ARCO Transportation Company Internal Correspondence

Date: January 7, 1988

Subject: ARCO Anchorage Bulk Sample Analysis

PLAINTIFF'S EXHIBIT
ARCO 39

From/Location: P. Persaud, LAC 1413

To/Location: D. B. Sucharski, LAC 1179

On December 21, 1987, a bulk sample of residual dust present in several state rooms of the accommodations spaces on the ARCO Anchorage was collected by Jeff Shaw, ARCO Marine, Inc. The purpose of this sample was to evaluate the material for the presence of friable asbestos fibers.

The results of the sample indicated that the collected material contained approximately 5 percent chrysotile asbestos similar to the type used in pipe lagging and insulation. The sample was analyzed using polarized light microscopy utilizing dispersion staining techniques as specified in Interim Method of Determination of Asbestos in Bulk Insulation Sample, EPA 600/M4-82-020, Dec. 1982. The detection level of this method is 0.1%.

Based on the results of the sample, airborne sampling and evaluation of the physical state of asbestos-bearing materials are scheduled to be conducted on the ARCO Anchorage during the week of January 11, 1988. It should be noted that good housekeeping is essential in maintaining an environment free of dust potentially bearing airborne asbestos fibers. Steps should be taken to ensure good housekeeping is maintained at all times.

Please feel free to call me if you have any questions or require further assistance.

PP:vaw

cc: S. M. Menkus
J. P. Shaw

ARCO Marine, Inc.

ARCO Anchorage

Bulk Sample Results

Sample Identification	Location		Material Content	Percentage
AR 33044	Accommodation Areas		Non-Asbestos Material	
	- Vacant 3rd Asst. Room	° Window Sill	- Human Hair	4%
	- Actual 3rd Mate Room	° Top of Mirror	- Unknown	15%
	- Vacant 3rd Mate Room	° Top of Bathroom Cabinet	Asbestos Fibers	
		° Bedhead	- Chrysotile	05%
		° Ventilation duct		

DAN NAPIER & ASSOCIATES
INDUSTRIAL HYGIENE

DAN NAPIER, M.S., C.I.H., C.S.P.
ROBIN EKROOT, M.S.

4005 CATHANN STREET
TORRANCE, CALIFORNIA 90503-6911
TELEPHONE 213-316-1058

Pamela Persaud
ARCO MARINE TRANSPORTATION
300 Oceangate
Long Beach, California 90802

March 14, 1988

Dear Ms. Persaud;

This letter will confirm our meeting on January 14, 1988, at that time we reviewed your vessel the Arco Anchorage with David Sucharski. During the meeting we conducted an asbestos survey. The result of that meeting is summarized here.

The following items are submitted for your approval and implementation. The test result is described and a recommended action is suggested. Safety is a responsibility of your management. Our work is intended to assist you. Recommendations are developed from conditions observed at the time of our visit. They do not necessarily include every possible loss potential, code violation, or exception to good practice. This report applies only to the sample, or samples, investigated and is not necessarily indicative of the quality or condition of apparently identical or similar products or conditions. As a mutual protection to clients, the public and us, this report is submitted and accepted for the exclusive use of the client to whom it is addressed and upon the condition that it is not to be used, in whole or in part, in any advertising or publicity matter without prior written authorization from us.

The bulk samples taken in the crew quarters did not contain detectable levels of asbestos. The air monitoring samples were evaluated by optical microscopy (PLM) and electron microscopy (EM). The results tests did not indicate any airborne fiber levels.

The vessel is constructed with asbestos containing components, as such mechanical abrasion of the transite panels or any modification of the vessel must be done under controlled circumstances. An asbestos management plan must be developed to insure that the vessel is not modified nor that any fiber release is permitted to occur. Air monitoring of all normal shipboard conditions must be conducted on a regular basis. The crews should be provided with an orientation program to insure that they do not create fiber releases by improper or unauthorized work practices.

