FILE NAME: Garlock (GAR)

DATE: 0000

DOC#: GAR044

DOCUMENT DESCRIPTION: Government Report

FIGURE 6

STORAGE OF GASKETS IN OPEN BINS

SECTION II
HAND PUNCHING

HAND PUNCHING

Bolt holes in gaskets are often made with use of a hand punch and mallet (Figure 7). This operation conducted without controls produced a dust level of 3.00 fibers/cc (single sample). The introduction of good housekeeping techniques, including the use of a PORTVAC, lowered the airborne asbestos fiber level to 0.07 fibers/cc. This value is less than the point of initiation of medical monitoring (0.1 fibers/cc).

TABLE II Airborne Asbestos Levels During Hand Punching

Operation	Controls	Breathing Zone Dust Concentration (fibers/cc) Range	Ave.	No. of Samples
Hand punching	None	3.00	3.00	1
Hand punching	Housekeeping	<0.05 - 0.15	0.07	6

FIGURE 7

MANUFACTURE OF GASKETS BY HAND PUNCHING

SECTION III
HAND OPERATED MECHANICAL PUNCHING

HAND OPERATED MECHANICAL PUNCHING

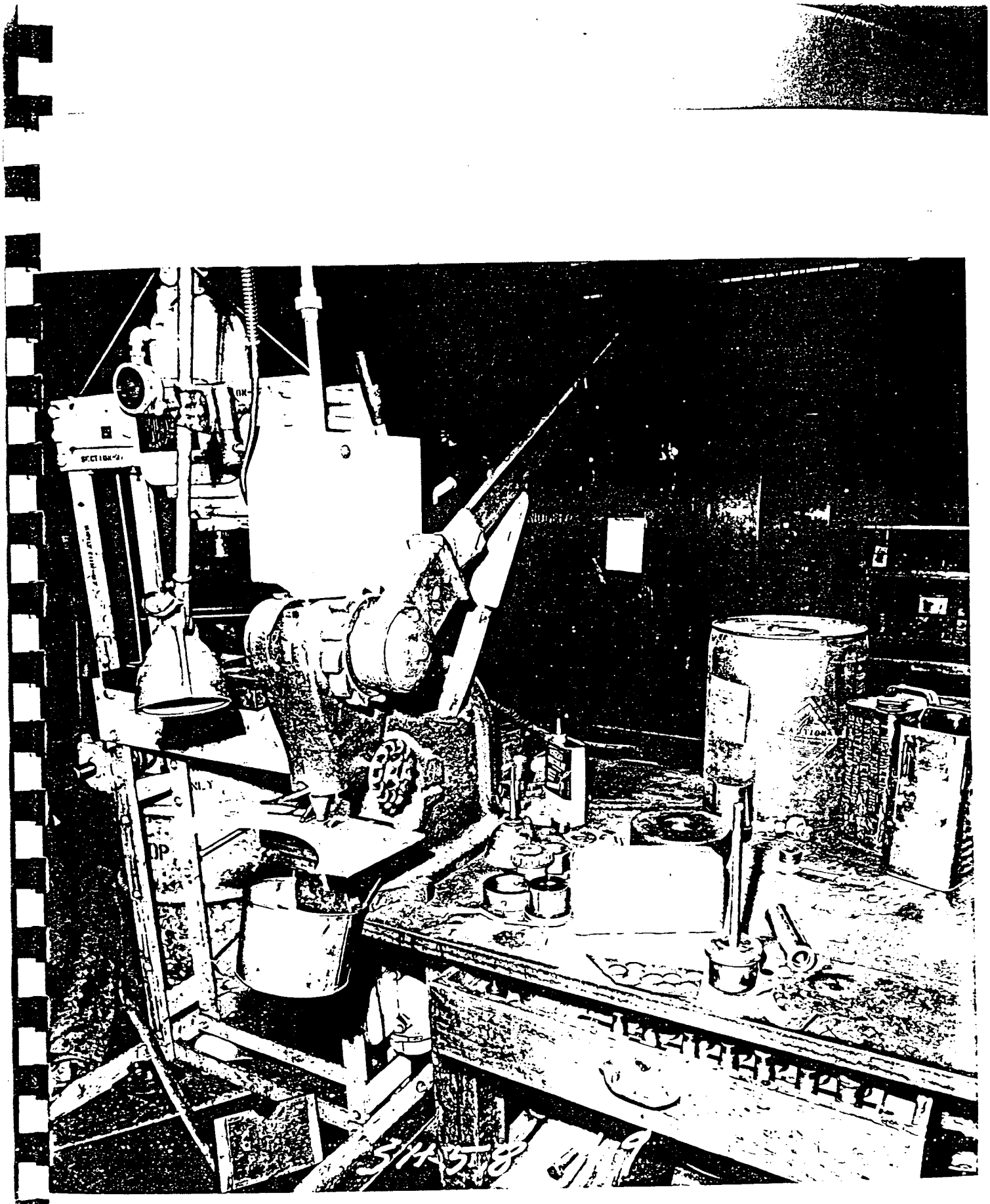
Gasket bolt holes may be made using a hand operated machine such as shown in Figure 8. This operation produces less than 0.05 fibers/cc which is less than the lower limit for medical monitoring (0.1 fibers/cc).

TABLE III Airborne Asbestos Levels During Hand Operated Mechanical Punching

Operation	Controls	Breathing Zone Dust Concentration (fibers/cc)		No. of Samples
		Range	Ave.	
Hand operated mechanical punching	None	<0.05	< 0.05	8

FIGURE 8

A HAND OPERATED MECHANICAL PUNCH USED FOR GASKET MANUFACTURE. THE HANDLE IN THE UPPER RIGHT IS DEPRESSED TO MAKE BOLT HOLES IN THE GASKET. SCRAP MATERIAL FALLS INTO THE CONTAINER BELOW THE PUNCHING SURFACE.



SECTION IV
MACHINE PUNCHING

MACHINE PUNCHING

Production manufacture of gaskets is often done on punch presses similar to those shown in Figure 9 and 10. With no controls on the operation a single sample was collected which showed 5.00 fibers/cc. Upon initiation of the use of high efficiency filtered vacuum cleaners (Portvacs) to thoroughly clean the work area, and the use of covered storage areas, the airborne asbestos levels were lowered to 0.19 fibers/cc. The addition of local exhaust ventilation on the press lowered the levels to <0.05 fibers/cc.

Airborne asbestos concentrations in uncontrolled machine gasket punching was over the maximum 8 hour allowable exposure limit of 2.0 fibers/cc; however, the results are based on a single sample. Addition of good housekeeping techniques alone lowered the air concentrations to 0.19 fibers/cc which is below the proposed exposure limit of 0.5 fibers/cc. Good housekeeping and local exhaust ventilation lowered the levels below 0.05 fibers/cc which is below 0.1 fibers/cc, the point at which medical surveillance begins.

TABLE IV Airborne Asbestos Levels During Machine Gasket Punching

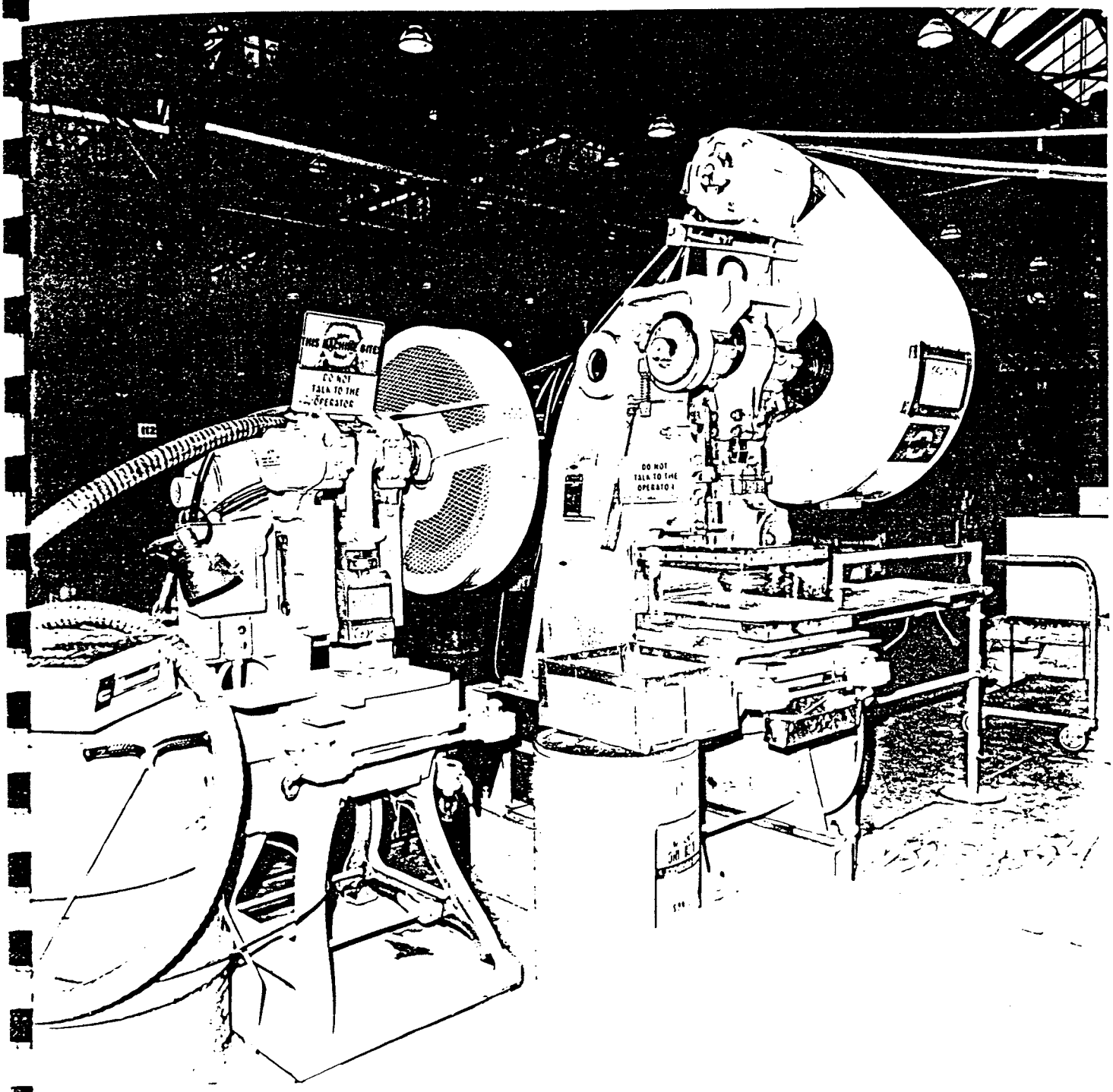
Operation	Controls	Breathing Zone Dust Concentration (fibers/cc)		No. of Samples
		Range	Ave.	
Machine punching	None	5.00	5.00	1
Machine punching	Housekeeping	<0.03 - 0.7	0.19	12
Machine punching	Housekeeping and Ventilation	<0.05 - 0.06	0.05	8

FIGURE 9

UNVENTILATED MACHINE FOR PUNCHING GASKETS

FIGURE 10

VENTILATED (RIGHT) AND UNVENTILATED (LEFT) MACHINES FOR GASKET PUNCHING. THE PORTVAC ON THE EXTREME LEFT IS USED TO VENTILATE THE PRESS.


