SC-1003 (Rev. 1-60)

SHELL CHEMICAL COMPANY

DATE DECEMBER 23, 1971

Rec'd. JAN 5 1972

TO PLANT MANAGERS/SUPERINTENDENTS

FROM MANAGER - INDUSTRIAL HYGIENE - ENGINEERING DEPARTMENT - HEAD OFFICE

SUBJECT ASBESTOS

The attached copy of an Insulation Hygiene Progress Report is brought to your attention for information and circulation to appropriate staff. The Insulation Industry Hygiene Research Program is financed jointly by the International Association of Heat & Frost Insulators and Asbestos Workers and Johns Manville Corporation. It is also supported by the Sprayed Mineral Fiber Manufacturers Association. Consulation and technical assistance is provided by the U. S. Public Health Services Bureau of Occupational Safety and Health.

The recommendations set forth in the portions of Holaday and Reitze's "procedures guide for insulation application and removal", printed in this copy, can be expected to set the "standard" for industry practice and conformance under the OSHA. It is recommended that a review of existing practices at all locations be initiated at an early date and evaluated in light of the likelihood of producing conditions in violation of regulation 1910.93a, Asbestos Dust.

PLAINTIFF'S EXHIBIT

SH-1344

N. G. White

Attachment

cc - Mr. J. W. Elger
Divisions - Manufacturing - Managers
Head Office - Engineering Department - Environmental Engrg. - Manager

LAM 024245

ABS-007424

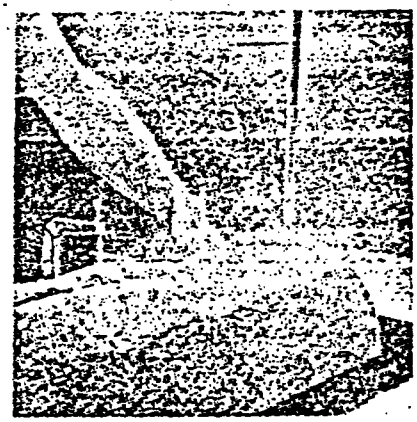
Environmental Sciences Laboratory
MSM MOUNT SINAI SCHOOL OF MEDICINE
of The City University of New York

INSULATION HYGIENE PROGRESS REPORTS

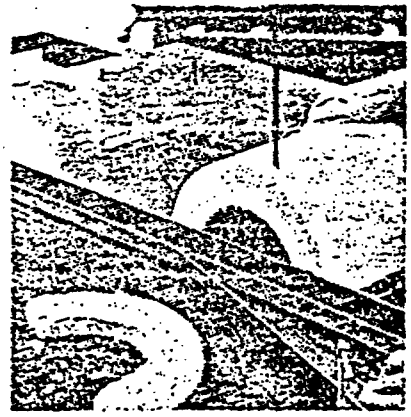
FROM THE INSULATION INDUSTRY HYGIENE RESEARCH PROGRAM

Irving J. Selikoff, M.D., Program Director

Vol. 3, No. 4 Winter 1971



Dust produced by use of an unventilated band saw. Without the back lighting used here, much of the dust would not be visible.



Cutting pipe with band saw equipped with high-velocity, low-volume exhaust system. Compare absence of any airborne dust with that shown in uncontrolled cutting (picture left.)

Shipyard Procedures Guide Helps All Insulation Men

The Winter 1970 issue of Insulation Hygiene Progress Reports announced a joint effort by the Insulation Industry Hygiene Research Program, the U.S. Navy, the Department of Labor, and insulation manufacturers and contractors to control shipyard asbestos dust exposures.

As part of that effort, Duncan A. Holaday and William B. Reitze of the IIHRP prepared a procedures guide for shipyard insulation application and removal. Because of its relevance to all insulation work, portions of it are given in this issue of Insulation Hygiene Progress Reports.

A complete report was presented by the authors at the International Symposium on Safety and Health in Shipbuilding and Ship Repairing, at Helsinki, Finland, on August 30, 1971.

by Duncan A. Holaday and William B. Reitze

The general goal in all insulation work should be to maintain a clean environment.

