FILE NAME: DuPont Remington (DRM)

DATE: 1972 June 13

DOC#: DRM007

DOCUMENT DESCRIPTION: Memo from DuPont RE OSHA Standard S4T - Measurement and Control of Asbestos Dust Exposure, with Comments by the Safety & Fire Protection Subcommittee

E. I. DU PONT DE NEMOURS & COMPANY
WILMINGTON, DELAWARE 19898

ENGINEERING DEPARTMENT
LOUVIERS BUILDING

cc: D.G. Windsor-Emp.Rel.-Wilm.
Subcommittee Members

J.D. Anthony - ERD
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Refer to Serial Letter 4013
Dated November 8, 1972

June 13, 1972

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STANDARDS SECTION - SAFETY & FIRE PROTECTION SUBCOMMITTEE
S4T - MEASUREMENT AND CONTROL OF ASBESTOS DUST EXPOSURE

This standard was approved without comment by the following departments: Elaschem, Employee Relations, ESD, F&F, International, Film, Pigments, Purchasing. In addition, the following comments have been received from the Engineering Standards Committee. These have been reviewed by the subcommittee, with replies as shown below.

Comments have been arranged to put like replies together due to the number involved, rather than the usual procedure.

J. V. FLYNN, COMMENTS BY R. D. GOTWALS/W. S. PERSON - ORCHEM - CH. WKS.
COMMENT NO. 1 - Does the TLV (S2T) meet proposed Federal limits?

REPLY - The threshold limit value (TLV) for asbestos listed in S2T was based on 1970 values of American Conference of Governmental Industrial Hygienists. A new, more restrictive limit for asbestos has been included in the OSHA regulation promulgated in the U.S. Federal Register of June 7, 1972, pages 11318-11322. Both S2T and S4T must be changed accordingly.

J. J. LAURINO, COMMENT BY J. J. LAURINO - PHOTO PRODUCTS - WILMINGTON
COMMENT NO. 2 - Recommend that this standard not be issued until the new format indicating the part covered by OSHA is in use.

REPLY - Standard has been delayed as you suggested. Also, see reply to Comment No. 1. The part covered by OSHA will be printed in red.

W. H. MC COY, COMMENTS BY J. PAVLOSKI/R. FISHER - IND. CHEM. - REPAUNO WORKS
COMMENT NO. 3 - Will this concept be extended to all insulating materials and not limited to just asbestos? Many insulations contain no asbestos but are dusty and fibrous. Insulations containing silica, although less toxic can cause silicosis and chronic lung disease.

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REPLY - This standard is limited to asbestos. Other insulating materials, although dusty and fibrous, do not contain carcinogenic material.

J. V. FLYNN, COMMENT BY R. D. GOTWALS/W. S. PERSON (CON'T.)
COMMENT NO. 4 - Exposure in a shop operation is somewhat different from working on pipelines in the field. Should we not mention the application of this standard in field work as well?

REPLY - It is intended as a guide for all cases of asbestos exposure including field work, as outlined in the scope.

J. A. SIGMAN, COMMENT BY G. B. KIRKPATRICK - TEX. FIB. - OLD HICKORY
COMMENT NO. 5 - 3.4.1 - This wetting down of insulation should carry a caution to refrain from wetting down hot lines where: a) water could be flashed off to vapor and cause burns; b) water could fracture pipe or weldments; c) water could freeze out or slow down process flow in "on stream" lines.

REPLY - Wetting down is carried out on lines that are still insulated, therefore direct contact by the water should not create a problem. Wording will be changed to "damper" vs. "wet down". Supervision should review unusual situations..

COMMENT NO. 6 - 6.1.1 - Each area group of insulators at Old Hickory are asked to take at least one sample (not necessarily of 8-hr. duration) on a different job each week. More samples are requested when there are indications of any change taking place or new types of materials are being tried. This type of sampling provides us with new data in some jobs and shows results of our efforts to improve dust control in other jobs.

J. A. SIGMAN, COMMENTS BY W. R. CLARK - TEX. FIB. - SEAFORD PLANT
COMMENT NO. 7 - 6.1.1 - Full 8-hr shift not necessary-one hr is sufficient.

