FILE NAME: Union Carbide (UC)

DATE: 1986 Sept 24

DOC#: UC026

DOCUMENT DESCRIPTION: Legal - Deposition of Robert Peele, Exhibits Only

LAWRENCE MADEKSHO
ATTORNEY & COUNSELLOR AT LAW
8320 GULF FREEWAY
SUITE 218
HOUSTON, TEXAS 77087

(713) 641-0251

September 24, 1986

Dr. Barry Castleman
1722 Linden Avenue
Baltimore, Maryland 21217

Re: Robert Peele Reports Regarding Kaylo Tests Which Were Done At Union Carbide (1962-63)

Dear Barry:

I have enclosed all the exhibits from the Robert Peele deposition that was taken on September 10, 1981, concerning the above subject. Let me know if I can be of any other help, and please give me a call if you hear of any other hot items surfacing.

Your pal,

Larry

LM:em
Enclosures

P-9
9-9-61
R.J.A.

Friday, February 8, 1963

39th day – 326 days follow

WENT STRAIGHT TO S. CHARLESTON @ 7:30

TO COUNT DUST

(1) COUNTED ALL SAMPLES RECEIVED ON THURSDAY

(2) CALLED DON MAHONEY & SET UP NEW DUST SURVEY FOR WEEK OF 2-18-63 TO CHECK ACME THEN RICHMOND

LATER

(3) TALKED TO HERB KAUFMAN

LEFT @ 6:00 & WENT TO INSTITUTE TO PICK UP DATA FOR DUST EVAL.

9-9-81
J.F.A.

P-10

Tuesday, March 12, 1963

71st day – 294 days follow

Arr 7:30 Ply

1) Called Tom Higgins for Cost Info on Aqueous Waste Incineration but Got No Answer

2) Called Golden Hutton for Cost Info. on Sewage Maintenance But Got No Answer

3) Talked to Hutchinson About Rejection on AIHA Request

4) Went to Tech Center Conf. for Melting with Bob Harper, Art Creamer, & CD Hodges On S. Charleston Waste Disposal Dump Problem. Finished Meeting @ 12:00 & Ate @ Cafeteria. Then Met With Nicut – Filled Him In On Meeting & Discussed AIHA Rejection.

5) Returned to Plant & Met with Ed Sluder To Obtain Info. on Fibrex Poundage & Cubage Disposal Material – Also Sent Copy of Form for Info to Doug Bess

6) Discussed Visit To Chet h. on Bird Problem with Dave Steinmetz – To Go Tomorrow

7) Saw Harold Combs About Vapor Problems 3 D.O.P. & Questioned Him About Possible Substitution of Different Type of Sleeves.

8) Talked to Hells. Hautchinson About Results of Port Check with Viscosity Tec

P-11
9-9-81
I.J.G.

ARR 1:45 PM Very Hot

(1) Took Phillip Carey Letter to Hazel for Typing

(2) Visited Clock House With Dave Sweinhart to Check Out Starling Tape Setup

(3) Called Golden Hutton & Asked For Cost Figures On Operational Expenses @ The Jeffrey

(4) Called Tom Higgins & Got Info. On Cost etc. For Aqueous Waste Incinerator

(5) Talked To Jim Nichols About TDI & Phosgene Problems @ New TDE Unit

(6) Talked To Billy Allen About Meeting Either Thursday Or Friday Morning About Noise & Degreasers

(7) Talked To Jack Young About Phthalic Acid Burn. Then Contacted Ed Wall & Arranged A Meeting For Monday

(8) Talked To Herb Kaufman About Dichloroethane

(9) Got Platinum Info. From Dr Seifen & Sent To Next For Method Evaluation

(10) Visited Lab. Saw Fowler About MO & Chas & Peterson About Blacksmith Shop Problem

(11) Picked Up Light Meter From Pollard

(12) Discussed Dust Problem With Frank Comerford

(13) Worked on Air Pollution Info

(14) " " Dust Report

(15) Checked Out Starling Tape With Stenhart Left @ 7:00

9-9-F1
L.J-a.

UNION CARBIDE INTERNAL CORRESPONDENCE

UNION CARBIDE CHEMICALS COMPANY • **INSTITUTE PLANT** P. O. BOX 2331, CHARLESTON, WEST VIRGINIA

To (Name) Mr. G. J. Ratcliffe
Company
Location Industrial Relations

Date 20 July 1962
Originating Dept. Medical Department - Plant 512
Answering letter date

Subject Insulation Block Dust Survey
Construction Insulation Shop
Plant 511

Copy to
Mr. L. N. Dickinson
Mr. G. H. Daniels
Mr. N. S. Eastman
Mr. R. A. Huber
Mr. B. F. King
Mr. F. B. Snyder
Dr. C. U. Dernehl
Dr. E. M. Best
Mr. E. G. Heinz
Mr. P. E. Henry
Mr. R. A. Neal
Mr. D. R. Matheny
Mr. N. H. Ketcham

Enclosed is an industrial hygiene report by Mr. R. E. Peele on the potential hazardousness of "new and improved" "Thermobestos" insulation blocks submitted by the manufacturer for evaluation by band saw processing in the Construction Department's Insulation Shop. The report points out that the three "new and improved" sample blocks, subjected to test conditions identical with those in use and reported upon in March of this year, are an improvement somewhat, but these blocks too, release quantities of asbestos dust particles into the working environment considerably above the acceptable safe limits (i.e., the T.L.V.). Therefore, definitely, the processing of "new and improved" blocks also constitute a hazard to health.

Mr. Peele recommends that "Thermobestos" blocks not be processed in the Construction Department Insulation Shop until they meet acceptable standards and I concur fully.

Very truly yours,

R. J. Sexton, M.D.
Plant Medical Director

RJS:gl

Enclosure

UC 1409

UNION CARBIDE

INTERNAL CORRESPONDENCE

UNION CARBIDE CHEMICALS COMPANY • INSTITUTE PLANT P. O. BOX 2831, CHARLESTON, WEST VIRGIN.

To (Name) R. J. Sexton, M.D.

Company Location Medical Department - Plant 512

Date 29 November 1963

Originating Dept. Industrial Hygiene - Plant 512

Answering letter date

Subject Construction Insulation Shop Building 511-2018

Copy to Mr. L. N. Dickinson
Mr. N. S. Eastman
Mr. S. C. Giambruno
Mr. R. A. Huber
Mr. B. F. King
Dr. E. M. Best
Dr. C. U. Dernehl
Mr. J. W. Perry
Mr. P. E. Henry
Mr. R. A. Neal
Mr. D. R. Mathany
Mr. N. H. Ketcham
Mr. L. B. Weddell - Safety Dept.
Mr. F. G. Comerford

In accordance with Mr. P. E. Henry's request of Thursday, 7 Nov 63, I have investigated the fabrication of "Carey-Temp" pipe covering. This operation is carried out with band saws and, on the basis of visual observation alone, it has been decided that there should be no health hazard associated with this particular type of operation.

This investigation took place during the morning of Thursday, 14 Nov 63, in the company of Mr. K. B. Lanham, Foreman of the Fabrication Insulation Shop, and consisted merely of observing the process of the cutting of half sections of eight inch diameter "Carey-Temp" pipe covering with a band saw. No effort was made, at that time, to determine the actual concentration of atmospheric dust being produced during this operation. It should not be necessary to perform this specific test so long as working conditions are not altered appreciably from those observed on this date. However, a more thorough evaluation of these conditions will be performed if (1) it is specifically requested, (2) employees begin complaining about reactions such as nose bleed, etc., (3) a thicker material, i.e., more than two inches in diameter is substituted for fabrication, or (4) the fabrication shop begins cutting each curved half-section from large blocks of "Carey-Temp".

Very truly yours,

R. E. Peele

R. E. Peele
Industrial Hygienist

REP:hl

I.G.a

UNION CARBIDE

INTERNAL CORRESPONDENCE

CHEMICALS DIVISION

INSTITUTE PLANT ... CHARLESTON, WEST VIRGINIA 25338

To: Mr. E. D. Lanham
Insulation Fabrication Shop
Bldg. 311 - Room 2018

Date: 24 August 1965

From: Industrial Hygiene - Plant 311

Answering letter date

Subject: DUST QUALITY OF "CAREY-TEMP" INSULATION

cc to:
Mr. F. L. Comerford
Mr. T. E. Fallon
Mr. P. L. Henry
Mr. H. H. Ketcham
Mr. D. R. Matheny
Dr. R. J. Sexton
Mr. Frank Shaffer
Mr. L. B. Weddell
Mr. Fred Williams

We have received results from the dust sampling series conducted in your shop while the head grinder machine was being used to cut "Carey-Temp" insulation block.

These results indicate that the hazard to health from dust exposure during this operation is very slight and should not present any serious respiratory problems to the machine operator if conducted in a similar manner to the test runs.

During our conversation, you mentioned that you anticipate moving the machine to another location in the shop and also making certain modifications to the machine and dust exhaust system. It is our recommendation that these changes be carried out to their completion in the near future so as to further add to the adequacy of the system.

In order to completely finalize this investigation, we would like to run another series of sampling when more "Carey-Temp" insulation is available and after the above changes and modifications have been made.

If, in the interim period, you have any questions relative to these tests, please notify this department.

Very truly yours,

J. D. Young

JDY:nl

1-9-61
S.S.A.

UNION CARBIDE

INTERNAL CORRESPONDENCE

UNION CARBIDE CHEMICALS COMPANY • INSTITUTE PLANT P. O. BOX 2831, CHARLESTON, WEST VIRGINIA

To (Name) Mr. S. C. Giambruno
Company
Location Industrial Relations

Date 23 October 1963

Originating Dept. Medical Department - Plant 512

Answering letter date

Copy to Mr. L. N. Dickinson
Mr. N. S. Eastman
Mr. R. A. Huber
Mr. B. F. King
Dr. E. M. Best
Dr. C. U. Dernehl
Mr. J. W. Perry
Mr. P. E. Henry
Mr. R. A. Neal
Mr. D. R. Matheny
Mr. N. H. Ketcham
Mr. L. B. Weddell - Safety Dept.

Subject Insulation Block Dust Survey
Construction Insulation Shop
Plant 511

Enclosed is a very excellent and very complete Industrial Hygiene report on the potential hazardousness of "Thermobestos", "Kaylo" and "Carey-Temp" insulation blocks which have been processed in the Construction Department's Insulation Shop. The report points out definitely that "Thermobestos" and "Carey-Temp" insulation blocks cannot be fabricated safely with existing equipment, but that "Kaylo" insulation blocks can be fabricated safely. Mr. Peele's recommendations are quite definite and I am sure that you will wish to comply with them. I believe this particular project should be considered completed.

If there are any comments, suggestions or criticism, please direct these to me.

Very truly yours,

R. J. Sexton, M.D.
Plant Medical Director

RJS:hl

Enclosures

11/47

9-9-81
I.G.A.

Mr. D. C. Willard

Building 8-F 6-2

April 28, 1967

D. Q. Hull, M.D.

Particulate Matter in Air
Asbestos Dust
Project No. [illegible]

Dear Dan:

As per our telephone conversation today, I am attaching a resume' of our determinations of dust breathed by the employees while cutting and installing "Mat" insulation.

We feel that further air sampling is needed to give you more meaningful conclusions as to the best protection for the employees handling this material.

At your convenience, we will be glad to discuss these findings with you. In the meantime, if you would keep us informed on jobs pertaining to cutting, installing and removing "Mat" insulation, it would [illegible]

Thanks,

Burt Murray

Plaintiff's Ex 8 for id
D Wilderman N.P.
4/8/81

52

F-20
9-9-81
L.F.a.

TABLE I

PARTICULATE MATTER IN AIR

Dust Breathed by Employees While Cutting and Installing "Kaylo" Insulation

Date	Sample Number	Sampling Conditions at Breathing Level	Number of Employees	Dust Count MPPCF (1)
12-26-64	1	5-min. cutting, 5-min. application inside building	2	2.1
	2	Same	2	2.6
	3	Same	2	2.7
	4	7-min. cutting, 3-min. application	2	8.0
1-19-65	5	Cutting and application during entire sampling period - inside building	6	[illegible]
	6	Same	6	17.0
	7	Same	6	[illegible]
2-16-65	8	Same	2	3.6
	9	Same	2	1.6
	10	Application of insulation - no hand saw cutting	2	0.3
	11	Same	1	0.1
3-1-65	12	Cutting and application during sampling period - outside building	2	7.6
	13	Same	2	2.4
	14	Same	2	4.0
3-22-65	15	Application of insulating - no cutting - inside building	3	1.9
	16	Same	3	13.8
	17	7-min. cutting; 3-min. application	1	7.3
5-25-65	18	Clean up of insulation from floor - sweeping and shoveling - inside bldg.	2	0.8
	19	Same	2	0.1
	20	Same	2	2.5
6-14-65	21	Cutting and application during sampling period - inside building	2	1.9
	22	Same	2	5.0
	23	Same	2	2.5
	24	Same	2	1.1

(1) Million particles per cubic foot of air.

10-14-65

54

PARTICULATE MATTER IN AIR

7-9-51
L.R.a

Dust Breathed by the Employees while Cutting and Installing "Kaylo" Insulation

Plant-wide Survey - Plant 514

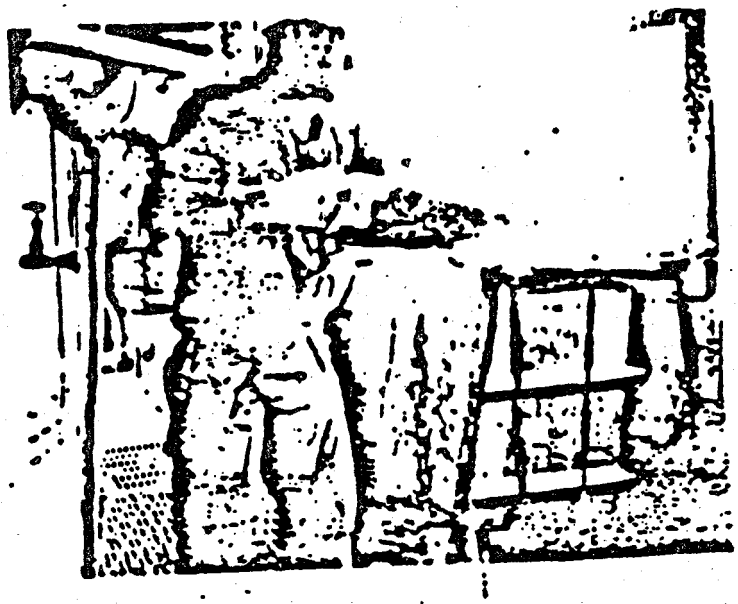


Figure 1. Sawing block sections. Breathing zone level air sample being collected in the background.

