725
Asbestos

PLAINTIFF'S EXHIBIT

SH-3086

INTEROFFICE MEMORANDUM

FEBRUARY 12, 1990

FROM: W. L. NEAL, SR. SAFETY INSPECTOR, DPMC

TO: MISCROPSICAL IDENTIFIERS OF ASBESTOS, DPMC

SUBJECT: AIHA BULK ASBESTOS PROFICIENCY TESTING PROGRAM

Attached are the results of round A01-489 of the Bulk Asbestos Proficiency Testing Program.

Classification and identification scores are shown in the upper right corner of page I. The classification score indicates the number of samples (out of four possible) which the lab personnel correctly determined whether the material was asbestos containing or not.

If the classification score is less than 4/4, an appropriate number of false negative and/or false positive errors is indicated. The identification score indicated the number of asbestos-containing samples in which the type(s) of asbestos were correctly identified. Note that this is based on the number of positive samples (3 in this round) and not on the total number of asbestos types present in them (4 in this round). A false negative classification error on a true positive sample automatically results in an identification error for that sample.

We will be receiving another round of samples to identify shortly. At that time I will notify you and we will establish a plan and date for all samples to be identified.

W. L. Neal

cc: W. Austin
E. Hawthorne
G. Buchanan
M. Davis
G. Hancock
H. Craddock
WLN CHRON

LAM 014130

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DPMC-15394

RESEARCH TRIANGLE INSTITUTE

RTI/4562/01-I

AMERICAN INDUSTRIAL HYGIENE ASSOCIATION
BULK ASBESTOS PROFICIENCY TESTING PROGRAM

FINAL REPORT TO LABORATORIES
ROUND A01-489

Prepared for

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January 1990

LAM 014131

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AMERICAN INDUSTRIAL HYGIENE ASSOCIATION
BULK ASBESTOS PROFICIENCY TESTING PROGRAM

FINAL REPORT TO LABORATORIES
ROUND A01-489

Section I - Introduction

The inaugural test round of the American Industrial Hygiene Association (AIHA) Bulk Asbestos Proficiency Testing Program was initiated on November 15, 1989, with the distribution of test samples to 146 laboratories enrolled for participation in that round. Each laboratory received four test samples, of which three were asbestos-containing. Asbestos varieties provided to the laboratories via these samples were amosite, chrysotile, and crocidolite. Laboratories were asked to classify each of the samples as asbestos-containing (positive) or nonasbestos-containing (negative). For positive samples, laboratories were also asked to identify the type(s) of asbestos present and to semi-quantitate the amount of asbestos present. For all samples, additional information concerning fibrous nonasbestos and nonfibrous matrix materials was also requested.

Section II - Test Material Selection and Preparation

The four test materials chosen for this round were selected to provide laboratories an opportunity to analyze both positive and negative materials, a variety of asbestos types, and a common synthetic asbestos substitute. All four bulk insulation materials originated from RTI's bulk asbestos repository. Each is a "real-world" material acquired from an asbestos abatement project. Detailed descriptions of these materials are contained in Sections III and IV of this report.

Each bulk material chosen for use in this round was quite homogeneous, so no mixing or blending was performed prior to packaging. Packaging consisted of placing small portions of each material (10-15 grams) into standard, plastic scintillation vials. Filled vials were placed in 100-vial capacity trays, with the order of tray filling noted on the side of the tray. Such labelling allows for detection of possible sampling bias

generated during packaging.

Upon completion of packaging, each vial of each sample lot was examined to verify the presence of test material. In addition, contents of 20% of the vials of each sample lot were examined by stereobinocular microscope to ensure test material homogeneity.

Section III - Reference Analysis of Test Materials

Two independent laboratories were employed to provide reference analyses of representative subsamples of each sample lot. The laboratories agreed on the classification (asbestos-containing or nonasbestos-containing) of each of the four sample lots and on the identification of asbestos types present in the three asbestos-containing lots. In addition, results of the quantitation of the amount of asbestos in the three asbestos-containing sample lots compared very favorably. Results of the reference analyses are provided in Table 2, with all quoted percentages the result of visual volume estimates by stereobinocular microscopy.

