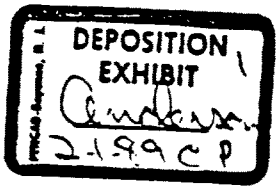
"Set No. 18"

THE DOW CHEMICAL CO[illegible]





July 17, 1969

As a result of his survey, Mr. DeGesero has made up a table showing under what conditions and with what materials an approved respirator must be worn. This table has been reproduced on a small card and each one of you will receive a copy. (Show transparency on the screen.)

I think you all know that there is a very good replacement for Aircell and that is Fiberglas. Fiberglas is more than twice as effective as Aircell as an insulating material and contains no asbestos. (K factor 61 versus .29) Fiberglas is being used in every Dow division except here at Midland. Actually, Aircell should not be used on any job except for personnel protection. It is not designed for temperatures higher than 200° F. and we know it is commonly used on lines traced with 150# steam (375°F.)

At the present time we are trying out an expanded silicone (perlite) type of insulation called Careytemp 1500. This material does contain about 6% asbestos which is about the same as Kaylo; however, it is not supposed to be nearly as dusty The Phillip-Carey Company has been doing some work on eliminating completely the asbestos from this material. More information on this material will be forthcoming as soon as an evaluation can be made.

Hi-temp is a diatomaceous earth type of insulation which contains about 15% asbestos. There is no non-asbestos substitute for this material on very high temperature applications; however, its use is rather limited and it should not present a real problem.

"Set No. 18"

Mag Oxide is another fairly high asbestos containing insulation which, at present, is not being used to any great extent here in the plant.

Mineral wool insulating cement commonly known as Webber's Cement contains about 10% asbestos and is quite dusty when being mixed with water. It has been suggested that the dry material be made up in batches large enough to last for a week or two. This would eliminate the need for a respirator each time the material is used. The use of Armentite is small enough so that making up large batches would not be warranted except in special cases.

Every major manuracturer of insulation has been contacted with regard to new products available, etc. This practice will be continued and anytime we can find a new product that will be more effective or easier to work with, it will be brought into the plant for your use.

Roy Anderson
Maintenance Engineer
222 Building
Phone 6-4456

rb

ST0025518

"Set No. 18"

MINIMAL RESPIRATORY PROTECTION REQUIREMENTS

ST0020519

Material	Remove	Mix	Cut	Apply
Air Cell	X			X
Kaylo (Cal sil)	X		X	X
High Temp.	X			
Mag Oxide	X			
No. 1 Plus (Webbers)		X		
Armentite (Asbestos Shorts 352)		X		
Super Power				
Thermobestos				
Fiberglass				

1. You [redacted] wear a respirator* when doing the above operations [redacted]

2. You [redacted] respirator* [redacted]

*MSA Dustfoe or Sure Guard (R-2090) are the only allowed types.

396951

DEPOSITION EXHIBIT 9
Anderson
2-8-9 CP

ST0020549.A

HEALTH AND SAFETY

Only in recent years have we become fully aware of the health hazards involved in working with asbestos-containing materials. In 1969 the Environmental Research Laboratory made a thorough study of air borne dust with relation to our coverers. As a result of this study and with strong support from the Medical Department, a program was initiated whereby we would (1) reduce drastically the purchase of all asbestos-containing insulating materials, and (2) wear approved respiratory protection when working with asbestos. Since then the purchase of asbestos-containing materials has been reduced to almost zero, and our Medical Department has instituted a very rigorous program of surveillance See Medical Information on page

ST0006103

In general, our dust problem can be divided into two categories, namely asbestos dust and nuisance dust. We have thousands of feet of lines still covered with asbestos insulation. These lines are continually being uncovered and recovered. It is mandatory that respiratory protection be worn when these operations are taking place. Whenever possible the materials should be wetted down to reduce the dust. Nuisance dusts, whil not as potentially dangerous as asbestos, can still be a very real source o irritation and respiratory protection is highly recommended. Rarely is a demolition job accomplished without a lot of dust. Wear your respirator.

Good housekeeping is essential in reducing the dust level in a working area Always pick up torn off insulation and deposit in a dempster promptly. Do not cut insulation or mix up cement in a confined area and wear clean, loose-fitting clothing.

