord that the differences were due to the normal random errors in the sample collection and counting procedure and did not represent a significant difference between the laboratories.

The critical problem with these samples was the presence of large amounts of mineral particulate that met the criteria for a countable fiber, but in all probability were only very rarely asbestos. An examination of three of the filters by scanning electron microscopy was carried out by Union Carbide. This study confirmed that free asbestos was rare and made up very roughly one countable fiber out of fourteen.

This information led to a further cooperative, large-scale sandblasting test at Trona, California wherein the samples were collected by DOSHA and counted by the Federal OSHA Compliance Laboratory in Salt Lake City. The Federal laboratory has considerable experience with this type of difficult sample and uses a combination of sophisticated optical techniques and electron microsopy to aid in the identification of non-asbestos particulate. The results of this study showed a ceiling concentration of 1.6 fiber/cc >5μ and 8-hour TWAs in the 0.1 to 0.4 fiber/cc >5μ range.

We believe that these levels, which may still be conservative (high), are more representative of asbestos fiber release from maintenance coatings during sandblasting than the data that either participating laboratory obtained at the earlier test at Corona.

TABLE OF CONTENTS

408481

A. BACKGROUND

During the hearings on the 1976 Presley Bill, Assemblyman Fenton asked the Department of Health to collect additional exposure data during the use of the products for which temporary exemptions were eventually granted. A cooperative government-industry effort ensued. The data obtained were submitted to the Standards Board by Mr. James H. Heacock of DOSHA in a letter dated October 30, 1978 (Attachment I). Appendix A of this letter covered tests of portland cement plaster. Appendices B and C related to sandblasting of maintenance coatings. This discussion is limited to maintenance coatings, the plaster applications will not be covered.

The initial two sandblasting tests (Location 1 and Location 2, Appendix B in the DOSHA letter) involved the removal of an asbestos-containing coating from a plaster or a stucco wall. When the results became available, they were higher than anticipated, i.e. 0.5-3 fibers per cc longer than 5μ. The manufacturer of the paints then asked Union Carbide to participate in a third test jointly with the DOH. This was acceptable to the DOH and the Village Grove Park location in Corona was selected as the site.

In this test the blasting operator, helper, and observer each wore two pumps and simultaneous samples were collected in the breathing zone with filter cassettes positioned on opposite shoulders. Paired background and area samples were also collected. A detailed report of the Union Carbide results is provided in Attachment II. For easy reference the corresponding DOSHA report has also been included in Attachment I as Appendix B. Only the key points of these reports will be summarized here.

B. RESULTS AND DISCUSSION

1. Fiber Counts by the Optical Phase - Contrast Method

The samples collected in the test at Village Grove Park, Corona were extremely difficult to count. They were heavily loaded with both fibrous and non-fibrous dust. Considerable particulates were present that met the dimensional criteria of a fiber, i.e. length greater than 5μ, length to diameter ratio greater than three, but they were clearly not asbestos. Both counters were experienced and discussed the problem of evaluating filters of this type prior to counting.

In an attempt to assess the impact of the asbestos fiber recognition problem, Union Carbide divided the fibers counted into two classes, "obvious chrysotile asbestos" and "possible asbestos fiber." When there was any doubt about a fiber's identity it was included in the count. The total of both classes would be the value ordinarily reported as asbestos.

Particles which were obviously not asbestos were not counted. This included such things as unbroken fiberglass, mineral flakes with non-parallel sides, and particulate that appeared bright under phase contrast. It should be noted that the only known source of asbestos of any type was the 5% by weight chrysotile that was added by the manufacturer. (Note that the 2% asbestos figure reported by DOSHA in Appendix B is in error.)

A08482

The Union Carbide results ranged from 0 to 0.8 fibers/cc >5μ of "obvious chrysotile" and from 0 to 3.6 fiber/cc >5μ for total asbestos. (See Attachment II.) These total values are compared with the DOSHA results for each paired sample collected on the opposite shoulder of the workers in Table 1. These values range from 0.1 to 7.1 fiber/cc >5μ.

Examination of Table I shows that the pretest controls and several of the samples collected on the observer and on the helper resulted in the detection of only several fibers in the hundred fields examined under the microscope. Blank filters, i.e. those which have never been exposed, will read from zero to several fibers per 100 fields, so these results really are not distinguishable from background. The remaining eight pairs ranged from about the same to a Cal/OSHA counting of about double that of UCC, 7.1 vs 3.2. Considering that these counts are not from the same filter but from filters that were collected on opposite shoulders, both laboratories were in agreement that the differences were probably the result of random errors in the sampling and counting method and did not represent a significant difference between the laboratories.

The time-weighted averages for the two operators for the time period where sandblasting was actively in progress and for the entire eight-hour day were calculated for each set of total asbestos count data and are listed below. The two workers' actual TWA exposures for the particular day were all below 0.5 fiber/cc >5μ. The highest value reported by either laboratory, 7.1 fiber/cc >5μ is still below the ceiling limit of 10 fiber/cc >5μ.

Time-Weighted Average Exposures
(Fibers/cc >5μ)

	During Active Operations		8-Hour Day Basis	
	Cal/OSHA	UCC	Cal/OSHA	UCC
Helper	1.1	0.6	0.2	0.1
Operator	4.1	2.2	0.2	0.2

2. Fiber Analysis by Scanning Electron Microscopy

It was evident from the results that non-asbestos material was being included as asbestos in the counts reported. In order to check this further, Union Carbide examined three of the filters with a scanning electron microscope.

A small square from each of three filters was exposed to acetone vapor under conditions that had previously been determined to collapse the filter to a smooth surface but did not allow the particles to sink into the filter. Shrinkage in area was measured and found to be about 45%. The samples were then gold-coated and mounted for microscopic examination in the normal manner.

A08483

TABLE I

COMPARISON OF AIRBORNE ASBESTOS FIBER COUNTS DURING SANDBLASTING OF ASBESTOS CONTAINING MAINTENANCE COATING

Description of Operation	Sample Data				Fiber Counts						
		Time			UCC		Cal/OSHA	UCC SEM (f/cc)			
	No.	On	Off	Total Min.	100 fields	f/cc	f/cc	Asbestos	Non-Asbestos	Total	Comments
Pretest Controls											
On fence, left side of area to be sand-blasted. ~4 1/2' above ground.	G-16	10:35	10:55	21	2	0.1	0.3				
On fence, ~100' from G-16. ~5' above ground.	F-44	10:42	10:59	17	0	0	0.1				
Personal sample on observer ~25' from fence and moving parallel to fence.	A-86	10:39	10:52	13	2	0.1	0.2				
Observer (During Sand-Blasting)											
Personal sample on observer ~20-30' from fence and moving parallel to fence.	A-81	11:12 11:25	11:18 11:27	6 2 8	1	0.1	0.1				
Same as A-81.	J-89	12:26	12:52	26	1	0.03	0.2				
Area sample on fence. 5' above ground and ~40' down-wind. (In lieu of observer)	G-3	1:35	2:00	25	29	0.7	1.9	0.3	1.0	1.3	3 Asbestos fibers in 25 fields
Helper (During Sand-Blasting)											
Personal sample. Assisting with hoses. Operating sand feeding equipment.	G-48	11:10 11:24	11:18 11:26	8 2 10	15	1.0	1.4				
Same as G-48.	X-8	12:25	12:48	23	28) 45)	1.1	2.2				
Same as G-48.	C-15	1:08	1:22	14	3	0.2	0.5				
Same as G-48.	X-4	1:36	1:58	22	2	0.06	0.2				
Blasting Operator (During Sand-Blasting)											
Personal sample. Operator handling sand-blasting nozzle, standing ~2' from fence.	D-71	11:10 11:24	11:18 11:26	8 2	32	2.2	1.6	0.3	1.5	1.8	3 asbestos fibers in 25 fields
Same as D-71.	X-14	12:25	12:36	11	43) 58)	3.2	7.1				
Same as D-71.	G-34	12:38	12:46	8	38	3.3	6.6				
Same as D-71 except inside of hood.	X-2	1:08	1:22	14	34	1.7	3.7				
Same as D-71.	X-3	1:36	1:58	22	56	1.8	2.1	0.0	1.0	1.0	0 asbestos fiber in 75 fields

A08484

Random fields were then selected and examined for particulate matter which met the "fiber" criteria, i.e. L >5μ, L/D >3. Magnification was 1500X and the defined field area used was 0.0048mm^2, This is similar to the optical counts where the field was 0.0062mm^2. Whenever a fiber was found it was analyzed by Edex in the spot mode for chemical composition.

Detailed results are listed in Table II and Figures 1 through 10, and are summarized below.

Sample No.	Total Fields Counted	Fibers Found(1)		
		Chrysotile	Non-Asbestos	Total
X-3	75	0	34	34
G-3	25	3	11	14
D-71	25	2(2)	19	20
	125	5	64	69

(1) Length greater than 5μ, length/diamer greater than 3.

(2) Does not include a non-fibrous asbestos "clump".

These data demonstrate that free asbestos fiber in the generated dust is both rare and a small fraction of the total fibrous particulates, in this case about one fiber in fourteen. The potential for erroneously high counts by the ordinary phase-contrast optical method is obvious.

The number of fields examined for each filter and number of fibers found were too small for a reliable estimate of airborne concentration. As a point of interest, however, the fibers per cc values corresponding to the numbers of fibers found have been shown in Table 1 and positively identified chrysotile asbestos ranged from 0 to 0.4 fiber/cc >5μ. These would be ceiling, not TWA values.

C. COMMERCIAL SANDBLASTING TEST

When these results became avilable, the problem was discussed with Mr. Heacock of the DOH and it was agreed that a carefully-planned, large-scale test using professional operators and equipment should be made. Samples would be collected by DOSHA and counted by the Federal OSHA Compliance Laboratory in Salt Lake City. This laboratory has had considerable experience with the type of highly contaminated samples expected and utilizes a combination of sophisticated optical techniques and electron microsocpy to provide more reliable counts.

A08485

TABLE II

SAMPLE ANALYSIS BY SCANNING ELECTRON MICROSCOPE

1500X — **Chemical Composition by EDEX** — **Field Area 0.0048mm²**

SAMPLE NO. X-3

Field No.	No. of Fibers	Approx. Length (μ)	Na	Mg	Al	Si	K	Ca	Cu	Fe	Zn	Ti	Identification
1	0												
2	0												
3	0												
4	0												
5	0												
6	0												
7	0												
8	0												
9	0												
10	0												
11	1	5	-	X	X	X	X	X	-	X	-	-	Non-Asbestos (Photos 1 & 1a)
12	0												
13	1	5	-	-	X	X	X	X	-	X	-	-	Non-Asbestos
14	0												
15	0												
16	0												
17	1	7.5	X	-	X	X	X	-	X	X	-	-	Non-Asbestos (Photos 2 & 2a)
18	2	24	-	-	-	X	-	-	-	-	-	-	Both Non-Asbestos
		5	-	-	X	X	X	-	-	-	-	-	
19	2	10	-	-	-	X	-	X	-	-	-	-	Both Non-Asbestos (Photos 3 & 3a)
		8	-	-	X	X	X	-	-	-	-	-	
20	2	5	-	-	-	X	-	-	-	-	-	-	Both Non-Asbestos
		15	-	-	X	X	X	-	-	-	-	-	
21	3	12	-	-	X	X	X	-	-	-	-	-	All Non-Asbestos
		5	-	-	X	X	X	-	-	-	-	-	
		10	-	-	X	X	X	-	-	-	-	-	
22	0												
23	1	12	-	-	-	X	-	-	-	-	-	-	Non-Asbestos
24	0												
25	1	5	-	-	-	X	-	-	-	-	-	-	Non-Asbestos
26													
27													
28													
29													
30													

14 Fibers — 0 Asbestos, 14 Non-Asbestos

SAMPLE NO. Y-3 (1)

Field No.	No. of Fibers	Approx. Length (μ)	Na	Mg	Al	Si	K	Ca	Cu	Fe	Zn	Ti	Identification
1	1	8	-	-	-	-	-	-	-	-	X	-	Non-Asbestos
2	1	5	-	-	-	X	-	-	-	-	-	-	Non-Asbestos
3	1	5	-	-	X	X	X	-	-	-	-	-	Non-Asbestos
4	0												
5	1	5	-	-	-	-	-	-	-	-	X	-	Non-Asbestos
6	0												
7	0												
8	0												
9	1	10	-	-	X	X	X	X	-	-	-	X	Non-Asbestos
10	2	7	-	-	-	X	-	-	-	-	-	-	
		7	-	-	-	X	-	-	-	-	-	-	Both Non-Asbestos
11	1	5	-	-	-	X	-	-	-	-	-	-	Non-Asbestos
12	0												
13	0												
14	0												
15	0												
16	0												
17	0												
18	1	6	-	-	-	X	-	-	-	-	-	-	Non-Asbestos
19	1	25	-	-	-	X	X	-	-	-	-	-	Non-Asbestos
20	0												
21	1	10	-	-	-	X	-	-	-	-	-	-	Non-Asbestos
22	0												
23	0												
24	0												
25	0												
26	0												
27	0												
28	0												
29	0												
30	0												
31	1	6	-	-	-	X	-	-	-	-	-	-	Non-Asbestos
32	0												
33	1	11	-	-	-	X	-	-	-	-	-	-	Non-Asbestos
34	0												
35	0												
36	0												
37	1	15	-	-	X	X	X	-	-	-	-	-	Non-Asbestos
38	0												
39	0												
40	3	15	-	-	-	X	-	-	-	-	-	-	
		14	-	-	-	X	-	-	-	-	-	-	All Non-Asbestos
41	0												
42	0												
43	0												
44	0												
45	0												
46	2	14	-	-	-	X	-	-	-	-	-	-	
		14	-	-	-	X	-	-	-	-	-	-	Both Non-Asbestos
47	0												
48	0												
49	1	15	-	-	-	X	-	-	-	-	-	-	Non-Asbestos
50													

35 Fibers — 0 Asbestos, 20 Non-Asbestos

(1) Successive adjacent fields counted.

SAMPLE NO. G-3

Field No.	No. of Fibers	Approx. Length (μ)	Na	Mg	Al	Si	K	Ca	Cu	Fe	Zn	Ti	Identification
1	1	27	-	X	-	X	-	-	-	-	-	-	Asbestos (Photos 14 & 14a)
2	3	15	-	-	-	X	-	-	-	-	-	-	
		5	-	-	-	X	-	-	-	-	-	-	All Non-Asbestos
		8	-	-	-	X	-	-	-	-	-	-	
3	0												
4	0												
5	2	10	-	-	X	X	X	-	-	-	-	-	
		10	-	-	X	X	X	-	-	-	-	-	Both Non-Asbestos
6	0												
7	2	10	-	X	-	X	-	-	-	-	-	-	Asbestos
		5	-	-	-	-	-	-	-	-	X	-	Non-Asbestos
8	0												
9	0												
10	0												
11	0												
12	0												
13	0												
14	0												
15	0												
16	1	5	-	-	X	X	X	-	-	-	-	-	Non-Asbestos
17	0												
18	1	8	-	X	-	X	X	-	-	-	-	-	Asbestos
19	0												
20	1	7	-	-	X	X	X	-	-	-	-	-	Non-Asbestos
21	0												
22	3	7	-	-	X	X	X	-	-	-	-	-	
		5	-	-	-	-	-	-	-	-	-	-	
		5	-	-	-	X	-	-	-	-	-	-	All Non-Asbestos
23	0												
24	0												
25													

14 Fibers — 3 Asbestos, 11 Non-Asbestos

SAMPLE NO. G-7?

Field No.	No. of Fibers	Approx. Length (μ)	Na	Mg	Al	Si	K	Ca	Cu	Fe	Zn	Ti	Identification
1	1	8	-	-	X	X	X	-	-	X	-	-	Non-Asbestos
2	2	14	-	-	-	X	-	-	-	-	-	-	Both Non-Asbestos
		21	-	-	X	X	X	-	-	-	-	-	
3	2	10	-	-	X	X	-	X	-	-	-	-	
		12	-	-	X	X	X	-	-	-	-	-	Both Non-Asbestos
4	0												
5	0												
6	0												
7	4	14	-	-	-	X	-	-	-	-	-	-	
		14	-	-	X	X	X	-	-	-	-	-	
		10	-	-	X	X	X	-	-	-	-	-	All Non-Asbestos
		20	-	-	-	-	-	X	-	-	-	-	
8	1	30	-	X	-	X	-	X	X	-	-	X	Asbestos (Photos 5 & 5a)
9	1	7	-	X	X	X	-	-	-	X	-	-	Asbestos (Photos 6 & 6a)
10	0												
11	0												
12	1	5	-	-	X	X	X	-	-	-	-	-	Non-Asbestos
13	2	6	-	X	X	X	X	-	-	-	-	-	Asbestos (Photos 7 and 7a)
		8	No reading obtained (burnout).										Not Counted as Asbestos
14	0												
15	0												
16	0												
17	0												
18	1	15	No reading obtained (burnout).										Not Counted as Asbestos
19	1	7	-	-	X	X	X	-	-	-	-	-	Non-Asbestos
20	1	6	-	-	-	-	-	-	-	X	-	-	Non-Asbestos
21	2	14	-	-	X	-	X	-	-	X	-	-	Asbestos Clump (Photos 10 &
		9	-	-	X	X	X	-	-	X	-	-	Non-Asbestos (Photos 11 & 1
22	1	5	-	-	-	-	X	-	-	-	-	-	Non-Asbestos (Photos 12 & 1
23	0												
24	0												
25	1	16	-	-	-	-	X	-	-	-	-	-	Non-Asbestos

A-084486

28 Fibers, 1 "Clump" — 3 Asbestos Fibers, 1 Asbestos Clump, 17 Non-Asbestos

The protocol for this study is appended as Attachment III and the DOSHA Report (Appendix C of their October 30, 1978 submission to the Board) of the study is also given for reference. The DOSHA report covers the test very well although it should be noted that the Federal OSHA counter included any fiber of doubtful identity as asbestos so the results presented would be conservative (high). It is also appropriate to acknowlege that the test site was provided through the courtesy of Kerr-McGee Company at Trona, California. Figures 11 and 12 show photographs of the test which give a clear illustration of the nature and scope of the operation.