Table 2. Reference Analysis Results

Sample Lot	Sample Classification	Reference Lab 1	Reference Lab 2
1	-	99% Polyethylene Tra Cellulose	100% Synthetic
2	+	35% Crocidolite 15% Chrysotile 2% Cellulose 48% Binder	35% Crocidolite 8% Chrysotile 1% Cellulose 56% Calcareous Binder
3	+	45% Chrysotile 55% Cellulose	40% Chrysotile 50% Cellulose 10% Filler
4	+	40% Amosite 60% Fibrous Glass	35% Amosite 60% Fibrous Glass <1% Cellulose 2% Gypsum

Section IV - RTI Analysis of Test Materials

A variety of analysis techniques was performed by RTI microscopists on each of the sample lots in order to confirm the findings of the reference laboratories. These techniques included stereobinocular microscopy, polarized light microscopy (PLM), and x-ray diffraction (XRD). In addition, gravimetric analysis was performed on Sample Lot 2, due to the high content of calcareous binder within the matrix. Results of these analyses are summarized as follows:

Stereobinocular Microscopy

Stereobinocular microscopy was used to obtain a macroscopic characterization of each sample lot prior to packaging. All percentages quoted are the result of visual volume estimates. The classification of each lot, and the identification and quantitation of asbestos present in the three positive lots, confirmed the subsequent findings of the reference laboratories. The macroscopic descriptions are as follows:

Lot 1: This loose-fill material is nearly snow-white in color, with a fluffy appearance; it is composed entirely of short, individual polyethylene fibers of irregular morphology, with some splayed ends exhibited.

Lot 2: This pipe-wrap material is characterized by an off-white to gray color and is dominated by calcareous binder; this binder, which constitutes approximately 65% of the material, heavily coats all fibrous material in the sample; the material contains crocidolite and chrysotile, in estimated amounts of 30% and 5%, respectively; crocidolite occurs as very long (up to 2") fiber bundles that exhibit characteristic straight, rigid morphology and deep blue color; chrysotile occurs as long individual fibers and fiber bundles, with characteristic wavy morphology, splayed ends, and white color.

Lot 3: This off-white cardboard or paper pipe-wrap is dominated by a matrix which consists of cellulose and a noncalcareous binder; these materials are present in amounts of approximately 35% and 40%, respectively; the cellulose fibers are short to medium in length, off-white to tan in color, with irregular morphology; chrysotile occurs in amounts of approximately 25%; it appears as white to off-white, short to long fiber bundles, with irregular to straight morphology and characteristic splayed ends.

Lot 4: This spray-on insulation is dominated by mineral wool and an off-white binder, in amounts of approximately 60% and 15%,

respectively; the medium-length, straight mineral wool fibers tend to aggregate into clumps; within these protrude long, straight, tan-colored amosite bundles; these bundles are only lightly coated by the binder/mineral wool matrix; amosite comprises approximately 25% of the material.

Polarized Light Microscopy

Upon completion of sample packaging, subsamples were extracted from the contents of randomly selected vials of each sample lot for detailed polarized light microscopy analysis. For each fibrous component encountered in each sample lot, the following optical properties were observed: morphology, aspect ratio, pleochroism, birefringence, extinction type and angle, refractive indices, central-stop dispersion colors, and sign of elongation. The PLM analysis of representative subsamples of each of the four sample lots produced no discrepancies with the reference analyses. Optical characteristics observed for asbestos in each of the three positive sample lots were within normal standards.

Gravimetric Analysis

Due to the presence of abundant calcium-carbonate matrix material, gravimetric analysis was performed on a subsample of Sample Lot 2. The composition of the matrix materials precluded the use of gravimetry in the other three sample lots. The results of the gravimetric analysis of Sample Lot 2 are as follows:

Lot 2: Four pre-weighed quantities of material were each treated with concentrated hydrochloric acid for 15 minutes; the residue was weighed to determine the approximate loss of calcium carbonate; the residue was then analyzed by sterobinocular microscopy and was determined to be almost entirely crocidolite and chrysotile; total asbestos for the three samples was 11.6%, 12.2%, 14.2%, and 18.6% of the total sample, with an average of 14.2%. The relative amounts of chrysotile and crocidolite were estimated by stereobinocular microscopy to be of roughly equal proportions.