Please call me should you have any questions or need any other information.

Respectfully Submitted

Dan Napier

DAN NAPIER & ASSOCIATES
INDUSTRIAL HYGIENE

DAN NAPIER, M.S., C.I.H., C.S.P.
ROBIN EKROOT, M.S.

15342 HAWTHORNE BOULEVARD, SUITE 207
LAWNDALE, CALIFORNIA 90260-2105
TELEPHONE 213-644-1924

Sample Data Sheet Fibers In Air

January 14, 1988 Sample Number: AT37363

Location of Study:	ARCO Marine, Inc.
Address:	300 Oceangate Long Beach, CA 90802-4341
Area of study:	Fireman/water tender, upper deck (Anchorage)

This was a FIXED site study. The monitor was placed in a representative air parcel in the normal breathing zone.

NIOSH method # 7400 Revision 5/15/85 was used as the standard analytical procedure. A 25 millimeter cellulose ester filter 1.2 micron pore size was used as collection media. It was protected with a conductive cowl. A Nikon Phase Contrast Labophot Microscope with a Walton-Beckett graticule was used to analyze the filter media.

The personal breathing zone was monitored with a Wilrun 13081
A rotameter # 1 calibrated against a primary standard on 11/20/87
was used before and after the sample to estimate the air volume.
The sample was started at 8:40 hours. The starting flow rate was 11000 ml/min.
The test was stopped at 11:54 hours. The ending flow rate was 10500 ml/min.
The average flow rate was 10750.00 ml/minute. The total time was 194 minutes
the total volume was 2085.50 liters.

Analysis found a total of 0.095 fibers per field.
Time Weighted Average of 0.002 fibers per cubic centimeter
was extrapolated for the area. The quantification limit for this study
is calculated at 0.002. The method (7400) indicates that the absolute
limit is 0.01 fibers per cubic centimeter.

This analytical work was completed at Dan Napier & Associates.
The microscopist was Faith V. Ujda.
The Industrial Hygienist was Dan Napier MS, CIH.

The workers in the area were exposed to 1.1 percent of a
daily allowed exposure.

The detection level, 0.002 is greater than the measured level. Since
this information must be considered, the above calculations were based on
the detecion level 0.002 f/cc and not on the calculated level, 0.002 f/cc.

DAN NAPIER & ASSOCIATES
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15342 HAWTHORNE BOULEVARD, SUITE 207
LAWNDALE, CALIFORNIA 90260-2105
TELEPHONE 213-644-1924

Sample Data Sheet Fibers In Air

January 14, 1988 Sample Number: AT37364

Location of Study: ARCO Marine, Inc.
Address: 300 Oceangate
Long Beach, CA 90802-4341
Area of study: Chief engineers office (Anchorage)

This was a FIXED site study. The monitor was placed in a representative air parcel in the normal breathing zone.

NIOSH method # 7400 Revision 5/15/85 was used as the standard analytical procedure. A 25 millimeter cellulose ester filter 1.2 micron pore size was used as collection media. It was protected with a conductive cowl. A Nikon Phase Contrast Labophot Microscope with a Walton-Beckett graticule was used to analyze the filter media.

The personal breathing zone was monitored with a
A rotameter # 1 calibrated against a primary standard on 11/20/87
was used before and after the sample to estimate the air volume.
The sample was started at 8:49 hours. The starting flow rate was 13000 ml/min.
The test was stopped at 11:19 hours. The ending flow rate was 12500 ml/min.
The average flow rate was 12750.00 ml/minute. The total time was 150 minutes
the total volume was 1912.50 liters.

Analysis found a total of 0.170 fibers per field.
Time Weighted Average of 0.004 fibers per cubic centimeter
was extrapolated for the area. The quantification limit for this study
is calculated at 0.002. The method (7400) indicates that the absolute
limit is 0.01 fibers per cubic centimeter.