DO NOT
TALK TO THE
OPERATOR
DO NOT
TALK TO THE

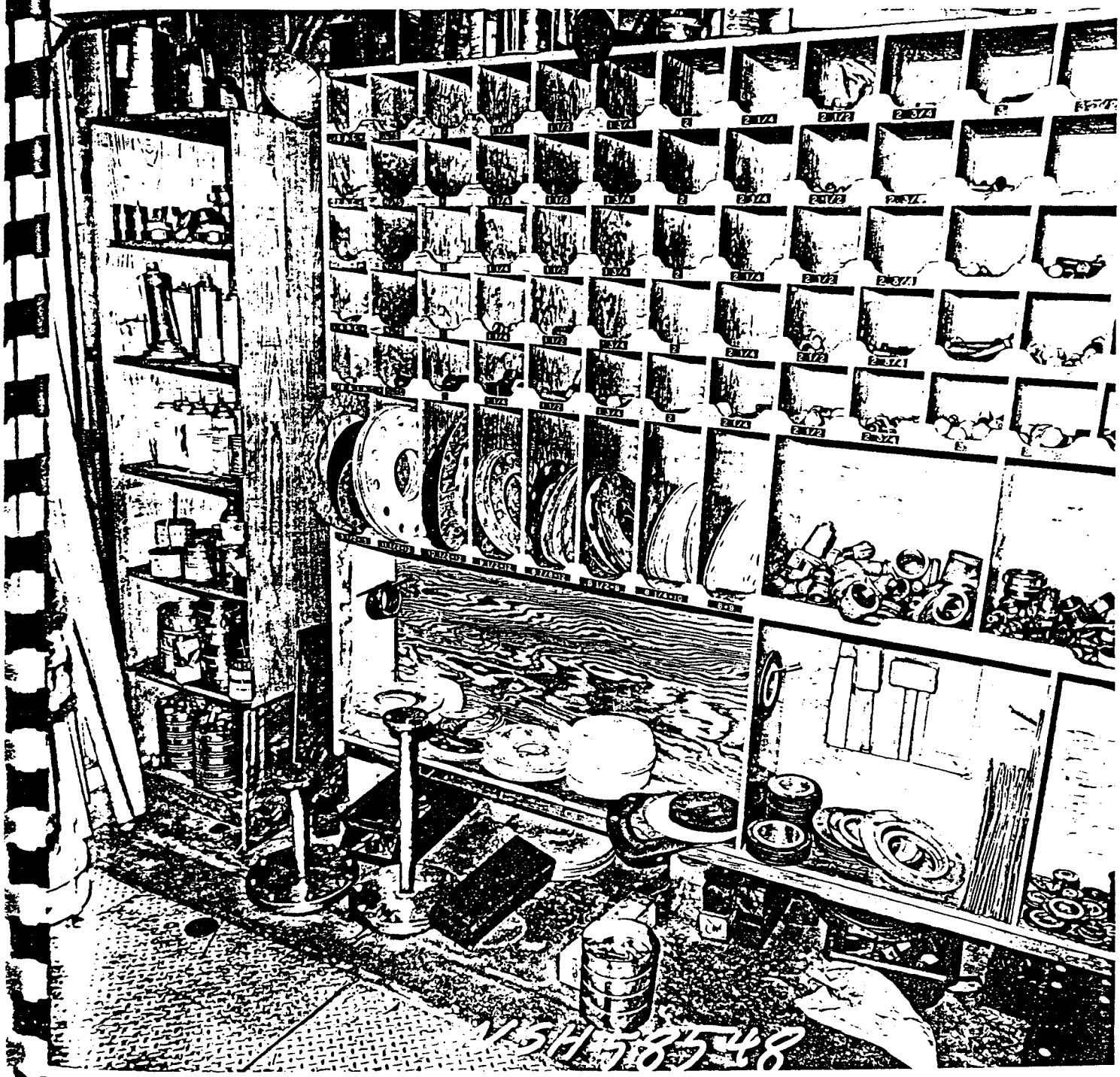
SECTION V
HAND SHAPING

HAND SHAPING

Hand shaping of gaskets is carried out by scribe, pocket knife or scissors. Gasket sizes are scribed onto a flat sheet of asbestos gasket material and then cut by use of scissors or pocket knife. Bolt holes are produced by hand punching (Figure 7). Airborne asbestos fiber concentrations ranged from < 0.03 to 0.3 fibers > 5 micron/cc air with an average value of 0.13 (Table V). These values are considerably less than the current standard of 2.0 fibers/cc of air, and the proposed Department of Labor standards.

TABLE V Airborne Asbestos Levels During Hand Shaping

Operation	Controls	Breathing Zone Dust Concentration (fibers>5 micron/ cc air) Range	Ave.	No of Samples
Hand shaping	None	< 0.03 - 0.3	0.13	10



SECTION VI
MACHINE SHEARING

MACHINE SHEARING

Many larger gaskets, such as those used for boiler door casings, are cut to approximate size by machine shearing (Figure 11). Evaluation of this operation with no controls showed 0.9 fibers/cc. The use of PORTVACS and other good housekeeping techniques lowered this level to 0.07 fibers/cc, a value considerably below the current standard and the point at which medical monitoring begins.

Table VI Airborne Asbestos Levels During Machine Shearing

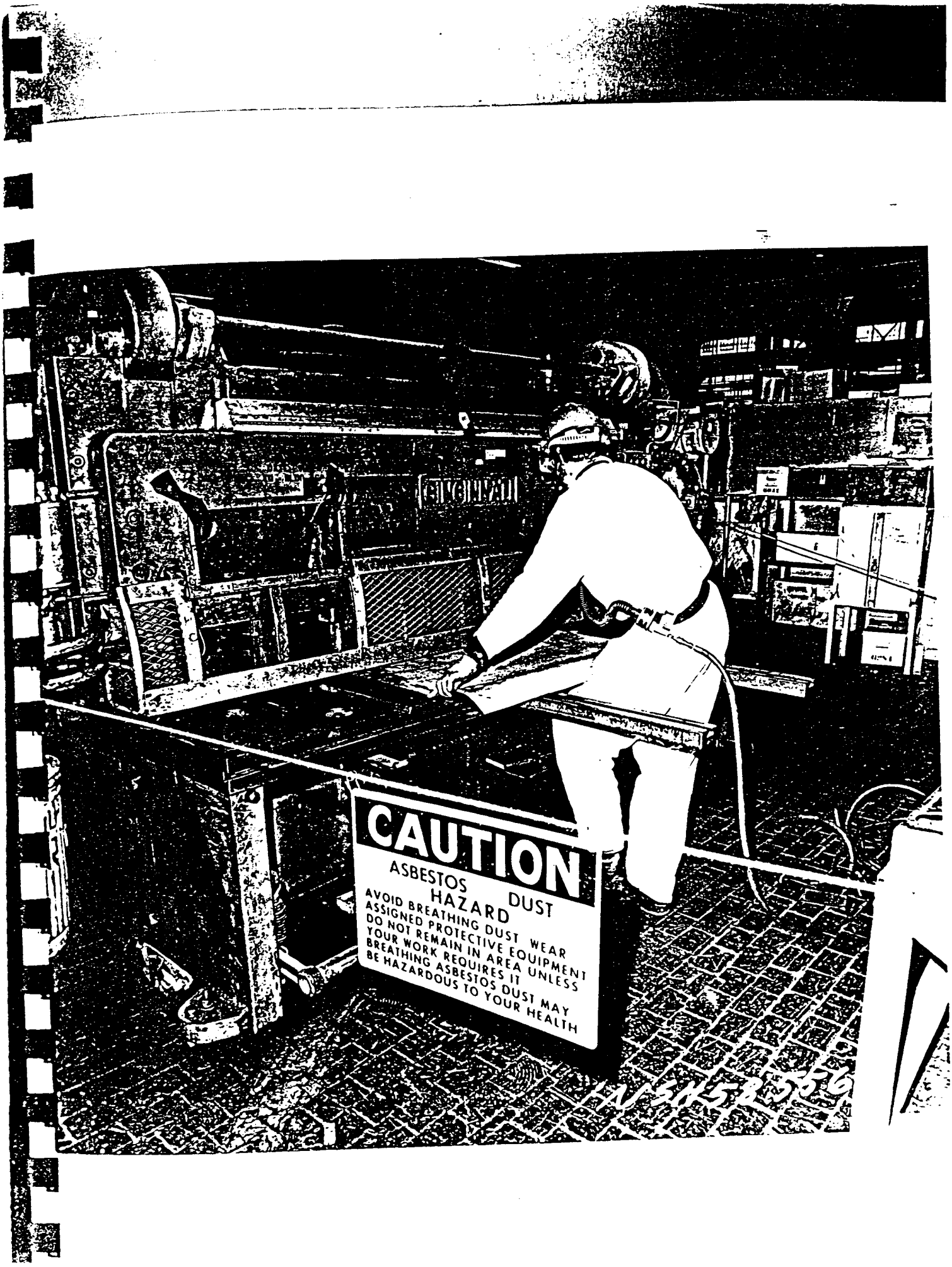
Operation	Controls	Breathing Zone Dust Concentration (fibers/cc) Range	Ave.	No. of Samples
Machine shearing gasket material	None	0.5-1.3	0.9	2
Machine shearing gasket material	House-keeping	0.05-0.15	0.07	6

FIGURE 12

MACHINE NIBBLING GASKET MATERIAL

FIGURE 11

MACHINE SHEARING GASKET MATERIAL


CAUTION
ASBESTOS DUST
HAZARD
AVOID BREATHING DUST WEAR
ASSIGNED PROTECTIVE EQUIPMENT
DO NOT REMAIN IN AREA UNLESS
YOUR WORK REQUIRES IT
BREATHING ASBESTOS DUST MAY
BE HAZARDOUS TO YOUR HEALTH

SECTION VII

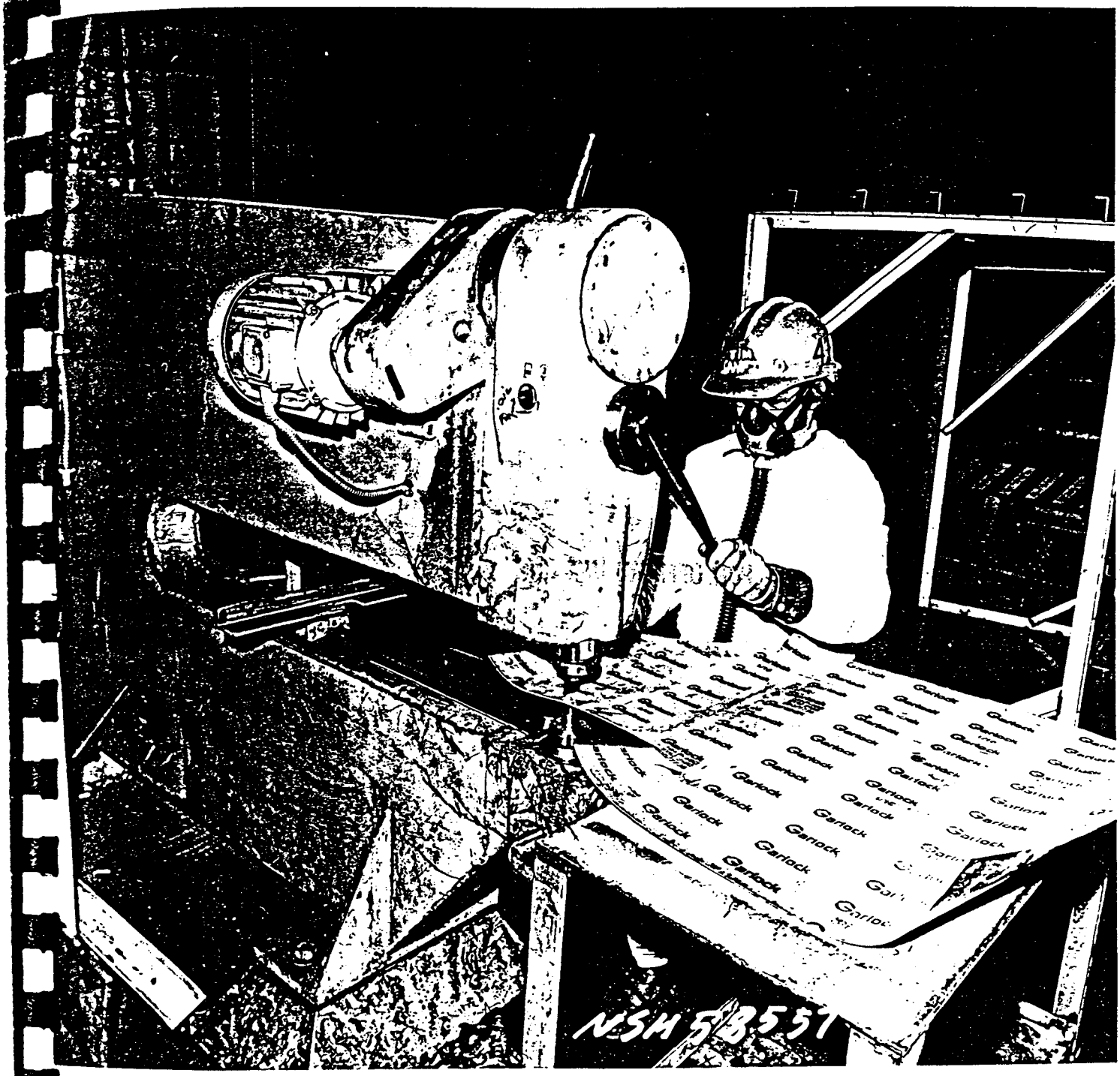
MACHINE NIBBLING

MACHINE NIBBLING

Gasket material may be cut to shape on a nibbler such as is shown in Figure 12. The results in Table VII show 0.26 fibers/cc before controls and 0.42 fibers/cc with the use of PORTVACS and other good housekeeping techniques. The apparent increase in airborne fiber concentration due to good housekeeping techniques may be due to the short sample length (8 minutes) in the pre-control samples. Average values, however, are below the current standard of 2.0 fibers/cc and the proposed Department of Labor level of 0.5 fibers/cc.