X-Ray Diffraction Analysis

Subsamples from each sample lot were extracted for x-ray diffraction (XRD) analysis. For Sample Lot 2, XRD analysis was performed on both the untreated material and the material residual to the gravimetric reduction. For each analysis, a subsample of bulk material was ground using a mortar and pestle, and a powder mount was prepared. Each powdered sample was

scanned from 8°2θ to 50°2θ, at a rate of 1°2θ per minute.

Diffraction peak heights and d-spacings resulting from XRD analysis of each of the sample lots confirmed the presence of the asbestiform components identified during in-house analysis and subsequently reported by the reference laboratories for each sample; no asbestiform components additional to those reported by the reference laboratories were detected.

Section V - Summary of Round

One hundred and thirty-three laboratories submitted results of analysis by the receipt deadline date of December 15, 1989. None of the materials selected for use were anticipated to cause great difficulties from an analytical standpoint, and as a result, the overall performance of laboratories for the round was expected to be very good. That proved to be the case; 126 of the 133 laboratories classified all four samples correctly, and of those 126, 112 also had no asbestos identification errors.

The total round effort, as generated by the results of analyses submitted by laboratories, is illustrated in the following tables.

Table 4 shows the distribution of classification and identification scores achieved by laboratories.

Table 4. Distribution of Classification and Identification Scores

Classification Score	Number of Labs Achieving	Identification Score	Number of Labs Achieving
4/4	126	3/3	112
3/4	7	2/3	15
2/4	0	1/3	6
1/4	0		
0/4	0		

Listed in Table 5 are all false negative, false positive, and identification errors committed by laboratories, by sample lot. False negatives and false positives are denoted by "F NEG" and "F POS", respectively, and identification errors are denoted by "IDERR." The

following evaluation criteria were used to assign these classification and identification errors:

- For true positives (one asbestos type only):
  - if asbestos is reported ≥1%, = no error
  - if asbestos is reported <1%, = false negative
- For true positives (two or more asbestos types):
  - if each asbestos type is reported ≥1%, = no error
  - if each asbestos type is reported <1%, = false negative
  - if one asbestos type is reported ≥1% and another is reported <1% or not reported, = ID error on 2nd asbestos type
- For true negatives (nonasbestos-containing samples):
  - if asbestos reported is <1%, = no error
  - if asbestos reported is ≥1%, = false positive

Table 5. Classification and Identification Errors, by Sample Lot

Sample Lot	Asbestos Content	Errors		
		F NEG	F POS	IDERR
1	-	---	3	---
2	+	0	---	17
3	+	0	---	4
4	+	4	---	6

Section VI - Individual Laboratory Results

Please refer to the computer printout which appears as the next page in this text for a tabulation of your individual laboratory results and a comparison of those results to the reference analyses. A classification score (the total number of samples correctly classified out of the four) appears in the upper right-hand corner of the form, along with the number of false negatives and/or false positives, where applicable. In addition, an identification score indicates the number of asbestos-containing samples in which the type(s) of asbestos was(were) correctly identified.