D. CONCLUSIONS

The fiber counts reported in Appendix B of the DOSHA letter of October 30, 1978 as well as the Union Carbide counts of the simultaneous counts include a great deal of material that is not asbestos. The subsequent large-scale test although possibly still conservative (high), is more representative of exposure during sandblasting.

A08487

Photo 1 - Sample X-3 @ 10,000X

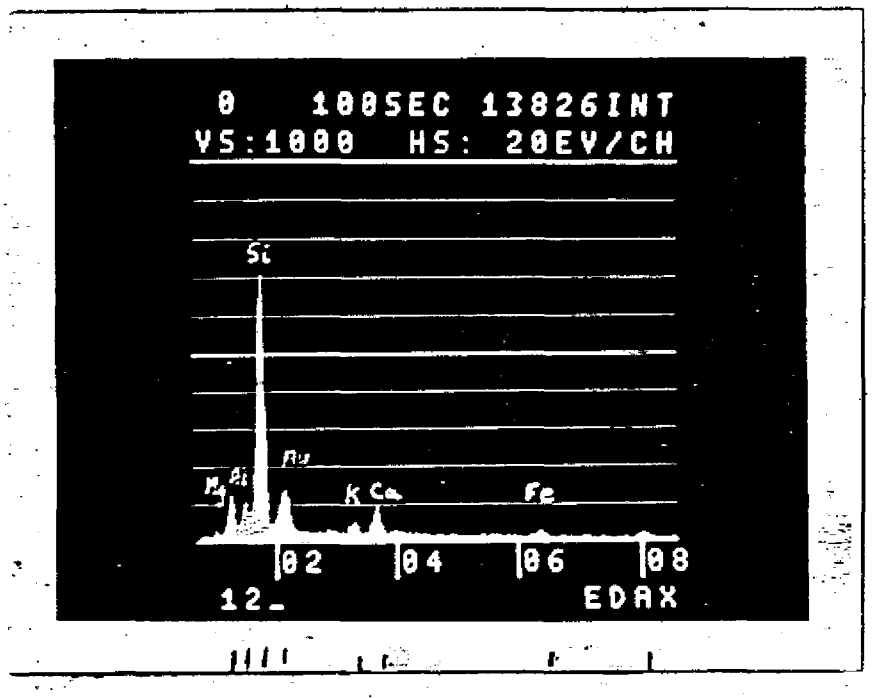


Photo 1A - Spot Mode of Particle Show Above

A08488

UCC 013968

FIGURE 1

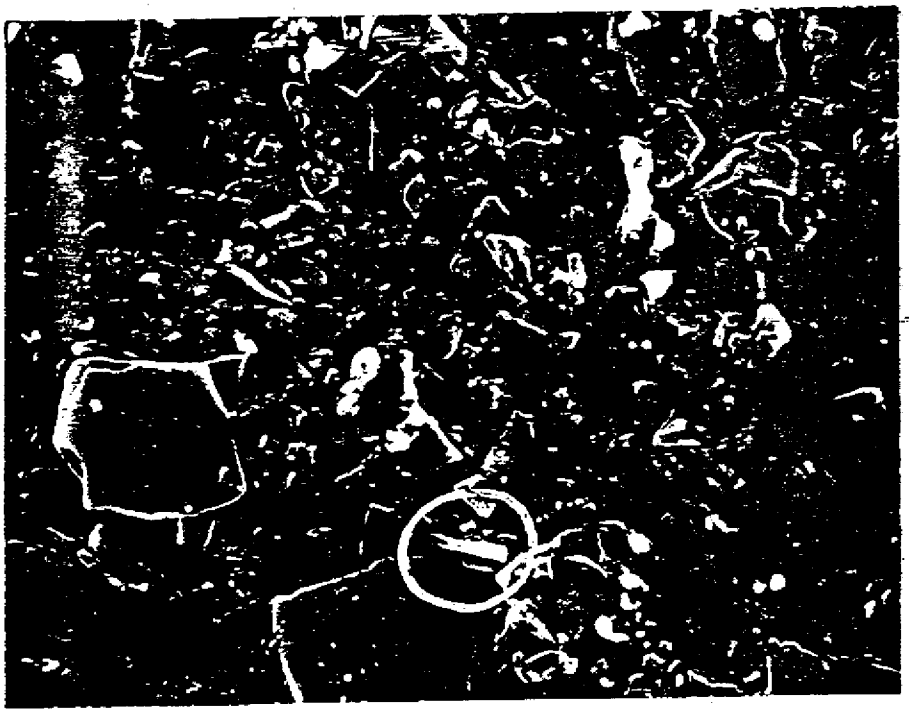


Photo 2 - Sample X-3 @ 1500X

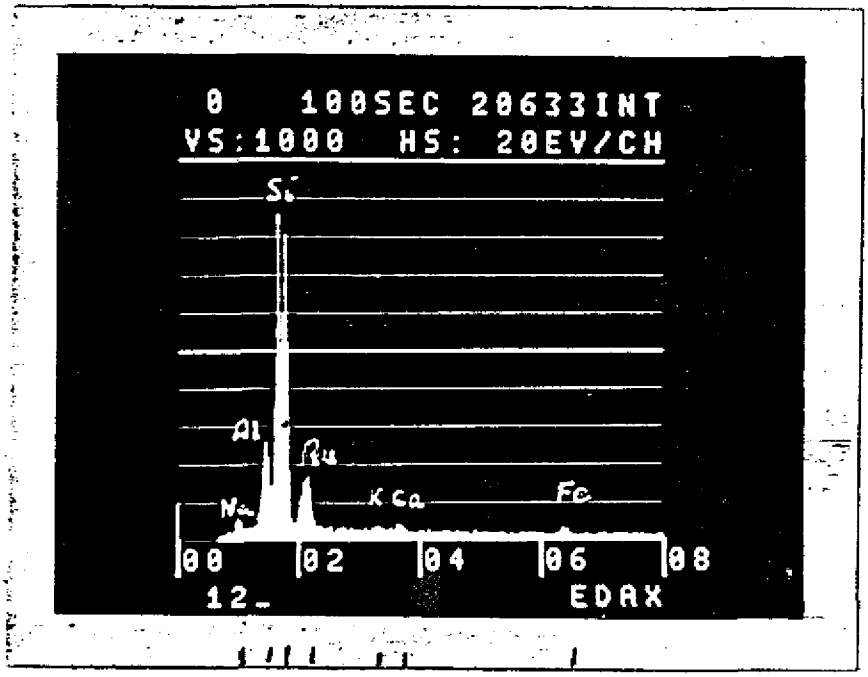


Photo 2A - Spot Mode of Particle Circled Above

A08489

UCC 013969

FIGURE 2

Photo 3 - Sample X-3 @ 1500X

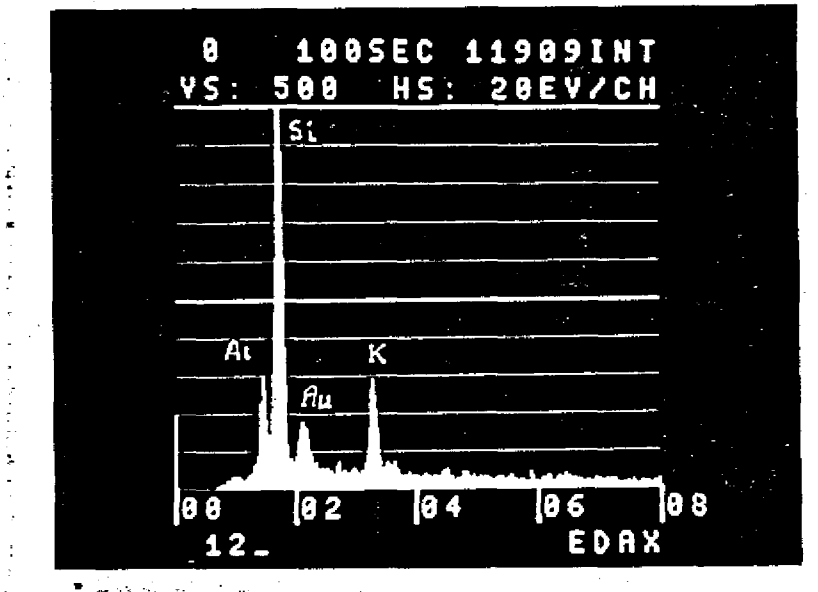


Photo 3A - Spot Mode of Particle Shown Above

A08490

UCC 013970

FIGURE 3

Photo 6 - Sample D-71 @ 1500X

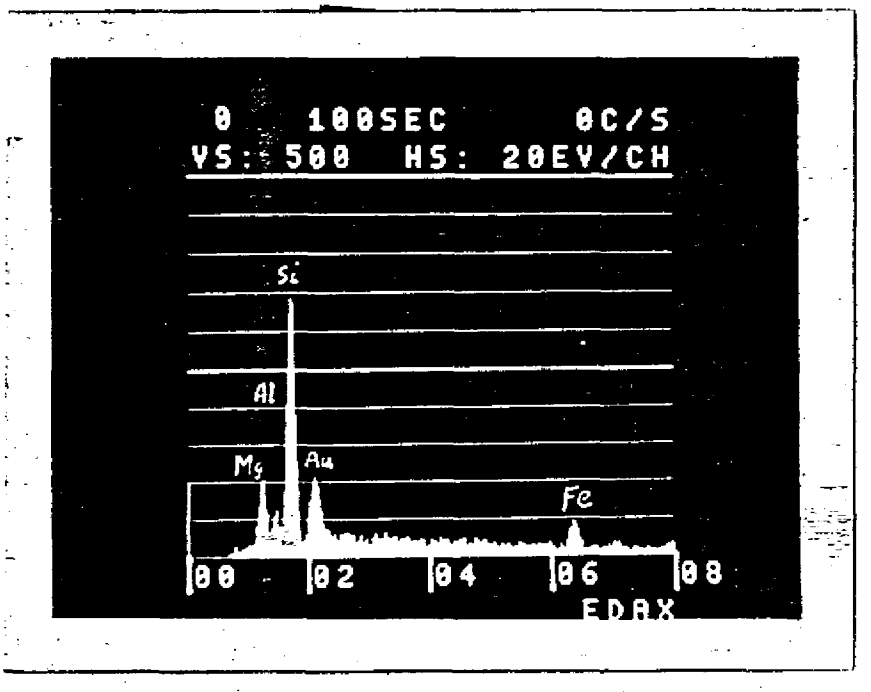


Photo 6A - Spot Mode of Particle Shown Above

A08491

UCC 013971

FIGURE 4

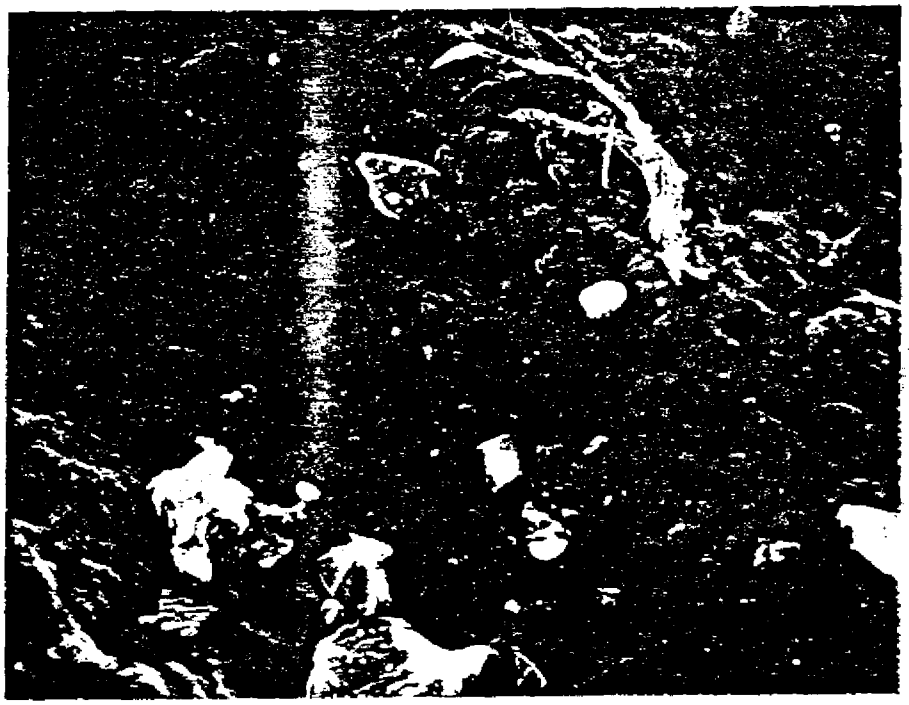


Photo 5 - Sample D71 @ 1500X

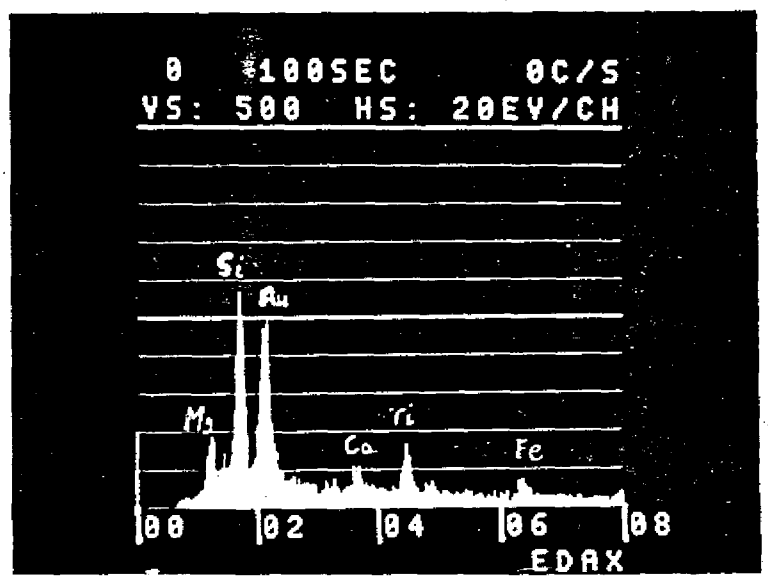


Photo 5A - Spot Mode of Fiber in Above Photo

A08492

UCC 013972

FIGURE 5