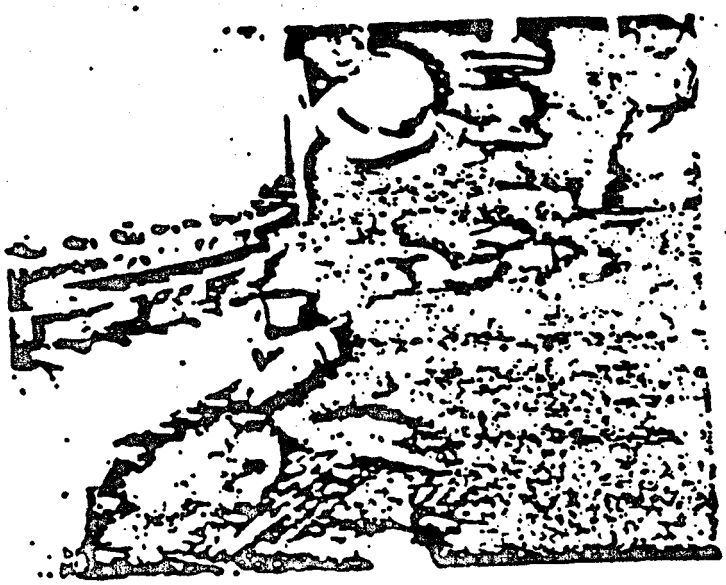


Figure 2. Applying insulation block. Breathing zone level air sample being collected in the foreground.

55

P-3H
9-9-81
J. L. A.

PARTICULATE MATTER IN AIR

Dust Breathed by the Employees While Cutting and Installing "Kaylo" Insulation

Plant-wide Survey - Plant 514

Authors: H. H. Warwick
E. L. Murray

Date: September 21, 1953
Project No.: IH-10-53

Dexter Bell, Plant Medical Director, requested a plant-wide industrial hygiene study to determine the potential exposure of insulators to asbestos fiber dust concentrations. Table I gives the results of seven separate tests, including 24 breathing zone level air samples and shows an average dust concentration of 5.2 million particles per cubic foot of air. A "threshold limit value" of 20 mppcf of air has been suggested.[1]

When these employees, or here, hand-cut and apply "Kaylo" insulation, the concentration of dust is considered safe from the health standpoint; however, when & new the dust count exceeds the [illegible] at this phase of the operation dust exhaust ventilation should be used. Excessive dust concentrations can be expected when the insulation is removed from piping and tanks. Again, exhaust ventilation should be used to move the dust away from the employees, if possible; otherwise, respirators are advised.

"Kaylo" insulation contains [illegible] and 5.6 to 6% crystalline-free silica.[2] This material is received in block and pipe form and the insulator measures and marks the material into appropriate sizes and cuts it with [illegible]. The insulation material is wired into position around the tank or pipe. The tasks of cutting and applying the "Kaylo" insulation are shown in Figures 1 and 2.

The air samples were collected with a midget impinger and a hand-jet sampler, drawing 0.1 cubic foot of air per minute through impinger flasks containing 10 milliliters of distilled water. Dust counts, made by the Light Field Microscopic Counting Technique, appear in Table I.

This study has revealed that further research work is needed to:

[redacted]

1. Cook, Warren A., and Poole, Robert E., Letter dated February 12, 1938 - The University of Michigan School of Public Health.
2. Poole, R. E., Industrial Hygiene Survey - Construction Insulation Shop, Building 511-2010. Report 52-III-1-G-1 (March 21, 1952).

53

L. j. a.

[redacted]

Medical Department - Plant 51?

Mr. L. N. Dic...nson
Plant Manager

Insulation Block Dust Survey
Construction Insulation Shop
Plant 511

Mr. G. H. D...	... P. E. Henry
Mr. H. ...	... S. H. Wilson
Mr. R. A. Hub	Mr. D. R. Mal...
Mr. D. F. K...	Mr. N. H. Tat...
Mr. C. J. R...cliffe	Dr. C. U. Dernehl
Mr. F. B. Snyder	
Dr. E. M. Best, Jr.	

Enclosed is a report by [redacted] of the Industrial Hygiene Department survey of an ... ...tion dust problem which existed in the Construction Insulation Shop in the [redacted] of Plant 512. In this report, Mr. Peele points out that [redacted] Free crystalline silica particles [redacted] one micron in size, or smaller, are capable of causing silicosis [redacted] ... protected workers.

... should be pointed out that as soon as ... he made his calculations and discovered the potential hazardousness of "Thermobestos" dust, he notified immediately the Construction Department [redacted]. Mr. Henry has advised ... so that they would discontinue at once any further [redacted] will no longer be processed, thus complying with Mr. Peele's recommendations.

The Plant 512 Medical Department has been informed that the Construction ... ... have had exposure to "Thermobestos" dust [redacted]

Very truly yours,

R. J. Sutton, M.D.
Plant Medical Director

RJS:cl

Ill's Ex 1 ford
... N.P. 4-14-81

PEELE #4
9-9-51
I & A.

Tuesday, April 30, 1957

120th day - 245 days follow

Last Day for employers to file quarterly Social Security Tax Return and Wage Report, covering three previous calendar months

(1) TALKED TO TOM RUCKLE ABOUT TANK 1087 -
PLANNED TO RUN CHECK FOR BENZENE & O
(2) RAN CHECK ON TANK 1087 - THEN WENT TO
FISCAL T WHERE RAN RAD. SURVEY ON
4 SOME SOURCE
(3) CHECKED MAIL
(4) TALKED TO [illegible] ABOUT ROBOT LETTER.
(5) WENT TO MAINT. INSTRUMENT SHOP -
WHERE RAN RAD CHECK ON ANOTHER SEALED
SOURCE & TALKED TO TOM WILKERSON ABO
WORK PROCEDURES IN SHOP
(5) CALLED RUCKLE ABOUT TANK 1087 RESULTS
WANT IT REDRAFTED TOMORROW
(6) WENT TO LAB TO SEE FOR BUT NOT TH
(7) [illegible] CELLOSIZE TO CHECK TWO RAD
SOURCES BUT HAD TO STOP DUE TO RAIN
(8) SAW DR. SEXTON & [illegible]
OWENS LOANING [illegible] TALKED TO [illegible] ABOUT
DUST ANALYSIS [illegible]
AGREED TO PROVIDE [illegible] TECHNIQUE
AND TALK TO [illegible] ABOUT RESULTS
(9) TALKED TO CHARLIE CRAWFORD [illegible]
LETTER AND DESIRE TO CHECK WORK CONCERNING
(10) TALKED TO DAVE HEALTH COMMITTEE
REGARDS TRIP TO AIHA.
(11) STRAIGHTEN OUT A.P. FILE [illegible] D.P. WILKERSON
[illegible]

PEELE #5
9-9-81
S.K.A.

...ALED on MAINT INSTRUMENT SHOP LIGHTING
Problem.

Wednesday, May 1, 1963

121st day – 244 days follow

...L 7:30 TRY
...KED TO BOB RUCKLE ABOUT CHECK OF TRUCK 1087
...KED TWO P40 SOURCES @ SCI. STRC
...D TO SLOVER WHO COULD NOT MEET UNTIL 1:00
...KED GEO FOR ¢ ARRANGED MEETING FOR 12:00
... GUY ARBAUGH ABOUT SYRINGE CLAMPS IN HIS OFFICE
...D TO BOB ESTEP OF OUTSIDE CODING & SET UP MEETING
... THE ¢ W.A. LOTZ FOR MAY 16TH @ 10:00
...KED KETCHUM & DISCUSSED SEALED SOURCES, A.I.H.A. Meeting

...KED TOM WILKINSON FOR INFO. ON TYPE OF WORK IN
...UMENT SHOP AREAS.
...TALKED TO BILL MCCLANNAHAN ABOUT CONTINUED SMEARS FOR
...U
...KED DICK REPASKE FOR INFO. ON HEW MONITOR
...KED TO JOHN ADKINS ABOUT DOWN TIME ON GEN. CEPOS.
... SUGGESTED I CONTACT PAUL LAIRD - LAIRD NOT IN
TALKED TO DR. LOFTUS ABOUT CHECKING SIMPLIFIED
...ORT FORMS
...ET WITH GEO FOR ¢ DISCUSSED HCL SAMPLING, HAS REQUEST
... A MEETING WITH T.C. MORTON
TALKED TO CARL BRAUN ABOUT SCHOOL PROGRAMS FOR SUMMER
...KED POWELL ¢ ARRANGED FOR HIM TO MEET T.C.
...TON WHEN HE ARRIVES
...KED LUD TO PLEASE ABOUT MEETING SET UP WITH
... WANTED TO SEE COPIES OF SET UP & CHECK ON RESULTS

PEELE #6
9-9-91
I.R.U.

Thursday, May 16, 1963

136th day – 229 days follow

ABT 7:30 PM

(1) Called Marion Cushenberry for DVC about Accts. Receivable Clerk & Cash Pit Position

(2) Contacted L.D. Slocum about Issuance & Mailing Receipt Jar

(3) Talked to Jerry about Running Copies of Tax Data

(4) " - Doug Rice about Recent Visit Friday

(5) " - Police Dept re: Check @ Cashing At J. R. Acuff Insurance Office

(6) Called Fleetwood for Info. on New Acuff Furniture Store Soon

(7) Talked to Ray Williams About Lease & Leasehold

(8) " - Walter Hall Concerning Living Room

(9) Met with William Inc. Exec Comm & Owners Corning Co. of Directors Dust Response for Air Analysis

(10) Talked to Jerry about Lease & Equipment

(11) Checked with Mayor about Resident Asst. & Comm. Hall Dept of Fed. Projects Pick Up Date to Copy

(12) Checking with Jerry Rice & Dave Woods About State Insp. Dept Inspection

(13) Talked to Ray Williams about the

Peele #2
9-9-81
I.f.a.

[illegible] INDUSTRIAL HYGIENE SURVEY

[illegible] Insulation Shop - Building 511-2018

Report 62-IH-1-3-1

SUMMARY: The industrial hygiene survey, evaluating the dust problem in existence at the Construction Insulation Shop (Building 511-2018) during the time of processing both "Thermobestos" and "Kaylo" insulation blocks, has been completed. The results of this investigation reveal the following conclusive facts:

First - The T.L.V. (Threshold Limit Value) for this material is 20 mppcf (million particles per cubic foot) of air.

Second - The fabrication of "Thermobestos" insulation blocks with band saws produces a definite atmospheric hazard to health.

Third - The fabrication of "Kaylo" insulation blocks with band saws does not constitute a hazard to health.

INTRODUCTION: On 15 November 1961, Mr. S. H. Wilson, Construction Safety Engineer at Plant 512, approached this department with a problem that had been brought to his attention by way of employee complaints. He stated that the "band saw" operators located in the Insulation Shop (Building 511-2018) were experiencing some rather uncomfortable working conditions as they performed their normal routine of ripping "Head Segments" from standard 18" x 36" x 4" insulation blocks. This concern was apparently initiated by virtue of the fact that two insulation materials, reputed to be identical in make-up although produced by different manufacturers, did not react in similar manners to the identical sawing techniques being utilized by the shop. According to statements obtained from the operators, heavy quantities of dust of such large concentrations as to seriously interfere with their normal breathing process, were immediately produced if and when "Thermobestos" blocks (a Johns Manville product) were supplied for sawing. Some dust also resulted whenever "Kaylo" blocks (an Owens Corning product) were handled in a similar manner; however, the quantity of particulate matter being produced from this latter material was hardly noticeable and never objectionable.

This interesting introduction to the problem stimulated a desire to visit the location in question and, while there, to obtain as many answers as possible to the numerous unanswered questions that came to mind upon the completion of Mr. Wilson's description. A visit was arranged and the following facts were noted: (1) Most of the fabrication equipment was connected to a well-known and apparently adequate dust collector by means of well constructed duct work. (2) This exhaust system had obviously been designed to cope with the normal dust problems encountered in most band saw operations. However, the band saw operations in evidence on this date were not what might be termed normal, as a result of the specific shape of the insulation material being fabricated and the particular manner in which each block was being cut. These conditions ruled out the possibility of the exhaust system operating in accordance with its pre-designed efficient manner. Figure 2 on page 15 has been included in an attempt to demonstrate the manner of processing these blocks and the position of the exhaust hoods in relation to the blocks during fabrication.

(3) the [illegible] Insulation Shop was completely open throughout and was ventilated above by means of six small roof fans. (4) Atmospheric dust samples were to be taken in various areas of the shed before any evaluation could be made and these would, of necessity, have to be taken when both "Thermobestos" and "Kaylo" insulation materials were being processed separately.

Discussion: On the morning of 21 November 1961, the initial air samples were taken in what proved to be but the first part of a two-phase program of dust evaluation at this location. This first phase was responsible for disclosing the actual concentrations of dust (in millions of particles per cubic foot of air) to which the various men were being subjected as they fabricated first "Thermobestos" and then "Kaylo" pipe band saws. Atmospheric samples of the "Thermobestos" dust exposures were taken on this initial sampling date whereas similar samples of "Kaylo" dust exposures were, of necessity, taken on 11 December 1961, since these two products are not processed simultaneously.

Five general areas, capable of revealing the most comprehensive information relative to any overall dust exposure, were initially selected and sampling points then spotted in these areas in locations deemed important. The sampling locations are displayed in the Shop [illegible] Plan revealed on page 7 The impingement* principle was utilized in the collection of these samples with the Midget Impinger apparatus (as described to on page 4) serving as the instrument of use. A total of thirteen samples were taken with the first seven being indicative of "Thermobestos" exposures and the latter six being representative of "Kaylo" exposures.

Each of these dust samples were evaluated through the use of light field microscopic counting techniques, referred to on page 4 , with the result of disclosure that some of the locations were quite heavily contaminated with excessive concentrations of dust. This disclosure rendered it imperative that more descriptive information would have to be obtained before an accurate evaluation of the conditions could be formulated, and so the second phase of the program was initiated.

This second phase had the designed purpose of supplying two types of physical data relative to these exposures: (1) the percentage of crystalline free silica present in each material, and (2) the particle size distribution of the air borne portion of each material. This information was deemed essential as a result of the following well-known facts relative to human dust exposures.

