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Project / Location: Richmond Industrial Fire; ALS-100 Mod. 1

PO Number: Not Provided

ALS Work Order: 23040798

**NARRATIVE:** Analysis was performed on an FEI Tecnai TEM at 100keV equipped with an EDAX/Ametek Octane T Plus Silicon Drift Detector System and Z2 Analyzer. Morphology, SAED, and EDXA used to determine fiber species. All sample collection is performed independent of ALS and is the sole responsibility of client. If collection or submission deviates from method requirements, then interpretation of the results via the method cannot be made. Samples archived for 60 days, prepared grids archived 3 years. Results apply only to portions of samples analyzed. Raw data validated by analyst. Representative EDXA spectra and/or SAED photomicrographs available upon request for an additional fee.

**REPORT LIMITS:** NIOSH Method 7402 (Issue 2, 15 August 1994), "The LOD depends on sample volume and quantity of interfering dust, and is <0.01 fiber/cc for atmospheres free of interferences." The AS for this method is based on the detection of one confirmed asbestos fiber in the total area analyzed and is expressed in fibers/mm<sup>2</sup> which is dependent upon the EFA of the media used and in fibers/cc(mL) which is dependent upon the air volume (L) collected as provided by the client. This method defines a fiber as any particle >5µm long, >0.25µm in diameter and having a length to width aspect ratio ≥3:1. As with any measurement statistically derived uncertainty data as it impacts this method should be considered when interpreting results. Measures of individual analyst and laboratory accuracy and precision are tabulated quarterly and available upon request.

**METHOD CODES:** "N7402" refers to air samples prepared by the direct transfer method and analyzed by TEM for airborne asbestos and other fibers according to NIOSH Method 7402 protocol. "N7402 IND" refers to samples exhibiting loose material, uneven loading, or overloading (>50% particulate coverage) which were prepared using an indirect method detailed in ASTM D5755. In either case, a minimum of 6 grid openings are analyzed and analysis is terminated upon completion of the opening containing the 100<sup>th</sup> fiber or the 40<sup>th</sup> grid opening, whichever is first. Results are not field blank corrected.

<sup>†</sup>This method calls for calculation of the fraction of optically visible asbestos (FOVA) which may be applied to PCM NIOSH Method 7400 results for the same filter or other filters for which the sample is representative in order to estimate the concentration of asbestos. The fraction reported herein is calculated;  $f_s/F_s$ . Where;  $f_s$  is the total number of asbestos fibers detected by TEM, and  $F_s$  is the combined total of all fibers (asbestos and non-asbestos) detected by TEM.

ALS SOP ID: TEM-SOP-NIOSH-058 Operations; "TEM NIOSH 7402 Analysis"

**ACRONYMS:** TEM=Transmission Electron Microscope, SAED=Selected Area Electron Diffraction, EDXA=Energy Dispersive X-ray Analysis, LOD=Limit of Detection, AS=Analytical Sensitivity, EFA=Effective Filter Area, NA=Not Applicable, ND=None Detected, NAF=Non-asbestos fiber  
**ALS is accredited for NIOSH Method 7402 through New York ELAP (Lab#11371).**

*Pamela M. Hizar*

Pamela M. Hizar

ALS Asbestos & Microscopy Technical Lead & Department Manager

# SAMPLE IDENTIFICATION

Client Sample ID:	RIF-PA01-HV-20230420	RIF-PA01-LV-20230420	RIF-PA02-HV-20230420-b	RIF-PA02-LV-20230420-a	RIF-PA02-HV-20230420-a
ALS Sample ID:	23040798-01A	23040798-02A	23040798-03A	23040798-04A	23040798-05A
Method:	N7402	N7402	N7402	N7402	N7402
Analyst:	Pamela Hizar	Pamela Hizar	Pamela Hizar	Pamela Hizar	Pamela Hizar
Date:	4/21/2023	4/21/2023	4/21/2023	4/21/2023	4/21/2023
Air Volume (L):	4176.14	1279.56	4226.19	1273.17	4238.56
Fraction Filtered:	NA	NA	NA	NA	NA
Openings:	40	40	40	40	40
Open Area (mm <sup>2</sup> ):	0.0102	0.0102	0.0102	0.0102	0.0102
AS: Fibers/mm <sup>2</sup> :	2.45	2.45	2.45	2.45	2.45
AS: Fibers/cc(mL):	0.0002	0.0007	0.0002	0.0007	0.0002