Photo 7 - Sample D-71 @ 15,000X

Photo 8 - Sample D-71 @ 1500X

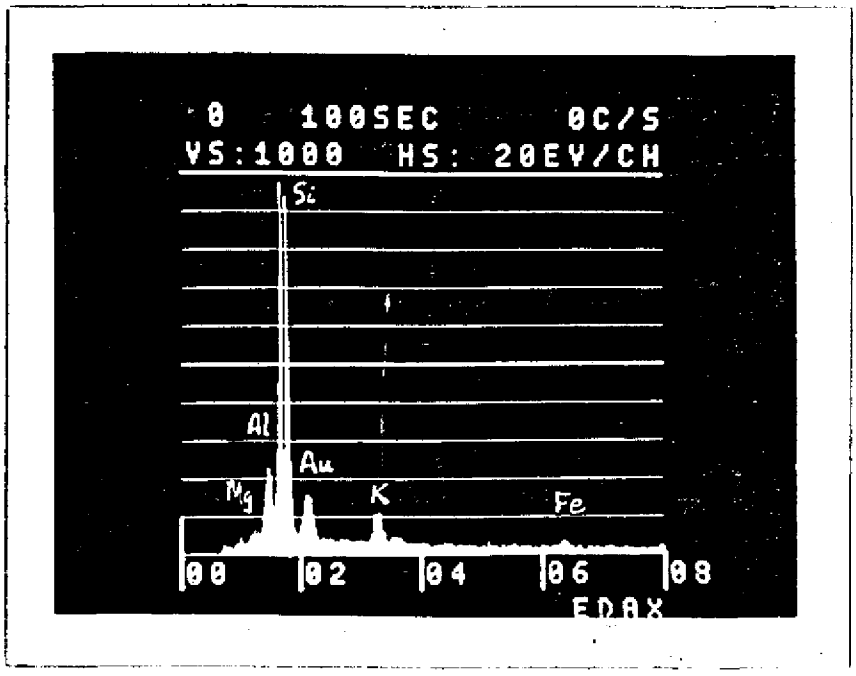


Photo 7A - Spot Mode on Particle Shown in Photos 7 and 8

FIGURE 6

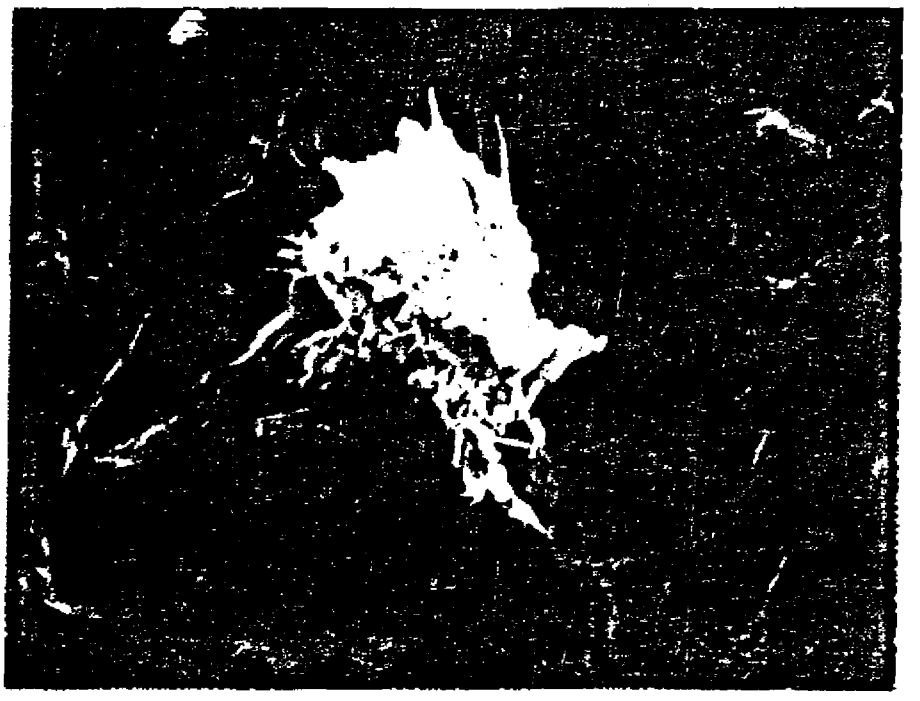


Photo 10 - Sample D-71 @ 5000X

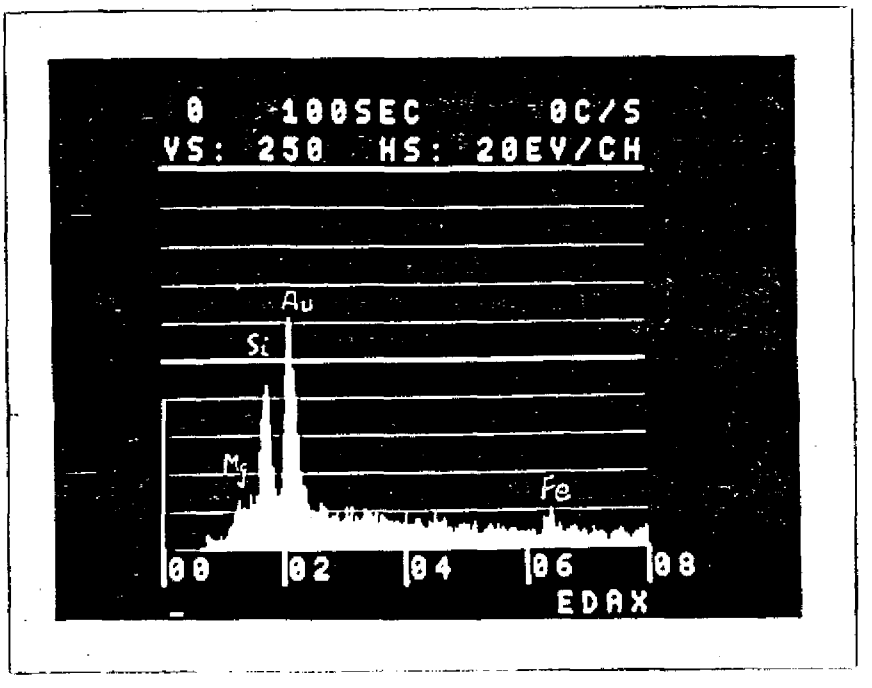


Photo 10A - Spot Mode of Particle Shown Above

A08494

UCC 013974

FIGURE 7

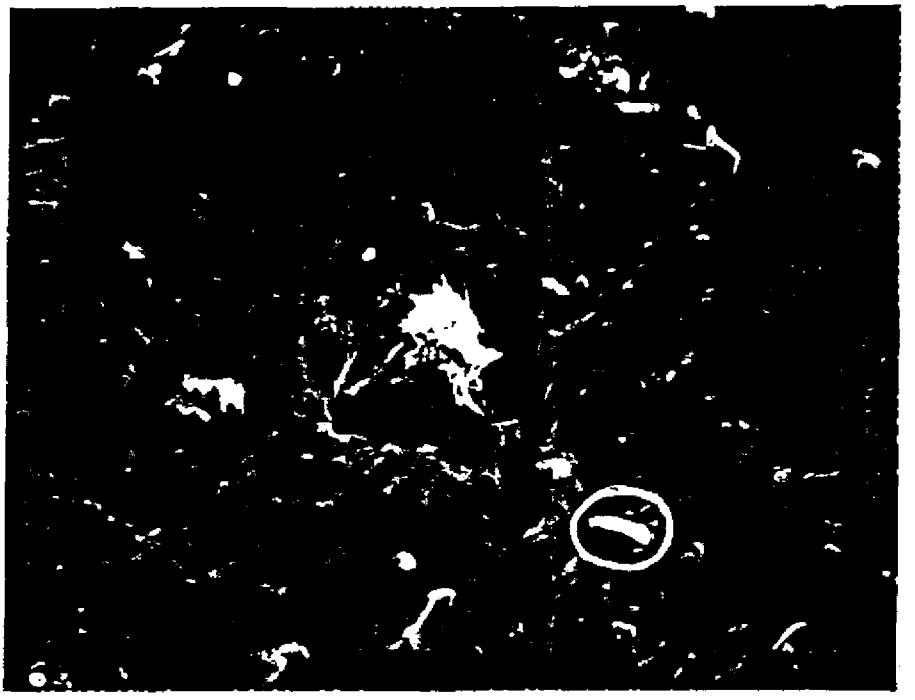
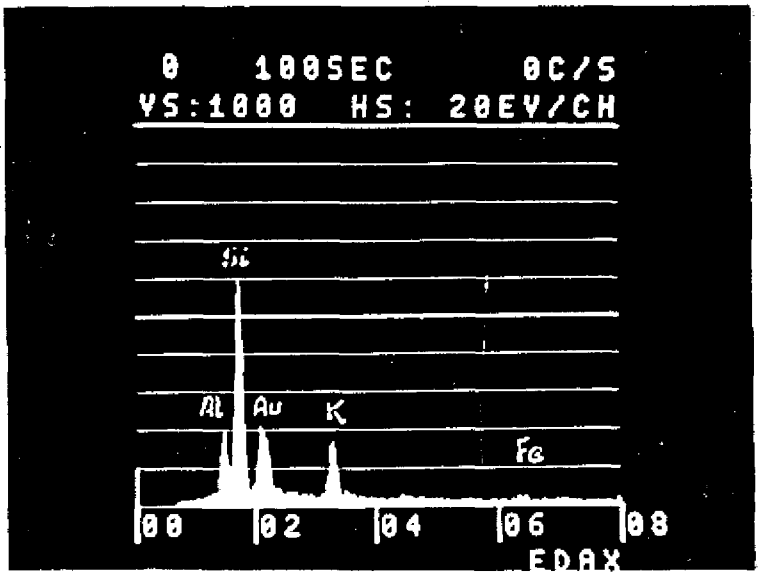


Photo 11 - Sample D-71 @ 1500X



Sample 11A - Spot Mode of Particle Circled Above

A08495

UCC 013975

FIGURE 8

Photo 12 - Sample D-71 @ 20,000X

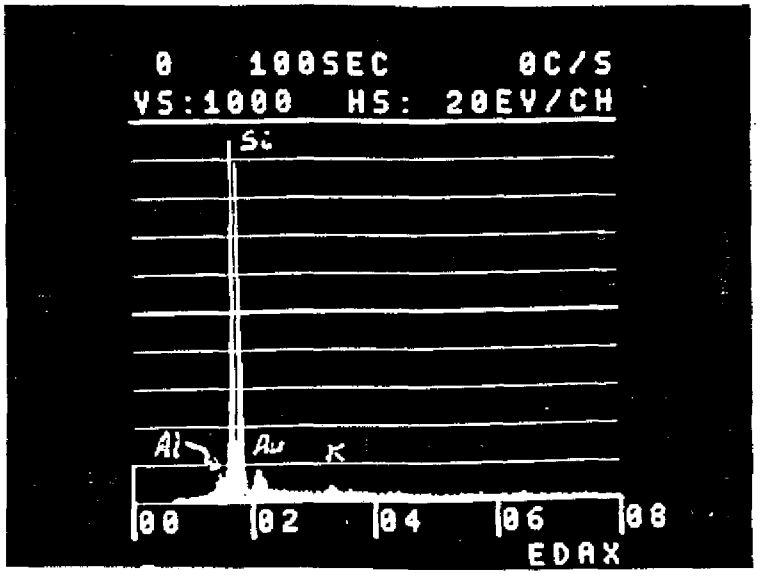


Photo 12A - Spot Mode of Fiber Particle Shown Above

408496

Photo 14 - Sample G-3 @ 1500X

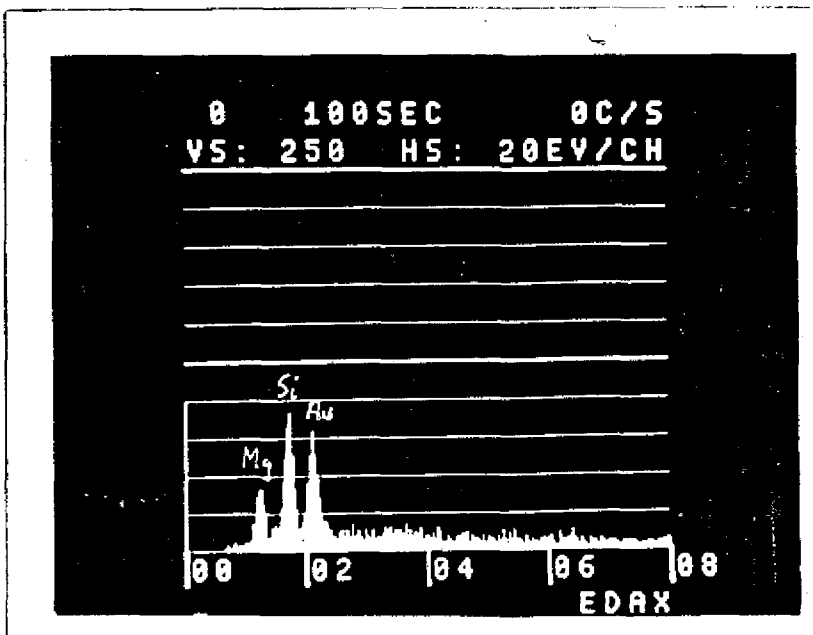


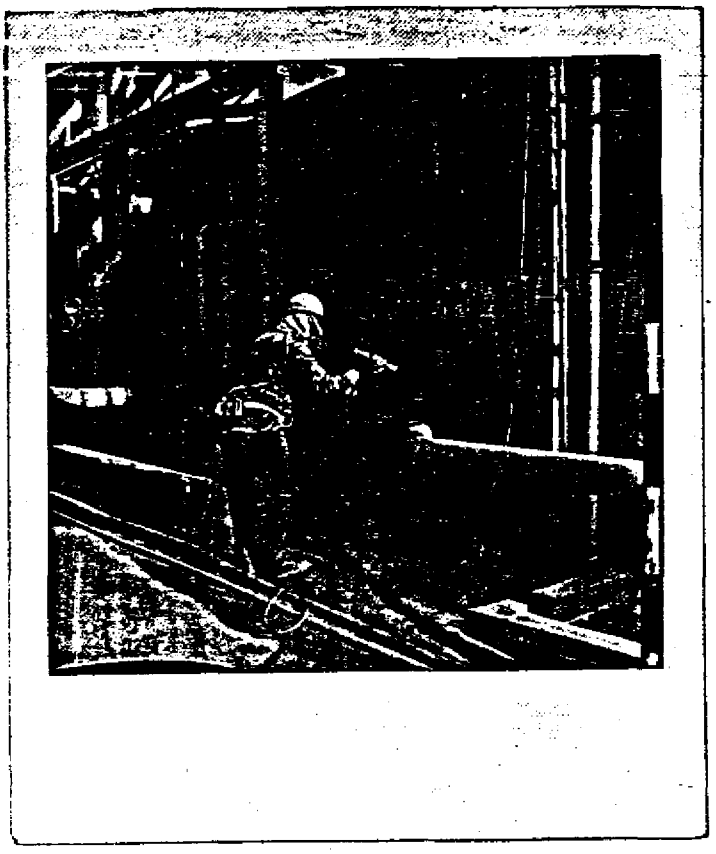
Photo 14A - Spot Mode of Particle Circled Above

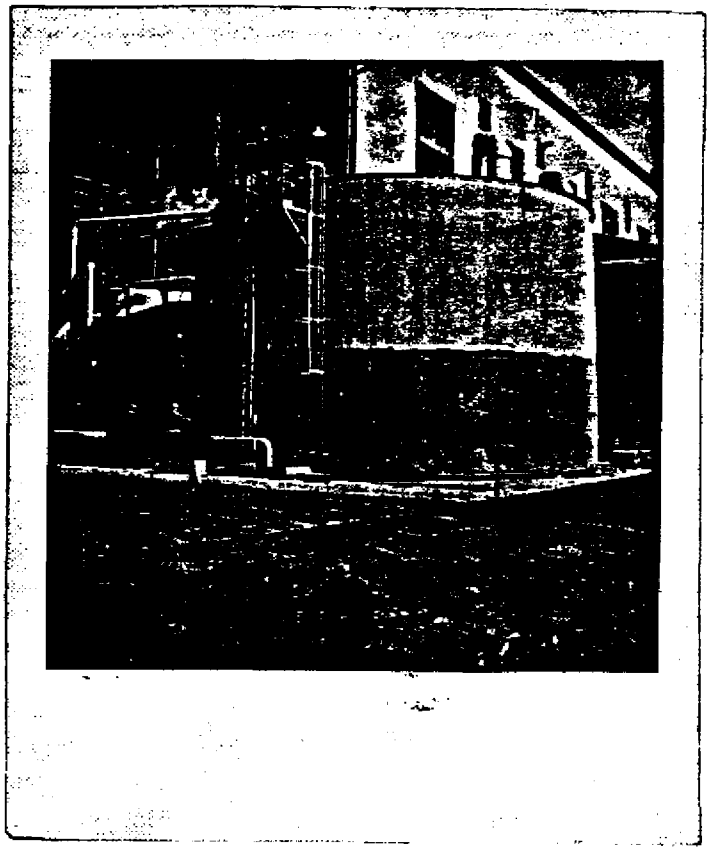
408497

UCC 013977

FIGURE 10

COMMERCIAL SANDBLASTING TEST
KERR-MC GEE CORPORATION - TRONA, CALIFORNIA

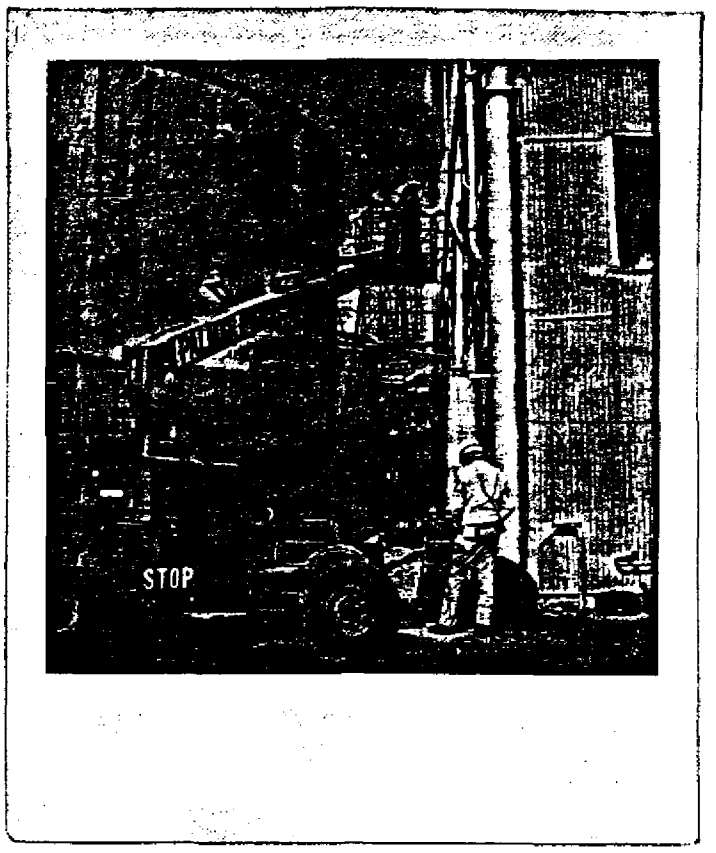




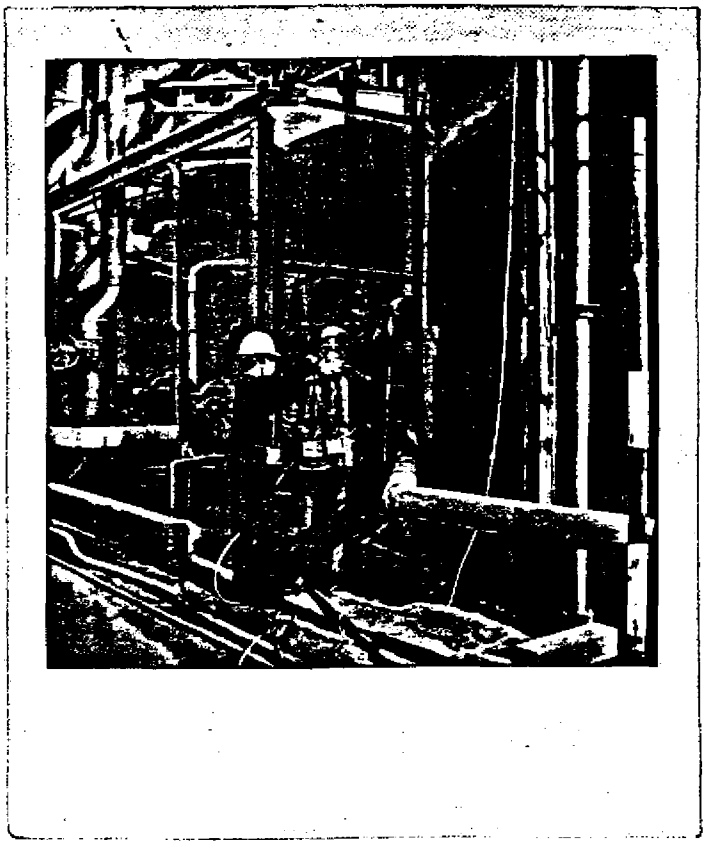
A08498

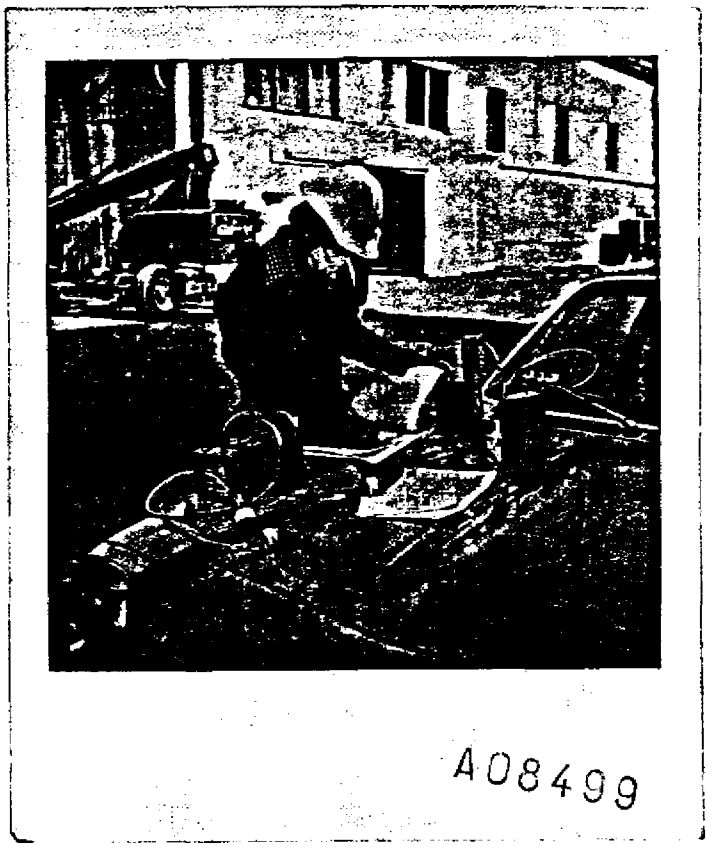
Operators Sandblasting Bottom Portion of Tank