Table VII Airborne Asbestos Levels During Machine Nibbling

Operation	Control	Breathing Zone Dust Concentration (fibers/cc)		No. of Samples
		Range	Ave.	
Machine nibbling	None	<0.08-0.46	0.26	2
Machine nibbling	House-keeping	0.08-0.8	0.42	8


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NSM 58551

SECTION VIII
INSTALLATION

INSTALLATION

Samples collected during installation of gaskets showed less than 0.03 fibers/cc. This value was consistently obtained in all samples and is considerably less than the point at which medical monitoring begins. Figure 13 shows an installed gasket.

Table VIII Airborne Asbestos Levels During Installation

Operation	Controls	Breathing Zone Dust Concentration (fibers/cc)		No. of Samples
		Range	Ave.	
Installation	None	< 0.03	< 0.03	4

FIGURE 13

AN INSTALLED GASKET

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Garlock
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SECTION IX

REMOVAL AND CONCURRENT INSTALLATION

REMOVAL AND CONCURRENT INSTALLATION

Many circumstances dictate concurrent gasket removal and installation with little or no clean-up between operations. Under these conditions gaskets are simply removed and new gaskets installed. An example of this type of operation is replacement of gaskets in boiler headers. This procedure was evaluated under basic housekeeping controls and results showed an airborne fiber concentration range of 0.02-0.30 with an average concentration of 0.09 fibers >5 micron/cc air (Table IX). These results are considerably below current and proposed standards as well as the starting point for medical surveillance.

Table IX Airborne Asbestos Level During Concurrent Gasket Removal and Installation

Operation	Control	Breathing Zone Dust Concentration (fibers/cc air)		No. of Samples
		Range	Ave.	
Removal and concurrent installation	Housekeeping	0.02-0.30	0.09	28

SECTION X

CLEAN-UP FOLLOWING REMOVAL

CLEAN-UP FOLLOWING REMOVAL

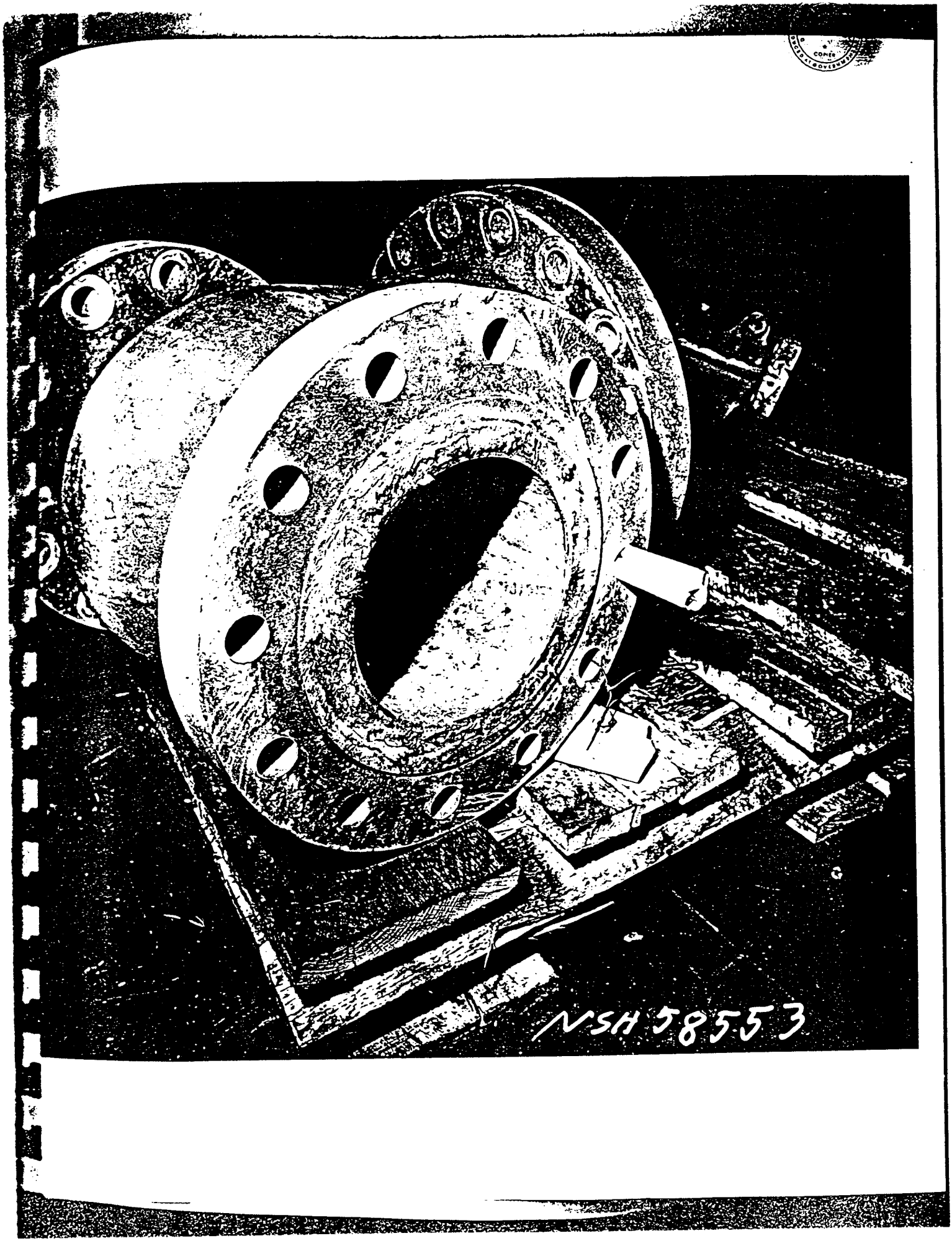
After removal of gaskets from an object, residual pieces of gasket material may remain attached. Figure 14 shows residual material remaining on a flange. Removal of this residual material can be accomplished in a variety of ways. Remove by means of a hand scraper is commonly used and results in low airborne asbestos fiber concentrations (Table X) even in the absence of control procedures. An average fiber concentration of < 0.05 fibers > 5 micron/cc air was obtained for this process; considerably below 0.1 fibers/cc (the beginning point for medical monitoring).

Table X Airborne Asbestos Levels During Removal of Residual Materials After Gasket Removal

Operation	Controls	Breathing Zone Dust Concentration (Fibers > 5 micron/cc air)		No. of Samples
		Range	Ave.	
Hand Scraping	None	< 0.05	< 0.05	4

FIGURE 14

FLANGE AFTER GASKET REMOVAL AND BEFORE
REMOVAL OF RESIDUAL GASKET MATERIAL


NSH 58553

SECTION XI
REMOVAL WITH SIMULTANEOUS CLEAN-UP

REMOVAL WITH SIMULTANEOUS CLEAN-UP

Under numerous circumstances gaskets are removed from materials with subsequent immediate clean-up. Removal is accomplished by a variety of methods but commonly by use of a hand scraper. Final clean-up of the material is generally accomplished by use of a hand scraper or by wire brushing. The operation of gasket removal and subsequent immediate clean-up by hand scraping was sampled and showed an average airborne fiber concentration of 0.13 fibers/cc of air (Table XI). When this operation was carried out by wire brushing an average fiber concentration of 0.11 fibers/cc of air was obtained. These average fiber concentrations are considerably below the current standard of 2.0 fibers/cc and the Department of Labor proposed level of 0.5 fibers/cc.

Table XI Airborne Asbestos Levels During Gasket Removal and Simultaneous Clean-Up

Operation	Controls	Breathing Zone Dust Concentration (fibers >5 micron/cc air) Range	Ave.	No. of Samples
Removal and hand scraping	None	<0.06-0.39	0.13	14
Removal and wire brushing	Housekeeping	<0.03-0.18	0.11	8

SECTION XII
MISCELLANEOUS AND MULTIPLE OPERATIONS

MISCELLANEOUS AND MULTIPLE OPERATIONS

Data from multiple and miscellaneous operations were provided by Naval Regional Medical Center Oakland. No controls were used on any of these operations and little direct comparison with data collected by NRMC Bremerton is possible. These results are within the same general range as other collected data. Appendix I, Section XII is a complete listing of the data.

SUMMARY

Analysis of data collected in all phases of the life cycle of asbestos gasket materials shows a number of interesting relationships. In general, average fiber concentrations obtained are well below the current exposure standards of 2.0 fibers/cc, the proposed Department of Labor level of 0.5 fibers/cc, and 0.1 fibers/cc which is the point at which reference (j) states medical monitoring will begin (Table XII).

In many operations control procedures were initiated several years ago; consequently, data for uncontrolled situations are scant. However, some data were collected, with values considerably higher than the current acceptable levels. A prime example of this situation can be seen for machine punching. With no controls a concentration of 5.00 fibers/cc was obtained; with the inception of basic housekeeping controls this level was reduced to 0.19 fibers/cc; and under local exhaust ventilation conditions the concentration was reduced to a level below the point at which medical monitoring begins (0.1 fibers/cc).

Fiber concentrations resulting from asbestos containing gaskets during storage in supply areas for issue and receipt, and storage in work areas for use, show no significant statistical difference between means (Table XII). The resultant airborne fiber concentration is very low, 0.02 and 0.04 fibers/cc respectively. These values are considerably below any accepted, proposed, or expected goal levels for asbestos exposure. In essence the manner of storage of asbestos containing gasket material is irrelevant. Gaskets may be stored wrapped, unwrapped, rolled, or flat and levels of airborne dust remain low.

Airborne fiber concentrations produced in all phases of hand operations are quite low. Values fluctuate depending on whether or not basic housekeeping controls were utilized during the procedure, However, even in the absence of housekeeping controls values were found to be considerably below the current standard of 2.0 fibers/cc, the proposed level of 0.5 fibers/cc, and either comparable to or below the starting point for medical monitoring.

Dust concentrations resulting from machine operations tended generally to be higher when compared with hand operations. However, the resultant values obtained are below the currently accepted level and the proposed Department of Labor level when housekeeping controls are utilized. A comparison of dust concentrations produced by different machines also implies utilization of different control procedures. Machine nibbling operations produce significantly higher concentrations of airborne fibers than do machine shearing operations; consequently, more stringent control methods are necessary to reduce the fiber concentrations from nibblers to a level below which operators do not need to be considered asbestos workers for medical monitoring purposes.

During gasket removal and clean-up, airborne dust concentrations are considerably less than the currently accepted and proposed levels. There is no significant difference between mean concentrations of fibers produced when hand scraping and wire brushing are compared. Wire brushing by its mechanical action will produce higher dust concentrations than hand scraping, however, basic housekeeping controls maintain airborne concentrations at comparable levels.

Table XII depicts results from a number of statistical comparisons between various operations. These comparisons show that in general there is no significant difference in the amount of airborne asbestos dust produced between various operations. Those comparisons that do show a statistical difference primarily involve some phase of gasket manufacturing.

