ASBESTOS
OPERATIONS AND MAINTENANCE PLAN
FOR
HISTORIC BULLION PLAZA CULTURAL CENTER AND MUSEUM

FUNDED BY: COPPER CORRIDOR BLIGHT BUSTERS BROWNFIELDS COALITION ASSESSMENT GRANT

150 NORTH PLAZA CIRCLE
MIAMI, GILA COUNTY, ARIZONA 85539
APN: 204-15-012A

ATLAS PROJECT NO. 1052000242, PHASE 4

REPORT DATE: FEBRUARY 17, 2023

Prepared by:

Atlas Technical Consultants LLC
9185 South Farmer Road, Suite 111
Tempe, Nevada 85284
Phone: (480) 894-2056
Fax: (480) 894-2497

Prepared for:

Copper Corridor Blight Busters
Brownfields Coalition
1400 East Ash Street
Globe, Gila County, Arizona 85501
Phone: (928) 402-4392

TABLE OF CONTENTS

1.0 INTRODUCTION

Atlas has prepared this Asbestos Operations and Maintenance (O&M) Plan for the Historic Bullion Plaza Cultural Center and Museum property (Subject Property), located at 150 North Plaza Circle in Miami, Arizona, which consists of a two-story building with basement that was constructed in 1923. The Subject Property building was opened as a grammar school from 1934 until 1994. In 1997, the Town of Miami purchased the Subject Property from the school district and committed to using it as a cultural center and museum. The Subject Property building was accepted for listing in the National Register of Historic Places in 2000.

The Subject Property building is surrounded by asphalt pavement and gravel surfaced areas, herein referred to as the "Subject Property." Site Plans for each floor are included in Appendix A.

The purpose of this O&M Plan is to assure the proper maintenance of asbestos containing materials (ACMs) at the Subject Property and to prevent exposure to asbestos fibers. The U.S. Environmental Protection Agency (EPA) and the Occupational Safety and Health Administration (OSHA) define ACMs as any materials that contains greater than one percent (>1%) asbestos. Atlas was provided with the *Asbestos Containing Material Survey Report of Historic Bullion Plaza Cultural Center and Museum, 150 North Plaza Circle, Miami, Gila County Arizona 85539, dated February 10, 2023* and prepared by Atlas Technical Consultants LLC (Atlas). During the ACM Survey Report by Atlas, sampling of the roofing materials was not included as part of the scope of work. Additionally, Atlas was unable to conduct a destructive investigation (cutting selective access holes in walls, ceilings, pipe chases, mechanical equipment, etc.) to assess concealed materials that were not readily apparent. Atlas could not conduct fully destructive investigation on floors to identify multi-layered tile/underlayment systems/concealed paper, vapor barriers, floor tiles/mastics under vinyl floor systems even though they attempted to classify multiple layers when noted. Atlas was unable to conduct destructive investigation of doors in the building to determine if the doors were insulated for fire-rating purposes. Additional ACM may be present at the Site in inaccessible or concealed spaces. These spaces include, but are not limited to, pipe chases, spaces between wall/ceiling/door/floor cavities, interior of mechanical components such as, interior ducts, beneath foundation pads, etc. Atlas recommends that all unidentified materials should be treated as assumed ACM, until analytical tests prove otherwise. The building materials that were excluded or unable to be sampled due to destructive limitations, excluding glass, wood or metal, will be presumed asbestos containing materials (PACM).

In both the OSHA Construction Asbestos Standard (29 CFR 1926.1101) and the General Industry Asbestos Standard (29 CFR 1910.1001) PACM is defined as thermal system insulation (TSI) and surfacing material found in a building constructed no later than 1980. TSI is the material applied to pipes, fittings (joints, "Ts", elbows, valves, etc.), boilers, breechings, tanks, ducts or other structural components, generally to prevent heat loss or gain. Surfacing material refers to materials sprayed, troweled-on or otherwise applied to surfaces generally for acoustical, fireproofing, or other purposes. Examples of surfacing materials include decorative finishes on ceilings and walls, fireproofing on structural members, and acoustical plasters. OSHA requires that building owners identify PACM in their buildings and treat the PACM as ACM, until the materials are proven not to contain asbestos.

Although not defined strictly as "PACM," both OSHA standards also require asphalt and vinyl flooring material installed no later than 1980 be "considered" and "treated" as asbestos-containing, until the building owner proves the flooring is not ACM. This includes not only the flooring material but associated mastics and backings.