This analytical work was completed at Dan Napier & Associates.
The microscopist was Faith V. Ujda.
The Industrial Hygienist was Dan Napier MS, CIH.

The workers in the area were exposed to 2.1 percent of a
daily allowed exposure.

DAN NAPIER & ASSOCIATES
INDUSTRIAL HYGIENE

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Sample Data Sheet Fibers In Air

January 14, 1988 Sample Number: AT37362

Location of Study: ARCO Marine, Inc.
Address: 300 Oceangate
Long Beach, CA 90802-434
Blank Control value 0.010

This blank correction has been averaged with other blanks and used to correct the submitted values

The microscopist was Faith V. Ujda
The Industrial Hygienist was Pamela Persaud

DAN NAPIER & ASSOCIATES
INDUSTRIAL HYGIENE

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LAWNDALE, CALIFORNIA 90260-2105
TELEPHONE 213-644-1924

Sample Data Sheet Fibers In Air

January 14, 1988 Sample Number: AT37361

Location of Study: ARCO Marine, Inc.
Address: 300 Oceangate
Long Beach, CA 90802-434
Blank Control value 0.010

This blank correction has been averaged with other blanks and used to correct the submitted values

The microscopist was Faith V. Ujda
The Industrial Hygienist was Pamela Persaud

AIRBORNE ASBESTOS ANALYSIS BY TRANSMISSION ELECTRON MICROSCOPY (TEM)

EPA Level I Method (Yamate et al.; 1984)

MED-TOX ASSOCIATES, INC.

DAP PIER, M.S.
4000 LATHANN STREET
TORRANCE, CA 90503-6911
DAN NAPIER 213-316-1058

Job Number : 6380-1
Client Number : BLANK
Med-Tox Number: 69202
Receipt Date : JANUARY 29, 1988
Report Date : FEBRUARY 11, 1988
Description :

HYPOTHETICAL AIR VOLUME USED TO FACILITATE COMPARISON.

Analytical Sensitivity : 0.0018 (structures/cu cm)
Total Area Scanned : 102540 sq um
Magnification : 19400 x
Area of Original Filter : 3.85 sq cm
Dilution Factor : <not ashed>
Area Ashed : <not ashed>
Area of Membrane : <not ashed>
Volume of Air : 2105.0 liters
Total number of structs : 0
Filter type : mixed cellulose ester
Conductive Coat : no

ASBESTOS SUMMARY

	All Structures	Only > 5 um Structures
Total Asbestos Structure Concentration	< 0.007 (structures/cu cm)	< 0.007 (structures/cu cm)
Total Asbestos Mass Concentration	0.000 (ng/cu meter)	0.000 (ng/cu meter)

Additional Information by Structure Type

	Fiber	Bundle	Cluep	Matrix	TOTAL
Structure Conc. (structures/cu cm)					
Chrysotile	0.000	0.000	0.000	0.000	0.000
Amphibole	0.000	0.000	0.000	0.000	0.000
Indeterminant	0.000	0.000	0.000	0.000	0.000
Mass Concentration (ng/cu meter)					
Chrysotile	0.000	0.000	0.000	0.000	0.000
Amphibole	0.000	0.000	0.000	0.000	0.000
Indeterminant	0.000	0.000	0.000	0.000	0.000

- The method detection limit is 4 times the analytical sensitivity. Analytical sensitivity is defined by the EPA as the asbestos concentration represented by each fiber counted under the electron microscope.
- TEM data is accurate to no more than one significant figure.
- Structures per cubic centimeter equals million structures per cubic meter.
- Amphibole asbestos includes amosite (i.e. grunerite - cummingtonite), crocidolite (i.e. riebeckite - magnesioriebeckite), anthophyllite, tremolite and actinolite.

Analyst _____ Date 2/11/88

Lab Manager Tom Dagenhart Jr. Date 2/11/88

Med-Tox Associates, Inc. 1229 Morena Blvd San Diego, CA 92110 619-276-8843

MED-TOX ASSOCIATES, INC.