Measurements of concentrations of asbestos fibers ("dust counts") in the atmosphere can be used to identify sources of contamination and to point out deficiencies in control methods. Primary reliance for control of exposures, however, must be placed on *faithful observance of operating rules.*

Control of Asbestos-Containing Dusts by Use of Substitute Materials

Substitution of materials containing reduced proportions of asbestos or no asbestos at all, is becoming more common in ship construction. Before a material is substituted for asbestos, however, two questions must be carefully considered:

a. Has the substitute material been tested? If not, it may turn out to be of the same or greater hazard than the material of known hazard. This sort of thing has happened in other environmental situations.

b. Does the new material meet engineering specifications and will it perform adequately under conditions of use?

Materials containing reduced amounts of asbestos have been used in the following applications:

a. Blanket and pad filling

Substitution of the proper types of other pad fillers not only reduces asbestos dust during fabrication and installation but also tends to lessen the problems during subsequent "rip-out". Additionally, asbestos cloth which has been treated with a dust suppressant is available and its use should also be encouraged. There are reports that much less dust will be produced.

b. Pipe covering and block

Serious consideration should be given to those products containing lower amounts of asbestos fiber. Several British firms have introduced asbestos-free calcium silicate block and pipe covering. To date, however, this material has not been adequately evaluated in the United States to determine how it will perform in use.

Here Are Some of Many Ways to Reduce Dust

Reduction of Dust by Changes in Work Methods

a. Mixing Asbestos Mortar

This operation has usually been done at the job site. While the time spent in mixing is quite short, considerable dust is produced. A tested method of control is to mix the mortar dockside under controlled conditions and package the mixed mortar in several containers for transportation to the job site.

Mortar is also available packaged

(Continued on second page)

Insulation Hygiene Progress Reports

Vol. 3, No. 4 Winter 1971

from the

Insulation Industry Hygiene Research Program

Editor: W. J. Nicholson, Ph.D.,

Published at the Environmental Sciences Laboratory (Irving J. Selikoff, M.D., Director), Mount Sinai School of Medicine of the City University of New York, New York, N.Y. 10029

PURPOSES OF THE INSULATION INDUSTRY HYGIENE RESEARCH PROGRAM

1. To develop improved methods for minimizing exposure of insulation workers to dusts and fumes encountered in their work.

2. To disseminate knowledge of these improved methods of dust control wherever they may be applied advantageously and to offer cooperation, advice and assistance toward their universal adoption.

Procedures Used at Puget Sound Naval Shipyard

(Continued from first page)

in several sizes of plastic bags which have a spout through which water is introduced. Sufficient water is added to moisten the mortar; after premixing, the bag is opened and the remaining water added. The carton in which the bag is packaged may serve as a mixing box and waste container.

b. *Pre-cutting pipe covering and block in the fabrication shop*

Hand-cutting of pipe covering and block should be kept to an absolute minimum. Bend sections, pipe cover lengths, and blocks, should be cut in the fabrication shop on exhaust-ventilated equipment.

How the Navy Does It

At the Puget Sound Naval Shipyard, cut sections are dipped in water and then packed in plastic bags which are labeled to identify the location where they are to be used. The cut sections are still damp and relatively dust-free when they are applied and the plastic bags are available for use in collecting wastes.

c. *Pre-scoring blocks*

Insulation blocks should not be scored at the job site. Blocks which have been pre-scored by the manufacturer can be purchased, or standard blocks can be scored in the fabrication shop by using an exhaust-ventilated gang saw.

d. *Insulating pipe assemblies in the shop*

Some pipe assemblies are quite intricate and are troublesome to lag while in place. A satisfactory method of doing these jobs, particularly during ship repair, which is employed by the Puget Sound Naval Shipyard, is to remove the assembly in conveniently sized sections and transport them to the shop. Here the old insulation is removed, any necessary repair of the pipes performed, and the assembled section relagged.

Relag in the Shop

Not only is dust dispersion reduced, but it is much more convenient to re-lag the section in the shop than when it is in place shipboard. Any insulation which is damaged during transport and fitting is repaired after the sections are in place.