This O&M Plan was designed to provide specific procedures for the maintenance of the PACM.

1.1 Property Description

The property building improvements consist of the following as of February 2023:

PROPERTY IMPROVEMENTS	
Size of Property (approximate)	2.48 acres
Adjoining and/or Access/Egress Roads	North Live Oak Canyon to the north, North Plaza Circle to the east and West Laurel Street to the west of the Subject Property provide access/egress to the Subject Property.
Paved or Concrete Areas (including parking)	Asphalt-paved parking areas and concrete-paved sidewalks and curbing.
Unimproved Areas	None
Landscaped Areas	Landscaping is located along the eastern, southern and western Subject Property boundaries.
Number of Occupied Buildings	One
Building Name or General Building Description	Historic Bullion Plaza Cultural Center and Museum
Number of Floors	Two with a basement
Total Square Feet of Space (approximate)	48,000
Construction Completion Date (year)	1923

PROPERTY IMPROVEMENTS	
Construction Type	Lightly reinforced, cast-in-place concrete and plaster exterior walls, wood frame first and second floors and a wood frame roof. Interior walls are typically plaster on wood frame. The foundation consists of continuous spread wall footings and isolated pier footings.
Interior Finishes Description	Flooring: Floor tile, ceramic tile, vinyl sheet flooring, carpet, epoxy coated concrete, concrete; Walls: Brick and mortar, drywall, plaster, wall tile, concrete; Ceilings: Plaster, acoustical ceiling panels, fiberboard, concrete
Exterior Finishes Description	Brick and mortar, plaster

1.2 Asbestos Containing Materials (ACMs)

This O&M Plan is based on results obtained from a visual and ACM survey of the Property for suspect ACM conducted by Atlas on November 16-18, 2022, during the *Asbestos Containing Material Survey Report of Historic Bullion Plaza Cultural Center and Museum, 150 North Plaza Circle, Miami, Arizona 85539, dated February 10, 2023*. PACM for the Subject Property building during Atlas' Survey included roofing materials, exterior building materials and any other areas that were not sampled because the building materials were in inaccessible or concealed spaces. As a reminder, these building materials were not sampled and should be considered PACM, until sampled and proven not to contain ACM.

In the ACM Survey Report of the Historic Bullion Plaza Cultural Center and Museum, a total of 119 representative bulk samples of suspect ACMs were collected from 35 identified HAs at the Subject Property. Subsequent laboratory analyses determined that 33 of the HAs were not considered ACM. Laboratory analyses confirmed two HA were identified as an ACM. The identified ACM are summarized in Table 1.2-1.

Table 1.2-1: Identifed ACM – Historic Bullion Plaza Cultural Center and Museum

Summary of Identified ACM Historic Bullion Plaza Cultural Center and Museum 150 North Plaza Circle Miami, Arizona 85539 Survey Date: November 16-18, 2022							
Sample No.	Homogenous Material	Location/ Functional Space	Asbestos Content	Friable	Condition	Approx. Quantity	NESHAP Category
Flooring Materials							
*F19-A *F19-B *F19-C	Floor Tile & Mastic – 12"x12", Cream with Light Gray Streaks and Black Mastic	1st Floor Breakroom Bathroom (2 rooms)	Floor Tile - 2.30 to 2.53% % Chrysotile by TEM Black Mastic – 1.08 to 1.25% Chrysotile by	No	Good	60 SF	CAT I/ CAT II

Summary of Identified ACM Historic Bullion Plaza Cultural Center and Museum 150 North Plaza Circle Miami, Arizona 85539 Survey Date: November 16-18, 2022							
Sample No.	Homogenous Material	Location/ Functional Space	Asbestos Content	Friable	Condition	Approx. Quantity	NESHAP Category
			TEM				
Miscellaneous Materials							
*M1-A *M1-B *M1-C	**Pipe Insulation – White Powdery Chalky	Basement / Crawl Space	Pipe Insulation = 50% Chrysotile by TEM	Yes	Fair to Poor	600 LF	RACM
*ND = Non Detect; NA = Not Applicable; SF = Square Feet; TEM = Transmission Electron Microscopy; * = Sample also analyzed by TEM; Friability, Condition, quantity, and NESHAP categories provided for ACMs only. Bold indicates ACM. Bulk sample colors observed in the field may not reflect colors identified within the lab report.*							

This O&M Plan document is an ongoing document that should be updated as necessary. Future sampling, prior sampling, O&M activities and on-going response actions (i.e. small and large abatement activities) at the Subject Property should be documented, continually incorporated into this document and placed in Appendix I.