TABLE XII

COMPARISON OF AIRBORNE ASBESTOS FIBER CONCENTRATION IN ALL EVALUATED PHASES OF GASKET OPERATIONS

Operation	Controls	Breathing Zone Dust Conc. (Ave. No. Fibers>5 μ/cc air)	Statistical Comparisons *
1(a) Storage for receipt and issue	housekeeping	0.02	a,p,q
1(b) Storage for use	none	0.04	a
2(a) Hand punching	none	3.00	
2(b) Hand punching	housekeeping	0.07	b,c
3 Hand operated mechanical punching	none	< 0.05	b,d,o
4(a) Machine punching	none	5.00	
4(b) Machine punching	housekeeping	0.19	d,e,f,t
4(c) Machine punching	ventilation	0.05	e
5 Hand shaping	none	0.13	c,o,s,t,u,v,w
6(a) Machine shearing	none	0.9	g
6(b) Machine shearing	housekeeping	0.07	f,g,h,s

TABLE XII CONT'D

Operation	Controls	Breathing Zone Dust Conc. Ave. No. Fibers >5 u/cc air	Statistical Comparisons *
7(a) Machine nibbling	none	0.26	
7(b) Machine nibbling	housekeeping	0.42	h,l,r
8 Installation	none	< 0.03	i,j,m,n,p
9. Removal and concurrent installation	housekeeping	0.09	i,q,w
10 Clean-up	none	< 0.05	j
11(a) Removal and hand scraping	none	0.13	k,m,r,u
11(b) Removal and wire brushing	housekeeping	0.11	k,l,n,v

a. no significant difference at $p < 0.05$ by t-test
b. no significant difference at $p < 0.05$ by t-test
c. no significant difference at $p < 0.05$ by t-test
d. no significant difference at $p < 0.05$ by t-test
e. no significant difference at $p < 0.05$ by t-test
f. no significant difference at $p < 0.05$ by t-test
g. significant difference at $< p < 0.05$ by t-test
h. significant difference at $< p < 0.05$ by t-test
i. no significant difference at $p < 0.05$ by t-test
j. no significant difference at $p < 0.05$ by t-test
k. no significant difference at $p < 0.05$ by t-test
l. significant difference at $p < 0.05$ by t-test
m. no significant difference at $p < 0.05$ by t-test
n. no significant difference at $p < 0.05$ by t-test
o. significant difference at $p < 0.05$ by t-test
p. no significant difference at $p < 0.05$ by t-test

46 Cont'd

TABLE XII CONT'D

q. significant difference at p 0.05 by t-test
r. significant difference at 0.05 by t-test
s. no significant difference at p 0.05 by t-test
t. no significant difference at p 0.05 by t-test
u. no significant difference at p 0.05 by t-test
v. no significant difference at p 0.05 by t-test
w. no significant difference at p 0.05 by t-test

*

Each identical pair of alphabetical letters were compared to each other. For example, the letter "c" compares the amount of airborne asbestos dust produced during hand punching with housekeeping controls and the amount of airborne asbestos dust produced during hand shaping with no controls. A comparison of the mean amount of dust produced by each operation was conducted by using the standard student t-test at the 95% confidence level. Hand punching with housekeeping controls produced an average of 0.07 fibers/cc versus 0.13 fibers/cc for hand shaping with no controls. To determine whether these two means are equal the t-test was employed using the 95% confidence level. Through a series of mathmatical computations a calculated t value is derived. This calculated t value is compared with a tabulated t value obtained from published tables of t values; the tabulated t value is the minimum t value with which we can be 95% sure that the means are different. If the calculated t value is greater than or equal to the tabulated t value, then we are 95% sure that the means are different; if the calculated t value is less than the tabulated t value, then the difference between means is not significant at the 95% level. The conclusion that can be drawn from the example using the "c" comparisons is that these two operations produce essentially the same amount of airborne asbestos dust, i.e. there is no significant difference between mean values at the 95% confidence level. Stated differently, this indicates that there is no satistically significant difference between the amount of dust produced by hand punching with housekeeping controls and the amount of dust produced by hand shaping with no controls.

PART II

RECOMMENDATIONS

WORK PRACTICES AND PROCEDURES FOR ASBESTOS CONTAINING GASKETS

The recommended work practices and procedures are based on reducing asbestos exposures to gasket workers to below 0.1 fibers/cc. The engineering controls for achieving this goal are feasible and the necessity for medical surveillance for large numbers of gasket workers is eliminated. If less stringent goals, such as 0.5 or 2.0 fibers/cc are acceptable, the work practices can be modified accordingly using the Summary Table XII.

A. Industrial Hygiene

Control measures are as follows:

1. Storage

   No special storage methods are necessary. Storage in impermeable containers in isolated locations is desirable.

2. Hand punching

   All areas of gasket manufacture by hand punching shall be thoroughly cleaned with a PORTVAC and all waste shall be sealed in impermeable containers. Dry sweeping is not permitted.

3. Hand operated mechanical punching

   All areas of hand operated mechanical punching shall be thoroughly cleaned with a PORTVAC and all waste shall be sealed in impermeable containers. Dry sweeping is not permitted.

4. Machine punching

   All power operated presses used for gasket manufacture shall be provided with local exhaust ventilation. PORTVACS shall be used to thoroughly clean the area and all waste shall be sealed in impermeable containers. Dry sweeping is not permitted.

5. Hand shaping

   All waste shall be sealed in impermeable containers.

6. Machine shearing

   All areas where machine shearing is done shall be thoroughly cleaned with a PORTVAC. No dry sweeping is allowed.

7. Machine nibbling

All areas where machine nibbling is done shall be provided with local exhaust ventilation. PORTVACS shall be used to thoroughly clean the area and all waste shall be sealed in impermeable containers. Dry sweeping is not permitted.

8. Installation

No special controls are necessary.

9. Removal

All waste shall be sealed in impermeable containers.

10. Flange clean-up following removal

All waste shall be sealed in impermeable containers.

B. Personal Protective Equipment

Until local exhaust ventilation sufficient to reduce airborne asbestos levels to less than 0.1 fibers/cc is installed, personnel engaged in power operated gasket pressing or nibbling shall wear National Institute of Occupational Health (NIOSH) approved dust respirators, disposable coveralls, head covers, and foot covers. Coveralls shall be sealed at the ankle and wrist and treated as asbestos waste for disposal.

C. Waste Disposal

All asbestos waste material collected in sealed, impermeable containers shall be disposed of by burial under at least two feet of earth at a suitable sanitary land fill.

D. Labeling

All asbestos containing gasket materials shall be labled to inform the users of their asbestos content.

NOTE: The method of labeling gasket materials adequately so that the content is obvious even during removal is beyond the scope of the project and was not addressed.

PART III
MISCELLANEOUS

REFERENCES

(a) NIOSH Publication No. 77-169, Revised Recommended Asbestos Standards, 1976

(b) BUMED Washington, DC 081625Z, Feb 1978

(c) COMNAVSEASYSCOM Washington, DC 061928Z, Feb 1978

(d) NAVSEA S9086-VH-STM-000 Chapter 635, Thermal Insulation

(e) NIOSH Publication 77-173, Occupational Exposure Sampling

(f) Sec 6101E 1AW 620 SEA-04H Ser 214
Subj: Portable Vacuum Cleaners (PORTVACS) for Asbestos, dated 13 Jan 1978

(g) BUMED Instruction 6260.14, Asbestos; measures for control of, Jun 1973

(h) OPNAV Instruction 6260.1, Control of Asbestos Exposure to Naval Personnel and Environs, Apr 1974

(i) FR, Vol 40, No. 197, Page 47652; Occupational Exposure to Asbestos

(j) NAVENVIRHLTHCEN ltr Ser 8-152, of 7 Apr 1978

SAMPLING PROCEDURE SHEET

SUBSTANCE: Asbestos

SAMPLING EQUIPMENT AND PROCEDURE:

A personal sampling pump is used to pull air through a 37 mm 4-piece (2 rings) filter holder. The contaminant is collected on a 0.8 micrometer pore size mixed cellulose ester filter (37 mm in diameter). The filter holder is held together by tape or a shrinking band. A piece of flexible tubing connects the filter holder to the pump. Sample at a flow rate of 1.5-2 liters per minute with the face cap removed and filter facing down. After sampling, replace the face cap. Number the samples as per laboratory log.

SAMPLE SIZE: Sampling periods of between 5 minutes and up to 4 hours may be necessary. Usually 15-30 minute samples are adequate.

BLANK:

With each batch of samples submit one filter which is subjected to exactly the same handling as for the samples except that no air is drawn through it. Label it as a blank and enter it into the laboratory log.

REFERENCES:

a. NIOSH SDS 2.01 3/12/74

b. Sampling and Evaluating Airborne Asbestos Dust, NIOSH, Jan 73

Prepared by: L R Liukonen
L. R. LIUKONEN
Industrial Hygienist

Approved by: R R Beckett
R. R. BECKETT
Head, Industrial Hygiene Branch

Occupational & Environmental Health Service
Naval Regional Medical Center, Bremerton
November 1975

ENCLOSURE (1)

13ND NRMC 6260/04 (7-7[illegible]

COLLECTION AND COUNTING AIRBORNE ASBESTOS FIBERS
PHASE CONTRAST MICROSCOPY METHOD

DATA SHEET AIRBORNE ASBESTOS FIBER CONCENTRATION

DATE: _____ SAMPLE #: _____

SAMPLE LOCATION: _____

AIR SAMPLER FLOW RATE (liters/min): _____

TIME ON: _____ OFF: _____ NET TIME: _____ (minutes)

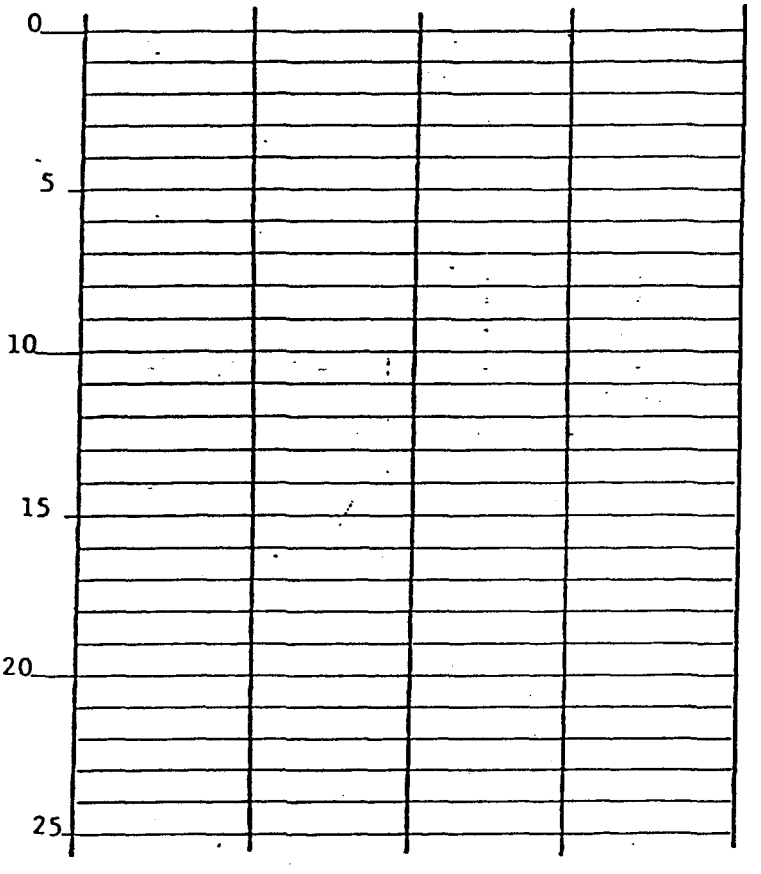
TOTAL AIR VOLUME: _____ (liters)

BLANK COUNT AVERAGE: _____

AVERAGE COUNT: _____

COMMENTS: _____

COLLECTED BY: _____ COUNTED BY: _____



CALCULATIONS:

AIRBORNE ASBESTOS CONCENTRATION =

$$\frac{\text{(Average Fiber Count)(Filter Area)}}{\text{(Field Area)(Sample Volume)(1000)}} = \frac{\text{(Average Fiber Count) 182.3}}{\text{Sample Volume}}$$

Filter Area 37 mm Filter = 855 mm^2
Field Area = 0.00469 mm^2

ENCLOSURE (2)

ASBESTOS COUNTING PROCEDURES

INTRODUCTION:

This method describes the sampling of airborne asbestos fibers, the filter mounting procedure, and counting of the fibers on the filter by phase contrast microscopy. This procedure is written for use with the Zeiss standard RA microscope.