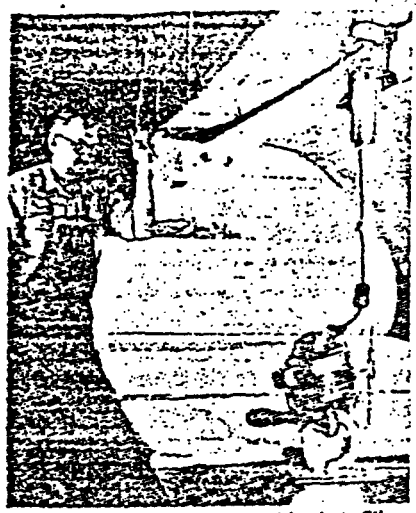
e. *Hand-cutting at job sites*

Some hand-cutting at job sites is unavoidable. However, dispersion of dusts by these operations can be minimized. A portable downdraft table is used by the Puget Sound Naval Shipyard. This table has folding legs so that it can be carried down companionways and set up conveniently to the work. A small industrial vacuum cleaner is the source of exhaust. Scrap is dropped into a plastic bag and a

(Continued on third page)

High temperature mortar packed in plastic bag. Water is added to bag through spout and mortar moistened before opening. The moistened mortar is removed as required and mixing completed in shipping container. All wastes are placed in container and sent to disposal at end of shift.

Procedure used at Puget Sound Naval Shipyard for handling bend sections. Sections are cut in fabrication shop, dipped in water and placed in plastic bag. The bag is then labelled with the job-site description.



Dampening fibrous glass blanket filler before cutting. Note lateral draft hood in which fabrication is done.

(Continued from second page)

dropcloth is placed on the deck under the equipment.

f. Fabrication of Pads and Blankets

Pads for valves and machinery should be fabricated in the shop whenever possible. Amosite has been largely replaced by fibrous glass filling with covers of an asbestos cloth which has been treated with dust suppressants. As an effective means for suppressing dust dispersion and collection, the fibrous glass blanket is unrolled, dampened and rerolled. This procedure insures that all the blanket will be dampened. The blanket and asbestos cloth shapes are cut in the lateral draft booth.

g. Housekeeping and Clean-up

Essential parts of a dust control program are housekeeping and clean-up procedures. Meticulous attention must be given to restricting the spread of dust and larger wastes. Use of a dropcloth under a work area vividly illustrates how much waste would be distributed over the general area or to lower decks if one were not used.

Areas should be cleaned up at the lunch break and the end of each shift, using an industrial vacuum cleaner to collect dust and small scrap.

In all possible instances, workmen should clean up their own areas. Where work rules prohibit this, the clean-up crew should be under the direction and supervision of the insulation foreman to insure that proper attention is given to this important subject.

Reduction of Dusts by Use of Local Exhaust Ventilation

a. Ventilation of Large Power Tools—Band Saws

Extensive use of band saws both in dockside fabrication shops and, on board larger ships such as aircraft carriers make emissions from band saws a major source of asbestos dust. Control devices for such saws have been known for years and are relatively simple. Conventional low-velocity, high-volume systems, using a negative pressure baghouse for air cleaning, are practical in a fixed installation fabrication shop.

Because some degree of portability is desirable in a temporary shipboard fabrication area, a high-velocity, low-volume dust collection unit is desirable for

Portable down-draft table developed by Puget Sound Naval Shipyard for use shipboard. Lightweight industrial vacuum cleaner is used as the air mover. Note plastic bag for scrap and dropcloth on deck.

such use; it may also be suitable for fixed installations. The air mover is an industrial vacuum cleaner which pulls about 50 cubic feet of air per minute past the saw blade at velocity of more than 10,000 feet per minute. This system is a very efficient dust collector. Units such as this can also be designed to control dusts produced by table saws and gang saws.

b. Ventilation of Hand Power Tools

High-velocity, low-volume collection systems control dust emissions from most small power tools adequately. Saber saws for cutting pipe covering and rotary saws for cutting asbestos cement board are well controlled with these systems.

Control of Number of Workmen Exposed

a. Scheduling of Insulation Work

Standard industrial hygiene practices call for insolating operations which contaminate the atmosphere with toxic materials. Areas where insulation work is being done under conditions in which dust might be created should be isolated by non-flammable curtains or other means. Whenever possible, work should be scheduled to minimize the numbers of other tradesmen in the area. Ship construction operations are more readily scheduled than are ship repair or ship-breaking jobs. However, every effort should be made to keep the number of men exposed at a minimum. In particular, rip-out of old insulation should always be isolated and, if necessary, performed on an off-shift. Trained workmen supplied with proper protective equipment should always be used for rip-out work and it should be scheduled for rapid completion.