FIGURE 11



Operator on Manlift Sandblasting Top Portion of Tank





DOSHA Representative Collecting Samples and Recording Data

FIGURE 12

STATE OF CALIFORNIA — EDMUND G. BROWN JR., Governor

DEPARTMENT OF INDUSTRIAL RELATIONS
DIVISION OF OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
1449 WEST TEMPLE
LOS ANGELES, CA 90026

ADDRESS REPLY TO:
1449 WEST TEMPLE
LOS ANGELES, CA 90026

October 30, 1978

Occupational Safety and Health
Standards Board
1006 Fourth Street
Sacramento, CA 95814

Gentlemen

Subject: Public Hearing November 8, 1978
Asbestos Products in Buildings and Structures

The Occupational Health Branch of the California Department of Health evaluated employee exposures to asbestos during the destruction of building materials in an industry-government cooperative consultation program. Results of those tests have bearing on all items of the hearing and specific information on Items 1, 2 and 5.

Previously applied sprayed materials containing asbestos were removed by sanding or sandblasting, or the structure demolished. The employees doing the work were sampled and results analyzed in the same manner as any other compliance or consultation OSHA samples would be handled. (In one study, samples were analyzed by the Federal OSHA Laboratory in Salt Lake City in the hopes that advanced analysis might be available. They repeated the California OSHA Laboratory and NIOSH methods.)

Regarding Public Hearing Questions 1 and 2, the report of employee exposures to airborne asbestos during demolition of a portion of an apartment building previously damanged and burned by a light airplane is attached as Appendix A. The stucco was identified as having been sprayed, and as having contained less than one-half of 1 percent asbestos. In summary, employee exposures during demolition were determined to range from 0.25 to 0.83 fibers longer than 5 microns in length per cubic centimeter of air.

Regarding Public Hearing Question 3, if any exemptions should be granted by the Board, it is recommended that employee exposures be limited to, and employee protection be the same as, that specified in Title 8, CAC 5208 Asbestos.

A0850C

Question 5. Regarding exemptions for products containing "encapsulated fibers," tests conducted by the Health Department indicate that the fibers are not all "encapsulated" during destructive removal, such as sanding or sandblasting, but rather are also found as free fibers. Four studies were conducted, with reports forming Appendices B (consolidated report of three studies) and C. In all studies, employees were exposed to asbestos fibers, with a range of 0.1 to 7.1 fibers/cm^3 (greater than 5 microns in length).

Very truly yours

James H. Heacock
Supervising Industrial Hygiene Engineer

JHH/cs
enc

408501

APPENDIX B

TEXTURED COATINGS OF AMERICA, INC.

Because of Legislature concern with regard to future worker exposure to the asbestos contained in asbestos coatings being spray applied, the Occupational Health Branch conducted industrial hygiene determinations of worker exposure to asbestos released from substances (those materials covered by the exemptions introduced by SB 1596), previously applied and aged, during building renovation/repair and demolition operations. Mr. P. Tillisch of Textured Coatings of America (TCA) agreed to provide appropriate opportunities for such determinations during typical industrial operations. This study involved intermittent sampling and analytical determinations over a period of several months.

On three different occasions, the Department of Health, Occupational Health Branch and TCA conducted tests:

(1). August 31, 1976 at 4801 Exposition Blvd., Los Angeles, for building interior coatings

(2). November 16, 1976 at 950 S. Broadway, Los Angeles, for building exterior coatings and

(3). December 17, 1976 at Village Grove Park in the city of Corona for exterior fence coatings.

METHOD

At all three locations sanding or sandblasting was used to simulate building renovation.

At the first location, 4801 Exposition Blvd., Los Angeles, the tests for asbestos were conducted inside the building at the end of a hallway which had been partitioned off from the rest of the building (to keep dust to a minimum).

The enclosed area was approximately 5 ft wide, 12 ft long and 8 ft high. Inside the partitioned area an "employee" did the actual sanding. The "employee" was Scott Tillisch, an employee of TCA. He was observed by Mr. J. Heacock and Mr. L. Beck of the Occupational Health Branch (OHB) and Mr. M. Ordanik of the Southern California Laboratory Section.

The sanding was done with a portable electric hand sander which the operator used on the wall for approximately 2 hours.

Samples were collected in three ways. The first was in the operators breathing zone (OBZ). The second type was an area sample. The area sample utilized the same type of pump and filter-cassette as the OBZ sample but were located

on an "observer" who walked back and forth throughout the test area. The third type of samples collected were "material" samples. These were collected from the settled dust after the sanding operation by chipping material off of the sandpaper face, or from the material off of the wall before sanding.

At the second location, 950 So. Broadway, Los Angeles, the asbestos test was conducted in the alley behind the building using a commercial sand-blasting machine. An exterior wall approximately 20 feet long was selected and blasted for most of its length to a height of about 5 feet.

Again the three types of samples were collected. Operator Breathing Zone, area, and material sample. A second OBZ sample on the man running the sand mixer for the sandblaster was also collected. The area sample was again collected on an observer walking back and forth through the blasting area, both upwind and downwind of the operation. "Material" samples were from settled sand-dust or from building surface chips.

The people involved were Mr. Scott Tillisch as sandblaster (TCA), Mr. Ron Michalski as mixer-hose tender (TCA), Mr. J. Heacock (CHB), Mr. L. Beck (CHB) and Mr. M. Ordanik (So. Cal. Lab) all as observers. The area samples were collected on Mr. Beck as he observed the operation.

The third location, Village Grove Park, Corona, utilized the same sandblasting equipment as the second location. This time a fence was sandblasted. The fence surrounded a mobil home development. Samples were taken in the vacant lots (#'s 19 and 20) on the North side of the development approximately 30 feet from the Northwest end of the fence. The two lots were approximately 50' x 150' combined. Wind out of the west @ 10 mph.

Samples were collected at the sandblasters OBZ, mixer-hose tender's OBZ and area samples upwind and downwind, both stationary and mobil.

At this third location Mr. H. Rhodes and Mr. B. Ingalls of Union Carbide (New York) represented TCA as consultants and Industrial Hygienists and collected samples along with the Occupational Health Branch. It was mutually agreed that Union Carbide and the Occupational Health Branch would collect samples side by side.

People present were Mr. Paul Tillisch, V.P. of TCA; Scott Tillisch as hose-tender-mixer; Ken Schorr as sandblaster; Mr. Rhodes and Mr. Ingalls of Union Carbide; and Mr. J. Hinton and Mr. L. Beck of the Occupational Health Branch.

Again the air in the sandblaster and mixer-hosetender's OBZ's was sampled. Area samples included fixed location samples on the fence post upwind and downwind, and roving samples on Mr. Rhodes who walked back and forth through the area. Settled dust was again collected as a material sample after the sandblasting ceased.

For all three locations sample "Blanks" were kept for analytical comparison. Laboratory analysis utilized OSHA and NIOSH approved methods.

408503

Data:

LOCATION 1 1901 Exposition Blvd., Los Angeles

	Sander	Area	
Fibers/cc	1.7	0.3	Both samples simultaneously* within 10 ft of so
5 Microns	1.1	0.9	" "
in length	0.5	0.3	" "
		0.2	" "

Material - 1% Chrysotile bound in matrix: Free fibers released with grinding abrasion

- Latex Base Paint (Vinyl-Acrylic)

LOCATION 2 950 South Broadway, Los Angeles

	Sandblaster	Mixer-Hosetender	Area	
Fibers/cc	1.5 (filter outside of hood)	0.4	1.6	All 3 sampled simultaneously*
5 Microns	3.5 "	0.7	1.2	"

Material - Aldyd Base; 3-5% Chrysotile Asbestos
Within 15 to 20 feet of source

LOCATION 3 Village Grove Park (Lots 19 and 20), Corona

	Sandblaster	Mixer-Hosetender	Area	
		Before Blasting	0.3	(Stationary Backgrou Upwind
			0.2	(Moving Background)
Fibers/cc			0.1	(Stationary Backgrou Upwind*
5 Microns	1.6 (Filter outside of hood)	1.4	0.1	(Moving during blast Never downwind
	7.1 "			
	6.6 "	2.2(Upwind)	0.2	" " "
	3.7 (Filter inside of Hood)	0.5 "		" " "
	2.1 (Filter outside of Hood)	0.2 "	1.9	(Stationary during blasting) Downwi

Material - 1% Chrysotile Epoxy base?

Within 20 to 40 feet of

* Horizontal lines distinguish those samples collected in the same time frame and/or simultaneously.

Variables:

ALL LOCATIONS

Several variables were not accounted for in the study concerning all three locations. First the sanding medium was not analyzed for asbestos. At location 1, this would have been the sandpaper used and, at locations 2 and 3, the sand used for sandblasting. Secondly the building material on which the textured coating had been applied was not analyzed for asbestos content. At the first location this would have been the wall plaster, the second location, a stucco wall reinforced with wood, and the third location a metal fence. Thirdly, the area samples varied in distance from the source and were not constant with regard to wind direction except in a few instances. Finally, no "before" and "after" air samples were collected to establish an ambient asbestos concentration, except at the third location. Ambient air samples at the third location revealed that there is asbestos from unknown sources contaminating the air which might be the subject of an environmental study.

However, in view of these variables, we feel the results would be changed insignificantly had they been accounted for. The bag was labeled "100% sand"; the sandblasting went only to the surface of the plaster, stucco and metal; and the chemist who analyzed the samples is an experienced expert in the field of asbestos determinations.

RESULTS

The data shows that there is a definite exposure to asbestos when employees or workers sandblast or sand coatings containing asbestos and that this exposure is present in the immediate area. In this case, the immediate area referred to is within a 10 foot radius of the source in a non-windy condition and within a 40 foot radius downwind in windy conditions.

In any case, at all three locations there was an employee exposure of at least 1 fiber/cc, and up to 4 fiber/cc as an average. The area samples also showed exposure into the 1 to 2 fiber/cc range. And finally the mixer-nosetender exposure range was from 0.5 to 2.0 fibers/cc.

DISCUSSION

The current standard for asbestos is 2 fibers/cc greater than 5 microns in length. However, medical monitoring is required at 1 fiber/cc on an 8 hr. time weighted basis.

Since the results indicate employee exposure to 1 fiber/cc and greater, we conclude that there is a high possibility of harmful exposures to employees during building renovation.

A08505

APPENDIX C

ASBESTOS SAMPLING DURING COATING DESTRUCTION

Many questions have been raised regarding the levels of asbestos fibers released during the removal of paint type coatings containing asbestos. In this investigation, air samples were collected during the destruction of a high performance coating containing 2.1% asbestos. A 40 foot diameter, 25 foot high steel tank spray coated in 1973 was sandblasted to bare metal. Since sandblasting represents an extreme condition, it provides an estimate of the highest employee or community exposure to asbestos.

METHOD

Air samples were collected in the breathing zones of workmen using personal sampling equipment. Open face filter cassettes containing 37 mm Millipore AA filters on a cellulose backing pad were attached to the employee's respirator straps or lapel. MSA Model G portable sampling pumps were used to maintain a flow rate of 1.5 liters per minute. Flow rates were calibrated in the field with a Brooks type 1355-OlAlAAA rotameter. Sampling times varied from 5 to 15 minutes. Thirty minute background samples were collected before sandblasting.

Unexposed blanks were also submitted. Samples were collected on the three workmen, two sandblasters and one pot tender. Sandblasters wore airline respirators to protect them from silica exposure.

ANALYSIS

Asbestos sample filter cassettes were sealed in the field, packaged and forwarded to the U. S. Department of Labor, OSHA Laboratory in Salt Lake City for analysis.

Samples were analyzed by phase contrast microscopy. Selected samples were also analyzed by dispersion staining and electron microscopy.

Results of the laboratory analysis were forwarded as soon as they became available. The optical microscopic results are summarized in Table 1. Asbestos fibers were counted by the standard NIOSH method. Blank sample cassettes submitted with the asbestos samples were counted by optical methods.

APPENDIX C

Three unused filter cassettes were submitted. No fibers were detected on two filters, one filter was reported to have 0.01 fiber/field (100 fields counted).

Background samples collected before sandblasting were reported below the detection limits for asbestos.

In addition, JK-32, collected during sandblasting of a section of the tank sandblasted to bare metal earlier in the day was also reported as below the detection limit for asbestos.

To gain additional information about the fibers present, filters were further analyzed by dispersion staining. In a study of sample JK-3, by dispersion staining, 16 of 110 fibers were identified as chrysotile asbestos. Other samples were stained. The fibers present were found similar to JK-3. The nonasbestos fibers were identified as plant fibers and fiber glass.

RESULT

Time weighted average concentrations were calculated from the optical microscopic analysis. Exposures to the workmen are listed in Table 2. Sandblaster TWA exposures were calculated to be 0.2 and 0.3 fiber/cm^3. The pot tender's average was 0.1 fiber/cm^3, greater than 5 μ in length.

DISCUSSION

Employee exposures were within the present Cal/OSHA standard of 2 fibers/cm^3, greater than five microns in length. In addition, workers with the greatest asbestos exposure were protected by the airline respirators worn to prevent silica exposure.

Sandblaster #1 did not sandblast all day. His calculated time weighted average, 0.2 fibers/cm^3, represents a partial day of sandblasting. Sandblaster #1 was not used between 13:15 and 15:30.

Asbestos fiber counts of mixtures of air contaminants containing asbestos are slow and tedious. The standard phase contrast optical microscopic

method was relied upon to determine worker exposures. In this method of analysis, the procedure allows for information gained through additional testing to be used to more precisely identify countable fibers. The analyst may reject fibers identified as not being asbestos. Dispersion staining and the use of cross polarizing filters, or a first order red retardation plate, give additional information regarding the nature of the fibers. Fibers without the correct morphology or other characteristics, recognized as not asbestos, are not counted. Fibers of doubtful identity are included with the asbestos count.

The results of electron microscopic analysis and dispersion staining quantify the proportion of the total fibers which are actually asbestos. These percentages were between 12 and 14%. Although the percentages are small, it is important to note that free asbestos is released. Analysis of blank samples ruled out the possibility of significant contamination from either the blasting sand or desert air.