SAMPLE COLLECTION:

Asbestos samples are collected in accordance with procedures described in Section C.3. using personal sampling pumps calibrated according to procedure A.2. Data regarding sample collection is recorded on Form D5.

SAMPLE MOUNTING:

A mounting solution is prepared which consists of a mixture in a one-to-one ratio by volume of dimethyl pthalate and diethyl oxalate and 0.002 gram of clean filter material per ml of solution. The solution is stirred until the filter material is dissolved and a homogeneous mixture is obtained. The normal shelf life of the mounting solution is about 6 months after which time fiber shaped crystals may begin to form and the mounting solution must be discarded.

With a glass rod place a small amount of the mounting solution onto the center of a 1 x 3" glass slide, being careful not to touch the slide with the rod. The correct amount of solution results in the solution extending only slightly beyond the filter boundary. If more solution is used particle migration may occur.

Using a spatula or supplemental glass rod spread the mounting media into a triangular shape the size of which should coincide with the dimension of the filter wedge.

Cut a triangular wedge from the filter using a scalpel or microscissors. Using tweezers, grab the filter edge in the area which was sandwiched by the monitor case sections and place the wedge, sample side up, upon the mounting media. Using tweezers, pick up the cover slip and place it on the filter media combination. Press slightly on the cover until it makes contact with the now dissolving filter. Once this contact has been made do not reposition the cover slip. The sample should become transparent after about 15 minutes. If the filter appears cloudy it may be necessary to again press lightly on the cover slip. Discard the sample mount after 5 days if it has not been counted as crystals which appear similar to asbestos fibers may begin to grow at the mounting solution/air interfaces.

5. Rotate the objective turret Ph No. 2 (40 X) into position and the phase condenser to position 2. This will give 400 power with the 10X eyepieces.

IMPORTANT. The phase condenser position must always correspond to the Ph number of the objective in order to have the proper phase contrast conditions.

6. Recheck the rings to ensure they are concentric, and adjust slightly if necessary.

7. Remove the centering telescope and replace the 10X eyepiece.

8. Ensure that the compensating lens is in place and swing out the neutral density filter. This ensures the proper light intensity and Kohler illumination conditions.

9. Adjust the width of the binocular bodies so that the field of vision appears as one large field. Note the value of the center disc; then set each eyepiece body to this value. Now the microscope is parfocal with each objective. Only slight adjustments will be required for going from one magnification to the other.

10. The microscope is aligned for phase contrast microscopy at 400 power. Do not make further adjustments to the optical system. Misalignment or out-of-phase conditions will greatly affect asbestos fiber counts.

PORTION RETICLE:

1. Place the stage micrometer on the stage of the microscope.

2. Place a dust-free Porton Reticle in one 10X ocular of the microscope. (The ocular or eyepiece must be specially designed or modified by the Zeiss representative to accept a reticle. If not, the reticle image will appear out of focus. The microscopist may carefully push the field stop inside the eyepiece down about 1/8" to 1/4", then place the Porton Reticle beneath it. The reticle can be held in place with a small compression ring. The field stop may have to be adjusted to find the exact focus).

3. Bring the stage micrometer into focus under 400 power phase contrast.

4. Align the left edge of the reticle grid with the left edge of the stage micrometer grid.

ENCLOSURE (3)

ASBESTOS COUNTING PROCEDURES
(Cont'd)

PHASE MICROSCOPY:

Kohler illumination

1. Set up the microscope to 100 power with 10X oculars (eye pieces) and the Ph No. 1 phase contrast objective (10X).
2. Rack the stage to its upper stop.
3. Rack the condenser to its upper stop and set the condenser iris fully open and the phase condenser lens in the "J" position (bright field).
4. Swing the neutral density filter and compensating lens into position.
5. Set the iris of the illuminator at No. 5 position.
6. Adjust the lamp intensity to 5.5 volts.
7. Rack the condenser down until the leaves of the illuminator iris (a 13 sided polygon) are in sharp focus.
8. Center the image of the illuminator iris with the centering screws if required.
9. Fully open the illuminator iris to cover the full field of the eyepiece.
10. Do not move the condenser. The microscope is now at Kohler illumination.

Phase Contrast Conditions

1. Set the phase condenser ring to position No. 1.
2. Rotate the objective turret to Ph No. 1 (10X). This will give 100 power with the 10X eyepieces.
3. Introduce the centering telescope in place of an eyepiece into the viewing tube and focus on the phase annulus and annular diaphragm which appear as light and dark discs. Without the telescope a light and dark ring can be seen.
4. Align the two rings using 2 small adjustable knobs located to the left (a knurled lock screw) and on the front of the phase condenser (a knurled wheel). The light and dark rings or discs should be concentric.

ENCLOSURE (3)

ASBESTOS COUNTING PROCEDURES
(Cont'd)

5. Read the full length (200 L) of the reticle grid in millimeters (reticle size = 100W x 200L).

6. Calculate L: $L = \frac{X\text{mm}}{200} \times 1000\ \mu/\text{mm} = X$ microns

7. Calculate circle sizes by the formula

$D = L \sqrt{2^n}$

n = circle number
L = microns, μ
D = diameter, μ

8. The counting area is the square composed of 6 rectangles on the left side of the recticle. The area is found by dividing the full length measured in mm by 2 and squaring the result.

Example: Length (200L) = .137 mm

Counting area = $.137/2 = (.0685)^2 = .00469$

ASBESTOS COUNTING AND SIZING:

1. Count only the fibers (aspect ratio of at least 3 to 1).

2. Count only the fibers 5 μm in length.

3. Count any fiber 5 μm in length if it is entirely within the field of area or if some portion is within and the part without crosses one or both of the pre-selected adjacent sides. The intent of this rule is to exclude potentially eligible fibers that are either outside the field of view or that cross either of the remaining sides (even if the fiber also crosses one of the selected sides).

4. Count as many field as required to yield at least 100 fibers: at least 20 and at most 100.

5. The fields of view are selected without looking into the eyepieces.

6. The fields are selected in a straight line running from the tip of the wedge (center of the filter) to the center of the arc side (circumference of the filter).

7. Do not count a field containing more than twenty fibers unless there is very little fiber overlap and very few background particulates.

ENCLOSURE (3)

ASBESTOS COUNTING PROCEDURES
(Cont'd)

8. When an agglomerate (a group of particulates that adhere to one another) covers at most 1/6 of the field area, reject the field and select another.

9. Since you must be able to see both ends of a fiber, ideally you must only size free fibers - that is, fibers that are unattached and you can see both ends.

CALCULATION OF CONCENTRATION:

$$\text{Concentration} = \frac{(\text{Av. Fiber Cnt.})(\text{filter area})}{(\text{field area})(\text{Sample volume})(1000)}$$

Av. Fiber Count: Average fiber count in fibers/field

Filter area: 855 mm^2 for 37 mm dia. membrane filters

Counting area: Reticle calibrated in mm^2/field

Sample volume: Total time in minutes x flow rate in liters/minute

1000: (milliliters/liter)

If blanks are used, subtract the average blank count of the same.

Prepared by: L R Liukonen
L. R. LIUKONEN
Industrial Hygienist

Approved by: R R Beckett
R. R. BECKETT
Head, Industrial Hygiene Branch

Occupational & Environmental Health Service
Naval Regional Medical Center, Bremerton
June 1976

ENCLOSURE (3)

APPENDIX I

SAMPLING DATA AND MATERIAL DESCRIPTION

CONTENTS

Section I
Storage

Section II
Hand punching

Section III
Hand operated mechanical punching

Section IV
Machine punching

Section V
Hand shaping

Section VI
Machine shearing

Section VII
Machine nibbling

Section VIII
Installation

Section IX
Removal and concurrent installation

Section X
Clean-up following removal

Section XI
Removal with simultaneous clean-up

Section XII
Miscellaneous and multiple operations

SECTION I: Storage

Operation	Sample Number	Airborne Asbestos Fiber Conc. (# fibers 5 μ/cc air)	Sample Time (min)	Total Air Volume (l)
Storage areas for receipt & issue	1	< 0.01	124.7	249.4
	2	< 0.01	123.8	247.7
	3	< 0.01	125.0	250.0
	4	0.02	127.0	254.0
	5	0.03	105.7	211.4
	6	0.02	116.2	232.5
	7	0.03	117.5	235.0
	8	0.05	132.0	264.0
	9	< 0.01	132.0	264.0
	10	< 0.01	102.6	205.2
	11	< 0.05	123.1	246.3
	12	< 0.01	113.3	226.6
	13	< 0.02	60.0	120.0
	14	< 0.02	60.0	120.0
		$\bar{X}$ = 0.02		
Storage areas for use	1	0.04	97.2	194.5
	2	< 0.01	118.4	236.8
	3	0.04	107.9	215.8
	4	0.03	122.0	244.0
	5	< 0.01	112.0	224.0
	6	0.05	98.5	196.9
	7	0.12	103.1	206.2
		$\bar{X}$ = 0.04		

5330-00-880-4032
" " 585-9502
" " 942-4727
" " 942-4728
" " 197-8335
" " 197-8496
" " 197-9633
" " 197-8536
" " 197-8490
" " 197-8498
" " 197-9635
" " 238-9029
" " 197-8491
" " 184-4168
" " 197-8538
" " 197-8492
" " 184-4170
" " 197-8539
" " 197-8493

5330-00-197-8526
" " 184-4172
" " 599-9544
" " 197-8494
" " 197-8527
" " 197-8541
" " 197-8528
" " 197-8542
" " 197-8530
" " 186-1745
" " 599-9545
" " 186-1747
" " 599-9546
" " 186-1749
" " 599-9547
" " 245-8256
5640-00-270-1619
5330-00-186-4099
" " 186-4104

5330-00-186-4099
" " 186-4109
" " 803-1921
" " 803-1921
" " 803-9003
" " 180-4100
" " 180-7200
" " 186-4100
" " 196-6987
5640-00-270-1622
5330-00-268-9880

Local purchase items are shown on following pages (56a - 56r)

NSN 5330-LL-S04-0062 NOMENCLATURE B-176 LOW PRESS NAVY 150 PSI STD

PART NO.	CID/APL	U/I	COST

CHANGE ACTION	MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 1/2 IN

COMPRESSED ASBESTOS PER MIL-A- 17472 1/8 IN THICK

SIZE 1/2 IN IPS 3 9/16 IN DIA, PC 2 7/16 IN

3 HOLE, 1/2 IN BOLT SIZE RN B-176 LOW PRESS NAVY 150 PSI STD

MFR NAVSEA SYS COMMAND FSCM 80064 RNVC 1

ADDED DATA 1 80064B-176 LOW PRESS NAVY 150 PSI STD

UNIT PACKAGE TO BE 25 EA SEALED IN PLASTIC

BY K.L. 5/19/77 C/540. 24

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN 5330-LL-S04-0064 NOMENCLATURE B-176 LOW PRESS NAVY 150 PSI STD

PART NO.	CID/APL	U/I	COST

CHANGE ACTION	MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 1 IN

COMPRESSED ASBESTOS PER MIL-A-17472 1/8 IN THICK

SIZE 1 IN IPS 4 1/4 IN DIA PC 3 1/8 IN

4 HOLE, 1/2 IN BOLT SIZE RN B-176 LOW PRESS NAVY 150 PSI STD

MFR NAVSEA SYS COMMAND FSCM 80064 RNVC 1

ADDED DATA 1 80064B-176 LOW PRESS NAVY 150 PSI STD

UNIT PACKAGE TO BE 25 EA SEALED IN PLASTIC

BY K.L. 5/19/77 C/540. 24

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN 5330-LL-S04-0065 NOMENCLATURE B-176 LOW PRESS NAVY 150 PSI STD