AMERICAN INDUSTRIAL HYGIENE ASSOCIATION
BULK ASBESTOS PROFICIENCY TESTING PROGRAM
RESULTS OF ROUND A01-489
12/20/89

Wayne B. Austin
SHELL OIL COMPANY
P.O. Box 100
Deer Park, TX 77536

LABORATORY I.D. NUMBER
77536-001

CLASSIFICATION SCORE: 4/4
FALSE NEGATIVES: 0
FALSE POSITIVES: 0
IDENTIFICATION SCORE: 2/3

SAMPLE I.D. NUMBER	A) 3601	B) 3956	C) 6363	D) 1344
ANALYSIS RESULTS FROM LABORATORY NUMBER 77536-001				
ASBESTOS (%)	NONE (0) NONE (0) CHRY (0)	NONE (0) NONE (0) AMOS (32)	CHRY (35) NONE (0)	AMOS (45) NONE (0)
OTHER FIBROUS MATERIAL (%)	CELL (90) NONE (0)	CELL (55) NONE (0)	CELL (64) NONE (0)	FBGL (51) CELL (4)
NONFIBROUS MATERIAL (%)	OTHR (10)	OTHR (13)	OTHR (1)	NONE (0)
ANALYSIS RESULTS FROM REFERENCE LABORATORY 1				
ASBESTOS (%)	NONE NONE	CHRY (15) CROC (35)	CHRY (45) NONE	AMOS (40) NONE
OTHER FIBROUS MATERIAL (%)	OTHR (99) CELL (TRA)	CELL (2) NONE	CELL (55) NONE	FBGL (60) NONE
NONFIBROUS MATERIAL (%)	NONE	CACO (48)	NONE	NONE
ANALYSIS RESULTS FROM REFERENCE LABORATORY 2				
ASBESTOS (%)	NONE NONE	CHRY (8) CROC (35)	CHRY (40) NONE	AMOS (35) NONE
OTHER FIBROUS MATERIAL (%)	OTHR (100) NONE	CELL (1) NONE	CELL (50) NONE	FBGL (60) CELL (TRA)
NONFIBROUS MATERIAL (%)	NONE	CACO (56)	OTHR (10)	CASO (5)
SUMMARY OF RESULTS FROM ALL LABORATORIES				
TYPE ONE ASBESTOS	NONE	CHRY	CHRY	AMOS
TYPE ONE MEAN		15.84	43.60	34.72
TYPE ONE STD DEV		9.51	16.41	14.01
TYPE TWO ASBESTOS	NONE	CROC	NONE	NONE
TYPE TWO MEAN		32.53		
TYPE TWO STD DEV		13.06		
OTHER ASBESTOS TYPES REPORTED IN SAMPLE	CHRY	AMOS	TREM,ANTH, AMOS,ACTN	CROC,ACTN

ASBESTOS ABBREVIATIONS

ACTN=ACTINOLITE
AMOS=AMOSITE
ANTH=ANTHOPHYLLITE
CHRY=CHRYSOTILE
CROC=CROCIDOLITE
TREM=TREMOLITE

OTHER FIBROUS MATERIAL ABBREVIATIONS

CELL=CELLULOSE
FBGL=FIBERGLASS/MIN WOOL
OTHR=OTHER

NONFIBROUS MATERIAL ABBREVIATIONS

CACO=CALCIUM CARBONATE (CALCITE)
CASO=CALCIUM SULFATE (GYPSUM)
OTHR=OTHER

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Section VII - Analysis Problems and Suggestions

No analysis problems had been anticipated with sample classification or identification of the asbestos in the three positive lots. The tabulations of results of analyses submitted by all laboratories, as shown in Section V, Tables 4 and 5, would certainly bear this point out. The only error that occurred with any frequency was the failure of laboratories to detect the chrysotile in Sample 2. That error was committed by 12% of the laboratories.

An area of bulk sample analysis which has always been troublesome for laboratories involves semi-quantitation of the amount of asbestos in a positive sample. Experience by RTI with the conducting of other past or present bulk asbestos analysis programs indicates a general tendency for laboratories to overestimate the amount of asbestos present in positive materials. The degree of overestimation is likely dependent on several factors, including the true percentage of asbestos, characteristics of the asbestos fibers, such as length and color, and characteristics of the matrix, such as color contrast and coating tenacity.

A comparison between the mean values calculated for laboratory analysis results and those quoted by the two reference laboratories shows no significant quantitation differences. However, the quantitation information derived from the RTI gravimetry analysis of sample 2 suggests that, for that sample at least, even the reference laboratories may be estimating high. Thus is underscored the pervasiveness of the problem. In this sample, the problem may be due in part to the high contrast between the crocidolite fibers and the calcareous matrix.

Until calibration standards are available, laboratory analysts will continue to contend with the dilemma of accurate quantitation. Gravimetric analysis of bulk materials by the determination of weights of various isolated material components is not the answer, but simply an alternative for comparison to visual estimates. RTI will continue to provide such information whenever the test materials lend themselves to that type of analysis.

Section VIII - Schedule for Test Round A02-190

The following dates relating to the conducting of Round A02-190 of the Bulk Asbestos Proficiency Testing Program have been agreed upon by AIHA and RTI:

January 15, 1990 - Last day for new labs to be enrolled for Round A02-190 testing.

February 15, 1990 - Distribution of test sample packets to laboratories

March 15, 1990 - Deadline for receipt of results of laboratory analyses at RTI

IH Monitoring (By Source)
Asbestos 13032 & 3 1980

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