Two types of U. S. Bureau of Mines approved respirators are carried in stock. They are Dustfoe #66 and #67, and Sure-Guard #R2090. These pieces of equipment, properly fitted and kept in good condition, will afford

S00205491.D

adequate protection. It is very important that the outer edges of the face piece form a perfect seal with the face. This should be checked frequently.

Coverers are frequently called upon to work on hot vessels and lines and to remove insulation that has been saturated with chemicals. This calls for alertness and caution. In other respects the safety habits of coverers should be no different than any other maintenance personnel. Remember, "Safety must be a first consideration and basic responsibility of every Midland Division employee."

MEDICAL INFORMATION

The Medical Department is concerned about the hazards of excessive asbestos exposure not only because of the possibility of developing asbestosis, a permanent scarring condition of the lungs, but also because of the increased risk of developing lung cancer. We know that cigarette smoking along with exposure to asbestos dusts increases the risk of developing lung cancer about 80 times. Therefore, it is against your best general interest to smoke from a health standpoint--more so, if you are a pipe coverer.

Always wear the proper protective equipment when working with asbestos containing insulation materials.

The Medical Department maintains surveillance of all pipe coverers through periodic chest x-rays, measurements of breathing ability and health screening examinations. After an initial series of chest x-rays are taken, if you are under 40 years of age or have been pipe covering less than 10 years, follow up x-rays will be taken every year. If you are over 40 years of age or have been pipe covering more than 10 years, follow up chest x-rays will be taken every 6 months.

In recent years we have markedly reduced the use of asbestos in the Midland Plant. Our long range plans call for complete elimination of asbestos; however, until this is possible through the substitution of other materials, you are urged to use extreme caution when working with asbestos containing insulation.

Should you have any question relating to your health in regard to the handling of these materials, please contact the Medical Department at 6-2243.

396954

GENERAL THEORY AND PRACTICE

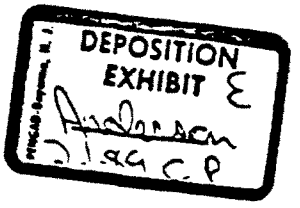
Heat Transfer

The function of thermal insulation is to retard heat flow. We can best accomplish this by knowing how heat is transferred. Heat has two methods of transfer, namely, conduction and radiation. Convection, in the strict sense of the word, is not a method of heat transfer even though it is commonly used as such. Definitions are as follows:

> Conduction is energy (heat) transferred from one body to another through actual physical contact. Example: heat traveling through a metal wire.
>
> Radiation is energy (heat) transmitted through space from a hotter to a colder body. Example: the sun's heat on the earth.
>
> Convection is the movement of a mass (air) from one location to another. Example: the movement of air from one part of a room to another.

One of the important measurements of an insulation's value is its thermal conductivity or "k" factor. This is defined as the amount of heat in Btu which will travel through a square foot of insulation one inch thick in one hour. The lower the "k" factor the better the insulation. Another way of saying the same thing would be to state that a good insulating material is a poor heat conductor. One of the big reasons for this is that insulating materials contain a large number of air spaces, and dry, immobile air is a very poor conductor.

THE DOW CHEMICAL COMPANY



DEPOSITION EXHIBIT E
Anderson
2-1-99 C.P.

August 7, 1969

ST0020550

Larry Warren
Construction Superintendent
Capital Construction Projects
572 Building

Since completing our panel presentation to the pipe covering group this week, we have reconsidered our position on the wearing of a respirator when removing fiberglas as follows:

It is recommended that when removing fiberglas insulation that may be contaminated with toxic chemicals that the pipe coverers are to wear respirators in addition to any other protective devices that may be deemed necessary, not because of any pulmonary hazard from exposure to fiberglas, but because of possible injury due to the contaminating chemicals that may be present.

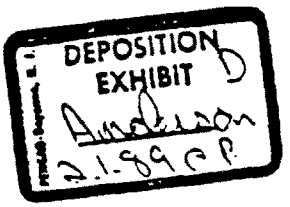
Please see that this information reaches all pipe coverers and their supervisors.

Thank You.