J. A. SIGMAN, COMMENT BY B. R. BOLTON - TEX. FIB. - MARTINSVILLE PLANT
COMMENT NO. 8 - 6.1.1 - Question need for sampling each operation for a full 8-hr shift monthly. Many operations are not continuous and 8-hr sampling is impractical. Also, sampling can show TLV limits have never been exceeded in a particular operation. Some samples should be taken monthly, others semi-monthly, or annually.

J. A. SIGMAN, COMMENT BY W. M. READING - TEX. FIB. - KINGSTON PLANT (DISAPP.)
COMMENT NO. 9 - 6.1.1 - We are taking 2 eight-hour samples monthly as a check and for histrocial file.

J. A. SIGMAN, COMMENT BY A. PAETSCH - TEXTILE FIBERS - DENTROP WORKS
COMMENT NO. 10 - 6.1.1 - Sampling should be carried for a monthly shorter time.

W. H. MC COY, COMMENT BY W. O. CHRISTY - IND. CHEM. - SAVANNAH RIVER PLANT
COMMENT NO. -- - 6.1.1 - Evaluating a complete operation in this manner will be very time consuming. Sampling with millipore (membrane) paper, or its equivalent, usually is of short duration (10-15 min.) because of the high

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collection efficiency of this paper. Such a procedure, as described, might involve taking many samples for an 8-hour shift for each operation. At $15.00 per sample for analysis, the cost of this operation will exceed the benefits, since the results of these analyses are not known for some time and any reference to the TLV for that work period will be meaningless. Such a program of sampling could be satisfactory provided the work conditions do not change. Respiratory protection must be required in all cases where the degree of exposure is unknown.

REPLY TO COMMENTS 6-11 - Eight-hours' sample is advisable in the preliminary sampling in accordance with frequency and pattern by OSHA. Subsequent samples may be tailored to the individual needs of the location. 6.1 1 revised accordingly.

J. A. SIGMAN, COMMENTS BY P. E. M. SOONS - TEX. FIB. - DORDRECHT
COMMENT NO. 12 - Change 5.2 as follows: "Clothes must be kept free of dust accumulation. Clothes contaminated with dust shall be vacuum-cleaned before taking them off. Avoid breathing asbestos dust when removing clothes". Being more specific at this point is desirable.

J. A. SIGMAN, COMMENT BY W. R. CLARK - TEX. FIB. - SEAFORD PLANT
COMMENT NO. 13 - 5.2 - Intent good - but how and to what extent?

REPLY TO COMMENTS 12 AND 13 - We do not agree the underlined sentence should be added. Specific techniques for removing dust accumulation from clothes should be developed locally. Vacuum cleaning is one way, but it may not be the best method available.

J. A. SIGMAN, COMMENT BY W. R. CLARK - TEX. FIB. - SEAFORD PLANT
COMMENT NO. 14 - 3.1.2 - omit.

REPLY - This is considered a large source of asbestos dust; therefore we feel it is necessary.

COMMENT NO. 15 - 3.1.3 - Include vacuum or respiratory protection. Should be done only if sample analyses so indicate.

REPLY - Subcommittee prefers current wording.

COMMENT NO. 16 - 3.2.1 - Recommend use of respirator with or without exhaust system.

REPLY - We do not feel that a respirator should be required when it is not necessary. Requirements of Sect. 4 will determine need.

COMMENT NO. 17 - 3.2.3 - Assume portable vacuum cleaners are acceptable.

REPLY - Yes, also see reply to comment No. 45.

J. A. SIGMAN, COMMENT BY W. R. CLARK (CON'T.)
COMMENT NO. 18 - 3.3.1 - Why not eliminate use of asbestos cement? Use Power House cement, which contains no asbestos.

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J. A. SIGMAN, COMMENT BY J. M. MARTIN - TEX. FIB. - CHATTANOOGA PLANT
COMMENT NO. 19 - Asbestos-cement should be avoided whenever possible.

REPLY TO COMMENTS 18 AND 19 -2.7 encourages the substitution of non-asbestos bearing materials wherever possible.

J. A. SIGMAN, COMMENTS BY W. R. CLARK (CON'T.)
COMMENT NO. 20 - 3.4.1 - Do not recommend wetting down. Do recommend vacuum before removal and for job cleaning.

J. A. SIGMAN, COMMENTS BY W. M. READING (CON'T.)
COMMENT NO. 21 - 3.4.1 - Impractical; would create a slipping hazard. Also, impossible to protect electrical equipment. There is little likelihood that this would be done unless a most elaborate and unusual precautionary procedure was followed.