N NAPIER, M.S.
4005 CATHANN STREET
TORRANCE, CA 90503-6911
DAN NAPIER 213-316-1058

Job Number : 6380-1
Client Number : BLANK
Med-Tox Number: 69202
Receipt Date : JANUARY 29, 1988
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Analytical Sensitivity : 0.0018 (structures/cu cm)
Total Area Scanned : 102540 sq um
Magnification : 19400 x
Area of Original Filter : 3.85 sq cm
Dilution Factor : <not ashed>
Area Ashed : <not ashed>
Area of Membrane : <not ashed>
Volume of Air : 2105.0 liters
Total number of structs : 0
Filter type : mixed cellulose ester
Conductive Cowl : no

Dimensional Limitations:

Only structures with diameters greater than 0.3 um and lengths greater than 5.0 um are included in the data subset used to calculate the following results.

	Asbestos Structures	All Structures
Total Concentration	< 0.007 (structures/cu cm)	< 0.007 (structures/cu cm)

Structure Concentrations by Structure Type
(structures/cu cm)

	Fiber	Bundle	Clump	Matrix	TOTAL
Chrysotile	0.000	0.000	0.000	0.000	0.000
Amphibole	0.000	0.000	0.000	0.000	0.000
Indeterminant	0.000	0.000	0.000	0.000	0.000
Non-Asbestos	0.000	0.000	0.000	0.000	0.000

- The method detection limit is 4 times the analytical sensitivity. Analytical sensitivity is defined by the EPA as the asbestos concentration represented by each fiber counted under the electron microscope.
- TEM data is accurate to no more than one significant figure.
  Structures per cubic centimeter equals million structures per cubic meter.
- Amphibole asbestos includes amosite (i.e. grunerite - cummingtonite), crocidolite (i.e. riebeckite - magnesioriebeckite), anthophyllite, tremolite and actinolite.

AIRBORNE ASBESTOS ANALYSIS BY TRANSMISSION ELECTRON MICROSCOPY (TEM) - DIMENSIONAL DATA
EPA Level I Method (Yanate et al.; 1984)

MED-TOX ASSOCIATES, INC.

AN NAPIER, M.S.
4005 CATHANN STREET
TORRANCE, CA 90503-6911
DAN NAPIER 213-316-1058

Job Number : 6380-1
Client Number : BLANK
Med-Tox Number: 69202

	Chrysotile	Amphibole	Indeterminant	Nonasbestos

Detailed Data For Structures Classified as FIBERS:

No Structures Detected in This Category.

Detailed Data For Structures Classified as BUNDLES:

No Structures Detected in This Category.

Detailed Data For Structures Classified as CLUMPS:

No Structures Detected in This Category.

Detailed Data For Structures Classified as MATRICES:

No Structures Detected in This Category.

DETAILED DATA FOR ALL STRUCTURES:

No Structures Detected in This Category.

AIRBORNE ASBESTOS ANALYSIS BY TRANSMISSION ELECTRON MICROSCOPY (TEM) - DATA LISTING
EPA Level I Method (Yamate et al.; 1984)

MED-TOX ASSOCIATES, INC.

J NAPIER, M.S.
4005 CATHANN STREET
TORRANCE, CA 90503-6911
DAN NAPIER 213-316-1058

Job Number : 6380-1
Client Number : BLANK
Med-Tox Number: 69202

Field No.	Structure No. per Field	Structure Type	Diameter (microns)	Length (microns)	Mass per Structure (fg)	Fibers per Structure	Structure Identification

ANALYSIS DETECTED NO FIBERS ON THIS SAMPLE.

- um = micron, a micron is one millionth of a meter.
  ng = nanogram, a nanogram is one billionth of a gram.
- fg = femtogram, a femtogram is one millionth of a nanogram.
- Masses of indeterminate and non-asbestos fibers are estimated by assuming a density of 2.6 grams per cubic centimeter.