It is an uncontested fact that prolonged exposures to excessive concentrations of certain types of atmospheric dust will result in the production of either one of two, or possibly even a combination of both, types of the following lung diseases; i.e., silicosis or asbestosis. It is also known that there are five specific factors that directly influence the production of these diseases. They are: (1) the composition of the dust;

---

*Impinge means to strike or dash against, as (in this application) the striking or dashing of atmospheric dust particles against the bottom of a small impinger flask containing a specific volume of dust free water as a collecting medium.

i.e., percentage crystalline free sili[illegible], (2) the number of particles of inhaled dust, (3) the [illegible] number of particles in [illegible] dust, (4) the length of time during which [illegible] and, (5) the individual susceptibility of each [illegible].

Since the determinations revealed that some of the workers were being exposed to dust concentrations of such magnitudes as to exceed even the most lenient of all dust standards, i.e., a T.L.V. (Threshold Limit Value) of 50 mppcf of air (see table below - entry #3) and since it had been revealed (per a Johns Manville representative on 21 November 1961) that this material contained 12.0 - 13.0% asbestos with the remainder 88.0 - 89.0% being entitled, calcium silicate, then it became imperative that conclusive information be obtained which would identify exact numerical values for two of the five specific factors listed above: i.e., the percentage crystalline free silica present in this material known as calcium silicate and the exact particle size distribution of the respirable portion of such material. The following criteria was used in the evaluation of this data:

First: The actual percentage crystalline free silica or percentage [illegible] found to be present in a mineral or non-metallic inorganic dust furnishes the basic information needed in the establishment of a T.L.V. for the material in question. This selection is arrived at in accordance with criteria as follows:

T.L.V. in mppcf of Air	Substance	Limiting Conditions
5*	Silica as quartz	High percentage crystalline free silica, i.e., above 50%
20*	Silica as quartz	Medium percentage crystalline free silica, i.e., 5 to 50%
50*	Silica as quartz	Low percentage crystalline free silica, i.e., below 5%
5+	Silicate as asbestos	High percentage asbestos, i.e., above 50%
20+	Silicate as asbestos	Medium percentage asbestos, i.e., 5 to 50%
50+	Silicate as asbestos	Low percentage asbestos, i.e., below 5%

* A.C.G.I.H. Threshold Limits Values for 1961, Page 11 (April, 1961)
\+ Warren A. Cook, Personal correspondence, 21 February 1962.

Second: The fraction of an inhaled dust which is retained in [illegible] respiratory system and the depth to which the dust penetrates [illegible] sensitively related to particle size. Thus, the size factor [illegible] in determining the magnitude of hazard associated

... inhalation of particulate matter. This relationship ... particle size, its area of deposit, and the resultant ... is revealed in the following table:

PARTICLE SIZE	AREA OF DEPOSIT	HAZARD POTENTIAL
Above 5.0 microns	Nasal	None
1.0 - 5.0 microns	Upper respiratory to alveoli	Great to extreme
1.0 micron	Alveoli (most optimum size for alveoli retention)	Extreme
0.25 - 1.0 microns	Alveoli	Extreme

The actual procedure was started on 5 December 1961, on which ... two types of samples were obtained. ... sample of "Kaylo" dust was taken in ... No. 2, through the use of a Millipo... Both ... are referred to on page 4, and particle sizing ... were then used to determine the particle size ... sample. Second, a direct sample of the ... collected and later analyzed for crystalline free silica by the ... technique, both listed on page 5. On 4 January 1962, two samples of "Thermobestos" dust were also obtained and evaluated for ... percentage crystalline free silica and particle size distribution in a manner identical with that used on the "Kaylo" material.

PROCEDURE: Both sampling and analytical methods are as follows:

Sampling: (1) All samples used in determining the actual concentrations in air were collected with a midget impinger apparatus which is a hand-cranked, four cylinder suction pump drawing 0.1 cubic feet of air per minute through impinger flasks containing 15 milliliters of double distilled dust free water.

(2) All samples used in obtaining particle size distribution data were collected on Millipore Filters connected to a small battery operated pump. These Cellulose Ester filters are recognized as being the most efficient and adaptable filter material available on the ... today being capable of retaining particles down to and below 0.1 micron in size.

Analytical: (1) The actual counting technique, used in this ... referred to as the Light Field Microscopic Counting Technique, is accurately described on pages 152-153 of Industrial Dust by Drinker and Hatch

... Midget Impinger Apparatus ...

(2) The sizing technique was [illegible] from two separate sources. First, the sample was [illegible] in accordance with a permanent mounting method referred to on page [illegible] of the September, 1957, issue of the A.I.H.A. Quarterly. Second, the actual sizing was accomplished in accordance with the procedural technique described on pages 166-179 of Industrial Dust by Dalmer & Nash which depicts the use of a Filar micrometer, and a standard microscope [illegible] using both the 43X (high and dry) and 97X (oil immersion) [illegible].

(3) Free silica determinations were conducted through the use of both of the two following techniques. First, a wet chemical procedure entitled, "Determination of Quartz in the Presence of Silicates Using Phosphoric Acid" by N. A. Talvitie, Division of [illegible], U. S. Public Health Service, Cincinnati, Ohio, [illegible], X-ray diffraction techniques as described in the encyclopedia of "[illegible] for Industrial Hygiene", pp. 436-439), and as performed by Mr. H. J. Curran, Research and Development Department, Instrumental Methods Group, Union Carbide Chemicals Company.

RESULTS: The physical data listed in the appendix were evaluated and revealed the following facts:

(1) The composition of the dust (Table #5, page 12) is

(a) For "Thermobestos": Asbestos = 12.0 to 13.0%
Crystalline Free Silica = 2.5% 1 to 6.4%

(b) For "Kaylo": Asbestos = 12.0 to 13.0%
Crystalline Free Silica = 5.6% 1 to 7.4%

(2) The number of particles of atmospheric dust (Table #1, page 8) is revealed to be:

(a) [illegible] greatest concentration in and around the #1 and #2 [illegible] same.
(b) [illegible] greatest concentration when "Thermobestos" is being fabricated.

(3) The particle size of the atmospheric dusts in question (Graphs 1 and 3, pages 13 and 14) is demonstrated to be:

Predominantly 1.0 micron in size for both "Thermobestos" and "Kaylo", but slightly smaller in size for "Kaylo" than for "Thermobestos".

(4) The length of time during which the particles are inhaled (as demonstrated in Table 2 page 9) reflects a weighted reduction in the overall dust exposures to both materials.

(5) The individual susceptibility is, in this case, one of those unmeasurable human factors which lends special emphasis to the need for the conscientious use of adequate protective measures deemed essential in the prevention of these incurable diseases.

CONCLUSIONS:

(1) The T.L.V. (Threshold Limit Values) for both of these materials is 20 mppcf (million particles per cubic foot) of air.

(2) The greatest hazard to health is experienced when processing only "Thermobestos" blocks.

(3) The existing ventilation control devices do not adequately control the dust problem being created when "Thermobestos" blocks are processed.

(4) The computed exposure at the band saw is slightly in excess of the T.L.V.

(5) The hazard to health, experienced when fabricating only "Kaylo" blocks is negligible.

(6) The environmental conditions in evidence, during the time of this survey of the fabrication of "Kaylo" blocks, were not hazardous to health.

(7) "Thermobestos" blocks should not be fabricated with any existing band saw unless a more effective ventilation system is designed and installed in such a manner as to render it capable of reducing the inherent atmospheric dust concentrations to within safe and acceptable limits.

RECOMMENDATIONS:

(1) Do NOT fabricate 18" x 36" x 4" "Thermobestos" insulation blocks with the existing equipment unless:

(a) The atmosphere dust problem can be reduced to below 20 mppcf of air through the use of ventilation, etc., or

(b) The producer of this product begins manufacturing an insulation block which will not release, upon fabrication with a band saw, dust concentrations in excess of 20 mppcf of air.

Submitted by: R E Poole

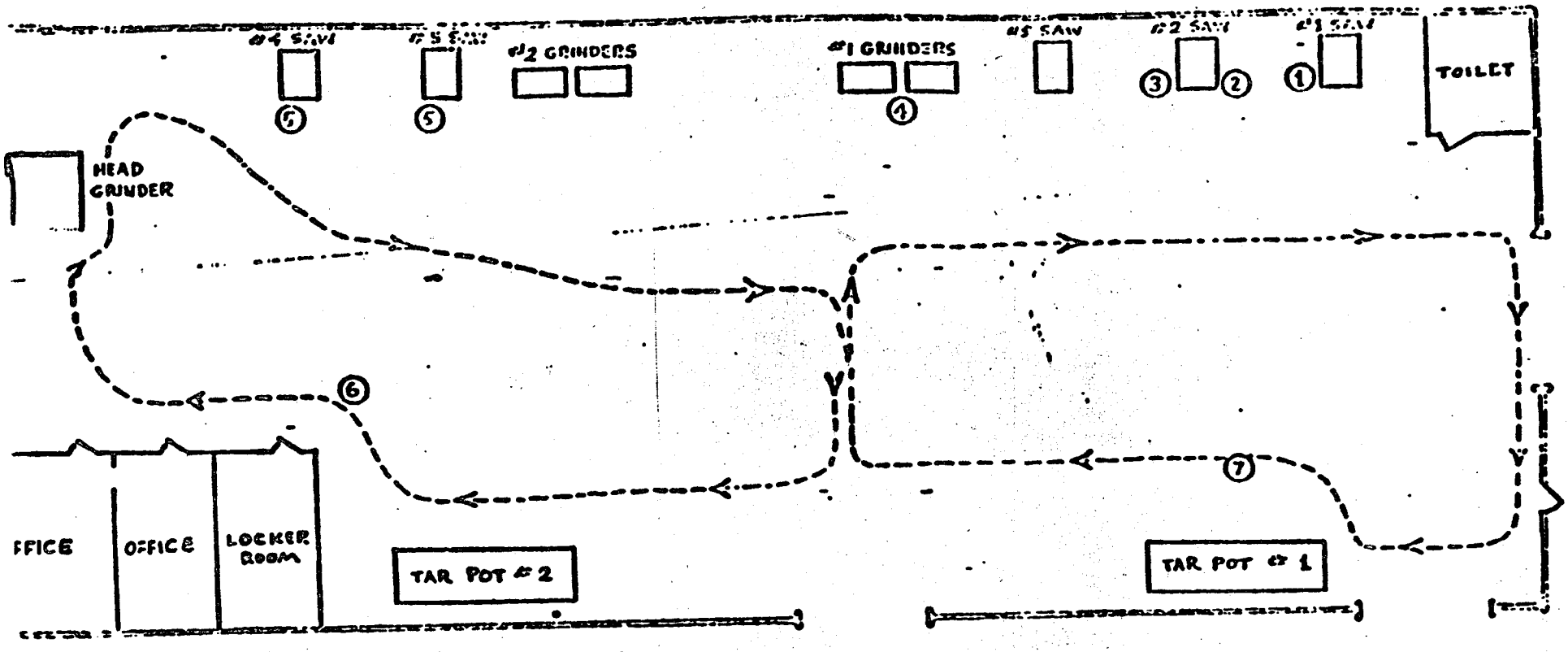
R. E. Poole
Industrial Hygienist

RE?:gl

FIGL. : 1

INDUSTRIAL HYGIENE SURVEY

CONSTRUCTION INSULATION SHOP
BLDG 511-2018



① SAMPLING POINT AS "MITCHELL" SAWED BLOCKS
② SAMPLING POINT AS "BENNETT" WAS OFF BEARING ON #2 BAND SAW
③ SAMPLING POINT AS "RAINES" SAWED BLOCKS
④ SAMPLING POINT AS "DUNLOP" GROUND FIBER GLASS PIPE COVERS
⑤ SAMPLING POINT AS "SAMPLES" CUT RADIUS ON HEAD SEGMENTS
⑥ GENERAL ATMOSPHERIC SAMPLING AREA IN SOUTH END OF SHOP
⑦ GENERAL ATMOSPHERIC SAMPLING AREA IN NORTH END OF SHOP

INDUSTRIAL HYGIENE SURVEY

EVALUATION OF ATMOSPHERIC DUST CONDITIONS AT THE CONSTRUCTION INSULATION CHIC

TABLE 1

Atmospheric Dust Concentration Data

As Collected with the Midget Impinger Pump & Apparatus

Type of Dust Material	SAMPLE No.	Location	Rate in cfm	Time in Min.	Vol. in C.F.	Blank # Particles	Dilution Factor	Count # Particles	Conc. in # Mppcf of Air
Asbestos	1	#1 Band Saw "Mitchell" while sawing	0.1	10.0	1.0	8.0	250	89.6	83.3
"	2	#2 Band Saw "Bennett" off bearing	0.1	10.0	1.0	8.0	250	105.4	24.5
"	3	#2 Band Saw "Raines" while sawing	0.1	10.0	1.0	8.0	625	51.4	102.4
"	4	#1 South Grinder "Dunlop" grinding fiber glass pipe covers	0.1	8.5	0.85	8.0	50	73.8	15.1
"	5	#3 Band Saw "Samples" sawing "Kaylo" head segments	0.1	10.0	1.0	8.0	50	72.4	13.2
"	6	G. A. (General Atmospheric) south end of Shop	0.1	10.0	1.0	8.0	20	37.8	2.4
"	7	G. A. North end of Shop	0.1	10.0	1.0	8.0	50	95.5	20.1
Kaylo	1	#1 Band Saw "Mitchell" while sawing	0.1	10.0	1.0	5.2	20	37.2	3.03
"	2	#2 Band Saw "Bennett" off bearing	0.1	10.0	1.0	5.2	20	52.8	4.45
"	3	#2 Band Saw "Raines" while sawing	0.1	10.0	1.0	5.2	50	79.6	17.2
"	5	#3 Band Saw "Samples" cutting radius on head segments	0.1	10.0	1.0	5.2	20	99.6	7.93
"	6	G. A. South end of Shop	0.1	10.0	1.0	5.2	20	23.4	1.5

TABLE 2

SUMMARY OF 40-HOUR WEEKLY WEIGHTED EXPOSURES AS

EXPERIENCED BY FIVE WORKERS EMPLOYED AT BLDG. 511-2018

Worker*	Length of Exposure in Hours Per Week+			Concentrations in mppcf of Air		Weighted Exposures in mppcf
	To Both "Thermobestos" & "Kaylo"	To Only "Thermobestos"	To Only "Kaylo"	"Thermobestos"	"Kaylo"	
chell" and Saw ing ks)	16.0	6.4	9.6	83.3	3.1	14.1
ines" Band Saw ping cks)	16.0	6.4	9.6	101.4	17.1	23.4
les" & #4 Saws - tting fus on ad ments)	16.0	6.4	9.6	13.1	7.7	3.9
Bennett" Band Saw Bearing)	16.0	6.4	9.6	84.5	4.5	14.6
Jordan" 3 & #4 nd Saws me as "Samples"	SAME AS SAMPLES					

* These workers were selected for identification upon the suggestion of the Shop Insulation Fabrication Foreman, Mr. D. R. Matheny, who stated that these particular men prove to be the ones most exposed to high concentrations of this air borne material known to the trade as "calcium silicate".