J. A. SIGMAN, COMMENT BY A. PAETSCH (CON'T.)
COMMENT NO. 22 - 3.4.1 - Insulation will be used more than one time. Wet insulation cannot be used. Insulation with finish is water-resistant.

COMMENT NO. 23 - 3.4.3 - Area should be cleaned with vacuum system. Water should not be used.

REPLY TO COMMENTS 20-23 - We consider wetting down the desirable technique. Local conditions may indicate other control measures. "Wetting" changed to "dampen".

J. A. SIGMAN, COMMENT BY W. R. CLARK (CON'T.)
COMMENT NO. 24 - Add- where dust problem exists (5.3)

J. A. SIGMAN, COMMENT BY W. M. READING (CON'T.)
COMMENT NO. 25 - 5.3 - We have not insisted on this. Practical enforcement is questionable.

J. A. SIGMAN, COMMENT BY A. PAETSCH (CON'T.)
COMMENT NO. 26 - 5.3 - Gum or eating-tobacco can be consumed in working areas because breath-way will be kept wet. No smoking. No food.

REPLY TO COMMENTS 24-26 - Food, tobacco and gum should be restricted, since dust concentrations are not always known.

J. A. SIGMAN, COMMENT BY P. F. PHILYAW - TEXTILE FIBERS - WAYNESBORO PLANT
COMMENT NO. 27 - 5.3 - Adherence to this item will create problems in that alternate facilities must be provided which will result in lost time from the job. Unless there is a clear need for this item, it should be deleted.

REPLY - This restriction is recommended to prevent ingestion of asbestos particles into the system orally. We consider it is needed.

J. A. SIGMAN, COMMENT BY J. M. MARTIN (CON'T.)
COMMENT NO. 28 - Not necessary to isolate power cutting equipment in a separate work area if adequate exhaust system is provided.

REPLY - Agree. An adequate exhaust system will eliminate the need for total isolation of the equipment.

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J. A. SIGMAN, COMMENT BY J. M. MARTIN (CON'T.)
COMMENT NO. 29 - Question necessity of extensive daily clean-up; good judgement should be exercised for frequency of clean-up.

REPLY - Daily clean-up is strongly recommended.

J. A. SIGMAN, COMMENT BY W. M. READING (CON'T.)
COMMENT NO. 30 - In general, we believe that the standard is basically good but unrealistic. We would, at best, require a major modification of our equipment and procedures to comply.

REPLY - We understand that a major modification of equipment and procedures may be required; however, we believe the standard is reasonable when considering worker health and OSHA regulations. Also, see reply to Comment No.1

COMMENT NO. 31 - Neither vacuum or mask are believed to be necessary(3.1.3).

REPLY - Vacuum or respiratory protection is considered necessary since this operation is a major source of airborne asbestos fibers.

COMMENT NO. 32 - Would like to know where to purchase and what type of insulation is available. We cannot accept Unibestos (3.1.4).

COMMENT NO. 33 - 3.3.2 - Would like to know where this type of cement could be purchased.

REPLY TO COMMENTS 32 AND 33 - This information is being included in insulation specifications. Contact the Insulation Standards Subcommittee.

COMMENT NO. 34 - 3.2.1 - Our saws are not isolated, but we have not been above the TLV in our tests. Our exhaust system performs very well; however, the dust is not wet down. Adjacent carpenter shop's outside exhaust system is tied into same system. Contents from cyclone drop into closed dumpster. Some fibers are lost in cyclone air exhaust outside of the building.

REPLY - Saws must not necessarily be isolated in the sense of partitioning off. They should be in a separate area and the efficiency of the exhaust systems measured to assure they are functioning properly. (See Comment 1.)

COMMENT NO. 35 - 4.1.1 - We do not believe this is necessary, but the information is pertinent.

R. D. CARLTON, COMMENT BY W. F. DOBBS - BIOCHEMICALS - BELLE PLANT
COMMENT NO. 36 - 3.4.2 - Believe some exception should be made to this requirement permitting "small" amounts of insulation to be removed without respiratory protection. Can a rule-of-thumb quantity be stipulated which will not result in exposure to higher than permitted TLV? Can incidental removal of insulation not requiring over 5-10 minutes be excepted?

