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FROM: RICHARD S. DANCHIK
ENVIRONMENTAL HEALTH LABORATORY
ALCOA TECHNICAL CENTER - C

TO MEMORANDUM

File Centers

1980-09-09

RE: SCREENING PROCEDURE FOR THE DETERMINATION OF ASBESTOS IN BULK INSULATING MATERIALS
Ref: DHEW (NIOSH) Publication No 80-110

A simple and inexpensive test procedure to detect the presence of asbestos in bulk samples of insulation materials has been developed by NIOSH and critically evaluated at Alcoa's Environmental Health Laboratory. Attached is a copy of the procedure and EHL's evaluation.

The method tests for the presence of magnesium and iron from asbestos in bulk samples. The test is simple and can be readily used in the field to screen for the presence or absence of asbestos. Only a small portion of sample is needed for the test procedure. A colorimetric reagent is applied to the sample in a testing dish. A color change in the presence of magnesium or iron will virtually assure that the material contains asbestos.

A total of 198 field samples were tested by NIOSH indicating 126 positive and 72 negative results. Later laboratory analysis confirmed the presence of asbestos in 78 of the positive samples, but found no traces in 48 of the positive samples. The laboratory also confirmed the absence of asbestos in the 72 negative samples. The laboratory detected no false negative sample results. Therefore, the screening procedure theoretically could have saved 72 needless laboratory analyses.

The enclosed NIOSH procedure is a viable method for the screening of asbestos in bulk insulating materials. If you have any questions, or need more information, please contact the Environmental Health Laboratory.

R. S. Danchik

RICHARD S. DANCHIK

/ds

Attachment

Distribution attached

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FROM RICHARD A. MILITO
ENVIRONMENTAL HEALTH LABORATORY
ALCOA TECHNICAL CENTER - C

TO DR. R. S. DANCHIK
ENVIRONMENTAL HEALTH LABORATORY
ALCOA TECHNICAL CENTER - C

1980-09-04

RE: EVALUATION OF NIOSH's "TEST FOR SCREENING ASBESTOS"
Ref: DHEW (NIOSH) Publication No. 80-110)

An evaluation of the above captioned test was carried out following preparation of the required reagents in accordance with the authors' (Kim, Carter and Kupel) instructions. Samples used for testing included pure asbestos, asbestos sheet, a submitted sample containing asbestos and a submitted sample not containing asbestos. The EHL test results are as follows:

Material	Mg^{+2}	Fe^{+2}
Asbestos (pure)	positive	positive
Asbestos sheet	positive	positive
Sample No. 3603 (calcium silicate insulation)	positive	negative
Sample No. 3604 (medium asbestos by analysis)	positive	positive

Sample No. 3603 was then washed in glycerin and filtered. The Mg^{+2} test then proved negative. This result confirms statements made by R. E. Kupel in our phone conversation of 1980 August 03, that certain elements (Ca) will exhibit a false positive unless initially treated with glycerin.

Our lab evaluation appears to have duplicated results I observed at Kettering Institute while attending NIOSH's Industrial Hygiene Chemistry Course 590. At Kettering a slight change in the method was observed. Instead of adding Mg or Fe reagent initially, acid is added, followed by NaOH for Mg or Fe reagent for Fe. This is if asbestos is strongly suspected. If not, then a glycerin wash is recommended prior to acid additions as stipulated in the method.

Comments

There appears to be no difficulty in determining the presence of Fe using this method. Some difficulty however may arise in determining the presence of Mg due to interferences associated with plaster-like substances. There is some indication that specific materials (i.e. calcium silicate) will dissolve upon the addition of phosphoric acid but this is not definite for all non-asbestos products.

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TEST FOR SCREENING ASBESTOS

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OCTOBER 1979

TEST FOR SCREENING ASBESTOS

I. SCOPE AND APPLICATION

This colorimetric test is applicable to the detection of magnesium (II) and iron (II) from asbestos in bulk samples. These samples include sprayed on asbestos as well as ceiling tiles. The test is simple and can be readily used in the field to screen for the presence or absence of asbestos. The amount of the sample needed for the test is only about the size of a large pea.

II. PRINCIPLE

The test is based upon the formation of color complexes with Mg^{+2} and Fe^{+2} released from asbestos. The Mg^{+2} from chrysotile is complexed with p-nitrophenylazo-α-naphthol. The Fe^{+2} from crocidolite and amosite is complexed with 1, 10-phenanthroline. A positive test is indicated by the formation of colored complex for Mg^{+2} and/or Fe^{+2}, and it indicates possible presence of asbestos.

III. INTERFERENCES

The test is a colorimetric spot test for Mg^{+2} and Fe^{+2}, and is not specific for asbestos.

A bulk sample may contain Mg and Fe compounds other than asbestos. Without treating the sample as in the Procedure, a few drops of color forming reagents are added directly to the sample. If either color forms, an interferring substance is present and the sample must be cleaned before the test is conducted to eliminate the interference. In this cleaning process, plaster, mineral wool, fiberglass, and soluble Mg and Fe compounds are removed before the screening test, preventing their interference.

IV. SENSITIVITY, PRECISION, AND ACCURACY

A sample containing more than 1% asbestos gives a positive color reaction.

A total of 198 various field samples were tested before the Acid Wash steps were added to the Iron Test procedure. Results are listed below:

Results of the screening test without the Acid Wash.

	True Positive	False Positive	True Negative	False Negative
No. of Samples	79	50	69	0
% of Total	40	25	35	0

VII. PROCEDURE

A. Magnesium Test

1. Add a few drops of Mg Reagent directly to the sample. If blue color appears, wash the sample with glycerin before the test. Any sample containing plaster is also washed with glycerin.

   Glycerin Wash

   a. Place a small portion of sample, about the size of a large pea, in a plastic beaker.

   b. Add 5 drops of glycerin and mix well with a plastic rod or spatula.

   c. Rinse the plastic rod with a small amount of water into the beaker.

   d. Filter the sample through the filtration assembly consisting of a syringe attached to the Swinnex filter holder loaded with a mixed cellulose ester filter and a gasket.

   e. Filter with a minimum of 5 washings or about 50 mL of water.

   f. Transfer the filter to a Teflon dish for the Magnesium test.

2. Add a drop of H_3PO_4 and mix well by grinding the sample with a plastic rod.

3. Add 2 drops of 10 N NaOH and mix well.

4. Add 5 drops of Mg Reagent and stir briefly. Note any color change.

5. Add 5 more drops of Mg Reagent and observe the final color.

6. A blue color indicates that chrysotile may be present.

7. Samples giving a positive test may be sent to a laboratory for confirmation. If the magnesium test is negative, the sample must be tested for iron.

B. Iron Test

1. Add few drops of Fe Reagent directly to the sample. If a red color appears, wash the sample with the acetic--sulfuric acid mixture before the test. Samples containing fiberglass or mineral wool are also washed with the acid mixture.

Distribution:

Alcoa Technical Center

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