+ These hourly exposure values were derived on the basis of the following estimates also submitted by Mr. D. R. Matheny: 16 hours a week are probably spent working with both products (i.e., "Kaylo" and "Thermobestos") with about 40% of this being "Thermobestos" exposure and 60% "Kaylo" exposure.

The following general formula was used in deriving the values reported to above as weighed exposures:

(Concentration of ... mppcf of Air) (Number Hours of Daily Exposure) (Concentration ... of "Kaylo" in mppcf of Air) ... of Daily ...

TABLE 3

"[illegible]" PARTICLE SIZE DISTRIBUTION USING BOTH

THE 43X & 97X OIL IMMERSION OBJECTIVES IN COMBINATION WITH A 12X FILAR [illegible].

SIZE (WHOLE ↓ / FRACTIONS →)	43X OR 516 MAG. WHERE 1 FILAR DIV.≈ 0.2 MICRONS — FRACTIONS: 0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	TOTAL	97X OR 1164 MAG. WHERE 1 FILAR DIV.≈ [illegible] — FRACTIONS: 0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	TOTAL
0.0																						
0.1																						
0.2																						[illegible]
0.3												2										[illegible]
0.4												7										[illegible]
0.5												6										[illegible]
0.6												13										[illegible]
0.7												10										[illegible]
0.8	10										10	9										[illegible]
0.9												14	14	7	8	11	9	7	5	3	3	[illegible]
1.0	15		19		14		16		8		72	3	4	5	4	3	1	2	1		2	[illegible]
2.0	10		9		10		12		6		47	1	2	1	1		3	3				[illegible]
3.0	10		6		3		2		2		23	4		3	1	1	2		2	3		[illegible]
4.0	2		3		1		6		3		15	2			1	1						
5.0	3		1		1		2		2		9			1		1	1					2
6.0	2				2						4				1			1				3
7.0	2		1						2		5		1				1					1
8.0					1		2		1		4	1									1	2
9.0	2		1				2		1		6				1							
10.0							1				2											
11.0			1																			1
12.0											1		1									
13.0		1																				1
14.0															1							1
15.0														1								
16.0																						
17.0																						
18.0																						
19.0																						
20.0																						
21.0																						
22.0																						
23.0																						
24.0																						
25.0																					1	1
26.0												1										
27.0						1																20[illegible]
											200											

21

TABLE 4

"MAYLO" PARTICLE SIZE DISTRIBUTION USING BOTH

THE 43X & 97X OIL IMMERSION OBJECTIVES IN COMBINATION WITH A 12X FILAR EYEPIECE

43X OR 516 MAG. WHERE 1 FILAR DIV. ≅ 0.2 MICRONS

	FRACTIONS										
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	TOTAL
0.0											
0.1											
0.2											
0.3											0
0.4	6										
0.5											23
0.6	73										
0.7											24
0.8	24										
0.9	-										84
1.0	29		19		13		13		10		24
2.0	8		5		2		6		3		13
3.0	3		1		4		1		1		7
4.0	2		1		3						4
5.0	3						1				2
6.0							1		1		2
7.0	2										
8.0											1
9.0					1						3
10.0			2		1						
11.0											1
12.0							1			1	1
13.0											1
14.0											1
15.0											1
16.0			1								1
17.0											1
18.0											1
19.0											1
20.0											
21.0											
22.0											
23.0											
24.0											
25.0											
TOTAL											200

97X OR 1164 MAG. WHERE 1 FILAR DIV. ≅ 0.0

	FRACTIONS										
	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	TOTAL
0.0											
0.1					2						
0.2											
0.3	3										
0.4	7										
0.5	31										
0.6	18		1	1							
0.7	23										
0.8	14										
0.9	19										
1.0	9	3	6	11	9	4			1	1	
2.0	1	1	1		1						
3.0				2							
4.0		1	1		1			1			
5.0		1									
6.0		1									
7.0	3		1		1						
8.0					1						
9.0						1					
10.0						1					
11.0						1					
12.0				1							
13.0											
14.0											
15.0											
16.0											
17.0											
18.0											
19.0											
20.0											
21.0											
22.0											
23.0											
24.0											
25.0											
TOTAL											200

TABLE 5

DETERMINATIONS OF THE PERCENTAGE CRYSTALLINE FREE SILICA PRESENT IN BOTH "THERMOBESTOS" & "KAYLO", AS QUARTZ, BY THE "GALVITIE" METHOD

"THERMOBESTOS"

TRIALS	W_1 in GRAMS	W_2 in GRAMS	W_3 in GRAMS	% FREE SiO_2
1	0.5002	0.0390	0.0069	6.42
2	0.5000	0.0347	0.0068	5.58
3	0.5002	0.0396	0.0082	6.28
Average % Crystalline Free SiO_2 = 6.4				

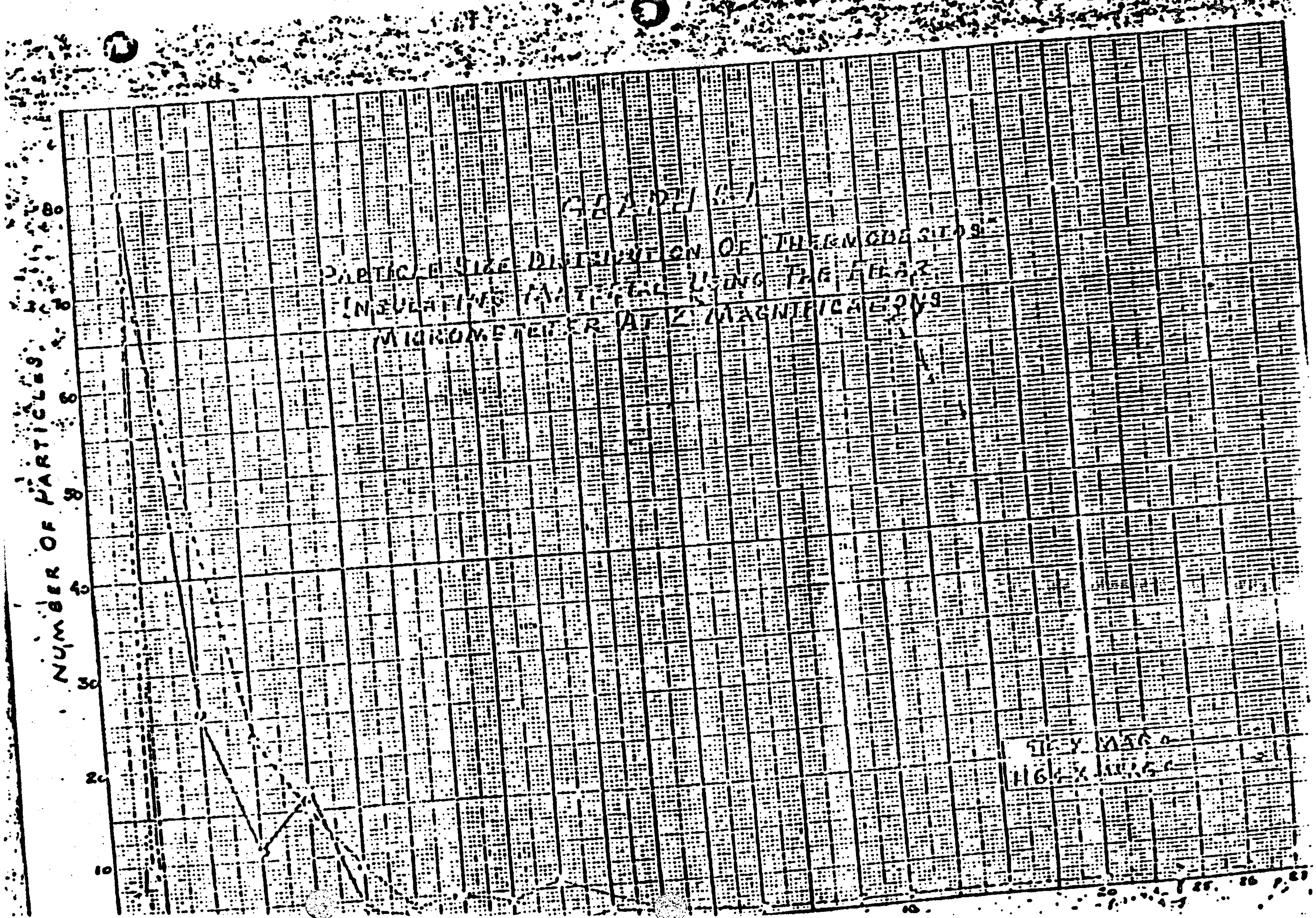
"KAYLO"

TRIALS	W_1 in GRAMS	W_2 in GRAMS	W_3 in GRAMS	% FREE SiO_2
1	0.5	0.0807	0.0433	7.48
2	0.5	0.0730	0.0364	7.32
3	0.5	0.0563	0.0190	7.46
Average % Crystalline Free SiO_2 = 7.4				

Determinations of the Percentage Crystalline Free Silica Present in Both "Thermobestos" & "Kaylo" by the X-ray Diffraction Method*

"Thermobestos"	"Kaylo"
2.5% ± 1%	5.6% ± 1%

*This information obtained and reported by Mr. K. J. Garska, Research and Development Department, Instrumental Methods Group, Union Carbide Chemicals Company.



NUMBER OF PARTICLES
80
70
60
50
40
30
20
10

GRAPH #12

SIZE DISTRIBUTION OF KAOLIN INSULATING MATERIAL USING THE MILLIPORE FILTER

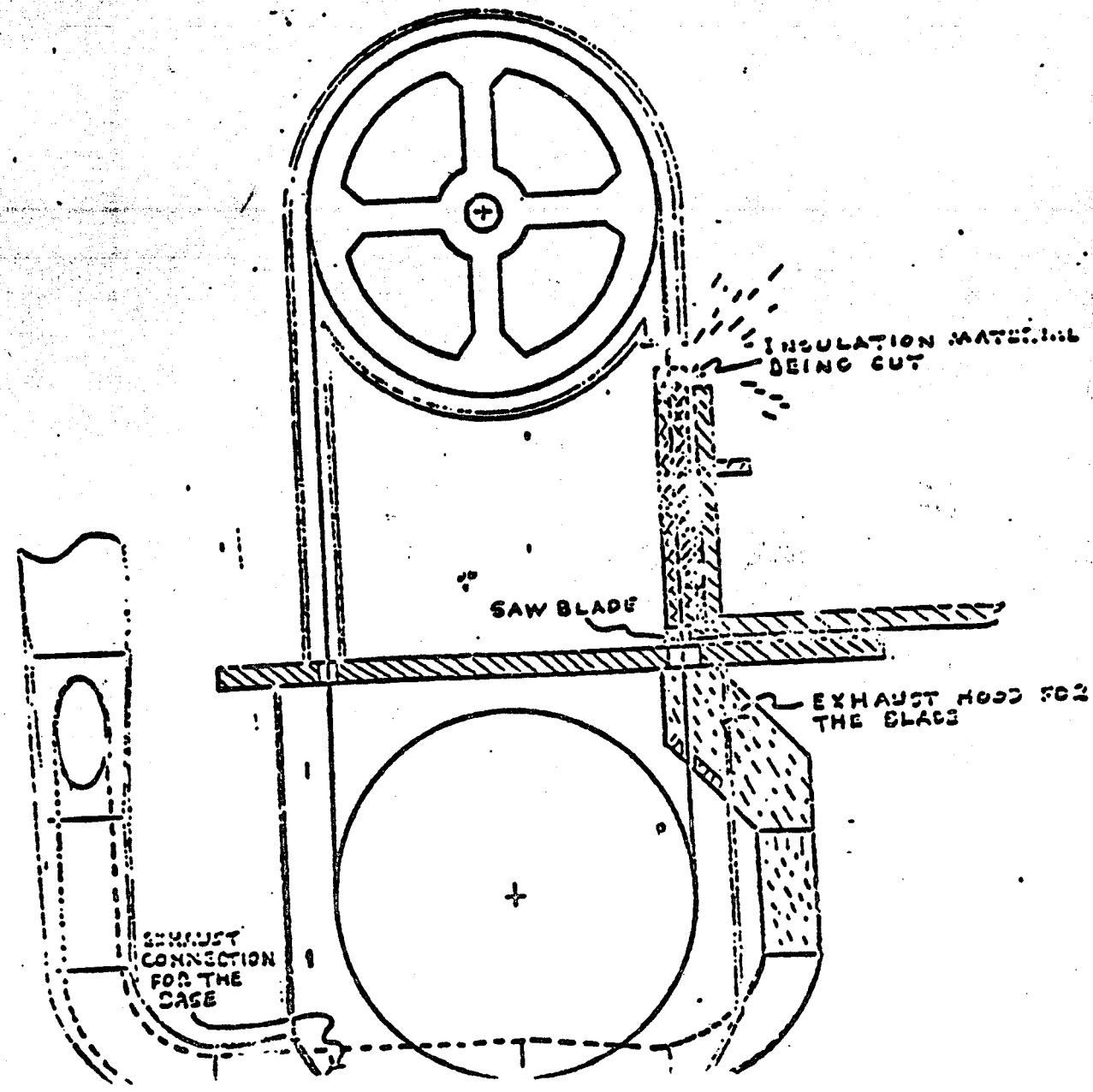
PARTICLE SIZE ANALYSIS

SIZE RANGE

NUMBER

FIGURE 2

Cut-away Side View of a Band Saw With Ventilation Provided.



9-9-61

INDUSTRIAL HYGIENE SURVEY

Construction Insulation Shop - Building 511-2018

Report 63-IH-3-G-1

WHY: The Construction Insulation Shop (Building 2018), Plant 512 location, routinely fabricates large quantities of insulation block with ventilated band saws. This more efficient procedure of fabrication has replaced an older, time honored, practice of using simple handsaws to do the job. However, it has, at the same time, created a health hazard resulting from exposure to excessive concentrations of atmospheric dust.

The hazard to health has been evaluated and reported previously* with the result that one material, "Thermobestos" was clearly identified with the hazard (exceeded TLV) and another material, "Kaylo", was safe to fabricate (within TLV). The present report (the third on this subject) was initiated in an attempt to supply answers to three basic questions: (1) was there any error in the original evaluation of "Kaylo", (2) can supplementary exhaust ventilation reduce the "Thermobestos" hazard to within safe acceptable limits, and (3) is a hazard to health produced in the fabrication of a third material, i.e., "Carey-Temp".