REPLY TO COMMENTS 35 AND 36 - Local conditions should be monitored and procedures established in consideration of other sections of this standard. Also, see reply to Comment No. 1.

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J. A. SIGMAN, COMMENT BY A. PAETSCH (CON'T.)
COMMENT NO. 37 - 2.3 - Standard S2T should be in conformity to the latest threshold limit values (TLV's) or to the limits of German authorities (Staubforschunginstitut).

REPLY - S2T is revised annually to conform with latest TLV's. See reply to comment No. 1.

COMMENT NO. 38 - 3.1.5, 3.4.1 - Design of proposed work table is required.

COMMENT NO. 39 - 3.4.5 (New) - If possible transportable work-table with vacuum system should be used for working in the areas.

REPLY TO COMMENTS 38 AND 39 - Tables should be designed to meet local needs.

COMMENT NO. 40 - 3.4.2 - Which dimension should the area have?

REPLY - Dimensions of the area would be determined by monitoring.

K. W. DAHL, COMMENT BY C. C. PRING - PLASTICS - SABINE RIVER WORKS
COMMENT NO. 41 - We would like to have suggested sampling equipment added to the standard.

W. H. MC COY, COMMENT BY W. O. CHRISTY (CON'T.)
COMMENT NO. 42 - 2.4 - Sampling fibers and particulates can differ. The battery-operated sampler approved for fiber sampling should be specified to include millipore filter.

COMMENT NO. 43 - 6.1 - Suggest clarification of this statement. Recommend addition of: "with a battery-powered personal air sampler". Suppliers of such samplers are: The Mine Safety Equipment Company, and the Union Industrial Equipment Company.

COMMENT NO. 44 - 6.1.3 - Asbestos handling is now recognized as an extremely serious industrial hygiene problem. Analyzing asbestos samples is necessary. But the problems in sending samples several hundreds of miles by mail should be pointed out and the importance of correct handling emphasized. Some of the problems are: transportation of samples may cause damage to the sample and possible loss of sample; delay in receiving results. This will, probably, be inevitable with laboratories receiving many such samples.

Expensive as it may appear, the alternative may be to do local monitoring, use local laboratories, or to utilize the best engineering and personal protective measures available.

REPLY TO COMMENTS 41-44 - We recognize that fibers and particulate sampling differs. Haskell Laboratory will recommend appropriate pump and filter for various applications.

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COMMENT NO. 45 - 3.1.2 - Type of vacuum cleaner and filter should be specified. Without high efficiency filters, this cleaning operation will filter out all particles and fibers, except those in the respirable fraction.

REPLY - Type of vacuum cleaners and filters will vary with location. Evaluation should be made and selection based on local need.

COMMENT NO. 46 - 3.1.3 - Type of respiratory protection should be specified.

COMMENT NO. 47 - 3.4.2 - Specify suitable respiratory protection.

REPLY TO COMMENTS 46 AND 47 - Required type of respiratory protection is specified as that which complies with Bureau of Mines Schedule 21B, see 4.1.2. There are various manufacturers who make an acceptable type.

COMMENT NO. 48 - 4.1.2 - A reference to U.S. Bureau of Mines Schedule 21B, Part 14, Subpart A, item 14.4, minimum efficiency 0.3 micron is needed. Several suppliers of respirators that meet this requirement are:

Acme Protection Equipment Company
1201 Kalamazoo Street
South Haven, Michigan

American Optical Company
Southbridge, Mass.

Mine Safety Equipment Co.
Braddock, Thomas, and Mead Streets
Pittsburgh, Pa.

REPLY - All requirements of Schedule 21B must be met and we should not pinpoint the part and subpart. We will delete the effective filtration range to avoid possible confusion.

COMMENT NO. 49 - 3.1.5 - This operation can still produce dust in breathing zones unless carefully controlled, perhaps a self-closing damper on the shute or flexible self-sealing slot.

REPLY - Some dust is inherent in all operations. If this is above the acceptable TLV, respiratory protection should be provided.

COMMENT NO. 50 - 3.2.2 - "An adequate exhaust system" should be defined. A minimal exhaust rate per fan should be specified. Our experience showed that, despite exhaust fans and no appearance of dustiness, the TLV still was exceeded. Suitable protection is not defined. Consideration should be given to exposure of other people in the work area.