D. J. Ducommun

D. J. Ducommun, M.D.
C. G. Kramer, M.D.
R. A. DeGesero

396956



M.T. Badley

TENTATIVE SCHEDULE FOR MEETINGS WITH PIPECOVERERS

ST0020551

Moderator.....Tom Madden

Introduction.....Jack Badley
(enclosure)

Discussion of Coverers Survey.....Roy DeGesero
(enclosure)

Discussion.....Dr. Cramer & Dr. Ducommun

Discussion.....Larry Warren
(enclosure)

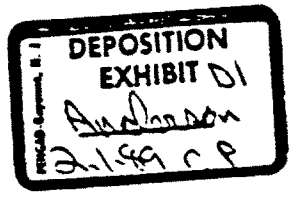
Discussion.....Roy Anderson
(enclosure)

Question and Answer Period
and Closing Remarks.....Tom Madden

MTB Cor

THE DOW CHEMICAL COMPANY

MIDLAND
July 24, 1969



T. Madden
✓ B. Vander Klipp
✓ H. Ahlich
✓ R. Williamson
✓ R. Wood
✓ R. Miller
✓ F. Harrison

Dr. C. Kramer
Dr. D. Ducommun
R. DeGesero
L. Warren
R. Anderson

cc: J. Scovic

INSULATION HAZARDS AND MATERIALS REVIEW

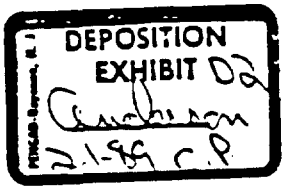
Following are the scheduled meeting dates for the sessions on Insulation Hazards and Materials Review. The meeting place is the upstairs auditorium in the Britton Research Laboratory, 438 Building.

August 4 — 10:00 to 12:00
Agricultural Chemicals Maintenance
14 coverers, 7 crew foremen, 10 building representatives
Tom Madden, Moderator

August 4 — 1:00 to 3:00
Organic Chemicals Maintenance - I
13 coverers, 5 crew foremen, 10 building representatives
Tom Madden, Moderator

August 5 — 1:00 to 3:00
Organic Chemicals Maintenance - II
13 coverers, 4 crew foremen, 10 building representatives
Tom Madden, Moderator

ST0029552



August 6 10:00 to 12:00

CCP & Research Maintenance

14 coverers, crew foremen, building representatives

Bob Williamson, Moderator

August 6 1:00 to 3:00

Inorganic & Basic Operations Maintenance

14 coverers, crew foremen, building representatives

Bruce VanderKlipp, Moderator

August 7 10:00 to 12:00

Plastics Maintenance

10 coverers, 1 coverer from PM Crew, crew foremen, building representatives.

Harold Ahlich, Moderator

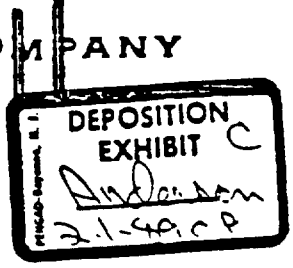
The meetings are designed to include Field Service Unit supervision, coverers, and production personnel. The groups should total about 35 people at each session. Each section manager will be responsible for having the proper personnel at his meeting and the persons listed as moderators are urged to attend one of the first sessions so that they may have a feel for the answers to questions that will be asked.

M. T. Badley

M. T. Badley
Field Maintenance and CCP
49 Building

THE DOW CHEMICAL COMPANY

MIDLAND
October 29, 1969



E. D. Stephenson
Midland Area Purchasing
47 Building

REVISION OF INSULATING MATERIAL STOCKS ON DVS

In a letter dated August 12 you were apprised of our decision to phase out Aircell pipe insulation and change to Fiberglas. We had arbitrarily chosen a period of three months in which to accomplish this. Now I think we shall set a date, namely November 1, 1969, at which time we should terminate the purchasing or stocking of any Aircell pipe insulation.

Beginning immediately, we will start a withdrawal of calcium-silicate type insulation in favor of asbestos-free Careytemp 1500. We should be able to accomplish this change in about the same period of time. This switch will not include Kaylo 20 or other high temperature insulating materials that we are presently using.