The information uncovered in the present evaluation reveals the following facts:

1. "Kaylo" insulation blocks <u>can</u> be safely fabricated with the existing equipment.

2. "Thermobestos" insulation blocks <u>cannot</u> be safely fabricated at the present time with existing equipment, but could be safely fabricated if the exhaust ventilation is improved.

3. The TLV (Threshold Limit Value) for "Carey-Temp" is identical with that established for both "Kaylo" and "Thermobestos", i.e., 20 mppcf (million particles per cubic foot) of air.

4. "Carey-Temp" also <u>cannot</u> be safely fabricated with the existing equipment, but could be if improvements are made in the ventilation system.

5. The original "downdraft" exhaust ventilation rates, on either band saw, do not meet the recommended capture velocity rate of 4,000 fpm (feet per minute).

6. The supplementary "overhead" exhaust ventilation on both band saws, is an improvement and the rates do meet the recommended capture velocity rate of 4,000 fpm.

* I.H. Reports 62-IH-1-G-1 and 62-IH-2-G-1

BACKGROUND: A report, submitted in March 1962, stated that an inhalation hazard to health was produced in the Construction Insulation Shop whenever "Thermobestos" insulation blocks were fabricated. In July 1962, a second survey was conducted in order to evaluate three new "Thermobestos" materials which had been supplied by the manufacturer for evaluation. This survey revealed that, although the inhalation hazard to health had been substantially reduced from that encountered during the first survey, the atmospheric dust concentrations being emitted during fabrication of these new products, were still in excess of the Threshold Limit Values as designated in the first report. Therefore, all recommendations should remain exactly as stated in the initial report of March 1962.

The manufacturer and Union Carbide's Purchasing Department expressed a great deal of concern about the findings revealed in this initial report when it was uncovered that the manufacturer's Research Department also had evaluated these materials and was not able to produce results comparable with those contained in the report of March 1962. That is to say, the atmospheric dust concentrations reported by the manufacturer, when processing "Thermobestos" insulation blocks, were substantially higher than those revealed in Report 62-IH-1-G-1. This revelation disclosed the need for a more extensive evaluation of this problem so as to resolve all differences of opinion relative to the atmospheric dust exposures in this environment.

This decision in favor of further evaluation, promoted the production of a much more extensive study than was originally planned, a study which eventually encompassed three separate intervals of dust sampling, analysis, and evalution before all of the unanswered health problems could be resolved.

DISCUSSION: These three investigations were actually initiated for the general purposes of both clarification and identification - purposely for clarification of the actual hazard to health (if any) connected with the fabrication of three different insulation materials and identification of acceptable measures for use in reducing all exposures to within safe acceptable limits. However, each investigation occurred for clearly identifiable reasons as explained below:

The investigation of 24 Jan 63 was conducted because:

1. The Johns Manville Company submitted a report, compiled by their Research Department, which contained data that conflicted with that submitted by this department in Report 62-IH-1-G-1.

2. This department desired to clarify the reasons for the discrepancy between the two reports and to identify positively, the actual conditions as they exist in the working environment..

The investigation of 25 and 26 Feb 63 was conducted because:

1. In the preceding investigation, the two insulation materials in question, i.e., "Thermobestos" and "Kaylo" were evaluated inadvertently during the same afternoon, a procedure which was not in keeping with an attempt to stimulate the conditions of the original report. In the original report, each material was evaluated on separate occasions so as to preclude the possibility that any one sample might contain dust produced by both operations.

2. The "Kaylo" insulation material had to be re-evaluated.

3. The Construction Insulation Shop requested that a new insulation material, i.e., "Carey-Temp", be evaluated.

The investigation of 6 Mar 1963 was conducted because

1. The Construction Insulation Shop recently had installed supplementary exhaust ventilation on both band saws and desired to know if this additional control method would reduce the "Thermobestos" dust concentrations to within safe acceptable limits.

A comparison of the reasons listed above discloses that each was different in content and concerned actually with different investigations but all were interrelated in part, i.e., each was concerned with the same environment, the same location and the same specific methods of fabrication. Consequently, the sampling procedures, utilized in each instance, basically were identical and in accordance with the following condensed explanation:

First: Two methods of fabrication, i.e., cutting and edging, and cutting a radius, were evaluated at each band saw since this is standard practice followed in the fabrication of any insulation material.

Second: The environmental conditions of both preceding reports, i.e., 62-IH-1-G-1 and 62-IH-2-G-1, were duplicated in that all outside doors to the building were closed.

Third: Each dust sample was collected in the operator's breathing zone as he worked in the fabrication process.

Fourth: The complete fabrication of "Carey-Temp" insulation blocks was evaluated in two ways: First, with all available ventilation in operation and second, with only the original downdraft ventilation in operation.

Specialized sampling procedures were utilized also during portions of the latter two investigations, in an endeavor to evaluate the supplementary exhaust ventilation system which had been installed as recommended. These were as follows:

First: The complete fabrication of "Thermobestos" insulation blocks was evaluated in two ways: First, with all available ventilation in operation and second, with only the original downdraft ventilation in operation.

Second: The complete fabrication of "Carey-Temp" insulation blocks was evaluated while utilizing all available exhaust ventilation.

It is necessary to explain that "Kaylo" insulation blocks were not included as a part of this evaluation since the initial investigation, (performed without supplementary exhaust ventilation) disclosed only one exposure exceeding the TLV of 20 mppcf of air and, therefore, it could be assumed that any ventilation that might be added should be more than adequate in controlling the hazard.

EVALUATIONS:

A. Atmospheric dust exposures:

1. The concentrations of inhalable dust, present in the breathing zone when fabricating any one of the three types of insulation materials, were determined in accordance with the following procedure:

   a. Three locations and nine different conditions of exposure, as described on Page 9, were selected for evaluation.

   b. Atmospheric dust samples were collected through the use of the impingement* principle of air sampling. The midget impinger apparatus (described on Page 5) served as the instrument of use.

   c. The concentration of dust collected in each sample was established through the use of standard light field microscopic counting techniques as described on Page 5.

2. The size of the particles of inhaled dust was determined, for both "Kaylo" and "Thermobestos", in the initial survey of 1962 in accordance with the procedure described on Page 5. Consequently, no effort was expended to repeat the determination for any of the insulation materials since the sawing techniques as well as equipment, i.e., saw blades with three teeth to the inch operating at 2200 linear feet per minute, were identical on both occasions and, therefore, the size of the particles should not be expected to deviate to any great degree from the prior recorded values.

3. The composition of the dust, i.e., percentage crystalline free silica or percentage asbestos was determined for both "Kaylo" and "Thermobestos" in the initial survey of 1962. Consequently, no effort was expended to repeat this determination since the materials used on both occasions, were reported as being identical in composition. However, since the composition of "Carey-Temp" was not established at any earlier date it was deemed imperative that it be determined and reported at this time. This was accomplished as described on Page 5.

B. Local exhaust ventilation controls:

1. The velocity of the air being exhausted through the ventilation hood openings on both band saws (#1 and #2) was measured through the use of a Model 60 Anemotherm air meter.

2. Four variable conditions of interest were evaluated:

   a. The velocity of air through the downdraft hood on both saws with all other hoods on the system closed off.

* This means to strike against, as (in this application) the striking or dashing of atmospheric dust particles against the bottom of a small impinger flask containing a specific volume of [illegible] medium.

b. The velocity of air through the downdraft hood on both saws with all other hoods on the system open.

c. The velocity of air through the supplementary overhead hood on both saws with all other hoods on the system closed off.

d. The velocity of air through the supplementary overhead hood on both saws with all other hoods on the system open.

METHODS: Both sampling and analytical methods were as follows:

SAMPLING:

1. All samples used in determining the actual concentrations in air were collected with a midget impinger apparatus, sampling 0.1 cubic feet of air per minute through impinger flasks containing 15 milliliters of double distilled dust-free water.

2. All samples used in obtaining particle size distribution data were collected on millipore filters connected to a small battery-operated pump.

ANALYTICAL:

1. Each dust sample was evaluated through the use of a counting procedure referred to as the light field microscopic counting technique.*

2. The particle sizing techniques were derived from two separate sources. First, the sample was prepared for sizing in accordance with a permanent mounting method.+ Second, the actual sizing was accomplished in accordance with the recommended technique depicting the use of a filar micrometer and a standard microscope while using both the 43X (high and dry) and the 97X (oil immersion) objectives.‡

3. The evaluation and free silica determination of "Carey-Temp" material was accomplished through the use of two methods. First, through information supplied by Mr. E. D. Ermenc, Director of Research of the Philip Carey Manufacturing Company and second, through contracted analysis performed by Mr. Thomas M. Durkan, Chief Chemist for the Trudeau Foundation, Inc., Saranak Lake, N. Y.

RESULTS: See Pages 8, 9, 10 and 11.

* Drinker and Hatch: "Industrial Dust", 2nd Edition, pp. 152-153, McGraw-Hill Book Company, Inc., New York, 1954.
+ Pautus, H. J., Talvitie, N. A., Fraser, D. A., and Keenan, R. G.: "Use of Membrane Filters in Air Sampling", A.I.H.A. Quarterly, Vol. 18, p. 269, September, 1957.
‡ Drinker and Hatch: "Industrial Dust", 2nd Edition, pp. 166-179, McGraw-Hill Book Company, Inc., New York, 1954.

CONCLUSIONS:

Relative to dust exposures from Graph #1 & Tables on Pages 8 & 9:

1. "Thermobestos" insulation blocks should not be fabricated when using only the original downdraft exhaust ventilation.

2. "Kaylo" insulation blocks could be fabricated safely when using only the original downdraft exhaust ventilation if existing leaks, observed on the #1 band saw, are corrected.

3. "Kaylo" insulation blocks definitely may be safely fabricated when using the entire exhaust ventilation facilities now available, i.e., hoods above the blocks as well as below.

From Graph #2 & Tables on Pages 8 & 9:

1. Methods of handling "Thermobestos" blocks (preparatory to sawing) and scraps (after sawing) contribute greatly to specific individual exposures as demonstrated by the following facts:

   a. The fabrication process, which always begins at the #2 band saw with the simple cutting of each 18" x 36" x 4" block into three smaller blocks about 18" x 12" x 4", is normally the least dusty of all the fabrication operations as revealed by the samples taken on 24 Jan 1963.

   b. However, on 6 Mar 1963, this operation was revealed as being one of the dustiest, regardless of the ventilation being used.

   c. There was only one major variable between the samples taken on the two dates, i.e., the method of handling the blocks preparatory to sawing. Consideration of the procedure used on these dates reveals: (1) that on 24 Jan 1963, the blocks were rolled up to the saw after having been removed from their shipping cartons and stacked on a "dolly" for easy individual removal and (2) on 6 Mar 1963, the blocks were not removed from their shipping cartons until needed by the worker. A large amount of dust is produced when blocks are removed individually from the cartons as a result of the natural abrasion produced when one block is pulled over the surface of the other. Consequently, the dust concentrations on this date at this location were greater than normal.

2. The supplementary overhead ventilation (added since the time of the preceding two reports) does successfully reduce the dust exposures. However, it does <u>not</u> reduce "Thermobestos" dust exposures to within safe acceptable limits when cutting radii.

From Graph #3 & Table on Page 9:

1. "Carey-Temp" dust concentrations for each exposure was substantially greater than the comparable "Thermobestos" dust concentrations and in excess of even the most lenient TLV established for human exposures, i.e., 50 mppcf of air.

2. The existing exhaust ventilation system as installed on both band saws is incapable of reducing the dust hazard, associated with the fabrication of "Carey-Temp", to within safe acceptable limits, i.e., 20 mppcf of air.

Relative to the exhaust ventilation system:

1. The duct velocity in the downdraft ventilation system on both band saws is far below the recommended value of 4000 fpm.

2. The duct velocity in the overhead ventilation system on both band saws is equal to or more than the recommended value of 4000 fpm.

3. The velocity in the downdraft ventilation systems for both band saws could be increased by patching all holes, leaks, etc., now in existence.

RECOMMENDATIONS:

1. Do not fabricate 18" x 36" x 4" "Carey-Temp" or "Thermobestos" insulation materials unless:

   a. The atmospheric dust problem can be reduced to below 20 mppcf of air through the use of improved ventilation techniques or repairs to the existing system, or

   b. The manufacturers of the two makes of insulation materials are able to produce a product which will not release, upon fabrication with a band saw, dust concentrations in excess of 20 mppcf of air.

Submitted by: Robert E. Peele

R. E. Peele
Industrial Hygienist

REP:hl

23 October 1963

INDUSTRIAL HYGIENE SURVEY
Evaluation of Atmospheric Dust Conditions at the Construction Insulation Shop
Table #1
Atmospheric Dust Concentration Data
Collected When Using Only Partial
Ventilation, i.e., Only Below the Blocks

Cutting & Edging Insulation Blocks

Date	Type of Material	Description of Location	Concentration in mppcf
Feb 63	Kaylo	#1, i.e., South Side of the #2 Band Saw	9.32
Jan 63	Thermobestos	#1, " " " " " " " "	10.00
Mar 63	"	#1, " " " " " " " "	51.50
Feb 63	Kaylo	#2, i.e., South Side of the #1 Band Saw	17.92
Jan 63	Thermobestos	#2, " " " " " " " "	26.36
Mar 63	"	#2, " " " " " " " "	42.70

Cutting a Radius on Insulation Blocks

Date	Type of Material	Description of Location	Concentration in mppcf
Mar 62	Kaylo	#3, i.e., South Side of the #2 Band Saw	17.10
" Feb 63	"	#3, " " " " " " " "	3.39
Mar 62	Thermobestos	#3, " " " " " " " "	101.40
24 Jan 63	"	#3, " " " " " " " "	69.59
6 Mar 63	"	#3, " " " " " " " "	36.82
Mar 62	Kaylo	#4, i.e., South Side of the #1 Band Saw	3.06
25 Feb 63	"	#4, " " " " " " " "	29.35
Mar 62	Thermobestos	#4, " " " " " " " "	83.30
24 Jan 63	"	#4, " " " " " " " "	66.69
6 Mar 63	"	#4, " " " " " " " "	70.00

Table #2
Atmospheric Dust Concentration Data
Collected When Using All Available
Ventilation, i.e., Both Above & Below the Blocks

Cutting & Edging Insulation Blocks

Date	Type of Material	Description of Location	Concentration in mppcf
5 Mar 63	Thermobestos	#1a, i.e., South Side of the #2 Band Saw	30.20
5 Feb 63	Carey-Temp	#1a, " " " " " " " "	51.70
6 Mar 63	Thermobestos	#2a, i.e., South Side of the #1 Band Saw	17.59
6 Feb 63	Carey-Temp	#2a, " " " " " " " "	68.20