PART NO.	CID/APL	U/I	COST

CHANGE ACTION	MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 1 1/4 IN

COMPRESSED ASBESTOS PER MIL-A-17472 1/8 IN THICK

SIZE 1 1/4 IN IPS 4 1/2 IN DIA, PC 3 3/8 IN

4 HOLE, 1/2 IN BOLT SIZE RN B-176 LOW PRESS NAVY 150 PSI STD

MFR NAVSEA SYS COMMAND FSCM 80064 RNVC 1

ADDED DATA 1 80064B-176 LOW PRESS NAVY 150 PSI STD

UNIT PACKAGE TO BE 25 EA SEALED IN PLASTIC

BY K.L. 5/19/77 C/540. 24

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN 5330-LL-S04-0063 NOMENCLATURE B-176 LOW PRESS NAVY 150 PSI STD

PART NO.	CID/APL	U/I	COST

CHANGE ACTION	MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 3/4 IN

COMPRESSED ASBESTOS PER MIL-A-17472 1/8 IN THICK

SIZE 3/4 IN IPS 3 13/16 IN DIA, PC 2 11/16 IN

4 HOLE, 1/2 IN BOLT SIZE RN B-176 LOW PRESS NAVY 150 PSI STD

MFR NAVSEA SYS COMMAND FSCM 80064 RNVC 1

ADDED DATA 1 80064B-176 LOW PRESS NAVY 150 PSI STD

UNIT PACKAGE TO BE 25 EA SEALED IN PLASTIC

BY K.L. 5/19/77 C/540. 24

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN 5330-LL-S04-0067 NOMENCLATURE B-176 LOW PRESS NAVY 150 PSI STD

PART NO. | CID/APL | U/I | COST

CHANGE ACTION | MO. | DAY | YEAR

DESCRIPTION

GASKET, FLANGE ASB 2 IN

COMPRESSED ASBESTOS PER MIL-A-17472 1/8 IN THICK

SIZE 2 IN IPS 5 9/16 IN DIA, PC 4 7/16 IN

6 HOLE, 1/2 IN BOLT SIZE RN B-176 LOW PRESS NAVY 150 PSI STD

MFR NAVSEA SYS COMMAND FSCM 80064 RNVC 1

ADDED DATA 1 80064B-176 LOW PRESS NAVY 150 PSI STD

UNIT PACKAGE TO BE 25 EA SEALED IN PLASTIC

BY K.L. 5/19/77 C/540. 24

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN 5330-LL-S04-0066 NOMENCLATURE B-176 LOW PRESS NAVY 150 PSI STD

PART NO. | CID/APL | U/I | COST

CHANGE ACTION | MO. | DAY | YEAR

DESCRIPTION

GASKET, FLANGE ASB 1 1/2 IN

COMPRESSED ASBESTOS PER MIL-A-17472 1/8 IN THICK

SIZE 1 1/2 IN IPS 5 1/16 IN DIA, PC 3 15/16 IN

6 HOLE, 1/2 IN BOLT SIZE RN B-176 LOW PRESS NAVY 150 PSI STD

MFR NAVSEA SYS COMMAND FSCM 80064 RNVC 1

ADDED DATA 1 80064B-176 LOW PRESS NAVY 150 PSI STD

UNIT PACKAGE TO BE 25 EA SEALED IN PLASTIC

BY K.L.5/19/77 C/540. 24

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN	5330-LL-S04-0242	NOMENCLATURE	B-176 LOW PRESS NAVY 150 PSI STD

PART NO.	CID/APL	U/I	COST

CHANGE ACTION	MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 3 IN

COMPRESSED ASBESTOS PER MIL-A-17472 1/8 IN THICK

SIZE 3 IN IPS 6 5/8 IN DIA, PC 5 1/2 IN

8 HOLE, 1/2 IN BOLT SIZE RN B-176 LOW PRESS NAVY 150 PSI STD

MFR NAVSEA SYS COMMAND FSCM 80064 RNVC 1

ADDED DATA 1 80064B-176 LOW PRESS NAVY 150 PSI STD

UNIT PACKAGE TO BE 25 EA SEALED IN PLASTIC

BY K.L. 5/19/77 C/540. 24

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN	5330-LL-S04-0072	NOMENCLATURE	ANSI B 16.5 150 PSI

PART NO.	CID/APL	U/I	COST

CHANGE ACTION	MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 1-1/2 IN

COMPRESSED ASBESTOS PER MIL-A-17472, 1/8 IN THICK

DIMENSIONS PER ANSI B-16.5 150 PSI 1-1/2 IN IPS

RN ANSI B-16.5 150 PSI

MFR. AMERICAN NATIONAL STANDARDS INSTITUTE FSCM 80204 RNVC 1

1-80204 ANSI B-16.5 150 PSI

BY K.L. 3-21-77 C/540. 2

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

56 1

NSN 5330-LL-S04-0244 | NOMENCLATURE B-176 LOW PRESS NAVY 150 PSI STD

*ART NO.	CID/APL	U/I	COST

CHANGE ACTION	MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 4 IN

COMPRESSED ASBESTOS PER MIL-A-17472 1/8 IN THICK

SIZE 4 IN IPS 7 11/16 IN DIA, PC 6 9/16 IN

8 HOLE, 1/2 IN BOLT SIZE RN B-176 LOW PRESS NAVY 150 PSI STD

MFR NAVSEA SYS COMMAND FSCM 80064 RNVC 1

ADDED DATTA 1 80064B-176 LOW PRESS NAVY 150 PSI STD

UNIT PACKAGE TO BE 25 EA SEALED IN PLASTIC

BY K.L. 5/19/77 C/S40. 24

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN 5330-LL-S04-0243 | NOMENCLATURE B-176 LOW PRESS NAVY 150 PSI STD

PART NO.	CID/APL	U/I	COST

CHANGE ACTION	MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 3 1/2 IN

COMPRESSED ASBESTOS PER MIL-A-17472 1/8 IN THICK

SIZE 3 1/2 IN IPS 7 3/16 IN DIA, PC 6 1/16 IN

8 HOLE, 1/2 IN BOLT SIZE RN B-176 LOW PRESS NAVY 150 PSI STD

MFR NAVSEA SYS COMMAND FSCM 80064 RNVC 1

ADDED DATA 1 80064B-176 LOW PRESS NAVY 150 PSI STD

UNIT PACKAGE TO BE 25 EA SEALED IN PLASTIC

BY K.L. 5/19/77 C/S40. 24

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN 5330-LL-S04-0246 | NOMENCLATURE B-176 LOW PRESS NAVY 150 PSI STD

PART NO.	CID/APL	U/I	COST

CHANGE ACTION	MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 6 IN

COMPRESSED ASBESTOS PER MIL-A-1747 1/8 IN THICK

SIZE 6 IN IPS, 10 1/8 IN DIA, PC 8 7/8 IN

10 HOLE 5/8 IN BOLT SIZE RN B-176 LOW PRESS NAVY 150 PSI STD

MFR NAVSEA SYS COMMAND FSM 80064 RNVC 1

ADDED DATA 1 80064B-176 LOW PRESS NAVY 150 PSI STD

UNIT PACKAGE TO BE 25 EA SEALED IN PLASTIC

BY K.L. 5/19/77 C/540. 24

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN 5330-LL-S04-0245 | NOMENCLATURE B-176 LOW PRESS NAVY 150 PSI STD

PART NO.	CID/APL	U/I	COST

CHANGE ACTION	MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 5 IN

COMPRESSED ASBESTOS PER MIL-A-17472 1/8 IN THICK

SIZE 5 IN IPS 9 1/16 IN DIA, PC 7 13/16 IN

10 HOLE 5/8 IN BOLT SIZE RN B-176 LOW PRESS NAVY 150 PSI STD

MFR NAVSEA SYS COMMAND FSCM 80064 RNVC

ADDED DATA 1 80064B176 LOW PRESS NAVY 150 PSI STD

UNIT PACKAGE TO BE 25 EA SEALED IN PLASTIC

BY K.L. 5/19/77 C/540. 24

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN	NOMENCLATURE
5330-LL-S04-0070	ANSI B16.5 150 PSI

PART NO.	CID/APL	U/I	COST

CHANGE ACTION	MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 3/4 IN

COMPRESSED ASBESTOS PER MIL-A-17472 1/8 IN THICK

DIMENSIONS PER ANSI B-16.5 150 PSI 3/4 IN IPS

RN ANSI B-16.5 150 PSI

MFR. AMERICAN NATIONAL STANDARDS INSTITUTE FSCM 80204 RNVC 1

1-80204 ANSI B-16.5 150 PSI

BY K.L. 3-21-77 C/540. 2

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN	NOMENCLATURE
5330-LL-S04-0069	ANSI B16.5 150 PSI

PART NO.	CID/APL	U/I	COST

CHANGE ACTION	MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 1/2 IN

COMPRESSED ASBESTOS PER MIL-A-17472, 1/8 IN THICK

DIMENSIONS PER ANSI B-16.5 150 PSI 1/2 IN IPS

RN ANSI B-16.5 150 PSI

MFR. AMERICAN NATIONAL STANDARDS INSTITUTE FSCM 80204 RNVC 1

1-80204 ANSI B-16.5 150 PSI

BY K.L. 3-21-77 C/540. 2

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

5/6

NSN	NOMENCLATURE			
5330-LL-S04-0073	ANSI B16.5 150 PSI			
PART NO.	CID/APL	U/I	COST	
CHANGE ACTION		MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 2 IN IPS

COMPRESSED ASBESTOS PER MIL-A-17472, 1/8 IN THICK

DIMENSIONS PER ANSI B-16.5 150 PSI 2 IN IPS

RN ANSI B-16.5 150 PSI

MFR. AMERICAN NATIONAL STANDARDS INSTITUTE FSCM 80204 RNVC 1

1-80204 ANSI B-16.5 150 PSI

BY K.L. 3-21-77 C/540. 2

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN	NOMENCLATURE			
5330-LL-S04-0071	ANSI B16.5 150 PSI			
PART NO.	CID/APL	U/I	COST	
CHANGE ACTION		MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 1-1/4 IN

COMPRESSED ASBESTOS PER MIL-A-17472, 1/8 IN THICK

DIMENSIONS PER ANSI B-16.5 150 PSI 1-1/4 IN IPS

RN ANSI B-16.5 150 PSI

MFR. AMERICAN NATIONAL STANDARDS INSTITUTE FSCM 80204 RNVC 1

1-80204 ANSI B-16.5 150 PSI

BY K.L. 3-21-77 C/540. 2

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN	NOMENCLATURE		
5330-LL-S04-0074	ANSI B16.5 · 150 PSI		
PART NO.	CID/APL	U/I	COST

CHANGE ACTION	MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 2-1/2 IN

COMPRESSED ASBESTOS PER MIL-A-17472, 1/8 IN THICK

DIMENSIONS PER ANSI B-16.5 150 PSI 2-1/2 IN IPS

RN ANSI B-16.5 150 PSI

MFR. AMERICAN NATIONAL STANDARDS INSTITUTE FSCM 80204 RNVC 1

1-80204 ANSI B-16.5 150 PSI

BY K.L. 3-21-77 C/540. 2

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN	NOMENCLATURE		
5330-LL-S04-0247	ANSI B16.5 150 PSI		
PART NO.	CID/APL	U/I	COST

CHANGE ACTION	MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 3 IN

COMPRESSED ASBESTOS PER MIL-A-17472, 1/8 IN THICK

DIMENSIONS PER ANSI B-16.5 150 PSI 3 IN IPS

RN ANSI B.16.5 150 PSI

MFR. AMERICAN NATIONAL STANDARDS INSTITUTE FSCM 80204 RNVC 1

1-80204 ANSI B/16.5 150 PSI

BY 3-21-77 K.E C/540. 2

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN	NOMENCLATURE		
5330-LL-S04-0249	ANSI B16.5 150 PSI		
PART NO.	CID/APL	U/I	COST

CHANGE ACTION	MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 4 IN

COMPRESSED ASBESTOS PER MIL-A-17472, 1/8 IN THICK

DIMENSIONS PER ANSI B-16.5 150 PSI 4 IN IPS

RN ANSI B-16.5 150 PSI

MFR. AMERICAN NATIONAL STANDARDS INSTITUTE FSCM 80204 RNVC 1

1-80204 ANSI B-16.5 150 PSI

BY 3-21-77 K.L C/540. 2

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN	NOMENCLATURE		
5330-LL-S04-0248	ANSI B16.5 150 PSI		
PART NO.	CID/APL	U/I	COST