1.3 Asbestos Awareness

Asbestos is the common name for a group of naturally occurring mineral silicates, which are resistant to heat and chemicals. Asbestos minerals are particularly useful as insulating, fireproofing, and strengthening additives for construction materials. The unique characteristics of asbestos have resulted in a very diverse use of the material over the years. Typical uses of materials in buildings include spray-applied fireproofing, boiler/mechanical equipment insulation, architectural ceiling fixtures, ceiling tile, floor covering, wall texture, steam and water pipe insulation, and transite panels on cooling towers or exterior walls. Asbestos Safety Data Sheets (SDS) can be found in Appendix C.

Exposure to asbestos can potentially result in various diseases. Three common diseases, asbestosis, mesothelioma, and lung cancer, are associated with asbestos exposure. Asbestos diseases generally have a latency period ranging from 10 to 40 years following initial exposure.

Typical remedial options to address the presence of asbestos include removal, enclosure, repair, or encapsulation. If any option other than removal is chosen, it is recommended that an Asbestos O&M Plan be instituted, which will serve to reduce

exposure of potential ACMs. Even if removal is planned, an O&M Plan is recommended as an interim control measure.

An O&M Plan is a detailed approach to controlling the potential disturbance of ACM. An O&M Plan will involve staff engineers, maintenance personnel, custodial and housekeeping personnel, and outside contractors who may occasionally need to work in close proximity to ACMs.

1.4 Summary of O&M Plan

The purpose of this O&M Plan is to comply with the Occupational Safety and Health Administration (OSHA) Regulations found in 29 CFR 1926.1101 and 1910.1001 (Appendix D), and guidelines found in the U.S. Environmental Protection Agency (EPA) Managing Asbestos In Place: Building Owner's Guide To O&M Programs For ACMs to implement a satisfactory approach to controlling the potential disturbance of ACM. Copies may be obtained from regional EPA or government publication centers.

The O&M Plan is designed to:

1) Facilitate clean-up of released asbestos fibers.
2) Reduce future asbestos fiber release by minimizing ACM disturbance or damage.
3) Control maintenance, custodial, and renovation activities to prevent uncontrolled disturbance of ACM.
4) Monitor the condition of ACM.

The O&M Plan will provide for the notification of the Subject Property' staff and outside contractors as to the presence, location, and quantity of ACM. In addition, it will include the institution of proper work practices and engineering controls when conducting activities that involve contacting or disturbing ACM, the establishment of a process that documents that ACM is not disturbed in an uncontrolled manner during building maintenance and housekeeping activities, and the periodic inspection of areas where ACM has been identified.

Specifically, this O&M Plan consists of the following elements:

- Addressing low, moderate, high, and immediate hazards.
- Normal maintenance activities.
- Work by outside contractors.

- Minor fiber release episodes.
- Major fiber release episodes.
- Proper disposal of asbestos wastes.
- Periodic inspection of ACM.
- Record keeping.

The O&M Plan also includes notifying appropriate personnel and outside contractors of the restrictions on disturbance of ACM.

1.5 Policy

All employees working at the Subject Property are to be notified of the ACMs within the buildings. All employees are cautioned against engaging in activities, which could disturb ACM.

- All employees are reminded that ACM removal must be undertaken by qualified contractor personnel and that they are prohibited from conducting or participating in abatement activities. All employees are prohibited from entering asbestos abatement enclosures for any reason.

- Activities adjacent to ACM or with ACM disturbance potential should be curtailed until approved methods for engaging in such activities have been issued.

- All employees must participate in the asbestos awareness training program explained in the text. If the staff engineers and maintenance personnel at the Subject Property will pursue a "Hands-on" approach to ACM O&M work, they will need to attend an OSHA 16-hour Asbestos O&M Training Program explained in the text.

2.0 PARTICIPATION AND ROLE DEFINITION

The success of the O&M Plan depends on the active participation of many persons. The identified participants at the Subject Property and outside contractors must clearly understand their roles in the O&M Plan. Participation and role definitions for the O&M Plan are described below.