AIRBORNE ASBESTOS ANALYSIS BY TRANSMISSION ELECTRON MICROSCOPY (TEM)
EPA Level I Method (Yanate et al.; 1984)

MED-TOX ASSOCIATES, INC.

..M MAPIER, M.S.
4005 CATHANN STREET
TORRANCE, CA 90503-6911
DAN MAPIER 213-316-1058

Job Number : 6380-1
Client Number : 37359
Med-Tox Number: 69200
Receipt Date : JANUARY 29, 1988
Report Date : FEBRUARY 11, 1988
Description :

VERY HEAVY FILTER LOADING...
SOME FIBERS MAY BE OBSCURED.

Analytical Sensitivity : 0.0012 (structures/cu cm)
Total Area Scanned : 1 2540 sq um
Magnification : .9400 x
Area of Original Filter : 3.85 sq cm
Dilution Factor : <not ashed>
Area Ashed : <not ashed>
Area of Membrane : <not ashed>
Volume of Air : 3132.0 liters
Total number of structs : 3
Filter type : mixed cellulose ester
Conductive Coul : no

ASBESTOS SUMMARY

	All Structures	Only > 5 um Structures
Total Asbestos Structure Concentration	< 0.005 (structures/cu cm)	< 0.005 (structures/cu cm)
Total Asbestos Mass Concentration	0.07 (ng/cu meter)	0.000 (ng/cu meter)

Additional Information by Structure Type

	Fiber	Bundle	Clump	Matrix	TOTAL
Structure Conc. (structures/cu cm)					
Chrysotile	0.001	0.000	0.000	0.000	0.001
Amphibole	0.000	0.000	0.000	0.000	0.000
Indeterminant	0.002	0.000	0.000	0.000	0.002
Mass Concentration (ng/cu meter)					
Chrysotile	0.07	0.00	0.00	0.00	0.07
Amphibole	0.00	0.00	0.00	0.00	0.00
Indeterminant	0.14	0.00	0.00	0.00	0.14

- The method detection limit is 4 times the analytical sensitivity. Analytical sensitivity is defined by the EPA as the asbestos concentration represented by each fiber counted under the electron microscope.
- TEM data is accurate to no more than one significant figure.
- Structures per cubic centimeter equals million structures per cubic meter.
- Amphibole asbestos includes amosite (i.e. grunerite - cummingtonite), crocidolite (i.e. riebeckite - magnesioriebeckite), anthophyllite, tremolite and actinolite.

Analyst [signature] Date 2/11/88

Lab Manager John Dagenhart II. Date 2/11/88

Med-Tox Associates, Inc. 1229 Morena Blvd San Diego, CA 92110 619-276-8843

MED-TOX ASSOCIATES, INC.

DAN MAPIER, M.S.
4005 CATHANN STREET
TORRANCE, CA 90503-6911
DAN MAPIER 213-316-1058

Job Number : 6380-1
Client Number : 37359
Med-Tox Number: 69200
Receipt Date : JANUARY 29, 1988
Report Date : FEBRUARY 11, 1988
Description :

VERY HEAVY FILTER LOADING.
SOME FIBERS MAY BE OBSCURED.

Analytical Sensitivity : 0.0012 (structures/cu cm)
Total Area Scanned : 102540 sq um
Magnification : 19400 x
Area of Original Filter : 3.85 sq cm
Dilution Factor : <not ashed>
Area Ashed : <not ashed>
Area of Membrane : <not ashed>
Volume of Air : 3132.0 liters
Total number of structs : 0
Filter type : mixed cellulose ester
Conductive Cowl : no

Dimensional Limitations:

Only structures with diameters greater than 0.3 um and lengths greater than 5.0 um are included in the data subset used to calculate the following results.