# ASBESTOS COUNT

Chrysotile:	0	0	0	0	0
Amosite:	0	0	0	0	0
Crocidolite:	0	0	0	0	0
Actinolite:	0	0	0	0	0
Tremolite:	0	0	0	0	0
Anthophyllite:	0	0	0	0	0
Total Asbestos:	0	0	0	0	0

# ASBESTOS CONCENTRATIONS

Fibers/mm <sup>2</sup> :	<AS	<AS	<AS	<AS	<AS
Fibers/cc(mL):	<AS	<AS	<AS	<AS	<AS

# NON-ASBESTOS FIBERS (NAF)

Count:	2	2.5	1	0	3
Fibers/mm <sup>2</sup> :	4.90	6.13	2.45	<AS	7.35
Fibers/cc(mL):	0.0005	0.0018	0.0002	<AS	0.0007
Dominant NAF:	Organic	Cellulose, Organic	Mineral	ND	Mineral
Prep Comments:	NA	NA	NA	NA	NA
Analysis Comments:	NA	NA	NA	NA	NA

Results Comments:	Biased; fiber counts outside optimal range.	Biased; fiber counts outside optimal range.	Biased; fiber counts outside optimal range.	Biased; fiber counts outside optimal range.	Biased; fiber counts outside optimal range.
FOVA <sup>T</sup> :	0	0	0	0	0

# SAMPLE IDENTIFICATION

	RIF-PA02-LV-	RIF-PA03-HV-	RIF-PA03-LV-	RIF-PA04-HV-	RIF-PA04-LV-
Client Sample ID:	20230420-b	20230420	20230420	20230420	20230420
ALS Sample ID:	23040798-06A	23040798-07A	23040798-08A	23040798-09A	23040798-10A
Method:	N7402	N7402	N7402	N7402	N7402
Analyst:	Pamela Hizar	Pamela Hizar	Pamela Hizar	Pamela Hizar	NA
Date:	4/21/2023	4/21/2023	4/21/2023	4/21/2023	NA
Air Volume (L):	1254.65	4364.5	1308.49	4114.23	1267.56
Fraction Filtered:	NA	NA	NA	NA	NA
Openings:	40	40	40	40	0
Open Area (mm <sup>2</sup> ):	0.0102	0.0102	0.0102	0.0102	0.0102
AS: Fibers/mm <sup>2</sup> :	2.45	2.45	2.45	2.45	NA
AS: Fibers/cc(mL):	0.0008	0.0002	0.0007	0.0002	NA

# ASBESTOS COUNT

Chrysotile:	0	0	0	0	NA
Amosite:	0	0	0	0	NA
Crocidolite:	0	0	0	0	NA
Actinolite:	0	0	0	0	NA
Tremolite:	0	0	0	0	NA
Anthophyllite:	0	0	0	0	NA
Total Asbestos:	0	0	0	0	NA

# ASBESTOS CONCENTRATIONS

Fibers/mm <sup>2</sup> :	<AS	<AS	<AS	<AS	NA
Fibers/cc(mL):	<AS	<AS	<AS	<AS	NA

# NON-ASBESTOS FIBERS (NAF)

Count:	0	1	0	1	NA
Fibers/mm <sup>2</sup> :	<AS	2.45	<AS	2.45	NA
Fibers/cc(mL):	<AS	0.0002	<AS	0.0002	NA
Dominant NAF:	ND	Organic	ND	Gypsum	NA
Prep Comments:	NA	NA	NA	NA	MISSING FILTER
Analysis Comments:	NA	NA	NA	NA	NOT ANALYZED

Results Comments:	Biased; fiber counts outside optimal range.	Biased; fiber counts outside optimal range.	Biased; fiber counts outside optimal range.	Biased; fiber counts outside optimal range.	NA
FOVA <sup>T</sup> :	0	0	0	0	NA