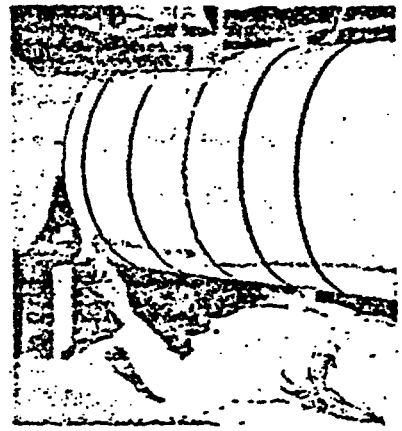
Personal Protective Equipment

In addition to dust suppression and dust control procedures, personal protective equipment is often necessary to reduce exposure and limit the spread of contamination. The equipment described below is used in control programs.

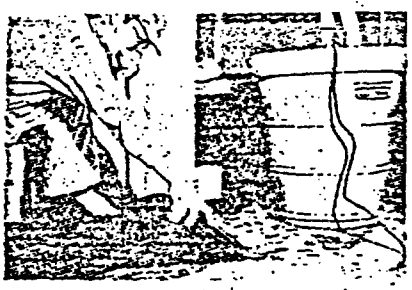
a. Protective Clothing

Protective clothing is required to keep contamination confined to the work areas. One method is to issue disposable coveralls which can be removed when leaving the

(Continued on fourth page)



Use of dropcloth to contain wastes and facilitate clean-up.



A small industrial vacuum cleaner being used by a Local 62 asbestos worker for clean-up.

(Continued from third page)

work area or some time prior to entering the locker room and placed in plastic bags for disposal.

Resin Impregnated Paper

A satisfactory type of protective clothing consists of resin impregnated paper coveralls. These are inexpensive and readily disposable. They prevent spreading contamination to laundries and eliminate pilferage. They are worn for one shift, then removed and placed in plastic bags for disposal with other asbestos-containing wastes.

b. Respiratory Protective Equipment

Occasionally some operations generate so much dust that it is virtually impossible to maintain satisfactory atmospheric concentrations of asbestos fibers and respiratory protection must be provided to the workers. A variety of respiratory protective equipment is available from which devices suitable for various situations can be selected. American National Standard Z88.3-1971, *Safety Guide for Respiratory Protection Against Asbestos-Containing Dusts* (obtainable from American National Standards Institute, 1430 Broadway, New York, N.Y. 10018) should be referred to for detailed information.

Invisible Dust

It is emphasized that unsatisfactory amounts of respirable dust can be present in the air even though conditions are not visibly dusty.

1. Air-supplied Respirators

Extremely dusty jobs, such as rip-out of old insulation where dust concentrations are very high, require use of air-supplied respirators which will deliver clean, dust-free air to a facepiece or hood. Two general types are available: air-line and self-powered.

Saber saw equipped with high-velocity, low-volume exhaust system.

a) Air-line respirators in which air is supplied to a hood, helmet or facepiece give the greatest degree of protection. Air is fed to the facepiece from a compressed air-line. The air source must be located in an uncontaminated area and if the source is not specifically designed for breathing purposes, a temperature sensing alarm must be installed on the compressor or a carbon monoxide monitoring device must be installed in the air-line.

Disposable Hood

Anti-freeze compounds should not be used in the compressor system; water vapor must be removed by dessicant and oil mists removed by a filter.

A plastic, disposable hood has been developed by the Puget Sound Naval Shipyard for situations where a very high degree of protection is required. This hood and other similar ones are available commercially. The air-line should be fastened to the hood with a quick-disconnect fitting.

Self-powered Respirators

b) Air-line respirators connected to a compressed air supply limit movement, and this limitation can be troublesome. Self-powered respirators do not impose such limitations, but they do add to the equipment the workman must carry and they also require careful maintenance.

2. Particulate-filtering Respirators

There are several types of particulate-filtering respirators. Those with a half-mask facepiece are considered most suitable for use by insulators. Only those approved for protection against asbestos dust by the U. S. Bureau of Mines should be used. These devices are recommended for use in situations where the atmospheric concentration of asbestos fibers is at relatively low levels. All the recommendations for respirator-fitting, training of workmen and maintenance, detailed in Z88-3-1971 should be followed.

a) Reusable particulate-filtering respirators

A variety of reusable particulate-filtering respirators are available. To insure proper fitting, several different makes should be available from which the workman can select one. *No one model respirator facepiece will fit all faces.* Routine maintenance is absolutely necessary to replace clogged filters and leaking inhalation or exhalation valves. *Unmaintained respirators produce a false sense of security.*

Maintenance Troublesome

b) Disposable particulate-filtering respirators

Operation of an adequate respirator maintenance program can be troublesome and, if only a few men are involved, impractical. Disposable respirators are available which are designed to be worn for no longer than one shift and then discarded.