Cutting a Radius on Insulation Blocks

Date	Type of Material	Description of Location	Concentration in mppcf
6 Mar 63	Thermobestos	#3a, i.e., South Side of the #2 Band Saw	22.42
6 Mar 63	Thermobestos	#4a, i.e., South Side of the #1 Band Saw	51.70
26 Feb 63	Carey-Temp	#4a, " " " " " " " "	85.40
26 Feb 63	Carey-Temp	#5a, i.e., North Side of the #1 Band Saw	100.90

Index for Graphs #1, #2 & #3

#1 = South Side #2 Band Saw - Cutting Blocks - Ventilation Only Below
#2 = " " #1 " " - Edging " - " " "
#3 = " " #2 " " - Cutting a Radius - " " "
#4 = " " #1 " " - Cutting Blocks - " Both Above & Below
#1a = " " #2 " " - Edging " - " " " "
#2a = " " #1 " " - Cutting a Radius - " " " "
#3a = " " #2 " " - " " " - " " " "
#4a = " " #1 " " - Cutting a Radius - Ventilation Both Above & Below
#5a = North Side #1 Band Saw - Cutting a Radius - Ventilation Both Above & Below

Table #3
Determination of Percentage Crystalline Free Silica
Present in "Thermobestos", "Kaylo" & "Carey-Temp"
as Quartz by the "Talvitie" Method

"Thermobestos"
(As Contained in Report 62-IH-1-G-1)

Trial #	W_1 in Grams	W_2 in Grams	W_3 in Grams	% Free SiO_2
1	0.5002	0.0390	0.0069	6.42
2	0.5000	0.0347	0.0065	5.58
3	0.5002	0.0395	0.0082	6.28
Average Percentage Crystalline Free SiO_2 = 6.4				

"Kaylo"
(As Contained in Report 62-IH-1-G-1)

Trial #	W_1 in Grams	W_2 in Grams	W_3 in Grams	% Free SiO_2
1	0.5000	0.0807	0.0433	7.48
2	0.5000	0.0730	0.0364	7.32
3	0.5000	0.0563	0.0190	7.46
Average Percentage Crystalline Free SiO_2 = 7.4				

"Carey-Temp"
(As Reported by Mr. Thomas M. Durkan)
4 October 1963

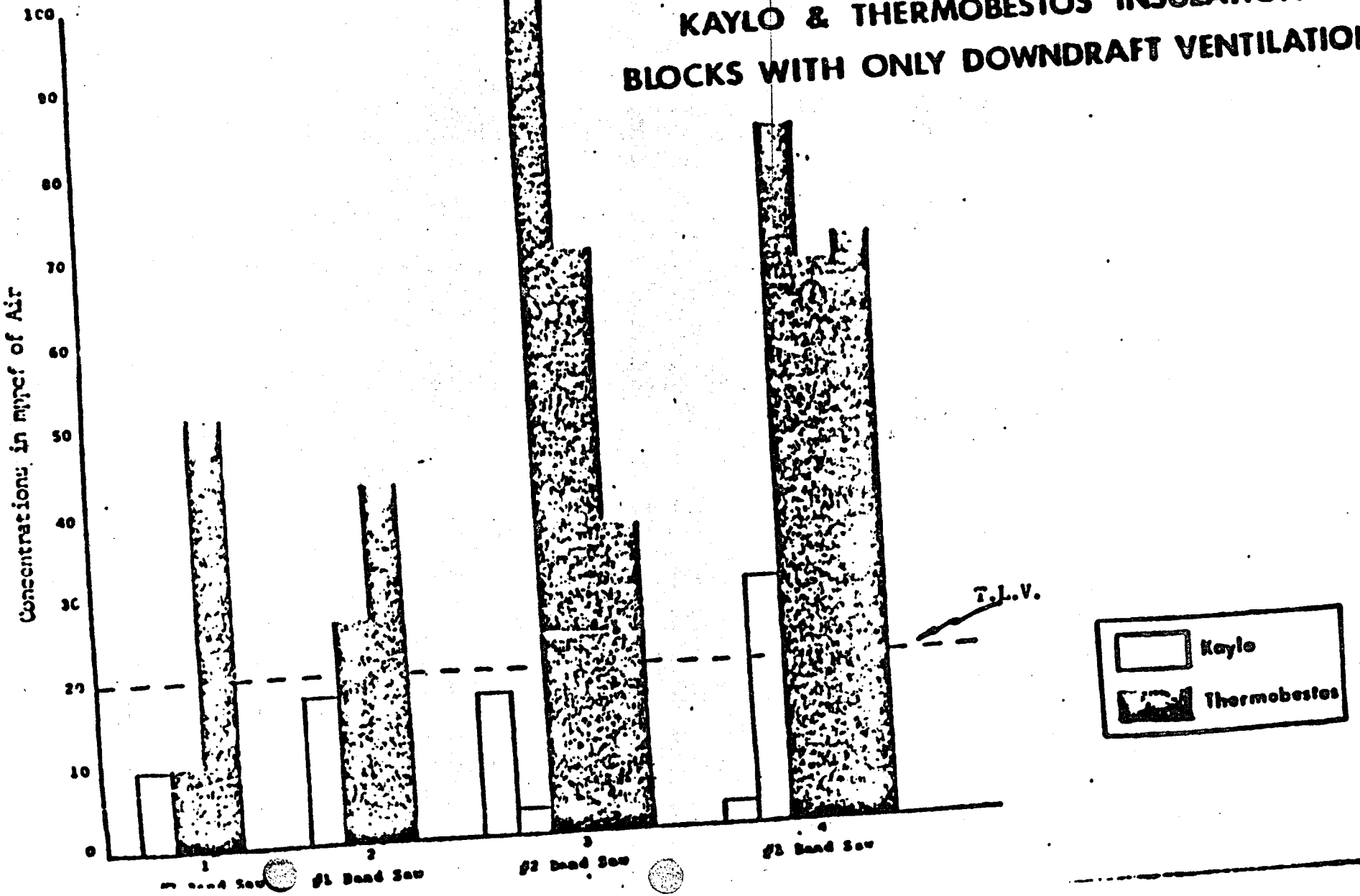
Components Soluble in Hcl	10.8%
Other Components Soluble in Phosphoric Acid	88.8%
	99.6%
Percentage Crystalline Free SiO_2 as Quartz	00.4%

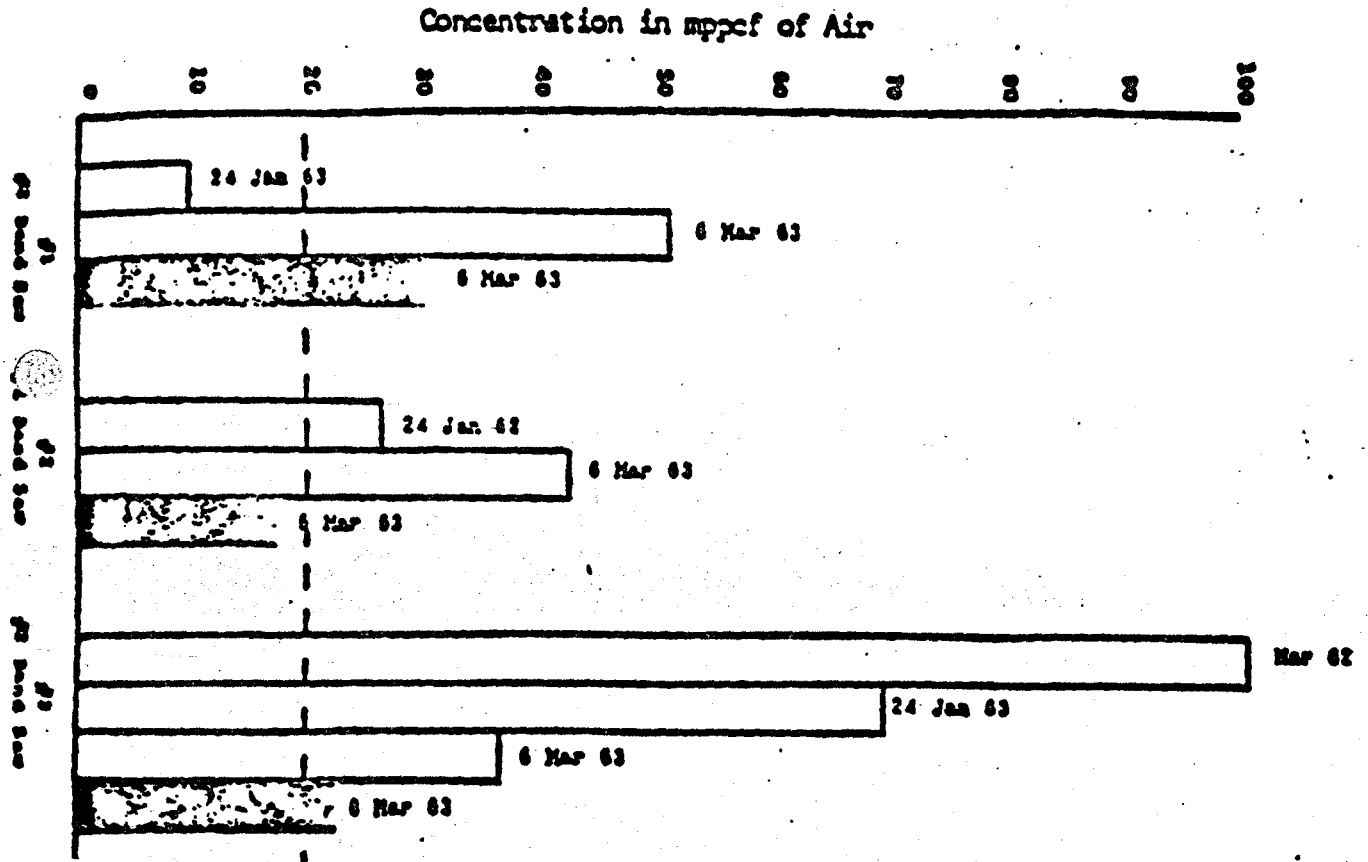
Table #4
Ventilation Rates on Two Band Saws

ate	Band Saw	Hood Being Checked	Description of Condition	Ventilation Rate in fpm
Feb 63	#2	Downdraft	Only Downdraft System in Operation	1500
Mar 63	#2	"	" " " " "	1450
Feb 63	#2	"	Downdraft & Overhead System in Operation	1200
Mar 63	#2	"	" " " " " "	1200
Feb 63	#2	"	Every Hood in the System Open	950
Mar 63	#2	"	" " " " " "	900
Feb 63	#2	Overhead	Downdraft & Overhead System in Operation	6500
Mar 63	#2	"	" " " " " "	4800
Feb 63	#2	"	Every Hood in the System Open	4000
Mar 63	#2	"	" " " " " "	
Feb 63	#1	Downdraft	Only Downdraft System in Operation	2100
Mar 63	#1	"	" " " " "	1500
Feb 63	#1	"	Downdraft & Overhead System in Operation	1600
Mar 63	#1	"	" " " " " "	1150
Feb 63	#1	"	Every Hood in the System Open	1100
Mar 63	#1	"	" " " " " "	
Feb 63	#1	Overhead	Downdraft & Overhead System in Operation	5500
Mar 63	#1	"	" " " " " "	4500
Feb 63	#1	"	Every Hood in the System Open	4200
Mar 63	#1	"	" " " " " "	

GRAPH NO. 1

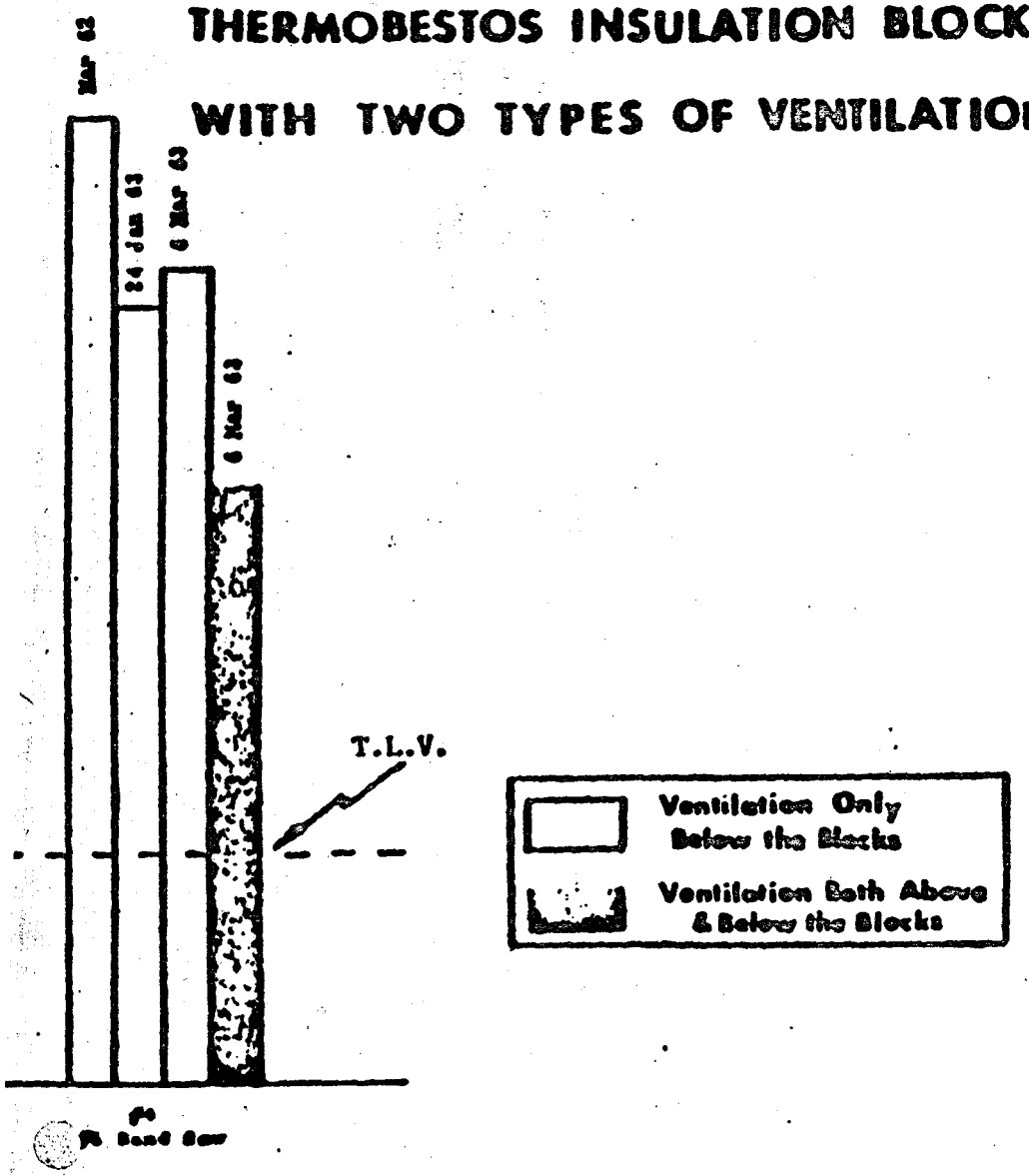
DUST EXPOSURES WHILE FABRICATING KAYLO & THERMOBESTOS INSULATION BLOCKS WITH ONLY DOWNDRAFT VENTILATIOI