2.1 Apartments Personnel

2.1.1 O&M Plan Coordinator

An employee selected at the discretion of the Subject Property owner will be the designated O&M Plan Coordinator and is responsible for asbestos related issues at the site. The O&M Plan Coordinator will attend an EPA-accredited 16-hour asbestos O&M training course and will read and understand this O&M manual. The O&M Plan Coordinator must also attend an annual 8-hour refresher class. The O&M Plan Coordinator will serve as the OSHA "Competent Person."

The O&M Plan Coordinator is responsible for coordinating all activities involving contact with ACM and potential ACM disturbance, ACM abatement, construction, and Renovation activities at the Subject Property. The O&M Plan Coordinator will apprise all outside contractor(s) of the location, presence, and quantity of ACM, as applicable, in each such contractor work area, as indicated in this document and the prior asbestos survey included in Appendix I. Prior to initiation of any work activities, which would potentially disturb ACM, a Maintenance Work Approval Form (Appendix G) should be reviewed and approved by the O&M Plan Coordinator. When required by this document or directed by the environmental consultant, the O&M Plan Coordinator will require work to be performed by an asbestos abatement contractor.

Additionally, the O&M Plan Coordinator will be the primary contact for employees and contractors who may have questions regarding ACM and/or the O&M Plan. Activities that will potentially disturb or contact the identified ACM must be brought to the attention of the O&M Plan Coordinator. The Maintenance Work Approval Form must be completed and the proper procedures for handling and contacting these ACMs must be specified by the O&M Plan Coordinator, prior to initiation of the work. The O&M Plan Coordinator is responsible for maintaining any asbestos related documentation.

The O&M Plan Coordinator should have the following qualifications:

- Knowledge of each building system and the locations of ACMs.
- Competence to maintain necessary records contained within this O&M Plan.
- Understanding of the assumed ACMs observed by Atlas and this O&M Plan.

The O&M Plan Coordinator for Historic Bullion Plaza Cultural Center and Museum is Mr./Ms_____.
His/Her designation is _____.
He/She can be contacted at the Subject Property_____.
In case of emergencies, he/she can be contacted at _____.
Alternately, Mr./Ms. _____ has been identified as the back-up O&M Plan Coordinator.
He/She can be reached at _____ during the said business hours and at _____ during non-business hours.

2.1.2 Staff Engineers and Maintenance Personnel

If the staff engineers and maintenance personnel at the Subject Property will pursue a "Hands-on" approach to ACM O&M work, they will need to attend an OSHA 16-hour Asbestos O&M Training Program and will need to read and understand this O&M manual. An annual O&M training refresher course must be taken for 16-hour O&M trained personnel. Newly hired staff engineers and maintenance personnel will also need to attend the 16-hour Asbestos O&M Training Program within 60 days of being hired. Staff engineers and maintenance personnel shall immediately report to the O&M Plan Coordinator the discovery of any believed damage or disturbance of any ACM at the Subject Property. Staff engineers and maintenance personnel, who as a direct result of their duties in the maintenance of the Subject Property may contact or disturb ACM, should be trained and knowledgeable in the special techniques and procedures required for contact with and disturbance of ACM. These techniques and procedures must be consistent with the scope of their duties.

The engineering staff and maintenance personnel shall be trained to recognize ACM and damage to ACM and advised in the special techniques and procedures required in working around ACM, as required for OSHA Class III workers. They shall immediately notify the O&M Plan Coordinator if they discover, disturb, or damage ACM. A Maintenance Work Approval Form must be completed prior to beginning work that may potentially impact ACM.

If the staff engineers and maintenance personnel at the Subject Property will pursue a “Hands-off” approach to ACM repair/removal or other response actions as

per the direction of the Subject Property owner, they shall participate in a 2-hour Asbestos Awareness training on an annual basis. A 2-hour Asbestos Awareness training video should be purchased and kept with the O&M Plan Coordinator for on-site viewing. Newly hired custodial and housekeeping personnel must be provided the OSHA 2-hour Asbestos Awareness training within 60 days of being hired. Staff engineers and maintenance personnel shall be made aware of the presence, location, and quantity of ACM as required for OSHA Class IV workers.

2.1.3 Custodial and Housekeeping Personnel

If the Subject Property owner establishes a "Hands-off" approach to asbestos maintenance, all current and future custodial and housekeeping personnel shall be provided OSHA 2-hour Asbestos Awareness training on an annual basis. Newly hired custodial and housekeeping personnel must be provided the OSHA 2-hour Asbestos Awareness training within 60 days of being hired. Custodial and housekeeping personnel shall be made aware of the presence, location, and quantity of ACM as required for OSHA Class IV workers.