/flw
10/19/78

A08508

APPENDIX C
Table 1

SAMPLE #	OPERATOR	TIME ON	TOTAL TIME (MINUTES)	FIBERS/CC	COMMENT
JK-1	Sandblaster-1	8:21	27	< D.L.	Background (Desert Air) Sample before sand blasting
JK-2	Pot Tender	8:21	27	< D.L.	Background (Desert Air) Sample before sandblasting
JK-3	Sandblaster-1	8:54	20	0.49	Under Blasting Hood.
JK-4	Pot Tender	8:54	32	0.35	Two Sand Blasters working
JK-5	Sandblaster-2	9:09	11	Membrane marred	Blasting at ground level
JK-6	Sandblaster-1	9:14	17	0.57	On Scaffold
JK-7	Sandblaster-2	9:20	16	0.31	Ground Level
JK-8	Pot Tender	9:26	20	No membrane in cassette	Two Blasters working
JK-9	Pot Tender	9:46	12	< D.L.	Two Blasters working
JK-10	Blank	—	—	None	———
JK-11	Sandblaster-2	9:36	5	0.63	Ground Level
JK-12	Sandblaster-2	9:41	6	0.71	Ground Level
JK-13	Sandblaster-2	9:47	5	1.4	Ground Level
JK-14	Sandblaster-2	9:55	6	1.6	Ground Level - Overlap JK-15
JK-15	Sandblaster-2	9:55	12	0.75	
JK-16	Pot Tender	9:58	22	0.17	
JK-17	Sandblaster-2	10:01	6	< D.L.	Hole in filter - Overlap JK-
JK-18	Sandblaster-2	10:07	7	1.3	Ground Level
JK-19	Sandblaster-2	10:13	10	0.3	Blasting $\frac{1}{2}$ of sample
JK-20	Pot Tender	10:20	22	0.24	11 minutes break
JK-21	Sandblaster-2	10:24	10	0.32	Entire sample break
JK-22	Sandblaster-2	10:34	18	0.91	On man lift
JK-23	Pot Tender	10:43	16	1.02	
JK-24	Sandblaster-1	10:47	16	1.27	On ground
JK-25	Blank	—	—	None	———

A08509

APPENDIX C
Table 1 (Continued)

SAMPLE #	OPERATOR	TIME ON	TOTAL TIME (MINUTES)	FIBERS/CC	COMMENT	
JK-26	Sandblaster-2	10:52	16	< D.L.	On lift above #1	
JK-27	Sandblaster-1	11:01	6	0.38	#2 above on lift	
JK-28	Pot Tender	11:00	17	0.40		
JK-29	Sandblaster-1	11:07	11	0.67	#2 still above	
JK-30	Sandblaster-2	11:09	14	0.45	Blasting time: 9 min	
JK-31	Pot Tender	11:18	8	< D.L.		
JK-32	Sandblaster-2	12:50	5	< D.L.	Blasting Bare Metal Area.	
JK-33	Sandblaster-2	13:04	11	< D.L.	Man lift	
JK-34	Sandblaster-1	13:09	5	0.95	Ground	
JK-35	Sandblaster-2	13:17	7	0.60	On man lift	Blasting time 6 min
JK-36	Sandblaster-2	13:24	9	0.66	On lift	
JK-37	Sandblaster-2	13:34	14	< D.L	On lift	7 min blasting
JK-38	Sandblaster-2	13:48	17	0.32	Lift	11 min blasting
JK-39	Sandblaster-2	14:06	11	0.19	Lift	
JK-40	Sandblaster-2	14:17	17	0.40	Lift	Blasting over operator's head (cat walk)
JK-41	Sandblaster-2	14:35	25	0.23	Lift	15 min blasting
JK-42	Sandblaster-2	15:00	21	No count possible	Lift	11 min blasting
JK-43	Sandblaster-2	15:21	15	0.46	Lift	
JK-44	Blank	___	___	0.01	fibers/field (100 fields)	

D.L. = Detection Limit

All samples Operator Breathing Zone

A08510

APPENDIX C
Table 2.

Pot Tender. Time Weighted Average Asbestos Exposure.

SAMPLE	TIME(Min.)	C FIBERS/CM^3
JK-2	27	0
JK-4	37	0.35
JK-8	20	No count
JK-9	12	0
JK-16	22	0.17
JK-20	22	0.24
JK-23	17	1.02
JK-28	18	0.40
JK-31	8	0
Unsampled	182	0.28*

CALCULATIONS

* Average Exposure = $\frac{\Sigma CT}{\Sigma T}$ = concentration of unsampled.

$TWA = \frac{\Sigma CT}{480} = \frac{97.5}{480} = 0.20$

$= 0.2$ fibers/cm^3, >5 μ

C = fibers/cm^3

T = Time (minutes)

Sandblaster. #1 Partial day time weighted average.

SAMPLE	TIME (Min.)	C FIBERS/CM^3
JK-1	27	0
JK-3	20	0.49
JK-6	17	0.57
JK-24	16	1.27
JK-27	6	0.88
JK-29	11	0.67
JK-34	5	0.95

CALCULATIONS

No exposure between JK-6 and JK-24..

$TWA = \frac{\Sigma CT}{480} = \frac{57.2}{480} = 0.1$ f/cm^3, >5μ

C = fibers/cm^3

T - Time (minutes)

A08511

APPENDIX C
Table 2. (Continued)

Sandblaster 2. Time Weighted Average Asbestos Exposure.

SAMPLE	TIME (Min.)	FIBERS/CM^3
JK-5	11	Marred
JK-7	16	0.31
JK-11	5	0.63
JK-12	6	0.71
JK-13	8	1.4
JK-14	Overlap	JK-15
JK-15	12	0
JK-17	Overlap	JK-15
JK-18	7	1.3
JK-19	10	0.3
JK-21	11	0.32
JK-22	18	0.91
JK-26	16	0
JK-30	17	0.45
JK-32	5	0
JK-33	11	0
JK-35	9	0.6
JK-36	9	0.66
JK-37	15	0
JK-38	17	0.32
JK-39	12	0.19
JK-40	17	0.40
JK-41	12	0.23
JK-42	17	No count
JK-43	25	0.46
Unsampled	52	0.38*

* Average Exposure

CALCULATION

*Average exposure = $\frac{\Sigma CT}{\Sigma T}$ = concentration of unsampled

TWA = $\frac{\Sigma CT}{480} = \frac{130.4}{480} = 0.27$

= 0.3 fibers/cm^3, >5 μ

C = Concentration (fibers/cm^3)

T = Time (minutes)

408512

AIRBORNE ASBESTOS COUNTS

for

Textured Coatings of America, Inc.
(Village Grove Trailer Park, Lots 19 and 20)
Corona, California

Date Sampled: December 17, 1976
Date Reported: April 1, 1977

Samples Collected By: B. L. Ingalls
Union Carbide Corporation

Samples Analyzed By: B. L. Ingalls & G. J. Spencer
Union Carbide Corporation

Reported By: H. B. Rhodes
Union Carbide Corporation

Union Carbide Corporation
Metals Division
Niagara Falls, New York

408513

OBJECTIVE

To measure the airborne asbestos fiber concentrations generated during the removal of an asbestos-containing maintenance coating from a sheet metal fence by sand-blasting.

DESCRIPTION OF OPERATION

The test was run at Village Grove Trailer Park, Lots 19 and 20 in Corona, California. The park was surrounded by a galvanized metal fence about 5' high that had been painted about five years previously. The metal was first primed and then painted with an alkyd-based maintenance coating containing about 5% asbestos. The paint also contained mica, talc (non-tremolitic), fiberglass, and perlite.

The sandblasting was done with a portable unit consisting of a compressor and a blasting unit. The latter had a sand storage tank about 1' in diameter by 3 1/2' long which fed silica sand through a lever operated control device and a heavy hose to a blast nozzle, under the control of the operator. One man handled the blasting nozzle while the other operated the compressor, assisted with the hoses, but primarily operated a lever on the sand delivery unit to keep the sand flowing. The nozzle operator wore a conventional sand-blasting hood with air openings on the sides.

During the blasting operation one man stood about 2' from the fence and moved the nozzle, held about 3-6 inches from the fence, in short arcs until the impinging sand removed the paint down to the base metal. Bonding was excellent and it took at least several passes of the blast to remove the paint. The material removed was finely pulverized. The bottom 1 1/2' of the fence was not hand-blasted to avoid raising extraneous dust from the dry ground at the base of the fence. The weather was clear and warm with a light, variable breeze blowing from left to right in approximately the same direction as the fence.

SAMPLE COLLECTION

The following types of samples were collected during the test:

1. Background samples prior to testing were collected at the fence, ~4 1/2' from the ground about 100' apart. (Spanned the section to be sand-blasted.) (G-16 & F-44)

2. A sample about 40' downwind, on the fence about 5' above the ground, during the last 25 minutes of sand-blasting.(G-3)

3. Personal samples on an observer in an area generally 25-35' from the blasting operation and approximately perpendicular to the blasting. (A-86, A-81, J-89)

4. Personal samples on both the helper and the sand-blasting operator. All operator samples were external to the hood except X-2.

   Helper - G-48, X-8, C-15, X-4
   Operator - D-71, X-14, G-34, X-2, X-3

A08514

COUNTING EQUIPMENT AND PROCEDURES

All samples were collected with battery-powered air pumps (M.S.A.), calibrated to 2 liters per minute on Millipore membrane filters of 0.8μ porosity. The samples were mounted and counted in accordance with the procedure of Bayer, Zumwalde, and Brown (Bureau of Occupational Safety and Health, February 1969). Counting was done with a Nikon microscope at 400X utilizing a Poton reticle with a 0.0062 mm^2 field area. One hundred fields were counted for all samples.

These samples proved to be particularly difficult to count. Out of the total of nine personal samples from the blast operator and the helper, six were loaded with dust to a level where filter areas were frequently obscured. When such an area occurred, the counter went on to another field. There is no way to tell how this may have influenced the results. Our normal practice in this situation is to resample, but considering the difficulties this would entail, the filters were used.

In addition to this problem, the nature of the samples puts an extreme strain on the method. Thus:

1. Fiber concentrations were low with 0.38 fibers/field the maximum and 0.2 fibers/field more or less typical. This is well below the 1-5 fibers/field range recommended by NIOSH.

2. The fibers counted were in the 5-15μ range so that the "5μ decision" was a frequent requirement.

3. There were substantial concentrations of mica "chips" present. These can generally be recognized as not asbestos but certain shapes around 5μ in length can become undistinguishable.

These factors of low fiber concentration on the filter, filter size distribution, and potentially interfering "fibers" result in a high degree of operator discretion in the determination of the total number of asbestos fibers counted. When this possible variation is combined with the short sample times substantial variations can result.

In view of these uncertainties, a modification was made in the procedure to report two categories of fiber:

1. Obvious chrysotile asbestos. Either long and curved, or distinctly thin and slightly curved in the 10-20μ range.

2. Possible asbestos fiber: Particles which did not have obvious identifying asbestos features but met the L/D >3, >5μ requirements and were dark and fiberlike under phase-contrast illumination.

When there was any doubt about a fiber's identity, it was included in the appropriate class. The total of both classes would be the value ordinarily reported as asbestos. Particles which were obviously not asbestos were not counted. This would include such things as unbroken fiberglass, mineral flocks with non-parallel sides, and particulate that appeared bright under phase contrast. It should be noted that the only known source of asbestos in this formulation was the 5% by weight chrysotile. (Note that the 2% asbestos figure reported by DOSHA in Appendix B is in error.)

408515

RESULTS AND DISCUSSION

A description of each sample and the respective fiber concentrations are shown in Table I. The data obtained by Counter A are presented graphically in Figure I. Where paired results are available Counter B was high six times and Counter A three times. The differences, without regard to sign ranged from 0.1 to 1.1 fibers/cc and averaged 0.3 fibers/cc. In view of the counting difficulties on these slides we consider this to be good agreement for operators in the same laboratory counting the same slides.

The operation of the sand-blasting equipment was too erratic to provide a meaningful estimate of operator TWA exposure for normal operation. Using just the time periods during the actual blasting operations, the time-weighted averages were:

$$\text{Operator} - \frac{(10)(2.2)+(11)(3.2)+(8)(3.28)+(14)(1.68)+(22)(1.76)}{(10)+(11)+(8)+(14)+(22)} = \frac{145.68}{65} = 2.2 \text{ fibers/cc } >5\mu$$

$$\text{Helper} - \frac{(10)(1.03)+(23)(1.1)+(14)(0.15)+(22)(0.06)}{(10)+(23)+(14)+(22)} = \frac{39.02}{69} = 0.6 \text{ fibers/cc } >5\mu$$

The measured TWA exposure for this particular 8-hour day would then be:

$$\text{Operator} - \frac{145.68}{480} = 0.3 \text{ fibers/cc } >5\mu$$

$$\text{Helper} - \frac{39.02}{480} = 0.08 \text{ fibers/cc } >5\mu$$

.408516

TABLE I

SUMMARY OF AIRBORNE ASBESTOS FIBER COUNTS DURING SAND-BLASTING OF ASBESTOS-CONTAINING MAINTENANCE COATING

Description of Operation	Sample Data				Airborne Fiber Concentrations (Fibers/cc >5μ)								
		Time			Operator "A"						Operator "B"		
					Obvious Chrysotile		Possible Asbestos		Total Asbestos		Total Asbestos		
	No.	On	Off	Total Min.	fibers 100 fields	f/cc	fibers 100 fields	f/cc	fibers 100 fields	f/cc	fibers 100 fields	f/cc	Comments
Pretest Controls													
On fence, left side of area to be sand-blasted. ~4 1/2' above ground.	G-16	10:35	10:56	21	0	0	2	0.07	2	0.07	-	-	
On fence, ~100' from G-16. ~5' above ground.	F-44	10:42	10:59	17	0	0	0	0	0	0	2	0.08	
Personal sample on observer ~25' from fence and moving parallel to fence.	A-86	10:39	10:52	13	0	0	2	0.11	2	0.11	4	0.21	
Observer (During Sand-Blasting)													
Personal sample on observer ~20-30' from fence and moving parallel to fence.	A-81	11:12 11:25	11:18 11:27	6 2 8	0	0	1	0.09	1	0.09	-	-	
Same as A-81.	J-89	12:26	12:52	26	0	0	1	0.03	1	0.03	-	-	
Area sample on fence. 5' above ground and ~40' downwind. (In lieu of observer)	G-3	1:35	2:00	25	7	0.19	22	0.61	29	0.7	21	0.6	
Helper (During Sand-Blasting)													
Personal sample. Assisting with hoses. Operating sand feeding equipment.	G-48	11:10 11:24	11:18 11:26	8 2 10	1	0.07	14	0.97	15	1.03	9	0.6	
Same as G-48.	X-8	12:25	12:48	23	10 -	0.30 -	18 -	0.54 -	28 45	0.84 1.35	60	1.8	Heavily loaded; ha to count second sl
Same as G-48.	C-15	1:08	1:22	14	1	0.05	2	0.10	3	0.15	-	-	
Same as G-48.	X-4	1:36	1:58	22	0	0	2	0.06	2	0.06	9	0.3	
Blasting Operator (During Sand-Blasting)													
Personal sample. Operator handling sand-blasting nozzle, standing ~2' from fence.	D-71	11:10 11:24	11:18 11:26	8 2	7	0.48	25	1.72	32	2.21	-	-	Heavily loaded, ha to count.
Same as D-71.	X-14	12:25	12:36	11	13 -	0.82 -	30 -	1.88 -	43 58	2.70 3.64	- 75	- 4.70	Heavily loaded; ha to count second sl
Same as D-71.	G-34	12:38	12:46	8	5	0.43	33	2.84	38	3.28	39	3.36	Heavily loaded; ha to count.
Same as D-71 except inside of hood.	X-2	1:08	1:22	14	8	0.39	26	1.28	34	1.68	-	-	" "
Same as D-71.	X-3	1:36	1:58	22	21	0.66	35	1.10	56	1.76	53	1.66	" "

A08517

AIRBORNE ASBESTOS FIBER COUNTS DURING SANDBLASTING

OF ASBESTOS-CONTAINING MAINTENANCE COATING

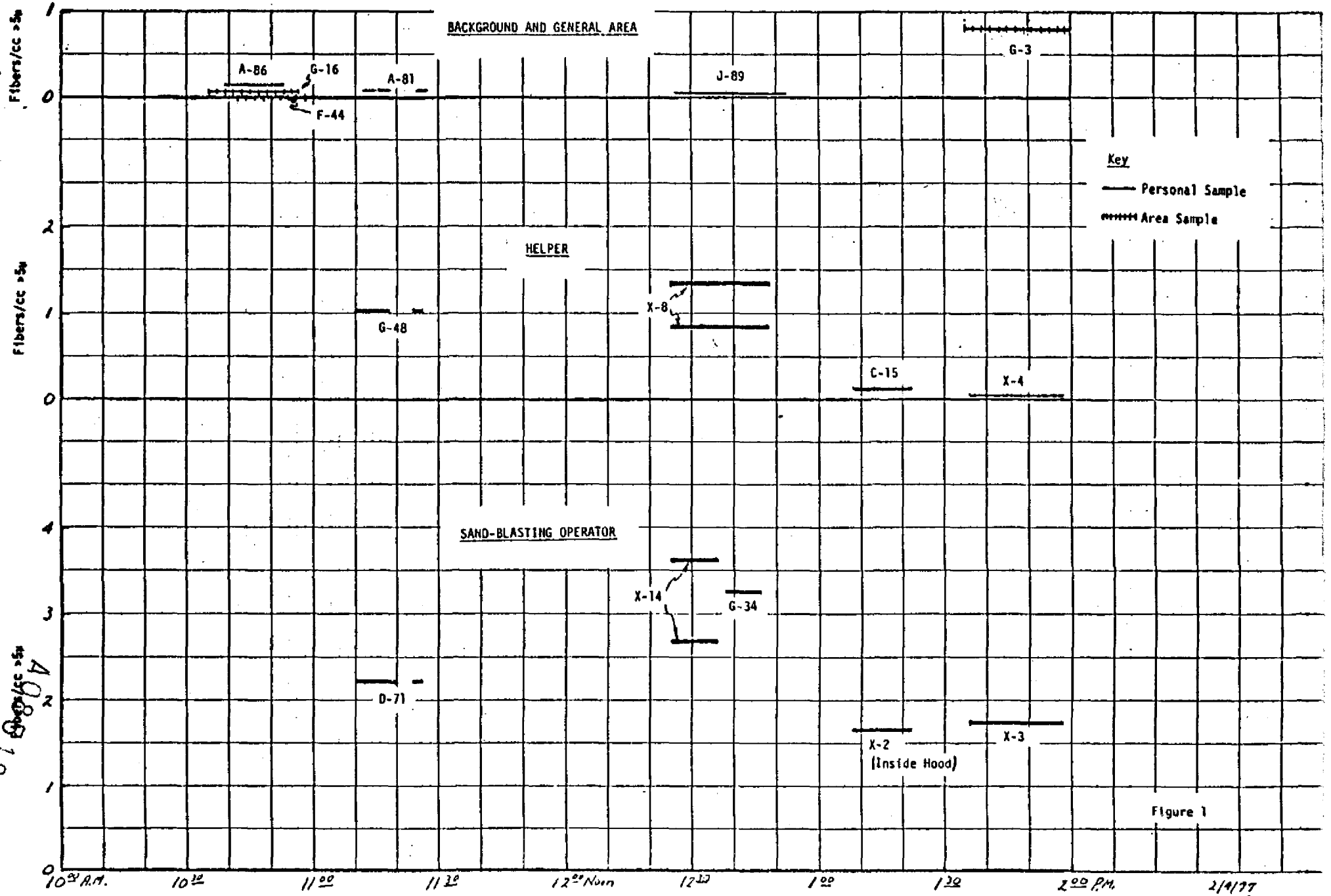


Figure 1

UNION CARBIDE CORPORATION • METALS DIVISION • P. O. BOX 579 • NIAGARA FALLS, N.Y. 14302 • TEL: 716-278-3376

January 13, 1978

Mr. James Heacock
Occupational Health Section
California Department of Health
2151 Berkeley Way
Berkeley, CA 94704

Dear Mr. Heacock:

The suggested protocol for the cooperative test that we discussed in your office is attached. As you requested, it has been set up so that the Department does the actual sample collection.