REPLY - An adequate exhaust system is one which maintains asbestos fiber concentrations below the acceptable TLV. 3.2.2 revised.

COMMENT NO. 51 - 3.4.4 - We have found no plant or governmental regulations governing the disposal of asbestos.

REPLY - OSHA Regulations recently issued on an emergency basis, and now permanent, are specific as to the disposal of asbestos. See Federal Register reference in Comment No. 1 reply.

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COMMENT NO. 52 - 4.1 - This rule really says always wear respiratory protection when handling asbestos. Samples are sent away for analysis and results are known long after the fact - too long for corrective action.

REPLY - Respiratory protection should be provided until sample results are received and it is established that TLV's are not being exceeded.

W. H. MC COY, COMMENTS BY J. PAVLOSKI/R. FISHER - IND. CHEM. - REPAUNO WORKS
COMMENT NO. 53 - In paragraph 2.2, spray asbestos for insulation and fireproofing should be added as this is discharged directly from a hose to the atmosphere. Contractors sometimes do this work at Plant sites and adequate isolation of the area is advisable.

J. A. SIGMAN, COMMENTS BY G. B. KIRKPATRICK (CON'T.)
COMMENT NO. 54 - 2.2b - "Opening boxes of new insulation" should read, "Opening boxes and stocking bins from new boxes of insulation". Old Hickory has made repeated sampling tests of this bin stocking operation and found them over TLV limits. Our safety rules are being changed to include this operation where dust respirators will be worn.

COMMENT NO. 55 - 3.1 - This may have to be rewritten to harmonize with comments above for 2.2b.

COMMENT NO. 56 - Dust respirators are to be worn anyway when removing insulation (2.2c).

J. A. SIGMAN, COMMENT BY P. E. M. SOONS - TEX. FIB. - DORDRECHT
COMMENT NO. 57 - Change point 3.1.4 as follows: "Glaze coating on block insulation reduces asbestos as a potential dust source". Available or not available is of minor importance here.

COMMENT NO. 58 - Add to 3.2.2: "Consideration also must be given to exposure of other personnel working in the area who are not directly involved. The same warning has been given in point 3.4.2. To our opinion, it applies here, too.

J. A. SIGMAN, COMMENT BY W. R. CLARK (CON'T.)
COMMENT NO. 59 - 3.1.5 - Do not agree - Use of vacuum cleaner to clean up workbench. Use of plastic bag okay, but question value of wetting bag unless done continually. This is not practical.

J. A. SIGMAN, COMMENTS BY P. F. PHILYAW (CON'T.)
COMMENT NO. 60 - 3.2.1 - Asbestos dust does not precipitate readily in cyclone collectors. A bag filter for asbestos dust should be required.

J. A. SIGMAN, COMMENT BY J. M. MARTIN (CON'T.)
COMMENT NO. 61 - Prefer to wear protective equipment when stripping insulation rather than wetting so that insulation can be reused.

J. A. SIGMAN, COMMENT BY W. M. READING (CON'T.)
COMMENT NO. 62 - 3.1.5 - We are not using a plastic bag or wetting the scrap because of slipping hazards and housekeeping problems that would be created. We frequently brush waste from table top into paper drum for disposal and do not allow accumulations to build up.

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J. A. SIGMAN, COMMENT BY A. PAETSCH (CON'T.)
COMMENT NO. 63 - 3.1.5, 3.4.1 - Dust should be eliminated through vacuum system. Wetting seems not to be successful because fine dust cannot be absorbed through water and will reduce the effect of the cyclone.

COMMENT NO. 64 - 3.2.1, 3.4.1 - Dust should not be wetted (see 3.1.5). Dust collecting bag should be closed and thrown away. Vacuum system should be designed for using one-way bags.

R. F. STEWART, COMMENT BY E. B. HALL - DESIGN - LOUVIERS
COMMENT NO. 65 - Suggest paragraph 3.1.3 be reworded as below in order to effect parallel construction and improve clarity:

"3.1.3 - Asbestos insulation blocks should be handled with care. If dust cannot be removed by vacuum, respiratory protective equipment must be used".

W. H. MC COY, COMMENT BY W. O. CHRISTY (CON'T.)
COMMENT NO. 66 - 3.2.1 - Experience with cyclone collectors for asbestos indicates they are inefficient and in some instances cause atmospheric pollution.