Education and Training

No dust control program can be effective unless workmen and supervisors understand the hazards associated with the jobs, the sources of the hazards and the reasons for following recommended procedures carefully. Understanding is only obtained by education of personnel and training in correct operating procedures. For an education and training program to be successful, both management and labor must be concerned and participate. As with all safety programs, it is essential that first-line supervisors be interested in and cooperate in the work.

The harmful effects of neglect of procedures for controlling asbestos dust are not apparent for many years. Therefore, it is more difficult to convince workmen and supervisors of the necessity of following rules for working with insulating materials than if more obvious physical hazards were involved.

Education in hazards associated with use of insulating materials and instruction in correct work practices should be included in apprentice training programs.

PHOTO CREDITS: Pg. 1, I.I.H.R.P.; pg. 2, Ryder Industries and Puget Sound Naval Shipyards (P.S.N.S.); p. 3, P.S.N.S.; pg. 4, I.I.H.R.P. and P.S.N.S.

As amended, Table G-3 reads as follows:

TABLE G-3—MINERAL DUSTS

Substance	Mppcf [1]	Mg/M³
Silica:		
Crystalline:		
Quartz (respirable)	250 [2]	10mg/M³ ÷ %SiO₂+5
Quartz (total dust)		%S:O₂+2 30mg/M³
		%S:O₂+2
Cristobalite: Use ½ the value calculated from the count or mass formulae for quartz.		
Tridymite: Use ½ the value calculated from the formulae for quartz.		
Amorphous, including natural diatomaceous earth	20	80mg/M³
		%SiO₂
Silicates (less than 1% crystalline silica):		
Mica	20	
Soapstone	20	
Talc	20	
Portland cement	50	
Graphite (natural)	15	
Coal dust (respirable fraction less than 5% SiO₂)		2.4mg/M³ or 10mg/M³
For more than 5% SiO₂		%SiO₂+2
Inert or Nuisance Dust:		
Respirable fraction	15	5mg/M³
Total dust	50	15mg/M³

NOTE: Conversion factors—
mppcf×35.3=million particles per cubic meter
=particles per c.c.

[1] Millions of particles per cubic foot of air, based on impinger samples counted by light-field techniques.

[2] The percentage of crystalline silica in the formula is the amount determined from air-borne samples, except in those instances in which other methods have been shown to be applicable.

[3] As determined by the membrane filter method at 430×phase contrast magnification.

[4] Both concentration and percent quartz for the application of this limit are to be determined from the fraction passing a size-selector with the following characteristics:

Aerodynamic diameter (unit density sphere)	Percent passing selector
2	90
2.5	75
3.5	50
5.0	25
10	0

The measurements under this note refer to the use of an AEC instrument. If the respirable fraction of coal dust is determined with a MRE the figure corresponding to that of 2.4 Mg/M³ in the table for coal dust is 4.5 Mg/M³.

2. A new § 1910.93a is added to Part 1910. The new § 1910.93a reads as follows:

§ 1910.93a Asbestos dust.

(a) The 8-hour time-weighted average airborne concentration of asbestos dust to which employees are exposed shall not exceed 5 fibers per milliliter greater than 5 microns in length, as determined by the membrance filter method at 400–450× magnification (4 millimeter objective) phase contrast illumination. Concentrations above 5 fibers per milliliter but, not to exceed 10 fibers per milliliter, may be permitted up to a total of 15 minutes in an hour for up to 5 hours in an 8-hour day.

(b) Engineering methods, such as but not limited to, enclosure, vacuum sweeping, and local exhaust ventilation, shall be used to meet the exposure limits prescribed in paragraph (a) of this section. Where such engineering methods are not feasible, or do not otherwise reduce the concentrations below those prescribed in paragraph (a) of this section, respiratory protective devices shall be provided and used in accordance with paragraph (c) of this section.

(c)(1) (i) When the limits of exposure to asbestos dust prescribed in paragraph (a) of this section are exceeded and when engineering controls required by paragraph (b) of this section are not feasible or do not otherwise reduce the concentration of asbestos dust below those prescribed in paragraph (a) of this section, the employer shall require the use of respiratory protective devices. The selection of respiratory protective devices shall be limited to those specified in the remaining subparagraphs of this paragraph (c).