M. T. Badley

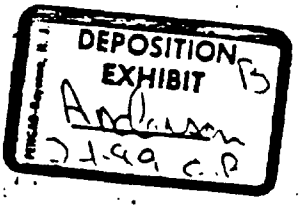
M. T. Badley
Manager
Maintenance Technology Center
49 Building
Phone 6-2736

cc: T. Madden
W. Graves
W. Hages
R. Anderson

396960

THE DOW CHEMICAL COMPANY

MIDLAND
October 24, 1969



M. T. Badley
Manager
Maintenance Technology Center
49 Building

CLARIFICATION OF INSULATION PROCEDURES

Due to the fact that there have been a few misinterpretations as to what we are doing and what we are trying to accomplish in the way of new insulating materials here at Midland, perhaps a few statements will clarify the situation.

First and foremost, for health reasons our intent has been to eliminate as many asbestos-containing materials as possible. In the low temperature range (100° - 350°F.) we have done this by substituting Fiberglas insulation for Aircell. In the medium temperature range (400° - 1500°F.) we are proposing the use of Careytemp 1500 instead of Kaylo. Unfortunately, at the present time, there is no asbestos-free material available for temperatures above 1500°F. The same statement is true for mineral wool insulating cements.

To protect our people from exposure to asbestos when exposure is necessary, we are providing and requiring the use of approved types of respiratory equipment. This requirement applies to the removal and mixing of asbestos-containing materials as well as the application.

Roy J. Anderson
Maintenance Engineer
OCP Maintenance
808 Building
Phone 6-4456

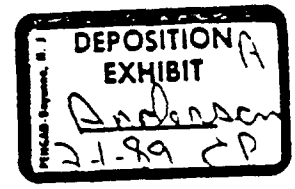
rb

cc: T. J. Madden

396961

MIDLAND
August 22, 1966

DEPOSITION EXHIBIT A
Anderson
2-1-89 CP



Les Engel
Engineering Dept.
47 Building

RE: USEAGE OF ONE PIECE SNAP ON FIBER GLASS INSULATION VERSES AIRCELL

In the year 1957 when 1703 building, Nuclear Lab, was being built the insulation contractor (J.W. Willman - Saginaw, Mich.) suggested Dow give him permission to try the new snap on fiber glass insulation.

The advantages he listed were that the fiber glass can be used on a hot and cold water lines, 10# steam and condensate, steam traced process and service lines.

The insulation cost on the Lab piping on above mentioned project was $10,000.00. If we approved fiber glass usage the insulation contractor would issue us a 10% savings - $1,000.00. This was accepted by Dow.

The Dow insulation committee formed a standard (IN-309-1) in 1959.

Another savings on process and service lines (steam traced) where a sprinkler deluge system exists that the aircell was completely saturated with water and had to be replaced. A feature of the fiber glass insulation is that it sheds the water without any problems.

A good example of this was the costly replacement approximately eight years ago when the deluge sprinkler system in 565 building tripped and saturated all the aircell insulated lines with water. This insulation was removed and replaced with one piece snap on fiber glass insulation.

The contractor insulators have voiced no objections on installing snap on fiber glass insulation.

The new Tybrene plant (771 building) has the fiber glass insulation of Dowtherm A service verses the previous method of calcium silicate.

Production people at Dow have expressed their satisfaction in its usage and the low replacement of fiber glass even when removal is necessary to repair for example a traced process line.

Very truly yours,

Leo Bartos

Leo Bartos
C.E. & C.S.
615 Building

LBB/ba

396962

ST0029555

INSULATION SAFETY TASK FORCE

Questions to be answered:

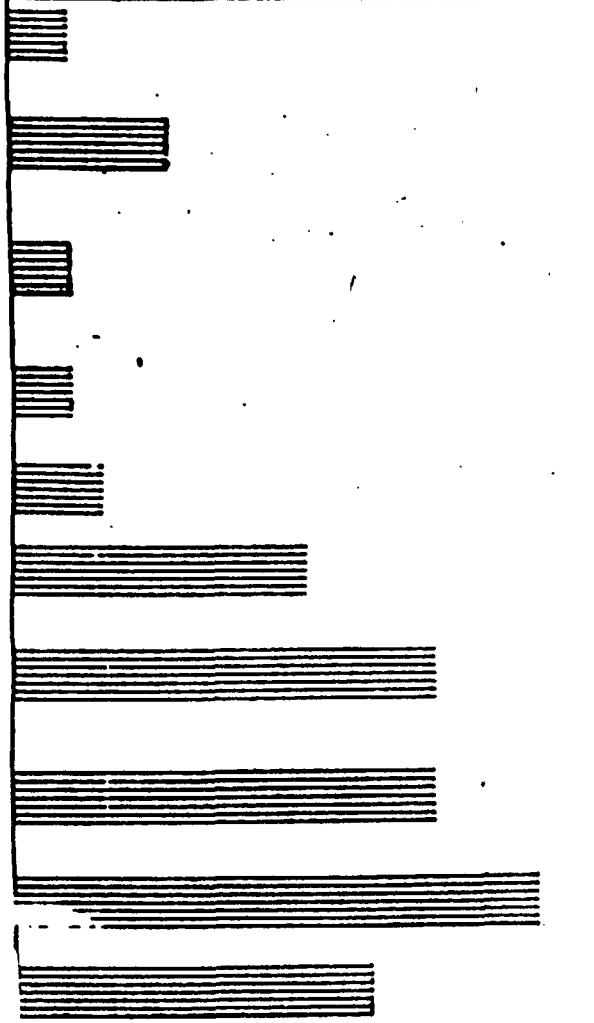
1. What are the health problems caused by some of our present insulating materials?
2. What insulation materials have these characteristics?
3. What precautions must be taken when working with these?
4. What are the added costs for taking these precautions?
5. What alternate insulation materials are available?
6. What are the health problems connected with them and what precautions must be taken?
7. What are the costs involved in relationship to the present materials?
8. What insulations do other plants use and what problems do they have?
9. What is the life expectancy and the performance of the alternate insulations vs. the currently used insulations?
10. What are the net annual Division costs (savings) in changing our insulation practices?
11. What is the best method of communicating this change in practice to, and receive support from, the Division Staff, plant supervision, maintenance supervision, and the Pipecoverers?
12. What has to be done and how long will it take for the proposed change to become a reality?

TJM
6-17-69

ST0022303

INSULATION ATA SHEET

FOR ABOVE AMBIENT TEMPERATURES

Temperature Range °F. (Ambient 500 1000 1500)	Type*	Notes
	Aircell	65% asbestos. Should use respiratory protection. Used on many temperature applications above the recommended limit.
	Fiberglas	Asbestos free. A strong, semi-rigid, resilient material. Used almost exclusively by the trade except by Dow maintenance people for this temperature range.
	Armaflex	A closed cell flexible, rubber type material. Excellent insulation for low temperature applications, particularly refrigeration.
	Thurane	Rigid preformed polyurethane. Excellent low temperature material. More fire retardant than Styrofoam.
	Polyurethane Foam	A sprayed or poured foam. Has good potential for a limited temperature range. Priced very favorably.
	Foamglas	A lightweight, rigid, cellular glass material. Excellent for dual temp. applications. Quite friable and time consuming to apply.
	Kaylo	Calcium-Silicate with 15-20% asbestos fiber. Should use respiratory protection. Is quite dusty and friable. Has good insulating qualities.
	Unibestos	70-80% asbestos fiber. Shock resistant. Not dusty. Not extensively used in maintenance.
	Careytemp 1500	Expanded perlite with 6% asbestos. New from Phillip-Carey. Usage similar to Calcium-Silicate.
	Insulating Cement	10-15% asbestos fiber. Commonly used with Aircell and Calcium-Silicate systems. Should use respiratory protection. Two companies are marketing a cement which is asbestos free.

* The trade names listed are typical of several similar materials on the market.

Roy Anderson
AC & OCP Maint.
6-3-69

396967

ST0022304

PLAINTIFF'S EXHIBIT
DOW-558

DOW CHEMICAL U.S.A.