CHANGE ACTION	MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 3-1/2 IN

COMPRESSED ASBESTOS PER MIL_A-17472, 1/8 IN THICK

DIMENSIONS PER ANSI B-16.5 150 PSI 3-1/2 IN IPS

RN ANSI B-16.5 150 PSI

MFR. AMERICAN NATIONAL STANDARDS INSTITUTE FSCM 80204 RNVC 1

1-80204 ANSI B-16.5 150 PSI

BY K. L. 3-21-77 C/540. 2

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN	NOMENCLATURE
5330-LL-S04-0251	ANSI B16.5 150 PSI

PART NO.	CID/APL	U/I	COST

CHANGE ACTION	MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 6 IN

COMPRESSED ASBESTOS PER MIL-A-17472 , 1/8 IN THICK

DIMENSIONS PER ANSI B.16.5 150 PSI 6 IN IPS

RN ANSI B16.5 150 PSI

MFR. AMERICAN NATIONAL STANDARDS INSTITUTE FSCM 80205 RNVC 1

1-80204 ANSI B16.5 150 PSI

BY K.L. 3-21-77 C/S40. 2

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN	NOMENCLATURE
5330-LL-S04-0250	ANSI B16.5 150 PSI

PART NO.	CID/APL	U/I	COST

CHANGE ACTION	MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 5 IN

COMPRESSED ASBESTOS PER MIL_A-17482, 1/8 IN THICK

DIMENSIONS PER ANSI B-16.5 150 PSI 5 IN IPS

RN ANSI B16.5 150 PSI

MFR. AMERICAN NATIONAL STANDARDS INSTITUTE FSCM 80204 RNVC 1

1-80204 ANSI B-16.5 150 PSI

BY K.L. 3-21-77 C/S40. 2

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN	5330-LL-S00-1603	NOMENCLATURE	B-176 LOW PRESS NAVY 150 PSI S[redacted]

PART NO.	CID/APL	U/I	COST

CHANGE ACTION	MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 5 IN

COMPRESSED ASBESTOS PER MIL-A-17472 1/16 IN THICK

SIZE 5 IN IPS 9 1/16 IN DIA, PC 7 13/16 IN

10 HOLE 5/8 IN. BOLT SIZE RN B-176 LOW PRESS NAVY 150 PSI STD

MFR NAVSEA SYS COMMAND FSCM 80064 RNVC 1

ADDED DATA 1 80064B-176 LOW PRESS NAVY 150 PSI STD

UNIT PACKAGE TO BE 25 EA SEALED IN PLASTIC

BY K.L. 5-19-77 C/540. 24

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN	5330-LL-S00-1604	NOMENCLATURE	B-176 LOW PRESS NAVY 150 PSI STD

PART NO.	CID/APL	U/I	COST

CHANGE ACTION	MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 6 IN

COMPRESSED ASBESTOS PER MIL-A-17472 1/16 IN THICK

SIZE 6 IN IPS 10 1/8 IN DIA, PC 8 7/8 IN

12 HOLE 5/8 IN BOLT SIZE RN B-176 LOW PRESS NAVY 150 PSI STD

MFR NAVSEA SYS COMMAND FSCM 80064 RNVC 1

ADDED DATA 1 80064B-176 LOW PRESS NAVY 150 PSI STD

UNIT PACKAGE TO BE 25 EA SEALED IN PLASTIC

BY K.L. 5/19/77 C/540. 24

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN 5330-LL-S00-1601 | NOMENCLATURE B-176 LOW PRESS NAVY 150 PSI STD

ART NO. | CID/APL | U/I | COST

HANGE ACTION | MO. | DAY | YEAR

DESCRIPTION

GASKET, FLANGE ASB 3 1/2 IN

COMPRESSED ASBESTOS PER MIL-A-17472 1/16 IN THICK

SIZE 3 1/2 IN IPS 7 3/16 IN DIA, PC 6 1/16 IN

8 HOLE, 1/2 IN BOLT SIZE RN B-176 LOW PRESS NAVY 150 PSI STD

MFR NAVSEA SYS COMMAND FSCM 80064 RNVC 1

ADDED DATA 1 80064B-176 LOW PRESS NAVY 150 PSI STD

UNIT PACKAGE TO BE 25 EA SEALED IN PLASTIC

BY K.L. 5/19/77 C/S40. 24

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN 5330-LL-S00-1602 | NOMENCLATURE B-176 LOW PRESS NAVY 150 PSI STD

PART NO. | CID/APL | U/I | COST

HANGE ACTION | MO. | DAY | YEAR

DESCRIPTION

GASKET, FLANGE ASB 4 IN

COMPRESSED ASBESTOS PER MIL-A-17472 1/16 IN THICK

SIZE 4 IN IPS 7 11/16 IN DIA, PC 6 9/16 IN

8 HOLE, 1/2 IN BOLT SIZE RN B-176 LOW PRESS NAVY 150 PSI STD

MFR NAVSEA SYS COMMAND FSCM 80064 RNVC 1

ADDED DATA 1 80064B-176 LOW PRESS NAVY 150 PSI STD

UNIT PACKAGE TO BE 25 EA SEALED IN PLASTIC

BY K.L. 5/19/77 C/S40. 24

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN	5330-LL-S00-1599	NOMENCLATURE	B-176 LOW PRESS NAVY 150 [redacted]
PART NO.	CID/APL	U/I	COST
CHANGE ACTION		MO.	DAY / YEAR

DESCRIPTION

GASKET, FLANGE ASB 2 1/2 IN

COMPRESSED ASBESTOS PER MIL-A-17472 1/16 IN THICK

SIZE 2 1/2 IN IPS 6 1/8 IN DIA, PC 5 IN

6 HOLE, 1/2 IN BOLT SIZE RN B-176 LOW PRESS NAVY 150 PSI STD

MFR NAVSEA SYS COMMAND FSCM 80064 RNVC 1

ADDED DATA 1 80064B-176 LOW PRESS NAVY 150 PSI STD

UNIT PACKAGE TO BE 25 EA SEALED IN PLASTIC

BY K.L. 5/19/77 C/540. 24

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN	5330-LL-S00-1600	NOMENCLATURE	B-176 LOW PRESS NAVY 150 PSI STD
PART NO.	CID/APL	U/I	COST
CHANGE ACTION		MO.	DAY / YEAR

DESCRIPTION

GASKET, FLANGE ASB 3 IN

COMPRESSED ASBESTOS PER MIL-A-17472 1/16 IN THICK

SIZE 3 IN IPS 6 5/8 IN DIA, PC 5 1/2 IN

8 HOLE, 1/2 IN BOLT SIZE RN B-176 LOW PRESS NAVY 150 PSI STD

MFR NAVSEA SYS COMMAND FSCM 80064 RNVC 1

ADDED DATA 1 80064B-176 LOW PRESS NAVY 150 PSI STD

UNIT PACKAGE TO BE 25 EA SEALED IN PLASTIC

BY K.L. 5/19/77 C/540. ____

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN 5330-LL-S00-1597 | NOMENCLATURE B-176 LOW PRESS NAVY 150 PSI STD

PART NO.	CID/APL	U/I	COST

CHANGE ACTION	MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 1 1/2 IN

COMPRESSED ASBESTOS PER MIL-A-17472 1/16 IN THICK

SIZE 1 1/2 IN IPS 5 1/16 IN DIA, PC 3 15/16 IN

6 HOLE, 1/2 IN BOLT SIZE RN B-176 LOW PRESS NAVY 150 PSI STD

MFR NAVSEA SYS COMMAND FSCM 80064 RNVC 1

ADDED DATA 1 80064B-176 LOW PRESS NAVY 150 PSI STD

UNIT PACKAGE TO BE 25 EA SEALED IN PLASTIC

BY K.L. 5/19/77 C/540. 24

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN 5330-LL-S00-1598 | NOMENCLATURE B-176 LOW PRESS NAVY 150 PSI STD

PART NO.	CID/APL	U/I	COST

CHANGE ACTION	MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 2 IN

COMPRESSED ASBESTOS PER MIL-A-17472 1/16 IN THICK

SIZE 2 IN IPS 5 9/16 IN DIA, PC 4 7/16 IN

6 HOLE, 1/2 IN BOLT SIZE RN B-176 LOW PRESS NAVY 150 PSI STD

MFR NAVSEA SYS COMMAND FSCM 80064 RNVC 1

ADDED DATA 1 80064B-176 LOW PRESS NAVY 150 PSI STD

UNIT PACKAGE TO BE 25 EA SEALED IN PLASTIC

BY K.L. 5/19/77 C/540. 24

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN 5330-LL-S00-1595 | NOMENCLATURE B-176 LOW PRESS NAVY 150 PSI STD

PART NO. | CID/APL | U/I | COST

CHANGE ACTION | MO. | DAY | YEAR

DESCRIPTION

GASKET, FLANGE ASB 1 IN

COMPRESSED ASBESTOS PER MIL-A-17472 1/16 IN THICK

SIZE 1 IN IPS 4 1/4 IN DIA, PC 3 1/8 IN

4 HOLE, 1/2 IN BOLT SIZE RN B-176 LOW PRESS NAVY 150 PSI STD

MFR NAVSEA SYS COMMAND FSCM 80064 RNVC 1

ADDED DATA 1 80064B-176 LOW PRESS NAVY 150 PSI STD

UNIT PACKAGE TO BE 25 EA SEALED IN PLASTIC

BY K.L. 5/19/77 C/540. 24

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN 5330-LL-S00-1596 | NOMENCLATURE B-176 LOW PRESS NAVY 150 PSI STD

PART NO. | CID/APL | U/I | COST

CHANGE ACTION | MO. | DAY | YEAR

DESCRIPTION

GASKET, FLANGE ASB 1 1/4 IN

COMPRESSED ASBESTOS PER MIL-A-17472 1.16 IN THICK

SIZE 1 1/4 IN IPS 4 1/2 IN DIA, PC 3 3/8 IN

4 HOLE, 1/2 IN BOLT SIZE RN B-176 LOW PRESS NAVY 150 PSI STD

MFR NAVSEA SYS COMMAND FSCM 80064 RNVC

ADDED DATA 1 80064B-176 LOW PRESS NAVY 150 PSI STD

UNIT PACKAGE TO BE 25 EA SEALED IN PLASTIC

BY K.L. 5/19/77 C/540. 24

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN 5330-LL-S00-1593 | NOMENCLATURE B-176 LOW PRESS NAVY 150 PSI STD

PART NO.	CID/APL	U/I	COST

CHANGE ACTION	MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 1/2 IN

COMPRESSED ASBESTOS PER MIL-A-17472 1/16 IN THICK

SIZE 1/2 IN IPS 3 9/16 IN DIA, PC 2 11/16 IN

3 HOLE, 1/2 IN BOLT SIZE RN B-176 LOW PRESS NAVY 150 PSI STD

MFR NAVSEA SYS COMMAND FSCM 80064 RNVC 1

ADDED DATA 1 80064B-176 LOW PRESS NAVY 150 PSI STD

UNIT PACKAGE TO BE 25 EA SEALED IN PLASTIC

BY K.L. 5/19/77 C/540. 24

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN 5330-LL-S00-1594 | NOMENCLATURE B-176 LOW PRESS NAVY 150 PSI STD

PART NO.	CID/APL	U/I	COST

CHANGE ACTION	MO.	DAY	YEAR

DESCRIPTION

GASKET, FLANGE ASB 3/4 IN

COMPRESSED ASBESTOS PER MIL-A-17472 1/16 IN THICK

SIZE 3/4 IN IPS 3 13/16 IN DIA, PC 2 11/16 IN

4 HOLE, 1/2 IN BOLT SIZE RN B-176 LOW PRESS NAVY 150 PSI STD

MFR NAVSEA SYS COMMAND FSCM 80064 RNVC 1

ADDED DATA 1 80064B-176 LOW PRESS NAVY 150 PSI STD

UNIT PACKAGE TO BE 25 EA SEALED IN PLASTIC

BY K.L. 5/19/77 C/540. 24

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN 5330-LL-S02-9002 | NOMENCLATURE 29N-L839, STYLE T | 41