Concentration in mppcf of Air
24 Jan 63
6 Mar 63
6 Mar 63
24 Jan 62
6 Mar 63
6 Mar 63
Mar 62
24 Jan 63
6 Mar 63
6 Mar 63

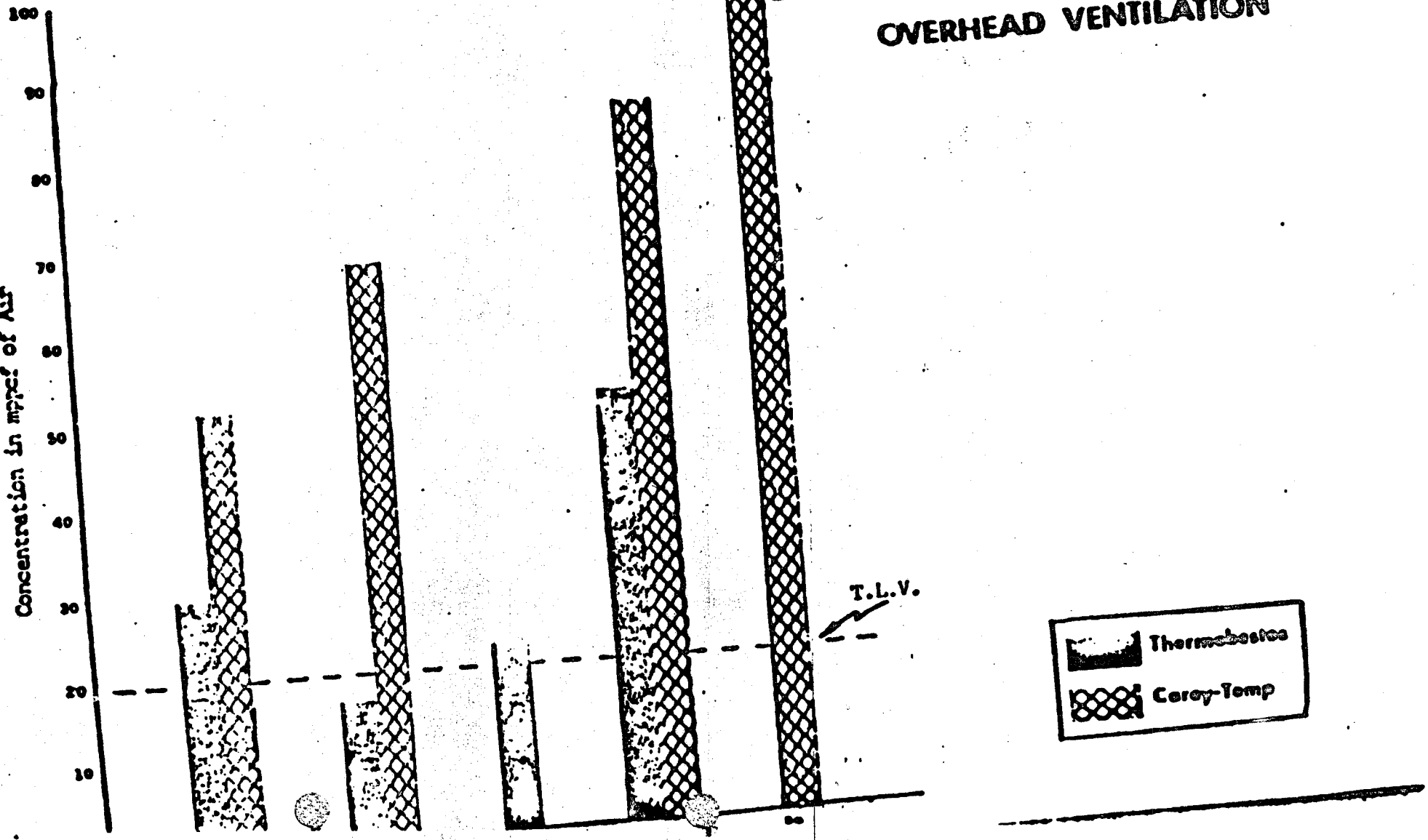
GRAPH NO. 2

DUST EXPOSURES WHILE FABRICATING THERMOBESTOS INSULATION BLOCKS WITH TWO TYPES OF VENTILATION



GRAPH NO. 3

DUST EXPOSURES WHILE FABRICATING THERMOBESTOS & CAREY-TEMP INSULATIC BLOCKS WITH BOTH DOWNDRAFT AND OVERHEAD VENTILATION



UNION CARBIDE

INTERNAL CORRESPONDENCE

9-9-91
L.f.a.

UNION CARBIDE CHEMICALS COMPANY • INSTITUTE PLANT P. O. BOX 2831, CHARLESTON, WEST VIRGINIA

To (Name) Mr. S. C. Giambruno
Company
Location Industrial Relations

Date 4 December 1962
Originating Dept. Medical Department - Plant 512
Answering letter date

Copy to Mr. L. N. Dickinson, Mr. G. H. Daniels, Mr. N. S. Eastman, Mr. R. A. Huber, Mr. B. F. King, Mr. F. B. Snyder, Dr. E. M. Best, Jr., Mr. E. G. Heinz, Mr. P. E. Henry, Mr. R. A. Neal, Mr. D. R. Matheny, Mr. N. H. Ketcham, Dr. C. U. Dernehl

Subject: Insulation Block Dust Survey
Construction Insulation Shop
Plant 511

Two reports by Mr. R. E. Peele have been issued on this subject (21 March 1962 and 20 July 1962) and sent out under my signature. On 16 May 1962, a copy of a letter from Doctor Nale to the UCC Central Purchasing Department in New York pertaining to this subject was sent to some of the people on the above distribution list. Undoubtedly, Johns Manville is extremely interested in having our Construction Department use their "Thermobestos" blocks. However, I believe that possibly unnecessary pressure is being applied to us from several sources.

The enclosed report by Mr. Peele includes information on an invitation for Mr. Peele to visit Manville, New Jersey, at Johns Manville's expense to evaluate their industrial hygiene studies. Mr. Peele points out in this report also that he has been contacted recently by the Design and Construction Department at the Technical Center who have implied that Mr. Peele should comply with Johns Manville's proposal.

It is my opinion that we should continue to do surveys, with limitations, on samples of "thermobestos" blocks that are of a new formula and are submitted to our Construction Insulation Shop at the Institute Plant for evaluation. However, I am not in favor of Mr. Peele accepting Johns Manville's invitation and would appreciate approval or disapproval for this trip from my supervision so that Mr. Peele can be informed accordingly.

Very truly yours,

R. J. Sexton, M.D.
Plant Medical Director

RJS:gh
Enclosure

9-9-81
L.J.S.

UNION CARBIDE

INTERNAL CORRESPONDENCE

UNION CARBIDE CHEMICALS COMPANY • INSTITUTE PLANT P. O. BOX 2831, CHARLESTON, WEST VIRGINIA

To (Name) R. J. Sexton, M.D.
Company
Location Medical Department

Date 3 December 1962
Originating Dept. Industrial Hygiene - Plant 512
Answering letter date
Subject Johns Manville "Thermobestos"

Copy to

On 21 March 1962, an Industrial Hygiene Report, i.e., 62-IH-1-6-1, identified the existence of a hazard to health in the Construction Insulation Shop during such times as when insulation blocks manufactured by the Johns Manville Company are being fabricated with exhausted band saws. It was recommended at that time that 18" x 36" x 4" "Thermobestos" insulation blocks* should not be fabricated with the existing equipment unless --

(a) The atmospheric dust problem could be reduced to below 20 mppcf of air through the use of ventilation, etc., or

(b) The producer of this product begins manufacturing an insulation block which will not release upon fabrication with a band saw, dust concentrations in excess of 20 mppcf of air.

In accordance with these recommendations, the Construction Insulation Shop discontinued almost immediately the purchase of "Thermobestos" insulation blocks.

On 20 July 1962, a second Industrial Hygiene Report, i.e., 62-IH-2-G-1, was submitted subsequent to an evaluation of three new insulation materials supplied by the Johns Manville Company. This report concluded that these materials were improved over the original. However, the dust concentrations produced upon fabrication of these insulation blocks were substantially in excess of the recommended safe concentrations of 20 mppcf of air. Therefore, the recommendations contained in this report remained exactly as those stated in the initial report of March, 1962.

On 20 November 1962 the author was contacted by Mr. D. R. Matheny, General Foreman of the Insulation Shop, who stated that three Johns Manville representatives, i.e., Messers. F. E. Saxer, N. Gordon, and H. E. Kaufman, were present and had requested a meeting with the Plant Industrial Hygienist. This meeting was held in the lobby of Building 2, at which time Mr. Saxer produced the accompanying copy of portions of a report submitted by the Johns Manville Industrial Hygiene Laboratory located at Manville, N.J. Mr. Saxer stated that, in accordance with this report, they were not able to produce results which agreed with those contained in the reports submitted by this department. Therefore, they were concerned and interested in learning if their methods of reproducing

*The Johns Manville trade name for their insulation blocks

5-26
9-9-81
F.K.A.

our environmental conditions, sampling and evaluating the dust concentrations contained therein were subject to question. At this point he stated also that this conclusion was promoted on the basis of their analysis of the atmospheric dust conditions produced by their competitors product, (i.e., Kaylo or Item # 5AT in the report) which in no way agreed with the data submitted in the Industrial Hygiene Report - IH-62-I-G-I.

It was explained at this point, that this department's interest in this problem is always confined solely to the environmental conditions as they effect the health of our workers, and that no part of the investigation should be construed as an attempt to arbitrarily promote the use of one company's product over that of another.

Upon completion of this statement, Mr. Saxer proposed that Mr. D. R. Matheny and the Plant's Industrial Hygienist make a trip to Manville, New Jersey, at Johns Manville's expense and at a time selected by Union Carbide. This visit would be for the specific purpose of observing, scrutinizing and comparing their method of atmospheric dust evaluation with that as utilitized by the Institute Plant's Industrial Hugiene Department. It was Mr. Saxer's opinion that such a visit would permit a more positive approach to the problem and remove the possibility of misunderstandings, etc., that results from written correspondence. At this point, Mr. Saxer was assured that there would be no personal objection on my part to the performance of such a service. However, a proposal of this nature would have to be submitted to the Plant Manager, Mr. L. N. Dickinson, through appropriate channels before a final decision could be made.

In conclusion, it should be stated that a phone call was received from Mr. F. G. Comerford of Design and Construction on the morning of 21 November 1962, who requested that he be brought up to date on this specific problem. This request was immediately satisified both by verbal explanation and by the promise that copies of both reports, i.e., 62-IH-I-G-I and 62-IH-2-G-1, would be mailed to him immediately. Mr. Comerford further stated that we should not back down on our requirements, but that it probably might be wise to consider their proposal in light of the many ramifications of the problem as it affects the whole company structure, i.e., purchasing, sales, manufacturing, etc.

Very truly yours,

Robert E. Peele

Robert E. Peele
Industrial Hygienist

REP:gh

Enclosure

9-9-81
J.J.A.

DISCUSSION

Atmospheric dust concentration tests were made on October 30, 1962 during the fabrication of insulation blocks on the DO-ALL Model ~~D-H-V and~~ saw in the Southern Center Materials Testing Laboratory sample preparation room. The National Conference of Governmental Industrial Hygienists Test Method was followed using the Greenburgh-Smith Impinger. Tests were conducted by Mr. T. F. Bednarchuk of the J-M Industrial Hygiene Laboratory at Manville. To obtain comparative data, the room ventilation was adjusted to give more than the usual amount of atmospheric dust. The test set up is shown in the photograph below.

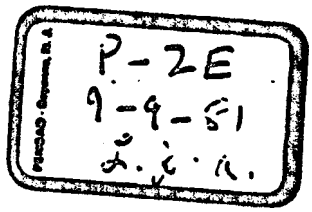


In addition to the room ventilating system, air was removed from directly above the block at a rate of 37 cu ft per min and from the solid bearing surrounding the saw at a rate of 15 cu ft per min. The saw blade was standard and had nine teeth per in. and a lineal speed of 2100 ft per min. The blocks were 18 × 11 × 4 or 6 in. and were cut so that the blade entered the 11-in. edge.

Five types of insulation were tested including standard Thermobestos, and three experimental pan coat blocks. Formulas are given in Appendix I. Prior to testing, blocks of each were conditioned by: a) drying a minimum of seven days at 250F; b) drying at 250F and conditioning for 10 days at 70 per cent RH, 70F; c) drying at 250F and conditioning for 10 days at 95-100 per cent RH, 95F.

The test data are given in Appendix II. The dust concentration tests were analyzed and indicated that the superiority reported by Union Carbide of over standard Thermobestos and the experimental pan coat blocks submitted to them is subject to question. The results also indicated that the slate dust composition, 2-AI, caused less atmospheric dust than the other types of blocks.

The effect that conditioning of the blocks had on the dust concentration in the air was not apparent. This is attributed to the limited amount of material tested and the possibility that an equilibrium condition of dust concentration in the sampling area may not have been reached in some cases. In order to definitely establish the effect moisture content of the blocks has on atmospheric dust a more extensive series of tests would be required. Such tests would also serve to more definitely establish the relative dustiness of the formulas investigated.



9-9-51
F.J.C.

APPENDIX II

TEST DATA

ATMOSPHERIC DUST CONCENTRATION DATA

	Experimental Pan Coat (Auto. Blend)			Std. Auto. Tablet Coating	Std. Auto.
	1-MT	2-MT	3-MT	4-MT	5-MT
Concentration in mppcf of Air					
Dried at 250F	110.8	19.9	16.4	34.2	52.0
Conditioned at 70% RH, 70F	39.3	14.8	47.1	15.8	36.4
Conditioned at 95-100% RH, 95F	99.6	20.6	31.4	104.0	97.6
Avg. of three conditions	83.2	18.1	31.6	51.3	62.0
Moisture Absorbed During Conditioning - %					
Dry to 70% RH, 70F	2.7	2.0	2.5	3.0	3.9
Dry to 95-100% RH, 95F	13.6	12.3	17.2	15.3	12.8

*This formulation was used for samples submitted to Union Carbide for evaluation. Refer to formula No. 58, samples 21, 22, 23, Research Report No. [illegible], p 1.