50983

TEXAS DIVISION
FREEPORT, TEXAS 77541

ENVIRONMENTAL HEALTH REPORT

EVALUATION OF ASBESTOS EXPOSURE TO INSULATORS AT GLYCOL "A"

FILE NO. A18-237

DATE November 21, 1973

AUTHOR R. L. Silverthorne

CHECKED R. L. Daniel

DATE 11/21/73

Summary

Contractor insulator exposure to asbestos fibers were evaluated during the removal of insulation on two columns at Glycol "A". The time-weighted average (the average exposure of asbestos fibers to employees during an eight hour work day) and peak exposures to asbestos fibers are within acceptable levels, although the peak exposures could approach maximum allowable concentrations due to the variability in the asbestos handling procedures. The employees should continue to wear respiratory protection during the handling of asbestos, and every effort should be made to wet down the asbestos insulation before and during removal.

ST0015109

Distribution

F. A. Newman A-510
/File

[redacted]
396929

INTRODUCTION

Environmental Health Services was asked to evaluate the exposure of Insulators to asbestos fibers during the removal of asbestos insulation from two reaction towers at Glycol "A".

METHODOLOGY

Breathing zone and general area air samples were collected on 47 mm-diameter(.8 micron pore size) membrane filters at a sample rate of about 2.0 LPM. The air pumps used were M.S.A. permissible portable personnel pumps. The fibers on the filters were counted by the standard phase-contrast microscopy technique at 450 magnification by the Texas Division Microscopy Laboratory.

DISCUSSION

Table A shows the insulator exposures to asbestos fibers based on an eight hour work day when insulation is being removed from reaction towers. His time weighted average and peak exposure are within acceptable levels based on the present OSHA standard.

Table B shows the results of the sample analyses for the various Insulator operations. The highest asbestos fiber concentration, up to 1.29 fibers/ml, were found during the actual removal of insulation by the employee. Because of the variability in the asbestos handling procedures the employee peak exposures could exceed the allowable ceiling concentration.

ST001511O

CONCLUSION

1. The employees time weighted average and peak exposures to asbestos fibers are within acceptable levels.

RECOMMENDATION

1. Asbestos insulation should be stored in plastic bags, tagged and sealed for disposal.

2. Employees who work regularly with asbestos should have clean work clothes daily. (Work clothes should not be taken home for laundering).

396930

RECOMMENDATIONS (continued)

3. Continue the work practice of wearing respiratory protection whenever asbestos is handled.

4. Employees with significant exposure should shower at the end of the work day.

5. Water should be used to wet down the insulation before and during the dismantling operation. This will reduce the possibility of asbestos fibers becoming air borne.

6. Environmental measurements should be made annually to determine the adequacy of precautions taken.

7. The contractor employer should be familiar with Subpart G, section 1910.93a, of the Federal Register.

ST0015111

EHS
RLS/bbs
11-21-73

396931

ST0015112

TABLE A
CONTRACTOR INSULATOR EXPOSURES
TO ASBESTOS FIBERS, GLYCOL "A"

OPERATION	*TIME WEIGHTED AVERAGE (fibers/ml)	*THRESHOLD LIMIT VALUE (fibers/ml)	MAXIMUM ALLOWABLE CONCENTRATIONS
Insulator wearing personnel monitor during the removal of insulation from the towers. He is putting the insulation in plastic bags.	1.43	5	10
Insulator wearing personnel monitor while at ground level. He is tagging & stacking the plastic bags full of insulation.	.063	5	10

396932

* Threshold Limit Value (TLV)--The time-weighted average concentration to which it is believed most people could be exposed daily without adverse effect.

* Time Weighted Average ------ The average exposure of asbestos fibers to employees during an eight hour work day.

EHS
RLS/bbs
11-21-73

ST0015113

396933

TABLE B

INSULATORS SUMMARY OF SAMPLE ANALYSIS

AREA OPERATION	NO. OF SAMPLES	ASBESTOS CONCENTRATION FIBERS/ML AVERAGE	RANGE
Personnel monitor on employee actually removing insulation from tower. (Only able to obtain one sample due to short operation).	1	1.43	---
Personnel monitor on Insulator at ground level, tagging each plastic bag full of asbestos & stacking it for removal later. (Only able to obtain one sample due to short operation).	1	.063	---
Area sampling around towers.	6	.243	0 to 1.31