COMMENT NO. 67 - Air sampling will not control dust. Air samples should be taken to document the adequacy of controls (3.2.4).

COMMENT NO. 68 - 5.1 - Recommend addition of: "and should be disinfected after each use". (See S2H).

COMMENT NO. 69 - 5.2 - Recommend addition of: "wear respirator when removing dusty clothing".

REPLY TO COMMENTS 53-69 - The standard will be revised as suggested.

R. D. CARLTON, COMMENT BY J. A. FLATTMANN - BIOCHEMICALS - GRASSELLI PLANT
COMMENT NO. 70 - Will probably have to incorporate some of this into Plant Safety Instruction.

COMMENT NO. 71 - If this comes under OSHA, we will also have to cover in arrangements with insulating contractors.

J. A. SIGMAN, COMMENT BY J. M. MARTIN (CON'T.)
COMMENT NO. 72 - Not necessary to wet insulation when emptying cyclones if discharged into a plastic bag and sealed.

J. A. SIGMAN, COMMENT BY W. M. READING (CON'T.)
COMMENT NO. 73 - 3.1.2 - Insulation is lifted from boxes and cartons put in trash dumpster.

COMMENT NO. 74 - 3.2.3 - The ledges, lights, inside of storage bins are cleaned on a weekly schedule. Other parts of work area are cleaned daily or more frequently.

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COMMENT NO. 75 - 3.2.4 - We are using Mine Safety air sampling pump with the Millipore filter type Aerosol Cat. #MAWG037A0 pore size .8. The pump is battery powered.

COMMENT NO. 76 - 3.3.1 - We are using Eagle-Picker Super 66 which conforms to Commercial Standard C.S. 117-49 issued by U.S.D.C.

COMMENT NO. 77 - 3.4.2 - We are barricading the work area to keep people out. A certain amount of dust inevitably drifts outside of the roped off enclosure. Infrequent large removals have created considerable dust at times.

COMMENT NO. 78 - 3.4.3 - We are putting our scrap insulation in boxes and cans but not wetting it down, nor do we believe it necessary to do so.

COMMENT NO. 79 - 5.2 - The men wear coveralls when working; however, nothing is being done to keep them free of dust other than a brushing off from time to time. The statement is ambiguous.

COMMENT NO. 80 - 6.1.3 - Samples are sent to Felix Stein, Department of Occupational Health, University of Pittsburgh.

J. A. SIGMAN, COMMENT BY A. PAETSCH (CON'T.)
COMMENT NO. 81 - 2.4 - Sample for asbestos fiber analysis may be obtained by using an instrument as it is used by German authorities (Staubforschungs-institut), i.g., Konimeter.

COMMENT NO. 82 - 3.2.1, 3.4.1 - Working area should have a little vacuum in order to keep the adjointed areas free of dust.

COMMENT NO. 83 - 3.2.1, 3.4.1 - Exhaust system should have provision of keeping work place free of dust.

COMMENT NO. 84 - 3.3.2 - Not possible because the whole quantity cannot be used at any time.

H. H. KOHL, COMMENT BY W. H. THOMPSON - F & F - PARLIN PLANT
COMMENT NO. 85 - This is not necessarily good measurement on the Plant level in as much as this standard will probably form the basis for Plant Standard Practices or Standard Operating Procedures, which will take precedence from then on. Without a standard on this subject, local practices will vary from no protection to unnecessarily involved protection. This looks like an excellent guide from the Plant standpoint.

W. H. MC COY, COMMENTS BY W. O. CHRISTY (CON'T.)
COMMENT NO. 86 - 3.1.4 - Glaze-coated insulation is satisfactory until the coating is penetrated by cutting blocks.

COMMENT NO. 87 - 3.2.3 - "Avoid sweeping" - this should be a positive rule. Do not sweep.

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COMMENT NO. 88 - 3.3.3 - Respiratory protective equipment should be worn when disposing of old asbestos cement.

REPLY TO COMMENTS 70-88 - Your comments are appreciated. No action is required.

Sixteen Engineering Standards Committee members advise an estimated total of 245 uses for this standard as reference per year.

In the absence of additional comments, which should be received by July 6, 1972, this standard will be issued with the revisions shown above.

DESIGN DIVISION
Standards Section

C. E. Marsh

C. E. Marsh
Senior Standards Engineer

CEM:kjk

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