Plans are well along to conduct the test on one or more large tanks in the Trona area that have been coated with zinc-rich primer. The only hold up is satisfactory verification of composition of the primer. We would like to go ahead and plan to conduct this test during the week of January 23, 1978, preferably on Tuesday the 24th.

Please let me know if this is satisfactory so we can finalize on a date and the other arrangements.

In view of the time that has passed since the original hearings and the number of new people involved, it seems appropriate to comment on two questions relevant to the previous testing results reported in a letter of June 1, 1977 from Jerome A. Lockner, M.D. to the Honorable Jack R. Fenton, i.e.:

1. The appropriateness of sandblasting as a representative test method.

2. The accuracy of the previous counts.

We have been informed by a large manufacturer of the high-performance maintenance coatings of particular interest here that certain of these coatings are sandblasted as a routine procedure. Usually it is a light "brush" blasting to remove rust spots and loose coating but occasionally complete removal takes place. Sandblasting thus represents an extreme condition and should thus be a reasonable way to approximate the upper limits of exposure.

408519

As we discussed several times, in the test where Cal/OSHA and Union Carbide collected side-by-side samples during a sandblasting operation, both laboratories found asbestos counts of several fibers/cc or more when counting by the routine NIOSH procedure. It is well recognized that the procedure has very serious limitations for dusts of the type generated during sandblasting. Subsequent examination by Union Carbide of several of the filters using scanning electron microscope techniques suggested that both laboratories may have counted substantial numbers of non-asbestos particles as asbestos and that free asbestos fibers were extremely rare.

Over the past year the Federal OSHA Laboratory at Salt Lake City has adopted more sophisticated optical techniques to distinguish asbestos from other particulate matter and are quite possibly the most skilled laboratory in the country in this area. I have discussed our problem with the Director, Mr. Floyd Madsen, and he is agreeable to count a reasonable number of samples. It will be appropriate for you to make a written request for this assistance at the time the samples are submitted.

Please let me know if you have any problems with this proposal. We are looking forward to participating in what appears to be the first carefully defined test of asbestos exposure in this type of application.

It was a pleasure meeting with you and the others in Berkeley.

Very truly yours,

H. B. Rhodes

Harrison B. Rhodes
Technology Manager

HBR/rmm
Attachment

A08520

TEST PROTOCOL

OBJECTIVE

The objective of this test is to measure the airborne concentration of asbestos fibers generated during the removal of a non-resilient maintenance coating by sandblasting. The site selection, test operation, sample collection, and sample analysis will be carefully planned in advance so that meaningful results are obtained.

WORKING ARRANGEMENTS

The selection of the test site and provision for the sandblasting operator and equipment are the responsibility of the Union Carbide Corporation with the choices subject to approval by the Department of Health. It is intended that the Department of Health and Union Carbide will each have at least one qualified person at the site to work out a mutually acceptable sample collection strategy in accordance with the general guidelines under "Sample Collection Strategy".

Sample collection will be performed by the Department of Health. After collection is completed, a validated summary sheet of the collection data will be prepared with a copy for both participants. In order to expedite matters, the cassettes will be packaged and sent immediately by registered mail to:

Mr. Floyd Madsen, Director
OSHA Laboratory
390 Wakara Way
Salt Lake City, Utah 84108

The Department will send a confirming letter to Mr. Madsen requesting them to analyze the samples. He has been alerted and is expecting to receive 10-30 samples. When analysis is complete, the OSHA Laboratory will provide both participants with a copy of the results.

TEST SITE AND OPERATION CRITERIA

The following criteria apply to test site selection:

1. Reasonably representative of a substantial commercial use of the product.

2. Large enough to allow for several hours of dust generation.

3. Reasonably unambiguous definition of the composition of the asbestos-containing material being handled and an asbestos content in the upper part of the range of contents of interest.

4. Sandblasting will be done with regular commercial equipment and materials by a professional operator in a manner that is accepted commercial practice.

A08521

A08521

SAMPLE COLLECTION STRATEGY

As noted previously, it is intended that the Cal/OSHA and Union Carbide representatives at the site work out the most appropriate sampling strategy with the following special provisions to be met:

1. Personal breathing zone samples will be taken on the operator and the helper (if present) that are subject to the highest exposures. In addition to samples collected during the actual operations, a reasonable number of samples will be collected before and after operation to permit an estimate of the 8-hour time-weighted average exposure.

2. Area samples upwind and downwind will be taken before, during and after the dust generation operation.

ADDED NOTE

The Union Carbide Corporation is participating in a national round-robin study of the NIOSH collection and analytical procedure. It has been agreed that we may have an observer wearing a pair of pumps moving in the immediate vicinity of the dust generation operation. Care will be taken that there is no interference with the test. These samples will be entered into the round-robin and since they will be counted by only the standard NIOSH procedure, the results are not relevant to the present tests.

SAMPLE ANALYSIS

All sample cassettes will be shipped unopened to the Federal OSHA Compliance Laboratory at Salt Lake City.

408522

ITEM G

PREPARED TEXT -

ORAL PRESENTATION BEFORE THE

CALIFORNIA STATE OCCUPATIONAL SAFETY

AND HEALTH STANDARDS BOARD

AUGUST 30, 1979

TITLE 8: GENERAL INDUSTRY SAFETY ORDERS
(Asbestos)

Held in San Diego, California

on

August 30, 1979

Union Carbide Corporation
Metals Division
Niagara Falls, NY 14302

A08523

Introduction

My name is John L. Myers and I am employed by Union Carbide Corporation as Marketing Manager for its "Calidria" asbestos products. Union Carbide produces about 30,000 tons per year of asbestos fiber from a mine and mill located in the King City area of California. The operation employes approximately 70 people with an annual payroll of nearly $2,000,000 and is the largest industrial employer in a radius of about 50 miles.

We produce and market raw asbestos fibers for industrial use but do not manufacture finished asbestos-containing products. Our plant has had complete air monitoring and medical surveillance programs since operations were initiated in 1963. Our interest in the proposals to change the "action level" for monitoring and medical examinations is because these changes can have a massive impact on the users of asbestos-containing products with, we believe, little or no gain in worker protection.

Changes in Section (8) - Monitoring and Recordkeeping

The staff proposes to reduce the level in paragraph (g)(1)(A) at which monitoring is required from 1 fiber/cc >5μ to 0.1 fiber/cc >5μ. The question of the appropriate "action level" to trigger monitoring and also medical examinations was discussed at the standards Board hearing on April 26, 1979. At that time, there was general agreement among labor, industry, and even state governmental representatives that a level of 0.5 fibers/cc longer than 5μ was reasonable. This level was based on considerations of worker protection, ability to measure, and an efficient allocation of professional resources. This level was adopted unanimously by the Board.

Subsequent to this action, on May 10, 1979, the Federal OSHA Regional Administrator, Mr. Gabe Gillotti, informed Mr. Don Vial by letter that this action by the Board was "unacceptable . . .Your asbestos exposure language will need to be identical to Federal OSHA" and quoted OSHA Program Directive #300-16 as the basis for this requirement.

Mr. Gillotti's letter was a surprise since California has a state plan which has been fully approved "as effective as" the Federal regulation in accordance with Section 18(e) of the OSHA Act and under Part 1902 of the implementation regulations. There has been no change in the Federal Regulations. 19CFR 1910.100 1 (j)(2), (3) or (4) which would require their incorporation into the State Regulations in accordance with Section 18 of the OSHA Act.

We discussed this with John W. Whittlesey, Esq. a Union Carbide Counsel specializing in OSHA matters. He has authorized the following opinion and will be glad to provide a written confirmation if the Board desires one.

1. Program Directive #300-16 is an administrative interpretation only. As such it does not have any regulatory or statutory authority.
2. California may elect to modify their regulations to conform but are under no statutory requirement to do so.
3. Failure to conform to such an Administrative interpretation does not provide the "substantial evidence" required under Section 18(g) of the OSHA Act to sustain a withdrawal of certification.
4. The authority delegated to the Regional Administrator under paragraph 1953.4 (a)(2) relates to inconsistent interpretations of standards as they exist. It does not require standards which have been certified "as effective as" to be modified to conform identically.

A08525

California is not required to change their present regulations to conform to the Federal wording. The choice is up to the Standards Board.

There are at least two reasons why the Board should retain the present action level of 1 fiber/cc or at most lower it to 0.5 fibers/cc.

1. The very large burden on resources to comply with (and enforce) a 0.1 fiber/cc level.
2. The inability to measure the airborne concentration at this very low level.

Significant releases of asbestos fiber must take place before the 1 fiber/cc >5μ current action level is exceeded. It is fairly easy to ascertain where initial monitoring does not need to be conducted and unnecessary action can be minimized. If, on the other hand, the California Asbestos Standard is changed to require monitoring at a level of 0.1 fiber/cc, virtually every place of employment where asbestos is present in any form must be monitored at least once.

Brake repair shops provide a specific example of the scope of the problem. Molded brake linings contain asbestos. Airborne fibers can be released when they are sanded, machined, or when the drum is blown out with compressed air. It has been shown that airborne asbestos concentrations can be controlled to low levels by careful handling, proper work practices and the use of vacuum cleaners to remove dust.

There are over 20,000 brake repair shops in California, the majority of which are service stations. A survey of 100 shops was made by CAL/OSHA some months ago and it is our understanding that it was found that a low level of airborne fiber is common but exposures above one fiber per cc are rare. Generally, the higher levels occured at the large truck repair shops where such things are blowing and sanding have been practiced without proper dust control. If the proposed action level is adopted, all of these shops, which are generally small businesses, would be required to monitor at least once.

We recently asked two industrial hygiene consulting laboratories the cost to conduct a basic "initial monitoring" for a relatively simple operation like a brake shop. Both gave a range of $300-$500 per test. These figures do not include travel and living expenses or provide for any significant extra technician travel time to the test site which can occur frequently.

Applying a representative value of $400 to the approximately 20,000 registered brake shops gives a cost of $8,000,000 added to the operating expense of this industry to comply with the new regulation. Each inspection would also use up about two man-days of the time of trained personnel. If we assume 200 man-days as equivalent to a working year, it would take the full-time activity of 200 trained technicians to carry out the monitoring in a year. We doubt if this quantity of people and equipment is available. The main information obtained from such a massive test program would be that exposures are generally above zero, and below one fiber/cc, which is already quite well established.

This discussion has emphasized brake shops because they are a well defined entity, already registered and identifiable. The same problem exists for the widespread low exposure in the less well defined construction industry. There is also an additional compounding factor in construction in that the "place of employment" changes a number of times a year so that continuous monitoring at frequent intervals would be required. The brake shops may really be only the tip of a very large iceberg.

Changing the initial monitoring action level to 0.1 fiber/cc would place a very heavy cost burden on the employer, require a massive use of limited technical resources in an area of low exposure and consequently low risk, and give a very questionable return in terms of worker protection. We recommend that your present standard be retained.

The second reason not to change to a 0.1 fiber/cc action level regards the ability to measure this concentration and I would like to ask my colleague, Dr. Rhodes, to discuss this aspect.

(j) Medical Examinations

The staff has proposed that the requirements for medical examinations be changed from the present one fiber/cc TWA "action level" to 0.1 fibers/cc >5μ as an eight-hour time-weighted average. It is instructive to continue with the brake shops as an example of the potential impact of the proposed regulations on this small-business oriented industry. It has been our observation that a local filling station is likely to have a couple of young mechanics who handle the brake repairs along with other general repair work. The larger franchise type shops may have a dozen or more people who repair brakes with some frequency.

For estimating purposes, it will be assumed that there will be two persons per shop for a total of 40,000 persons requiring pre-employment and annual medical examinations under the new proposed regulations. This does not allow for employee turnover.

Dr. Clark Cooper, who supervises the joint union-employer medical surveillance program for Western Department of the Asbestos Workers Union, has provided an estimate of $60-75 per man for a minimum physical examination to satisfy OSHA requirements. This is on a large-scale contract basis conducted by well qualified personnel. Examinations of an individual or small groups, as would probably be the case for brake repair shops, would increase the costs to approximately $100 each. These costs do not include time spent away from the job to obtain the examination.

At a conservative $50 each, the medical examinations could cost $2,000,000 annually and, obviously, double this to $4,000,000 annually at the

higher unit cost. This discussion, as with monitoring, emphasizes the brake shops. The less well defined construction industry is faced with the additional complications of a transient workforce and moving workplaces.

Although this is clearly a very large cost burden, the fundamental question is not the cost per se, but what is accomplished in terms of worker protection. Although it is admittedly controversial as to what exposure level is "significant", we believe that the present California level of one fiber/cc TWA, or some level in that general vicinity, such as 0.5 fibers/cc is reasonable and meets the California objective of a standard which is enforceable and makes a positive contribution to worker health. The lowering of this level to 0.1 fiber/cc would require a large new investment in time, money, and people by both the employer and the state compliance operation for which we see little if any return in terms of worker protection. We urge you not to make this change.

General Comments

1. Why are the proposed changes a unique problem in California?

It has been noted several times that the proposed changes would make the California standard the same as the Federal standard which is administered by the Federal Government in 26 states. The very legitimate question has been asked as to why a standard which has been in effect for seven years will present a serious problem if it is now adopted in California. The answer is basically very simple; although the Standard has been in effect for seven years there has been almost no Federal enforcement in the asbestos product user areas that would be most seriously impacted by the 0.1 fiber/cc

action level. This would no longer be the case in the more comprehensive California state industrial health activities, so we believe that the compliance and enforcement problems described earlier would soon become clearly evident.

The statement on Federal enforcement is based on a computer printout of all Federal asbestos inspections over a 30 month period from October 1976 through January 1979 that was supplied by OSHA to the Asbestos Information Association/North America. Details are included in Attachment I. In this 30-month time period there was a total of 17 inspections, of brake repair operations basically on large auto dealerships, relative to asbestos. There are about 250,000 brake shops in the country with roughly half estimated to be in states where Federal OSHA is the primary compliance enforcement.

The construction industry has also been mentioned in connection with enforcement and potential impact. The U.S. Department of Commerce published a census of the construction industry for 1972 which showed a total of about 430,000 construction establishments with an employment of about 3,500,000 construction workers.

It is not well defined how many of these establishments use asbestos-containing materials and at how many locations per year they work. Considering that over 60% of the asbestos used in the U.S. is in construction products, the number of both people and work locations could be substantial. The printout mentioned earlier shows a total of 173 asbestos-related inspections in the construction industry in the 30-month period. Considerably more time has been spent in the construction industry than in brake shops to make general inspections but it is clear that only a minute fraction of possible asbestos containing locations has been inspected.

It should be emphasized that the information presented is not intended to be a criticism of the Federal activities or the allocation of the resources

that have been made available to them. OSHA has statutory priorities to consider. It is provided to document the fact that regardless of the reason, the brake repair industry has been subject to virtually no enforcement of the 0.1 fiber/cc action level requirement for monitoring and medical examinations, and the situation is little different in the construction industry. There is no evidence that these provisions are reasonable and workable in the states under Federal administration since they have not been actively enforced on a wide basis.

In contrast to this, the State of California has supplemented their OSHA activities with the Carcinogenic Substances Control Act, a registration provision, a Carcinogens Control Unit, an active consultation program and an experimental voluntary labor-industry joint program. We believe that the incorporation of a 0.1 fiber/cc triggering level into this comprehensive compliance program would soon reveal the gross impracticality of such a level and urge that it not be done.

Concluding Statement

In conclusion, we wish to make certain that the Board has not been left with the impression that Union Carbide is opposed to monitoring and medical surveillance. Union Carbide strongly supports the need for both of these activities where significant asbestos exposures occur. Our plant employees have been provided with regular medical examinations since the plant opened in 1963.

Although it is admittedly controversial as to what exposure is "significant" we believe that the present California level of one fiber/cc TWA, or some level in that general vicinity, such as the 0.5 fiber/cc level adopted by the Board at the April 26, 1979 hearing, is reasonable and meets the California objective of a standard which is enforceable and makes a positive contribution to employee health. To lower this level to the extreme of 0.1 fiber/cc TWA will

extend monitoring and medical examination requirements to about 20,000 brake shops and quite probably an even larger number of construction sites where exposures are generally low. The return, in terms of worker health, on the large new investment of time, money and people by both the employer and the state compliance operation is very questionable and limited technical resources are diverted from more urgent higher risk situations. We urge you to retain your present well written standards for asbestos and not to make the proposed changes that would return them to an outdated Federal requirement.

Thank you for the opportunity to express our concerns.

/dal 8/27/79

April 9, 1976

Docket Officer
Docket H-033
U.S. Department of
Labor
Room N - 3620
200 Constitution Avenue, N.W.
Washington, DC 20210

SUBJECT: OCCUPATIONAL EXPOSURE TO ASBESTOS

Gentlemen:

Reference is made to the proposed rules on this subject published in the Federal Register V. 40, No. 197, PG. 47652, which states that interested persons are invited to comment on or before December 8, 1975 which comment period was subsequently extended to April 9, 1976.