EHS
RLS/bbs
11-21-73

ENVIRONMENTAL RESEARCH MPLE RECORD

FILE NUMBER	PROCESS	BLDG. NO.	DATE
A18-237	Contractor Insulators @ A-1801	A-1801	10/2/73

MATERIAL	SAMPLING METHOD	TRAPPING MEDIUM
Asbestos	Filter (Cellulose)	.8μ mill pore filter

EQUIPMENT NUMBER	TYPE OF EQUIPMENT	FLOW INDICATOR SETTING	SAMPLE FLOW RATE	OUTSIDE TEMP.	INSIDE TEMP.
2, 3, 4, 6	MSA Pumps	8		°F	°F

REMARKS (VENTILATION, ETC.)

SAMPLE NO.	CONTAINER NO.	DESCRIPTION OF SAMPLE	TIME START	TIME INCREMENT	CONCENTRATION
	Pump				
1	6	At base of tower 22. No activity (men just took break). Visible dust still seen after workers took break. Talked to foreman about applying water to asbestos.	21 min	25 sec	.055 f/
		Applying water to asbestos now!!!			
2	6	At base of towers #22 & 25 ≈ 30' N. Workers tearing down insulation, and seem to be more careful this time. Also starting to use plastic bags and lowering insulation to ground. Man on ground is tagging bags and keeping area wet.	25 min		-0-
3	4	≈ 40' N.W. of the two towers (in structure on ground floor ≈ 15' E of A-1801-B) Tearing down insulation & lowering to ground.	16 min	30 sec	.051 f/

ST0015114

396934

FORM 6-16670 PRINTED IN U.S.A. 10-62

ENVIRONMENTAL RESEARCH AMPLE RECORD

FILE NUMBER	PROCESS	BLDG. NO.	DATE
A-18-227	Contractor Insulators @ A-1501	A-1501	10/2/73
MATERIAL	SAMPLING METHOD	TRAPPING MEDIUM	
Asbestos	Cellulose Filter	.8μ millipore filter	
EQUIPMENT NUMBER	TYPE OF EQUIPMENT	FLOW INDICATOR SETTING	SAMPLE FLOW RATE	OUTSIDE TEMP.	INSIDE TEMP.
2, 3 ÷ 6	MSA Pumps	8		°,	

REMARKS (VENTILATION, ETC.)

SAMPLE NO.	CONTAINER NO.	DESCRIPTION OF SAMPLE	TIME START	TIME INCREMENT	CONCENTRATION
4	Pump 4	≈20' N.W. of tower 22 ground level men tearing down insulation	40min 35sec.		.023 f/
5	3	On Mr. B. Neeley. This employee is taking asbestos plastic bags from tower. He is also watering down the area. Putting green warning tags on each plastic bag full of asbestos. The tags state: Caution: Contains asbestos fibers. Avoid creating dust. Breathing asbestos dust May cause serious injury.	33min 25sec.		.063 f/
6	6	Same location as #2 (tearing down insulation and lowering to ground in plastic bags	18min 35sec.		.024 f/
7	2	On employee Andy Holy Tearing down insulation in column 22. Not using water, but carefully handling and putting into plastic bags	31min 30sec		1.4 f/

396935

ST0015115

ENVIRONMENTAL RESEARCH .MPLE RECORD

FILE NUMBER	PROCESS	BLDG. NO.	DATE
A 19-237	Contractor Insulators @ A-1801	A-1801	10/2/73

MATERIAL	SAMPLING METHOD	TRAPPING MEDIUM
Asbestos	Cellulose Filter	.8μ millipore filter

EQUIPMENT NUMBER	TYPE OF EQUIPMENT	FLOW INDICATOR SETTING	SAMPLE FLOW RATE	OUTSIDE TEMP.	INSIDE TEMP.
2,3,4,6	MSA Pumps	8		°,	°,

REMARKS (VENTILATION, ETC.)

SAMPLE NO.	CONTAINER NO.	DESCRIPTION OF SAMPLE	TIME START	TIME INCREMENT	CONCENTRATION
8	Pump 6	Same location as #4. Did not use water until after I have started.	26 min 10 sec.		1.31 f/

ST0015116

396936