(ii) The employer shall require that each employee test his respiratory protective device before each use in order to insure a proper fit according to the manufacturer's instructions. The employer shall further provide for effective training or supervision of employees in the testing of respiratory protective devices for fit before their use.

(2) For an atmosphere containing not more than 25 fibers per milliliter greater than 5 microns in length over an 8-hour average, or more than 50 fibers per milliliter over any period of 15 minutes, a reusable or single-use filter type respirator, operating with negative pressure during the inhalation phase of breathing, approved by the U.S. Bureau of Mines under the provisions of 30 CFR Part 14 (Bureau of Mines Schedule 21B), or a valveless respirator providing equivalent protection, shall be used.

(3) For an atmosphere containing not more than 250 fibers per milliliter greater than 5 microns in length over an 8-hour average, or more than 500 fibers per milliliter over any period of 15 minutes, a powered filter positive pressure respirator approved by the U.S. Bureau of Mines under the provisions of 30 CFR Part 14 (Bureau of Mines Schedule 21B) shall be used.

(4) For an atmosphere containing more than 250 fibers per milliliter greater than 5 microns in length over an 8-hour average a type C positive pressure supplied-air respirator approved by the U.S. Bureau of Mines under the provisions of 30 CFR Part 12 (Bureau of Mines Schedule 19B) shall be used.

(5) The employer shall establish a respirator program in accordance with the requirements of American National Standard Practice for Respiratory Protection Z88.2—1969.

(6) The respirators provided each employee shall be properly inspected, cleaned, repaired and stored.

(d) (1) When an employer has employees who are exposed to asbestos dust exceeding the limits prescribed in paragraph (a) of this section and the exposure results from the operations described in the remaining subparagraphs of this paragraph (d), the employer shall comply with the requirements of these subparagraphs relating to the operations involved. The requirements of this paragraph are in addition to those prescribed in paragraph (b) of this section.

(2) All hand- or power-operated tools which produce asbestos dust such as, but not limited to, saws, scorers, abrasive wheels, and drills shall be provided with local exhaust ventilation and dust collectors in accordance with the American National Standard Fundamentals Governing the Design and Operation of Local Exhaust Systems; ANSI Z9.2—1971.

(3) Employees exposed to the spraying of asbestos or the demolition of pipes, structures, or equipment covered or insulated with asbestos shall be provided with respiratory protective devices in accordance with paragraph (c)(4) of this section.

(e) Asbestos cement, mortar, coatings, grout, and plaster shall be mixed in closed bags or other containers.

(f) Asbestos waste and scrap shall be collected and disposed of in sealed bags or other containers.

(g) All cleanup of asbestos dust and blowing shall be performed by vacuum cleaners. No dry sweeping shall be performed.

3. Section 1910.12 is amended by changing paragraph (a) in order to apply the emergency standard prescribed in the new § 1910.93a, which is published in this document, to construction work which is subject to the Act. The amendment is necessary in light of the rule of regulatory construction set forth in § 1910.5(c). As amended, § 1910.12 reads as follows:

§ 1910.12 Construction work.

(a)(1) *Adoption and extension of established safety and health standards for construction.* The standards prescribed by Part 1518 of this title and in effect on April 28, 1971, are adopted as occupational safety or health standards under section 6(a) of the Act and shall apply, according to the provisions thereof, to every employment and place of employment of every employee engaged in construction work. Each employer shall protect the employment and places of employment of each of his employees engaged in construction work by complying with the appropriate standards prescribed by this paragraph.

(2) The standards prescribed in § 1518.55(c) of this title shall apply in the case of the exposure of any employee in construction work to airborne asbestos dust.

* * * * *

Effective date. These amendments shall become effective immediately upon publication in the FEDERAL REGISTER (12–7–71).

(Sec. 6(c), 84 Stat. 1596, 29 U.S.C. 655; Secretary's Order No. 12–71, 36 F.R. 8754)

Signed at Washington, D.C., this 2d day of December 1971.

G. C. GUENTHER,
Assistant Secretary of Labor.

[FR Doc.71–17833 Filed 12–6–71;8:47 am]

From Denver Plant Files

12-23-71
memo from
Norm White

IP29415
stg Box No.

LAM 024244

ABS-007423