Union Carbide is involved in the mining, milling and marketing of asbestos and we believe that the proposed rules will have a significant negative impact on our business. The attached presentation documents our position on the proposed revisions to the Occupational Standard on Airborne Asbestos. Our recommendations focus on the issue of insuring that the small or intermittent user of asbestos fiber is able to provide a safe work place for his employees without being unduly burdened by administrative or monitoring procedures.

This presentation submitted this date also incorporates by reference the position expressed in the presentation by the Asbestos Information Association/North America to the Occupational Safety and Health Administration, United States Department of Labor entitled:

Notice of Proposed Rulemaking
Occupational Exposure to Asbestos

29 CFR Part 1910
Federal Register, Vol. 40, No. 197, October 9, 1975

Asbestos Industry Response.
9 April, 1975

in which the name of Union Carbide Corporation appears as an endorser.

We reserve the right to provide additional comments at any public hearing which may be scheduled relative to this rulemaking.

Very truly yours,

W. C. Thurber (H.S.R.)

W. C. Thurber
Business Manager-Asbestos

WCT:dal

bcc: Messrs. G. G. Gabrielson, Jr. - AIA/NA Task Force Chairman
J. J. Kenney
R.F.X.Fusaro
D. M. Mintzes
Dr. H. B. Rhodes
D. H. Mennonese AIA/NA

A08533

UCC 014013

PRESENTATION TO THE

OCCUPATIONAL SAFETY AND HEALTH ADMINSITRATION

UNITED STATES DEPARTMENT OF LABOR

IN REGARD TO THE

NOTICE OF PROPOSED RULEMAKING

OCCUPATIONAL EXPOSURE TO ASBESTOS

29 CFR Part 1910

Federal Register, Vol. 40, No. 197, October 9, 1975

On behalf of

UNION CARBIDE CORPORATION

Date Submitted

April 9, 1976

A08534

INTRODUCTION

Union Carbide Corporation has been actively engaged since 1962 in the mining and milling of asbestos ore at facilities in central California. This asbestos is marketed throughout the United States and in many foreign countries. Union Carbide is a substantial supplier of short-fiber asbestos, similar to Canadian Grade 7, for the manufacture of floor tile, for tape joint compounds used in drywall finishing, and for oil-well drilling muds. We also supply highly refined asbestos fiber to about three hundred manufacturers of caulks, sealants, coatings, adhesives, mastics and similar materials that are widely used in the construction and automotive industries. We do not supply the longer fiber asbestos used for cement, fireproofing, or insulation products nor do we manufacture any asbestos-containing products.

The great majority of our customers are small businessmen in the secondary and consumer asbestos industries who have limited technical capabilities and resources. We are greatly concerned with the impact of the Proposed Rulemaking on these moderate sized but numerous users of asbestos. OSHA has recognized that this is a serious problem by the exclusion of the Construction Industry from the Proposed Rulemaking and the request for suggestions for appropriate provision for other industries with similar problems as contained on page 47657 in the Preamble to this rulemaking; vis.:

> "While the proposal does not address itself to specific alternatives, OSHA invites comments concerning options which would both provide full protection to affected employees and at the same time would minimize the administrative and economic burden on affected employers - especially those with small numbers of employees, non-fixed work places, or highly transient work forces."

The main purpose of this presentation is to discuss the specific alternatives requested. Certain portions of the Proposed Rulemaking which we feel are inconsistent with the mandate given to OSHA in the Occupational Safety and Health Act (hereinafter referred to as the Act) are also discussed.

The Proposed Rulemaking as well as the Asbestos Standard promulgated in 1972 are written to be applicable to conditions which normally occur in large, fixed places of employment, i.e., stable work forces who handle asbestos or asbestos-containing products for a major portion of most workdays throughout their working life. The application of such regulations to conditions where there is significantly less exposure is unnecessary and inequitable. It appears to be well within the scope of the Act to make allowances for this condition.

The Act also makes a clear distinction between monitoring, medical surveillance and the attendant recordkeeping requirements that are intended to protect today's worker and those which are intended for research. Unfortunately, the Proposed Rulemaking does not reflect this distinction and consequently the <u>entire industry</u> would be required to operate as a closely-controlled epidemiological research experiment. This will result in a tremendous expenditure of scarce industrial hygiene and medical resources as well as money to amass vast amounts of information of which only a miniscule fraction will ever be used. It is this portion of the Proposed Rulemaking

which is extremely burdensome to the large asbestos users, that becomes overwhelming when applied to the smaller and infrequent users.

Union Carbide believes that the Proposed Rulemaking should be modified to recognize the large gradation in exposure and the corresponding large gradation in hazard that exists in the working population to be covered. Research requirements should be defined and treated in a specific way, not imposed broadside on the entire industry. If this is done, the main difficulties for most employers with small numbers of employees, non-fixed work places, or highly transient work forces that are noted by OSHA would be solved in a realistic and equitable fashion without decreasing worker protection or imposing large, unnecessary costs on the employer. It also seems inappropriate that OSHA should proceed with new rulemaking without making specific provisions for the serious problems of small businesses, non-fixed work places, or highly transient work forces that are known to exist in the present standard.

GENERAL COMMENTS - PROPOSED RULEMAKING

It was suggested in the previous section that the Proposed Rulemaking should be modified to allow for differences in the overall level of exposure experienced by different workers during their working lifetimes. This suggestion is in accord with the provisions in paragraphs 6104 and 6114 of the Act. Section 3, Definitions, paragraph 6104 states:

> "(8) The term "occupational safety and health standard" means a standard which requires conditions, or the adoption and use of one or more practices, means, methods operations or processes, reasonably, necessary, or appropriate to provide safe or healthful employment and places of employment." (Emphasis added.)

Section 6, paragraph 6114, Criteria for Standards, states:

> "(5) The Secretary, in promulgating standards dealing with toxic materials or harmful physical agents under this subsection, shall set the standard which most adequately assures, to the extent feasible, on the basis of the best available evidence, that no employee will suffer material impairment of health or functional capacity even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life." (Emphasis added.)

The key words here are "... reasonably necessary and appropriate" and "... regular exposure... for the period of his working life." A standard which is reasonably necessary for a worker who has regular exposure for the period of his working life is not reasonably necessary and may not be feasible for work situations of irregular exposure for periods considerably less than a working life. It is certainly appropriate to recognize this difference in the health standard.

It was also suggested in the previous section that the Proposed Rulemaking does not make any distinction between monitoring, medical examinations, and the attendant recordkeeping requirements needed to protect the worker and enforce the Act and those that are mainly for research purposes. The basis that such a distinction should be made is found in Sections 6, 8 and 20 of the Act.

With regard to monitoring, Section 6, Labels, Warnings-Protective Equipment, states in paragraph 6116:

> "(7) ... Where appropriate, such standard... shall provide for monitoring or measuring employee exposure at such locations and intervals, and in such manner as may be necessary for the protection of employees." (Emphasis added.)

Section 20, Research and Related Activities, states in paragraph 6190:

> "(5) The Secretary... in order to develop needed information....may prescribe regulations requiring employers to measure, record, and make reports on the exposure of employees..." (Emphasis added.)
>
> "Upon the request of any employer who is required to measure and record exposure of employees... as provided under this subsection... the Secretary... shall furnish full financial or other assistance for the purpose of defraying any additional expense incurred by him in carrying out the measuring and recording as provided in this section." (Emphasis added.)

With regard to medical examinations, Section 6, paragraph 6116 states:

> "... where appropriate, any such standard shall prescribe the type and frequency of medical examinations and other tests... in order to most effectively determine whether the health of such employees is adversely affected by such exposure. In the event such medical examinations are in the nature of research... such examinations may be furnished at the expense of the Secretary of Health, Education and Welfare." (Emphasis added.)

Section 20, Research and Related Activities, states in paragraph 6190:

> "The Secretary... also is authorized to establish such programs of medical examinations and tests as may be necessary for determining the incidence of occupational illnesses and the susceptibility of employees to such illnesses."

With regard to recordkeeping, Section 8, in paragraph 6128, Accident and Illness Records, states:

[redacted]

> "(C) (1) Each employer shall make, keep and preserve ... such records regarding his activities relating to this Act as the Secretary....may prescribe.... as necessary or appropriate for the enforcement of the Act or for developing of information regarding the causes and prevention of occupational accidents and illnesses." (Emphasis added.)

It has already been noted that Section 20 provides for financial assistance for monitoring records obtained and retained for research purposes.

Finally, the extent of recordkeeping which can be required by the Secretary is clearly limited by Section 8, paragraph 6130, which states:

> "(d) Any information obtained by the Secretary.... under this Act, shall be obtained with a minimum burden upon employers especially those operating small businesses. Unnecessary duplication of efforts in obtaining information shall be reduced to the maximum extent feasible." (Emphasis added.)

The key point to note in these quotations is that Congress, in writing the Act, made a clear and repeated distinction between monitoring, medical examinations and recordkeeping that were intended to protect the employee and those which constituted research. One of the major shortcomings of the Proposed Rulemaking is the failure to incorporate this distinction into the regulations. Every employer, large and small, is required to prepare the same very detailed records and store them for 40 years or more.

The Preamble to the Proposed Rulemaking discusses the concept of the "technical feasibility" of the suggested new rules but does not clarify what is meant by this term. In fact, the crucial words "to the extent feasible" are omitted when the relevant section of the Act is quoted on page 47053, Column 3 in the Preamble. In view of the extremely low allowable exposure levels proposed by OSHA and the possible differences in what is feasible in various occupational situations, it is particularly important to establish the meaning of these words in the context of the Act.

The phrase, "... to the extent feasible" was an amendment to the Act offered by Senator Javits. The Senator explained the rationale of the amendment as follows:

> "As a result of this amendment, the Secretary, in setting standards, is expressly required to consider feasibility of proposed standards. This is an improvement over the Daniels Bill, which might be interpreted to require absolute health and safety in all cases, regardless of feasibility, and the administration bill, which contains no criteria for standards at all." S. Rep. No. 91-1282, 91st Cong., 2d Sess., at p. 58; Legis. Hist. at p. 97.

A08538

In Industrial Union Department, AFL-CIO, et. al, vs. Hodgson, 499 F. 2d 467, (C.A.D.C., 1974) (Appeal on First Asbestos Standard) the Court concluded that economic factors as well as technological factors are integral components in the concept and determination of feasibility.

The Court states at p. 477 in this decision:

> "There can be no question that OSHA represented a decision to require safeguards for the health of employees even if such measures substantially increase production costs. This is not, however, the same thing as saying that Congress intended to require immediate implementation of all protective measures technologically achieveable without regard to their economic impact." (Emphasis added.)

and at p. 478:

> "Congress does not appear to have intended to protect employees by putting their employers out of business-either by requiring protective devices unavailable under existing technology or by making financial liability generally impossible." (Emphasis added.)

It is evident from these passages that the basic objective of the Act is to protect the health and safety of the worker to the extent that is technologically and economically feasible. This distinction becomes particularly relevant when the medical examination and recordkeeping provisions of the Proposed Rulemaking are applied to small businesses, transient work places, and transient work forces.

SPECIFIC COMMENTS - PROPOSED RULEMAKING

Sections 1910.1001 (a) Scope and Application and (e) (1) Monitoring, Initial

With the exception of the construction industry, which will be covered separately, the Scope and Application section is virtually universal. It not only covers products where commercial asbestos is deliberately introduced but also where even minute quantities are present as impurities in any of the raw materials. This is expanded greatly by the inclusion of tremolite, a frequent impurity in talcs, in the definition of asbestos without any distinction between the asbestiform and non-asbestiform varieties of this mineral. Finally, the use of the word "stored" brings under the regulation every place where a product containing asbestos is present whether or not it is even removed from the package.

This universal definition of Scope and Application is combined in the Proposed Rulemaking with paragraph (e) Monitoring, which requires an initial monitoring at "... every place of employment where asbestos fibers may be released". At least a second monitoring must also be made regardless of the initial results. This differs substantially from the present regulations where the initial monitoring is needed only at places where asbestos fibers are released and in many situations further monitoring is not required.

It has been estimated[1] that there are approximately 258,000 places of employment in the secondary asbestos industries and 140,000 places in the asbestos consumer industries. Under a literal interpretation of the proposed regulation, it could be construed that fibers "may be released" at all of these locations. This is so, even though by the very nature of these operations a substantial portion are already in compliance with the proposed 0.5 fiber TWA standard. A monitoring requirement of staggering proportions results.

At the present time there are 90 laboratories participating in the NIOSH PAT Program to demonstrate competence to count airborne asbestos fibers. Approximately 70 of these are large company laboratories or are operated by states for compliance purposes and are not available for outside counting. A dust count by a consulting laboratory costs about $400. At this rate it would cost $320,000,000 to provide the 800,000 surveys that would be mandated by the Proposed Rulemaking. Due to geographical limitations and the need to collect sufficient samples to calculate an 8-hour time-weighted average it is estimated that each of the 20 laboratories could sample about two locations per day. At this rate it would take about 80 years to carry out this initial screening. It is recognized that some laboratories can handle more than two locations per day and more people are entering the field, but it must also be remembered that asbestos is only one of about 400 substances to be regulated. The same pool of trained personnel will be needed to provide similar services for these other materials. It is clearly impossible for industry to comply with this provision of the proposed standard.

We feel that this sweeping monitoring program mandated without regard to the potential hazard that actually exists at the places to be monitored is <u>not</u> "... reasonably necessary or appropriate to provide safe or healthful employment and places of employment." In addition, it is not "... necessary or appropriate for the enforcement of the Act or for the development of information..." or for research. It is a grossly unreasonable financial burden on the employer and a poor and inefficient use of limited industrial hygiene resources. As such it detracts from rather than adds to the protection of the workers. Finally, the words "may be released" without any qualification as to quantity, frequency or even probability that such an event will actually occur are too vague to be enforceable and are inappropriate in a regulation of this sort. It would also appear that they do not meet the requirements of the Criteria for Standards expressed in paragraph 6114 of the Act:

> "Whenever practicable, the standard promulgated shall be expressed in terms of objective criteria and of the performance desired."

A08540

It is suggested that the difficulties can be corrected within the provisions of the Act if an initial assessment of the hazard potential based on available information is required. Where suitable information for a reasonably reliable assessment is lacking it would need to be obtained. Monitoring would only be required where such an assessment could not be made or where there was a reasonable possibility that either of the allowable limits would be exceeded. Such an approach is well accepted industrial hygiene practice.

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(1) Technological Feasibility and Economic Impact of OSHA Proposed Revision to the Asbestos Standard. Prepared by Roy H. Weston, Inc., March 29, 1976.

As an alternative, the exception for bound fibers now used in the Proposed Rulemaking in connection with Danger Labels, paragraph (l) (2) could also be applied to monitoring. A suitable wording would be:

> "Monitoring is not required for asbestos or asbestos containing products where asbestos fibers have been modified by a bonding agent, coating, binder, or other material so that during any reasonably forseeable use, handling, storage, disposal, processing, or transportation no airborne concentrations in excess of either of the limits specified in paragraph (c) of this section are released."

This second wording has an advantage that this type of provision was adopted by the Construction Industry OSHA Advisory Committee at their meeting on September 17-18, 1975. It would remove one of the major problems in the application of the Proposed Rulemaking to the construction industry and the other problem areas that are the subject of this discussion.

Paragraph (c) Permissible Exposure to Airborne Concentrations of Asbestos Fibers

In arriving at the proposed 0.5 fiber/cc standard, OSHA has stated in the Preamble to the Proposed Rulemaking:

> "OSHA recognizes that there is no assurance of a safe exposure for a substance with known carcinogenic property, in this case asbestos, and thus there should be no detectable concentrations."

And:

> "While some level, below which exposure to a carcinogen does not cause cancer, may conceivably exist for any one individual, other individuals in the working population may have cancer induced by doses so low as to be effectively zero."

In taking this position OSHA has embraced the new "one-hit" hypothesis that is speculative and unproven. We feel that at this time, this theory does not meet the "... on the best available evidence..." requirement stated in paragraph 6114 of the Act. It is also questioned whether it is suitable under the "... with respect to questions of fact, if supported by substantial evidence on the record considered as a whole, shall be conclusive..." provisions of paragraph 6142, Judicial Review.

A08541

Paragraph (d), Regulated Areas

This paragraph introduces a new concept to the asbestos regulations wherein "any work area where a person may be exposed to airborne concentrations of asbestos fibers in excess of either of the limits shall be designated as a regulated area." The existence of such an area in a plant triggers very substantial additional compliance obligations of prohibited entrance by other

[redacted]

persons, warning signs, rosters, change rooms, lavatories, hygiene programs, prohibited activities in such areas and an employee training program. In many cases compliance can only be achieved by extensive relocation of equipment.

The basic concept of the regulated area is certainly a means to limit exposure to as few people as practicable but the use of the "may be exposed" wording is so vague that almost any place where unbound asbestos fiber is used can be construed to be a regulated area. We feel that regulated areas should be clearly defined as places where there is actual regular exposure of levels over the allowable limit. The speculative phrase, "may be exposed" is too vague to be enforceable and is inappropriate language for a regulation. This change would reduce the number of regulated areas to those places where a hazard exists and greatly reduce the burden for all industry and particularly those for the occasional or short term user and for non-fixed work places.

Paragraph (d) also provides for a daily roster of all persons entering a regulated area. This is clearly an attempt to obtain very detailed work history records for research. The corresponding exposure data would only be measured once a month, would not match the roster in detail, and would thus negate the value of such a roster. The same information, to the degree of detail that could possibly be needed for research, can easily be obtained from employee assignment records. The roster requirement is thus in conflict with paragraph 6130, Obtaining Information, in the Act which requires that information be obtained with a minimum burden upon employers. This portion of paragraph (d) should be deleted.