Bob Pendleton

9-5-51

INDUSTRIAL HYGIENE SURVEY

CONSTRUCTION INSULATION SHOP - BUILDING 511-2018

REPORT 62-IH-2-G-1

SUMMARY: In March of this year, following an industrial hygiene survey, it was recommended that band saw fabrication of "Thermobestos" insulation blocks in the Construction Department Insulation Shop at Plant 512 should cease completely and permanently unless the blocks, or the dust control techniques used in fabricating the blocks, are improved so that atmospheric dust concentrations are found to be within acceptable safe limits. In the following month of April, three new "Thermobestos" insulation blocks were submitted to Plant 511 for evaluation under environmental conditions identical with those experienced heretofore.

Critical analysis of the data obtained on this more recent survey revealed the existence of some degree of improvement in the dust contamination associated with the fabrication of these particular "Thermobestos" insulation blocks. However, the magnitude of the improvement did not reduce the atmospheric dust concentrations to within the recommended safe acceptable limits of 20 mppcf (million particles per cubic foot) of air. Therefore, the recommendations remain exactly as those stated in the report of the survey of March, 1962*.

INTRODUCTION: It was established unquestionably, in an industrial hygiene report submitted in March of this year, i.e., Report 62-IH-1-G-1, that an inhalation hazard to health is produced within the Construction Insulation Shop whenever "Thermobestos" insulation blocks are fabricated. Furthermore, it was recommended also that the fabrication of "Thermobestos" insulation blocks should cease until at least one of the following two conditions are met: First, that the atmospheric dust problem is reduced to below 20 mppcf of air through the use of ventilation, etc., or, second, that, if a new insulation block should be manufactured by the producer of "Thermobestos" blocks that, it would be subjected to testing under identical conditions as before thereby establishing the fact that it will not release, upon fabrication with a band saw, dust concentrations in excess of 20 mppcf of air.

The Industrial Hygiene Department's recommendations met exact compliance by those responsible persons in the Construction Insulation Shop, in that no "Thermobestos" insulation blocks have been fabricated with band saws for use in this plant since the date of the issuance of these recommendations. However, some change in procedure was indicated when, on 25 April 1962, this department was contacted by Mr. D. R. Matheny, General Foreman of the Insulation Shop. At that time, Mr. Matheny requested an evaluation of a new "Thermobestos" insulation block which had been developed by the manufacturer, in an effort to comply with the specifications as stated in the second part of the above listed recommendations.

---

*Insulation Block Dust Survey, Construction Insulation Shop, Plant 511, Report 62-IH-1-G-1.

DISCUSSION: Mr. Matheny's request for services was immediately acted upon at which time two basic decisions were made: First, Friday, the 27th of April, would be the most opportune time for obtaining the information needed in the performance of this evaluation and, second, two atmospheric dust samples of each condition should be obtained with each one being taken in identical locations so as to provide greater reliability. These sampling plans had to be altered somewhat, however, on the site, when it was discovered that the manufacturer had provided only three insulation blocks each of which differed in the precise manner in which it had been produced*.

This shortage of material, with identical characteristics, complicated the sampling and evaluation procedures somewhat, since it was impossible, therefore, to obtain more than one sample of atmospheric dust being produced by any one material (in actuality, a total of only three atmospheric dust samples were collected during the test period). However, this complication was not so severe as to render the sample data of no use, as is revealed in the condensed explanation of the sampling procedure selected on this date which is as follows:

First: The data contained on page 8 of Report 62-IH-1-6-1 revealed clearly that the greatest concentrations of atmospheric dust were produced at the band saws, and that location #3, i.e., #2 band saw while sawing, definitely provided the greatest hazard to health. Consequently each of the three samples, under consideration in this report, i.e., 62-IH-2-G-1, were taken at this same location.

Second: All of the results revealed in the preceding report, i.e., 62-IH-1-G-1, were obtained during the late fall and winter, therefore, the doors to the building were closed for purposes of heat conservation. These environmental conditions were duplicated during the performance of this second survey.

Third: The operator of the #2 band saw employed sawing techniques as nearly identical with those in evidence during the preceding periods of evaluation as were possible to duplicate, i.e., position of the block with respect to the saw blade, speed of feeding the block into the saw blade, position of the operator's head with respect to the block, etc.

Fourth: Each of the dust samples obtained during the time of performing the initial survey were held in the operator's breathing zone. This feature was also duplicated for this second survey, i.e., 62-IH-2-G-1.

EVALUATION: Each of the three samples collected were evaluated in the laboratory in accordance with recommended and prescribed light field microscopic counting techniques as referred to and identified in Report 62-IH-1-G-1. It should be noted that no effort was expended to obtain anything more than a knowledge of the concentration of dust in the air since the composition and particle size of this material should not be expected to deviate to any degree from the prior recorded values. This supposition was based on two facts, (1) the

*In accordance with information received from the manufacturer each block was composed of identically the same materials and was formed in the same general manner, i.e., by the "Pan Method". However, the similarity in production differed from here on with the manufacturer being the only one in possession of the exact description and the specific alterations incorporated in each method.

chemical make up of these materials was reported as being identical with the "Thermobestos" materials reported on in the prior survey and, (2) the sawing techniques utilized on both occasions were identical in nature.

PROCEDURES: Both sampling and analytical methods were identical in detail with those described in the earlier report, with sampling being accomplished through the use of the Mine Safety Appliance Company's Midget Impinger Pump and Apparatus and the analysis taking place in accordance with light field microscopic counting techniques.

RESULTS: Analysis of the physical data contained on page 5 reveals that the atmospheric dust concentration in mppcf (million particles per cubic foot) of air for each of the three new materials was

(a) 36.8 mppcf of air for J.M. #21,

(b) 48.1 mppcf of air for J.M.#22, and

(c) 44.1 mppcf of air for J.M. #23.

CONCLUSIONS:

(1) None of these three samples revealed a concentration as high as that recorded in the previous report for "Thermobestos" exposures in this position, i.e., 101.4 mppcf of air for Location #3. However, by the same token, none of the present three samples revealed a concentration as low as that recorded for "Kaylo" exposures in this position, i.e., 17.1 mppcf of air for Location #3.

(2) Each of the three values exceeded the established T.L.V. (Threshold Limit Value) of 20 mppcf of air by a substantial amount.

(3) None of the three insulation materials, i.e., J.M.#21, J.M.#22, and J.M.#23, as submitted by the manufacturer of "Thermobestos", should be fabricated with band saws in the Insulation Shop by our employees unless the manufacturer complies exactly with the following conditions:

The physical and/or chemical characteristics and composition of these materials are improved to the degree that some further future evaluation might reveal them to be incapable of releasing concentrations of dust into the atmosphere that are in excess of the T.L.V.

RECOMMENDATIONS:

Do not fabricate the 18" x 36" x 4" "Thermobestos" insulation blocks (J.M.#21, J.M.#22, J.M.#23) with existing equipment unless -

(1) The producer of this material can further improve his product to the point that it will not release, upon fabrication with our ventilated band saws, dust concentrations in excess of 20 mppcf of air, or,

(2) The atmospheric dust problem can be reduced to below 20 mppcf of air through the use of improved ventilation techniques, or other safeguarding measures.

Submitted by: Robert E. Peele

Robert E. Peele
Industrial Hygienist

REP:gl

15 July 1962

INDUSTRIAL HYGIENE SURVEY

EVALUATION OF ATMOSPHERIC DUST CONCENTRATIONS

AT THE CONSTRUCTION INSULATION SHOP

Atmospheric Dust Concentration Data

on Three "Thermobestos" Materials

As Collected with the Midget Impinger Pump and Apparatus

TYPE OF DUST MATERIAL	SAMPLE							
	LOCATION	Rate in cfm	Time in Min.	Vol. in C.F.	Blank # Particles	Dilution Factor	Count # Particles	Conc. in mppcf of Air
JM #21	#2 Band Saw, Breathing Level of Operator	0.1	10	1.0	8.3	100	94.8	86.8
JM #22	Same as Above	0.1	10	1.0	8.3	250	57.8	48.1
JM #23	Same as Above	0.1	10	1.0	8.3	200	65.0	44.1

9-9-51

INDUSTRIAL HYGIENE SURVEY

CONSTRUCTION INSULATION SHOP - BUILDING 511-2018

REPORT 62-IH-2-G-1

SUMMARY: In March of this year, following an industrial hygiene survey, it was recommended that band saw fabrication of "Thermobestos" insulation blocks in the Construction Department Insulation Shop at Plant 512 should cease completely and permanently unless the blocks, or the dust control techniques used in fabricating the blocks, are improved so that atmospheric dust concentrations are found to be within acceptable safe limits. In the following month of April, three new "Thermobestos" insulation blocks were submitted to Plant 511 for evaluation under environmental conditions identical with those experienced heretofore.

Critical analysis of the data obtained on this more recent survey revealed the existence of some degree of improvement in the dust contamination associated with the fabrication of these particular "Thermobestos" insulation blocks. However, the magnitude of the improvement did not reduce the atmospheric dust concentrations to within the recommended safe acceptable limits of 20 mppcf (million particles per cubic foot) of air. Therefore, the recommendations remain exactly as those stated in the report of the survey of March, 1962*.

INTRODUCTION: It was established unquestionably, in an industrial hygiene report submitted in March of this year, i.e., Report 62-IH-1-G-1, that an inhalation hazard to health is produced within the Construction Insulation Shop whenever "Thermobestos" insulation blocks are fabricated. Furthermore, it was recommended also that the fabrication of "Thermobestos" insulation blocks should cease until at least one of the following two conditions are met: First, that the atmospheric dust problem is reduced to below 20 mppcf of air through the use of ventilation, etc., or, second, that, if a new insulation block should be manufactured by the producer of "Thermobestos" blocks that, it would be subjected to testing under identical conditions as before thereby establishing the fact that it will not release, upon fabrication with a band saw, dust concentrations in excess of 20 mppcf of air.

The Industrial Hygiene Department's recommendations met exact compliance by those responsible persons in the Construction Insulation Shop, in that no "Thermobestos" insulation blocks have been fabricated with band saws for use in this plant since the date of the issuance of these recommendations. However, some change in procedure was indicated when, on 25 April 1962, this department was contacted by Mr. D. R. Matheny, General Foreman of the Insulation Shop. At that time, Mr. Matheny requested an evaluation of a new "Thermobestos" insulation block which had been developed by the manufacturer, in an effort to comply with the specifications as stated in the second part of the above listed recommendations.

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*Insulation Block Dust Survey, Construction Insulation Shop, Plant 511, Report 62-IH-1-G-1.

DISCUSSION: Mr. Matheny's request for services was immediately acted upon at which time two basic decisions were made: First, Friday, the 27th of April, would be the most opportune time for obtaining the information needed in the performance of this evaluation and, second, two atmospheric dust samples of each condition should be obtained with each one being taken in identical locations so as to provide greater reliability. These sampling plans had to be altered somewhat, however, on the site, when it was discovered that the manufacturer had provided only three insulation blocks each of which differed in the precise manner in which it had been produced*.

This shortage of material, with identical characteristics, complicated the sampling and evaluation procedures somewhat, since it was impossible, therefore, to obtain more than one sample of atmospheric dust being produced by any one material (in actuality, a total of only three atmospheric dust samples were collected during the test period). However, this complication was not so severe as to render the sample data of no use, as is revealed in the condensed explanation of the sampling procedure selected on this date which is as follows:

First: The data contained on page 8 of Report 62-IH-1-6-1 revealed clearly that the greatest concentrations of atmospheric dust were produced at the band saws, and that location #3, i.e., #2 band saw while sawing, definitely provided the greatest hazard to health. Consequently each of the three samples, under consideration in this report, i.e., 62-IH-2-G-1, were taken at this same location.

Second: All of the results revealed in the preceding report, i.e., 62-IH-1-G-1, were obtained during the late fall and winter, therefore, the doors to the building were closed for purposes of heat conservation. These environmental conditions were duplicated during the performance of this second survey.

Third: The operator of the #2 band saw employed sawing techniques as nearly identical with those in evidence during the preceding periods of evaluation as were possible to duplicate, i.e., position of the block with respect to the saw blade, speed of feeding the block into the saw blade, position of the operator's head with respect to the block, etc.

Fourth: Each of the dust samples obtained during the time of performing the initial survey were held in the operator's breathing zone. This feature was also duplicated for this second survey, i.e., 62-IH-2-G-1.

EVALUATION: Each of the three samples collected were evaluated in the laboratory in accordance with recommended and prescribed light field microscopic counting techniques as referred to and identified in Report 62-IH-1-G-1. It should be noted that no effort was expended to obtain anything more than a knowledge of the concentration of dust in the air since the composition and particle size of this material should not be expected to deviate to any degree from the prior recorded values. This supposition was based on two facts, (1) the

*In accordance with information received from the manufacturer each block was composed of identically the same materials and was formed in the same general manner, i.e., by the "Pan Method". However, the similarity in production differed from here on with the manufacturer being the only one in possession of the exact description and the specific alterations incorporated in each method.

chemical make up of these materials was reported as being identical with the "Thermobestos" materials reported on in the prior survey and, (2) the sawing techniques utilized on both occasions were identical in nature.

PROCEDURES: Both sampling and analytical methods were identical in detail with those described in the earlier report, with sampling being accomplished through the use of the Mine Safety Appliance Company's Midget Impinger Pump and Apparatus and the analysis taking place in accordance with light field microscopic counting techniques.

RESULTS: Analysis of the physical data contained on page 5 reveals that the atmospheric dust concentration in mppcf (million particles per cubic foot) of air for each of the three new materials was

(a) 36.8 mppcf of air for J.M. #21,

(b) 48.1 mppcf of air for J.M.#22, and

(c) 44.1 mppcf of air for J.M. #23.

CONCLUSIONS:

(1) None of these three samples revealed a concentration as high as that recorded in the previous report for "Thermobestos" exposures in this position, i.e., 101.4 mppcf of air for Location #3. However, by the same token, none of the present three samples revealed a concentration as low as that recorded for "Kaylo" exposures in this position, i.e., 17.1 mppcf of air for Location #3.

(2) Each of the three values exceeded the established T.L.V. (Threshold Limit Value) of 20 mppcf of air by a substantial amount.

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RECOMMENDATIONS:

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