	Asbestos Structures	All Structures *
Total Concentration	< 0.005 (structures/cu cm)	< 0.005 (structures/cu cm)

* Because of heavy non-asbestos fiber loadings, only asbestos and indeterminant fibers were recorded in order to improve detection limits. Therefore these TEM results are not strictly comparable with PCM results.

Structure Concentrations by Structure Type
(structures/cu cm)

	Fiber	Bundle	Clump	Matrix	TOTAL
Chrysotile	0.000	0.000	0.000	0.000	0.000
Amphibole	0.000	0.000	0.000	0.000	0.000
Indeterminant	0.000	0.000	0.000	0.000	0.000
Non-Asbestos	0.000	0.000	0.000	0.000	0.000

- The method detection limit is 4 times the analytical sensitivity. Analytical sensitivity is defined by the EPA as the asbestos concentration represented by each fiber counted under the electron microscope.
- TEM data is accurate to no more than one significant figure.
- Structures per cubic centimeter equals million structures per cubic meter.
- Amphibole asbestos includes amosite (i.e. grunerite - cummingtonite), crocidolite (i.e. riebeckite - magnesioriebeckite), anthophyllite, tremolite and actinolite.

AIRBORNE ASBESTOS ANALYSIS BY TRANSMISSION ELECTRON MICROSCOPY (TEM) - DIMENSIONAL DATA
EPA Level I Method (Yanate et al.; 1984)

MED-TOX ASSOCIATES, INC.

DAN NAPIER, M.S.
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DAN NAPIER 213-316-1058

Job Number : 6380-1
Client Number : 37359
Med-Tox Number: 69200

Detailed Data For Structures Classified as FIBERS:

		Chrysotile	Amphibole	Indeterminant	Nonasbestos
Total Number of Structures Counted		1	0	2	0
Total Surface Area (sq um/cu meter)		720.3	0.0	1718.3	0.0
Length	geometric mean	1.2000	0.0000	1.6733	0.0000
	standard deviation	0.0000	0.0000	0.4259	0.0000
Diameter	geometric mean	0.1500	0.0000	0.1225	0.0000
	standard deviation	0.0000	0.0000	0.0355	0.0000

Detailed Data For Structures Classified as BUNDLES:

No Structures Detected in This Category.

Detailed Data For Structures Classified as CLUMPS:

No Structures Detected in This Category.

Detailed Data For Structures Classified as MATRICES:

No Structures Detected in This Category.

DETAILED DATA FOR ALL STRUCTURES:

Total Number of Structures Counted		1	0	2	0
Total Surface Area (sq um/cu meter)		720.3	0.0	1718.3	0.0
Length	geometric mean	1.2000	0.0000	1.6733	0.0000
	standard deviation	0.0000	0.0000	0.4259	0.0000
Diameter	geometric mean	0.1500	0.0000	0.1225	0.0000
	standard deviation	0.0000	0.0000	0.0355	0.0000

AIRBORNE ASBESTOS ANALYSIS BY TRANSMISSION ELECTRON MICROSCOPY (TEM) - DATA LISTING
EPA Level I Method (Yanata et al.; 1984)

MED-TOX ASSOCIATES, INC.

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4[illegible] THANE STREET
TORRANCE, CA 90503-6911
DAN NAPIER 213-316-1058

Job Number : 6380-1
Client Number : 37359
Med-Tox Number: 69200

Field No.	Structure No. per Field	Structure Type	Diameter (microns)	Length (microns)	Mass per Structure (fg)	Fibers per Structure	Structure Identification
2	1	fiber	0.15	1.20	55.13	1	chrysotile
4	1	fiber	0.10	1.40	28.59	1	indeterminant
5	1	fiber	0.15	2.00	91.89	1	indeterminant

- um = micron, a micron is one millionth of a meter.
- ng = nanogram, a nanogram is one billionth of a gram.
- fg = femtogram, a femtogram is one millionth of a nanogram.
- Masses of indeterminate and non-asbestos fibers are estimated by assuming a density of 2.6 grams per cubic centimeter.

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