PART NO. | CID/APL | U/I | COST

CHANGE ACTION | MO. | DAY | YEAR

DESCRIPTION

GASKET, SPIRAL WOUND N/A N/A

316 CRES & ASBESTOS 1500PSI/1000 DEGREE SERVICE DIAMOND SHAPE

3 3/8 IN X 4 1/4 IN X 1/4 IN FLG WIDTH X .175 IN THICK

FOR BOILER HANDHOLE RN 29N-L839, STYLE T

MFR FLEXITALLIC CO FSCM 72433 RNVC 2

2 7243329N-L839, STYLE T

BY R.A. 11-8-77 C/540. 2

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

NSN 5330-LL-S00-1592 | NOMENCLATURE B-176 LOW PRESS NAVY 150 PSI STD

PART NO. | CID/APL | U/I | COST

CHANGE ACTION | MO. | DAY | YEAR

DESCRIPTION

GASKET, FLANGE ASB 1/4 IN

COMPRESSED ASBESTOS PER MIL-A-17472 1/16 IN THICK

SIZE 1/4 IN IPS 3 1/4 IN DIA, PC 2 1/8 IN

3 HOLE, 1/2 IN BOLT SIZE RN B-176 LOW PRESS NAVY 150 PSI STD

MFR NAVSEA SYS COMMAND FSCM 80064 RNVC 1

ADDED DATA 1 80064-B-176 LOW PRESS NAVY 150 PSI STD

UNIT PACKAGE TO BE 25 EA SEALED IN PLASTIC

BY K.L. 5/19/77 C/540. 24

TECHNICAL PARTS CHANGE RECORD 13ND PSNS 4410/4 (REV. 11-75)

56 r

SECTION II: Hand Punching

Operation	Sample No.	Airborne Asbestos Fiber Concentration (fibers > 5μ/cc air)	Sample Time (min)	Total Air Volume (l)
Hand punching No controls	1	3.00	*	*
Hand punching Housekeeping	1	<0.05	28.0	56.0
	2	<0.05	29.6	59.2
	3	<0.05	30.7	61.4
	4	<0.05	30.8	61.6
	5	<0.05	30.6	61.2
	6	0.15	27.8	55.6
		$\bar{x}$ = 0.07		

* Data Unavailable

NSN

5330-00-585-9501

SECTION III: Hand Operated Mechanical Punching

Operation	Sample No.	Airborne Asbestos Fiber Concentration (fibers > 5u/cc air)	Sample Time (min)	Total Air Volume (l)
Hand Operated Mechanical Punching	1	<0.05	30.0	60.0
	2	<0.05	30.0	60.0
	3	<0.05	30.0	60.0
	4	<0.05	30.0	60.0
	5	<0.05	30.0	60.0
	6	<0.05	30.0	60.0
	7	<0.05	30.0	60.0
	8	<0.05	30.0	60.0
		$\bar{x}$ = <0.05		

NSN

5330-00-880-4032
5330-00-585-9502
5330-00-942-4727
5330-00-942-4728

SECTION IV: Machine Punching

Operation	Sample No.	Airborne Asbestos Fiber Concentration (fibers > 5u/cc air)	Sample Time (min)	Total Air Volume (l)
Machine Punching No. Controls	1	5.00	*	*
Machine Punching Housekeeping (no ventilation)	1	<0.03	27.4	54.8
	2	<0.03	27.7	55.3
	3	0.15	30.0	60.0
	4	0.16	27.9	55.8
	5	0.43	26.4	52.8
	6	0.15	30.0	60.0
	7	0.71	20.4	40.8
	8	0.22	20.6	41.2
	9	0.32	28.6	57.2
	10	0.04	30.9	61.7
	11	0.03	27.1	54.3
	12	0.06	26.4	52.8
		$\bar{x}$ = 0.19		
Machine Punching Ventilation	1	<0.05	30.5	61.0
	2	<0.05	26.6	53.2
	3	<0.05	28.8	57.5
	4	<0.05	29.5	59.0
	5	<0.05	28.5	57.0
	6	<0.05	28.7	57.4
	7	<0.06	23.7	47.4
	8	<0.06	22.9	45.7
		$\bar{x}$ = <0.05		

* Data unavailable

NSN

5330-00-268-9880
5330-00-585-9501

SECTION V: Hand Shaping

Operation	Sample No.	Airborne Asbestos Fiber Concentration (fibers > 5u/cc air)	Sample Time (min)	Total Air Volume (l)
Hand Shaping No Controls	1	0.25	27.8	55.6
	2	0.06	30.0	60.0
	3	0.30	30.0	60.0
	4	0.23	30.0	60.0
	5	<0.03	31.1	62.2
	6	0.08	31.0	62.0
	7	<0.03	31.0	62.0
	8	0.07	31.0	62.0
	9	<0.09	7.0	19.6
	10	0.13	7.0	14.0
		$\bar{x}$ = 0.13		

NSN

5330-00-268-9880

SECTION VI: Machine Shearing

Operation	Sample No.	Airborne Asbestos Fiber Concertration (fibers > 5u/cc air)	Sample Time (min)	Total Air Volume (l)
Machine Shearing No Controls	1	1.30	6.0	16.8
	2	0.46	6.0	12.0
		$\bar{x}$ = 0.88		
Machine Shearing with Housekeeping	1	0.05	36.3	72.6
	2	0.05	35.4	70.9
	3	0.06	38.0	76.0
	4	0.05	31.3	62.7
	5	0.15	30.6	61.2
	6	0.05	34.0	68.0
		$\bar{x}$ = 0.07		

NSN

5330-00-268-9880

SECTION VII: Machine Nibbling

Operation	Sample No.	Airborne Asbestos Fiber Concentration (fibers > 5u/cc air)	Sample Time (min)	Total Air Volume (l)
Machine Nibbling No Controls	1	<0.08	8.0	22.4
	2	0.46	8.0	16.0
		$\bar{x}$ = 0.27		
Machine Nibbling with Housekeeping	1	0.42	28.7	57.4
	2	0.09	25.7	51.3
	3	0.28	24.1	48.3
	4	0.53	30.5	61.0
	5	0.35	26.0	52.0
	6	0.80	28.8	57.6
	7	0.74	24.7	49.3
	8	0.13	27.0	53.9
		$\bar{x}$ = 0.42		

NSN

5330-00-268-9880
5330-00-285-2071

SECTION VIII: Installation

Operation	Sample No.	Airborne Asbestos Fiber Concentration (fibers > 5u/cc air)	Sample Time (min)	Total Air Volume (l)
Installation No Controls	1	<0.03	30.0	60.0
	2	<0.03	30.0	60.0
	3	<0.03	30.0	60.0
	4	<0.03	30.0	60.0
		$\bar{x}$ = <0.03		

SECTION IX: Removal and Concurrent Installation

Operation	Sample No.	Airborne Asbestos Fiber Concentration (fibers >5μ/cc air)	Sample Time (min)	Total Air Volume (l)
Removal and Concurrent Installation with Housekeeping	1	0.02	39.9	79.7
	2	<0.03	31.0	62.0
	3	0.06	31.0	62.0
	4	0.09	31.0	62.0
	5	0.09	30.0	60.0
	6	0.09	20.9	41.7
	7	0.04	44.0	88.0
	8	0.12	30.8	61.5
	9	0.04	21.2	42.5
	10	<0.03	30.6	61.1
	11	0.05	31.9	63.9
	12	0.10	27.0	54.1
	13	0.11	34.0	68.0
	14	0.18	25.3	50.7
	15	0.03	34.0	68.0
	16	0.03	30.0	60.0
	17	0.06	44.0	88.0
	18	0.04	95.0	190.0
	19	0.07	41.0	82.0
	20	0.08	23.8	47.6
	21	0.04	43.7	87.3
	22	0.17	20.9	41.7
	23	0.12	30.7	61.4
	24	0.13	42.1	84.2
	25	0.20	32.2	64.4
	26	0.16	34.0	68.0
	27	0.05	33.9	67.8
	28	0.06	87.9	175.9
	29	0.30	27.1	54.2
		$\bar{x}$ = 0.09		

NSN

5330-00-862-9391

SECTION X: Clean-up Following Removal

Operation	Sample No.	Airborne Asbestos Fiber Concentration (fiber > 5u/cc air)	Sample Time (min)	Total Air Volume (l)
Clean-up Following Removal with No Controls	1	<0.05	33.3	66.6
	2	<0.05	36.2	72.4
	3	<0.05	36.0	72.0
	4	<0.05	36.8	73.5
		$\bar{x}$ = <0.05		

SECTION XI: Removal with Simultaneous Clean-Up

Operation	Sample No.	Airborne asbestos fiber conc. (fibers > 5 μ/cc air)	Sample time (min)	Total air volume (l)
Removal and hand scraping with no controls	1	0.12	30.0	60.0
	2	< 0.03	30.0	60.0
	3	0.11	25.3	50.6
	4	< 0.06	15.7	31.3
	5	0.14	19.0	38.0
	6	0.05	16.6	33.2
	7	< 0.06	15.4	30.9
	8	0.32	17.1	34.1
	9	0.24	22.7	45.4
	10	0.13	21.0	42.0
	11	0.39	16.3	32.6
	12	0.06	28.4	56.9
	13	0.07	27.4	54.8
	14	0.04	25.2	50.3
		$\bar{X}$ =0.13		
Removal and wire brushing with housekeeping	1	0.18	25.9	51.8
	2	0.17	26.3	52.7
	3	0.17	33.0	66.0
	4	0.03	29.6	59.2
	5	0.18	25.2	50.5
	6	0.03	31.1	62.2
	7	< 0.03	30.4	60.8
	8	0.07	27.3	54.6
		$\bar{X}$ =0.11		
		$\bar{\bar{X}}$ =0.12		

SECTION XII: CONT'D

Operation	Sample No.	Fibers/cc	Sample Time (min)	Total Air Volume (l)
Cutting eighteen 9" x 1/4" strips with snips. Clean-up waste removed. Seventy eight 9/16" holes hand punched. Five circles cut with hand gasket cutter.	1	0.08	10.5	17.9
	2	0.15	10.5	17.9
		$\bar{X}$ = 0.11		
Above samples taken using NSN 5330-00-942-4728				
Employee looking through cabinets & opening bags containing gaskets	1	< 0.01	15	25.5
Storage area background	1	< 0.01	124	210.8
	2	< 0.01	124	210.8
	3	< 0.01	124	210.8
		$\bar{X}$ = < 0.01		
Two 12" x 12" and eighteen 3" x 5" gaskets removed from ventilation duct heaters.	1	0.05	49.9	84.8
	2	0.24	49.9	84.8
		$\bar{X}$ = 0.14		
Nine 3" x 5" gaskets removed from ventilation duct heaters. Loose material cleaned up.	1	0.65	23.7	40.3
	2	0.77	23.7	40.3
		$\bar{X}$ = 0.71		

SECTION XII: Miscellaneous and Multiple Operations
(Data from NRMC Oakland)

Operation	Sample No.	Fibers/cc	Sample Time (min)	Total Air Volume (l)
Hand Cutting & Punching	1	0.2	5.3	8.9
	2	0.3	5.3	8.9
		$\bar{X}$ = 0.25		
Hand Cutting	1	0.2	5.2	8.8
Cutting with shear, punching on punch press, cutting with circle shear, hand punching	1	< 0.5	19.4	33.0
	2	< 0.5	17.8	30.3
		$\bar{X}$ =<0.05		
Cutting with Beverly hand shear & Widemann hand punch	1	0.2	15.0	25.5
Background & Clean-up around above shear	1	1.2	20	34.0
Cutting 6 inch dia. gaskets & punching. Ten gaskets cut & 6 holes punched in each. Cut with a compass type gasket cutter with a razor blade cutting edge. Punched with hand operated mechanical punch	1	< 0.01	16	27.2
re-stamping & hole punching Pre-punching done with hammers dip. Incomplete clean-up of scrap	1	1.67	15	25.5
Cutting 14 six-inch six hole gaskets	1	0.13	61	103.7
	2	0.24	35.3	60.0
		$\bar{X}$ =0.19		
Cutting 9/16 inch bolt holes by pre-punching with hammer & die & mechanical hand punch	1	0.28	26	44.2
Shearing (10 cuts) 4" x 22" strips on Cincinnati Auto Shear. Punching thirty-five 3-7/7" holes on a punch press. Cutting 9 gaskets on a cutting press	1	< 0.01	12.5	21.3