Paragraph (f), Methods of Compliance

The Proposed Rulemaking requires that engineering controls be installed, "except to the extent that such controls are not feasible", whether or not such controls will reduce exposure to allowable levels. Work practice controls must be used to supplement engineering controls where needed and, finally, respirators are permitted as a last means of compliance.

Engineering controls and work practices both protect the employee by reducing his exposure. Neither method is absolutely reliable and both are subject to mechanical and human failure. We feel that making engineering controls pre-eminent exceeds the "reasonably necessary or appropriate" provision of paragraph 6104, Section (3) subpart 8 of the Act and that engineering controls and work practices should be equally acceptable procedures to achieve compliance. In addition, Union Carbide takes strong exception to the apparent attempt to place the burden of disproving the existence of feasible engineering controls on the employer. The burden of proof has been shifted from the regulator to the regulated whereby the latter would, in effect be required to prove a negative to establish his innocence. This is contrary to the intent of the Act and repugnant to basic regulatory principles and the tradition of due process.

As noted previously, Section 6, paragraph 6114 of the Act, Criteria for Standards includes the words:

> "... even if such employee has regular exposure to the hazard dealt with by such standard for the period of his working life." (Emphasis added.)

It is certainly appropriate that OSHA provide a standard which meets these criteria for protection of the employee with regular exposure for the period of his working life. In view of the "to the extent feasible" wording in this same paragraph and the subsequent court ruling, IUD, AFL-CIO vs. Hodgson, on this subject that was discussed previously, it is questioned whether it is "reasonably necessary or appropriate" to apply this same standard to employees with irregular exposures or who are regularly exposed for only a moderate fraction of their working life.

This problem is exemplified by a worker who, although at a fixed place of employment, dumps a few bags of asbestos into a process vessel once a day. This situation is widespread, for example, in the great multiplicity of small businesses where adhesive and specialty coatings are manufactured as a small part of a broader line of products. In many cases engineering controls that would only be used intermittently for short periods would impose a prohibitive financial burden. We feel that it is appropriate and within the scope of the Act to permit the use of respirators with suitable limitations on the time they may be worn in any shift, as the primary means of compliance when asbestos is used only intermittently or occasionally. This would also facilitate compliance in many non-fixed work places, or small businesses which would have great difficulty in complying with the proposed regulations.

Paragraph (g) (3) (iv)

The Proposed Rulemaking moves further than the present standard in it's requirements for the transfer to other employment of any employee who is found to be unsuitable to wear a respirator. Further, in the Preamble, page 47658, OSHA states:

> "If warranted, OSHA may consider job reassignment based on medical unsuitability, per se, as the subject for a separate rulemaking procedure."

There is no authority in the Act for OSHA to include this subject in any regulation promulgated thereunder. It is a complex subject impinging on labor relations, workmen's compensation, and other existing legislation. It is suggested that this is a more fitting subject for collective bargaining.

Paragraph (i), Hygiene Facilities and Practices

Subsection (4) of this paragraph states:

> "Clothes lockers and shower facilities shall be arranged so as to separate regulated areas and uncontaminated areas." (Emphasis added.)

Subsection (5) states:

> "Lavatory and toilet facilities which are located in regulated areas shall be arranged so that no access is available from them to uncontaminated areas." (Emphasis added.)

The meaning of these provisions is not entirely clear but it would appear that OSHA envisions that each regulated area will be segregated physically by a fence or other means and that the only entrance and exit will be through shower and change rooms. There is no provision for raw materials to enter or products to leave except through the shower and change room. If this is OSHA's intent it clearly exceeds the "reasonably necessary or appropriate" criteria for standards and when applied to small businesses and non-fixed places of employment is generally not feasible. Locker rooms and shower facilities are already subject to the allowable levels prescribed in the regulations and regulated areas are set off by warning signs. These additional provisions are confusing, unnecessary, and unworkable, and should be deleted.

This section of the Proposed Rulemaking also states that:

> "... employees....shall be required to shower before leaving at the end of the work shift."

And:

> "Employees... shall be required to wash hands, face, and forearms prior to eating, drinking, or smoking."

There is no question that these are very desirable personal hygiene procedures but to make it a citable offense for the employer if the employee refuses to follow them is unreasonable. The employer can only provide the facilities, educate the employee on the need and desirability to use them, and encourage him to do so.

Actually, the Act is quite clear on the responsibility in this case. Paragraph 6103, Enumerated Purpose, states:

> "(2) By providing that employers and employees have separate but dependent responsibilities and rights with respect to achieving safe and healthful working conditions;"

This point is emphasized in the general duty provisions of Section 5 (b) which states:

> "(b) Each employee shall comply with occupational safety and health standards and all rules, regulations, and orders issued pursuant to this Act which are applicable to his own actions and conduct." (Emphasis added.)

We feel that OSHA has exceeded the mandate granted in the Act by proposing to make employers responsible for the personal hygiene of their employees and has failed to comply with a clear-cut intent in the Act by not making each employee directly responsible for compliance with rules applicable to his own conduct.

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Paragraph (j), Medical Surveillance and (n) Recordkeeping

The present asbestos regulations require an annual medical examination for every employee in any occupation exposed to "airborne concentrations of asbestos fibers." A recent review commission decision found that this was not

limited to exposure levels over the allowable limits but to any level whatsoever. The Proposed Rulemaking continues this provision and increases the time that the employer must store the medical records. It is also proposed that monitoring records be kept for the same extensive period of 40 years or more. It is in these provisions that OSHA has failed to distinguish properly between employee protection and research. As a result, the proposed regulations place an extreme and unnecessary burden on all employers and an even greater and more unnecessary burden on employers whose employees are not regularly exposed for the period of their working lives.

The Weston study cited previously estimates that about 15 million workers will be required to have annual medical examinations under the Proposed Rulemaking. This does not include an estimated 3-5 million additional workers engaged in the construction and shipyard industries. It also obviously does not include workers covered by similar OSHA standards now in effect or being promulgated under the standards completion programs who would be obtaining examinations from the same "pool" of medical practitioners.

At the present time there are approximately 350,000 licensed physicians in the United States. Estimates of the number who have a registered specialty in industrial medicine or have acquired special knowledge in this area as a result of their particular practices vary from 2000-5000. For 5000 physicians to give 20,000,000 examinations annually in accordance with the Proposed Rulemaking would require an average of 4000 examinations per year per physician, an obvious impossibility. To use this limited resource most efficiently medical examinations should be required only for those workers exposed to levels over the allowable limits.

It is well documented in medical research that there is typically a 20 year latent period before the appearance of asbestos related disease and that this period generally increases as the exposure level goes down. On this basis, annual examinations for at least the first 10 years of exposure do not contribute to the protection of the worker or provide research information. A tremendous decrease can be made in the medical examination burden without detracting from worker protection by reducing the examination period to once every 5 years for the first 10 years of employment. This would also make the regulation more reasonable for transient work force conditions and reduce the recordkeeping load.

It is clear from the Act that OSHA has a research responsibility to fulfill. The Proposed Rulemaking does this by adding to the universal medical examination requirements, universal provisions for keeping all of the medical and the corresponding monitoring records for 40 years or more. Successors to the business must keep such records and only in the case of a complete shutdown can the records be sent to the Secretary.

We question the need for a 100% cohort of about 20,000,000 workers to obtain valid epidemiological conclusions. What is the real possibility that any future study will examine the history of more than a very small fraction of this overwhelming mass of data? This is especially true if the regulations which have been adopted result in the elimination of asbestos related disease as expected. The motivation and funds to analyze these data will neither be available nor required. Union Carbide believes that the requirements that such records be kept 40 years or more by all employers is not "necessary or appropriate" for the protection of the worker and grossly

exceeds any reasonable requirements for "determining the incidence of occupational illnesses." It is also in conflict with the "minimum burden" provisions of the Act.

Instead of this impractical, cumbersome, and grossly excessive approach it is suggested that the research requirements of the Act can most effectively be met if OSHA will set up a planned research protocol with realistically sized cohorts for the range of exposure conditions to be studied. The workers covered would be designated and their records sent to OSHA at 5 year intervals. This would remove the necessity for long term storage of millions of records and employers would be permitted to discard such records after a 5 year period.

SUMMARY

Union Carbide believes that the Proposed Rulemaking which has been written to protect workers who are regularly exposed to the asbestos hazard for their entire working lifetime, is excessively burdensome and is not "reasonably necessary or appropriate" for the majority of workers who have a lesser degree of exposure. There is good basis in the Act to consider this gradation of exposure. Union Carbide also believes that the treatment of the entire industry as a large epidemiological experiment far exceeds the provisions of the Act for both worker protection and for research.

The following suggestions are offered to make the regulations more appropriate both for large fixed places of employment and for the particular problems encountered by employers with small businesses, non-fixed work places, transient labor or intermittent exposure.

1. Limit medical examinations to those workers regularly exposed to levels over the allowable limits. Such examinations would be at 5 year intervals for employees with less than 10 year exposure.

2. Define realistically-sized cohorts of workers who's medical history will be followed extensively to satisfy the research requirements of the Act. Records for these workers would be sent to the Secretary at 5 year intervals. Mandatory storage of records by employers would be limited to 5 years.

3. Narrow the definition of regulated areas to include only those places where the allowable levels are regularly exceeded.

4. Not require initial monitoring at those places where there is no reasonably foreseeable possibility that the allowable limits will be exceeded.

5. Make engineering controls and work practices co-equal methods to achieve compliance. Allow limited use of respirators as the primary means to achieve compliance for intermittent and short-term exposure conditions and for small businesses.

6. Delete the special requirements relative to the location and arrangement of change rooms and shower facilities and operate such facilities under the regular provisions of the Act.

ORAL PRESENTATION BEFORE THE CALIFORNIA STATE OCCUPATIONAL SAFETY AND HEALTH STANDARDS BOARD,

NOVEMBER 8, 1978

Mr. Chairman, Members of the Standards Board.

My name is Harrison Rhodes and I am employed by Union Carbide Corporation.

The continued use of certain products wherein the asbestos fibers are wetted and encapsulated is extremely important to a large number of California manufacturers and users. They are represented here today by a number of experts who are prepared to answer any technical or business questions you may have.

You have already received our written testimony and there is little point in reiterating it here today, although we can discuss it more thoroughly at your discretion. My intent is to show you some samples of the products so you can see what we are talking about. These samples show both the products in the form to be sprayed and the final product after cure. I will also summarize a spraying study which appears to be quite relevant and which came to my attention after the written testimony was prepared. A complete copy of this report was submitted to Mr. Rinaldi yesterday and may be in your folders.

Let me emphasize that we are discussing only products where the asbestos fibers are wetted and encapsulated from manufacture through final usage. These include the coating and laminating materials and both types of fibrated roof coatings, that is those manufactured from cold-process cut-back asphalt and those from emulsified asphalt. We are not addressing the Portland cement plaster or the naturally occurring impurity portions of the hearing.

As a frame of reference, let us first look at the asbestos-containing spray insulation material of the type that was the principal target of the 1974 legislation (60% mineral wool, 25% asbestos, 15% Portland cement.) This is the material as it was delivered to the construction site and this is what it looks like after application. Notice that I can pull it off with my fingers and crumble it to a powder. To use the Federal EPA definition - it is friable. Excessive dust generation would be expected during field mixing and during renovation or removal. There are no objections to the banning of these materials and any like them.

In contrast to this extremely friable material, all of the products for which we are requesting exemption must perform a protective or structural function which is defeated if they become friable. The first examples are a polyester laminating resin containing about three-quarters of one percent asbestos and a maintenance coating with about 2.5%. The laminating resin is used in conjunction with fiberglass to build up strong, rot-resistant structures such as boats. This is an example of one layer of the cured product. It is normally built up in layers to a thickness of a quarter of an inch or more. This is the finished maintenance coating containing 2.5% by weight asbestos. It is also hard and definitely not friable.

Next are two examples of roof coatings. This one has an emulsified asphalt base and this one uses cutback. They contain about 9 and 7 weight percent asbestos after cure, respectively. Note that the cured coating is slightly flexible or resilient. These products must be formulated this way to allow for the effects of temperature change. A set of roofing product samples containing a much wider range of asbestos contents has been prepared by the W. W. Henry Company and will be described subsequently by Mr. Paul Beemer, the General Manager of that company.

The spraying test I mentioned earlier, which was not included in our written testimony, was conducted by a consulting firm for the H. B. Fuller Company. This study was submitted by H. B. Fuller as part of their testimony on a proposed Federal EPA regulation on the spraying of asbestos-containing materials.

The materials sprayed consisted of a series of mastics used to provide weather-barrier coatings over soft thermal insulation on tanks, roofs, lines, etc. Asbestos contents were 1.8, 6.6, and 14.3% by weight chrysotile and a mixture of 13.7% chrysotile and 34.9% of Asbestine Fiber #2 talc. It is important to note that although Asbestine Fiber #2 is talc, not asbestos, it does contain a substantial portion of mineral particulate which would have been counted as asbestos by the consultant making this study if it became airborne.

The mastics were sprayed under two sets of conditions; in a closed 20x20 foot room to approximate the worst possible case, although the products are not normally used indoors; and in an outdoor application. The airborne fiber counts found are presented in this figure in the same manner as the other data in Figure 1, page 10, in the testimony. The fiber concentration in fiber/cc longer than 5 microns is shown on the vertical axis. The present DOSHA allowable limits of 10 fiber/cc ceiling, 2 fibers/cc TWA and the 1 fiber/cc maximum TWA set by SB-1591 are shown for reference. The four mastics are arranged in order of increasing mineral content from 1.8 to 48.6% by weight after cure.

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The solid circles show the operator breathing zone concentration. These are all in the 0.1 - 0.2 fiber/cc range. The bars show the maximum or ceiling values, the range, and the arithmetic mean for the area samples in the immediate vicinity of the spraying operation. The highest value found was about 0.5 fiber/cc for the non-typical interior spraying of the Hi Mastic. The remaining values were in the zero to 0.2 fiber/cc range. As an added

point of interest, the Gallo Company sprayed 40,000 gallons of the Monolar Mastic containing 6.6% asbestos to insulate the exterior surfaces of wine storage tanks located out-of-doors in Modesto. Air samples were collected on membrane filters. No airborne fibers were detected by microscopic examination.

The important point to note in these data is that the airborne fiber concentrations are all very low with no clearly defined trends with mineral content in the material being sprayed up to a total mineral loading of 48.6% by weight after cure. This result is very similar to the spraying and product removal data given in Figure 1, page 10 of the written testimony, indicating quite conclusively that the airborne asbestos exposure does not change a measureable amount with the asbestos content as long as the fibers are thoroughly wetted and encapsulated. For these products to be commercially useful, they must be wetted and encapsulated.

To conclude, the products with which we are concerned perform a useful and valid service for industry and for the general public. They contain wetted and encapsulated fibers which do not expose workers to fiber levels in excess of those established by DOSHA or SB-1591. We would not be here today if we were not convinced that the products could be used safely and within the confines of existing regulations. We request that continued use of these products be permitted by your action to modify Section 5208, Title 8, as suggested in our written testimony including a maximum allowable TWA exposure of one fiber/cc >5μ.

Thank you very much for the opportunity to express these views. With your permission, Mr. Paul Beemer would like to present the additional samples mentioned earlier.

Union Carbide Corporation
Metals Division
Niagara Falls, NY 14302
November 30, 1976

MEMORANDUM

To: J. L. Myers

From: H. B. Rhodes

B-10

RECEIVED
DEC 6 1976

Copies: R. E. Byrne, Jr.
T. P. Norris
R. L. Schult
W. C. Thurber
File

Subject: Status of Denver Drywall Asbestos Problem

Denver Drywall is the drywall contractor for the Johns-Manville World Headquarters in Denver. They were using a mud manufactured by a UCC customer, Drywall Supply, as the first coat in a three-coat finishing procedure. This mud contained about 1% SG-210. The mud used for the other two coats contained no asbestos. By a communications mix up, Denver Drywall was under the impression that the Drywall Supply mud also did not contain asbestos and had so certified to Turner Brothers, Inc. the prime contractor on the job.

On July 15, 1976, the site was inspected by Colorado State OSHA in response to an employee dust complaint. Denver Drywall received asbestos related citations for lack of monitoring and lack of medical examinations. Turner Brothers received a citation for lack of medical examinations.

Following the citations, UCC collected and analyzed dust samples at the J/M site (where no asbestos was now being used) and at another site where the previous system, i.e. base coat only contained asbestos, were in use. Our results indicated that asbestos exposures were so low that it was unlikely that they could be proven to be different from background levels.

Denver Drywall filed notice of opposition and an informal conference was scheduled. Denver Drywall pushed the position that OSHA had not adequately demonstrated exposure, and if there was exposure it had not come from their wet mud. OSHA which was obviously in a weak position offered as a compromise to remove all fines and accept the offer to the employees of one physical examination by Denver Drywall and 4-5 by Turner as meeting compliance.

Mr. Mitchell, the president of Denver Drywall, was seeking our comments on the desirability of not accepting this compromise and going on to the review commission as a matter of principle and to help with the overall battle with OSHA. The UCC involvement would be, at the least, the provision of expert testimony on monitoring results and procedures. I told Mr. Mitchell that I felt that the technical merits of his position were solid but that this did not look to me like a good place to do battle on the monitoring reliability question. The strong appreciation of both UCC and the AIA/NA for his willingness to help was expressed.

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At the present time Mr. Mitchell is extremely annoyed at Drywall Supply for misleading him and is not using any asbestos-containing muds. If a realistic set of construction regulations can be obtained from the current negotiations with OSHA he is a likely cqndidate to go back to such muds. He is one of the largest drywall contractors in the Rocky Mountain area and is quite influential in the national affairs of the contractors association.

H. B. Rhodes

H. B. Rhodes

HBR:dal

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