# SAMPLE IDENTIFICATION

	RIF-UW01-HV-	RIF-UW01-LV-	RIF-CA01-HV-	RIF-CA02-HV-	RIF-LM02-ABZ-
Client Sample ID:	20230420	20230420	20230420	20230420	20230420
ALS Sample ID:	23040798-11A	23040798-12A	23040798-13A	23040798-14A	23040798-15A
Method:	N7402	N7402	N7402	N7402	N7402
Analyst:	Pamela Hizar	Pamela Hizar	Pamela Hizar	Pamela Hizar	Pamela Hizar
Date:	4/21/2023	4/21/2023	4/21/2023	4/21/2023	4/21/2023
Air Volume (L):	4064	1210.7	4310.36	4388.9	859.18
Fraction Filtered:	NA	NA	NA	NA	NA
Openings:	40	40	40	40	40
Open Area (mm <sup>2</sup> ):	0.0102	0.0102	0.0102	0.0102	0.0102
AS: Fibers/mm <sup>2</sup> :	2.45	2.45	2.45	2.45	2.45
AS: Fibers/cc(mL):	0.0002	0.0008	0.0002	0.0002	0.0011

# ASBESTOS COUNT

Chrysotile:	0	0	0	0	0
Amosite:	0	0	0	0	0
Crocidolite:	0	0	0	0	0
Actinolite:	0	0	0	0	0
Tremolite:	0	0	0	0	0
Anthophyllite:	0	0	0	0	0
Total Asbestos:	0	0	0	0	0

# ASBESTOS CONCENTRATIONS

Fibers/mm <sup>2</sup> :	<AS	<AS	<AS	<AS	<AS
Fibers/cc(mL):	<AS	<AS	<AS	<AS	<AS

# NON-ASBESTOS FIBERS (NAF)

Count:	5	0	5.5	1	4
Fibers/mm <sup>2</sup> :	12.25	<AS	13.48	2.45	9.80
Fibers/cc(mL):	0.0012	<AS	0.0012	0.0002	0.0044
Dominant NAF:	Organic	ND	Organic, Mineral	Organic	Organic, Mineral
Prep Comments:	NA	NA	NA	NA	NA
Analysis Comments:	NA	NA	NA	NA	NA

Results Comments:	Biased; fiber counts outside optimal range.	Biased; fiber counts outside optimal range.	Biased; fiber counts outside optimal range.	Biased; fiber counts outside optimal range.	Biased; fiber counts outside optimal range.
FOVA <sup>T</sup> :	0	0	0	0	0

## SAMPLE IDENTIFICATION

	RIF-LM01-CBZ-	Equipment Blank-	Lot Blank-
Client Sample ID:	20230420	20230420	20230420
ALS Sample ID:	23040798-17A	23040798-18A	23040798-19A
Method:	N7402	N7402	N7402
Analyst:	Pamela Hizar	Pamela Hizar	Pamela Hizar
Date:	4/21/2023	4/21/2023	4/21/2023
Air Volume (L):	825.4	0	0
Fraction Filtered:	NA	NA	NA
Openings:	40	40	40
Open Area (mm <sup>2</sup> ):	0.0102	0.0102	0.0102
AS: Fibers/mm <sup>2</sup> :	2.45	2.45	2.45
AS: Fibers/cc(mL):	0.0011	NA	NA

## ASBESTOS COUNT

Chrysotile:	0	0	0
Amosite:	0	0	0
Crocidolite:	0	0	0
Actinolite:	0	0	0
Tremolite:	0	0	0
Anthophyllite:	0	0	0
Total Asbestos:	0	0	0

## ASBESTOS CONCENTRATIONS

Fibers/mm <sup>2</sup> :	<AS	<AS	<AS
Fibers/cc(mL):	<AS	NA	NA

## NON-ASBESTOS FIBERS (NAF)

Count:	4.5	0	0
Fibers/mm <sup>2</sup> :	11.03	<AS	<AS
Fibers/cc(mL):	0.0051	NA	NA
Dominant NAF:	Organic	ND	ND
Prep Comments:	NA	NA	NA
Analysis Comments:	NA	NA	NA

Biased; fiber counts outside optimal range. Biased; fiber counts outside optimal range. Biased; fiber counts outside optimal range.

FOVA<sup>T</sup>: 0 0 0

## PHOTOMICROGRAPHS

Collected using Gatan Digital Micrograph, OMAX Digital Camera, and/or iPhone/Smartphone and adapters.

23040798-10; No filter inside cassette upon receipt. Only rim remains suggesting high flow rate pulled filter out.