2.2 Contractors

Outside contractors other than asbestos abatement contractor(s), may be engaged to perform construction, alteration, renovation, or other work at the Subject Property from time to time.

Contractors shall not perform any work in the Subject Property until the scope of work to be performed has first been reviewed with the O&M Plan Coordinator to determine if the contractor will be working in an area that contains asbestos. If the area does contain asbestos, the contractor must complete a Maintenance Work Approval Form and must be provided with written authorization to proceed from the O&M Plan Coordinator. Contractors shall not perform work in areas of the Subject Property identified to contain ACM unless the O&M Plan Coordinator has determined that the contractor's work, if properly performed, would not contact or disturb ACM.

2.3 Asbestos Abatement Contractor

The asbestos abatement contractor is an independent contractor performing specific work practices at the Subject Property, which are identified in this O&M Plan that may include asbestos removal, repair, encapsulation or disposal of ACM. All asbestos abatement contractors and their abatement workers must be licensed by

an approved Environmental Protection Agency (EPA) Asbestos Hazard Emergency Response Act (AHERA) training provider. All asbestos abatement contractors shall be duly licensed and shall furnish a copy of such license to the O&M Plan Coordinator to be kept on file at the Subject Property. An asbestos contractor is part of the emergency response team and must be retained under contract for response to asbestos related emergencies.

Each asbestos abatement contractor shall perform work at the Subject Property in accordance with this O&M Plan, and any abatement specifications issued by the environmental consultant engaged by the Subject Property in accordance with applicable OSHA, EPA, and the Arizona Department of Environmental Quality regulations, since they have jurisdiction over Gila County.

2.4 Environmental Consultant

The environmental consultant will advise the O&M Plan Coordinator, as requested, in recommended techniques and procedures for managing contact and disturbance of ACM. The environmental consultant advises the O&M Plan Coordinator regarding modifications to the O&M Plan, serves as a liaison between the O&M Plan Coordinator and the asbestos abatement contractor(s) and, to the extent necessary, between the O&M Plan Coordinator and other outside contractors. The environmental consultant prepares and issues all abatement specifications and performs all bulk sampling, analysis, and air monitoring at the Subject Property as needed. The environmental consultant can conduct education and training programs required under this O&M Plan. The environmental consultant will be accredited for each asbestos discipline performed. Please ask for the asbestos manager or industrial hygiene manager at the following Atlas office:

Atlas Technical Consultants LLC
9185 South Farmer Avenue, Suite 111
Tempe, Arizona 85284
Phone: (480) 894-2056
Fax: (480) 894-2497

3.0 TRAINING

Subject Property personnel who may potentially disturb or come into contact with ACMs, should receive the EPA 16-hour O&M Asbestos Training Program for OSHA Class III work (refer to Section 6.2.3) which includes the following:

- Asbestos and its various uses and forms.
- Medical concerns associated with asbestos exposure and health effects associated with smoking.
- Mechanisms for exposure and techniques to limit exposure.
- Response actions to control ACM.
- Presence, quantity, and location of ACM located at the Subject Property.
- Respiratory protection and the use of respirators.
- Recognition of potentially hazardous conditions including damage, delamination, and deterioration to the ACM.
- Procedures for reporting hazardous or potentially hazardous situations associated with the ACM to the O&M Plan Coordinator.
- Review of OSHA Class III and IV Work Practices.
- Hands-on procedures dealing with work practices and handling of ACM.

Personnel who should attend the EPA 16-hour O&M Asbestos Training consist of staff engineers and maintenance personnel. An annual 8-hour O&M refresher training course must be taken for 16-hour O&M trained personnel. Newly hired Subject Property staff engineers and maintenance personnel will receive this 16-hour training within 60 days of employment. The O&M Plan Coordinator should attend an EPA accredited 16-hour asbestos O&M training course, and must attend an annual 8-hour O&M refresher class.

All current and future custodial and housekeeping personnel shall be provided EPA 2-hour Asbestos Awareness training on an annual basis. Newly hired custodial and housekeeping personnel will receive this training within 60 days of employment. Attendance sheets and records of all training activities shall be maintained by the O&M Plan Coordinator. This form (Form 1) is included in Appendix B. The EPA 2-hour Asbestos Awareness training for custodial and housekeeping personnel should include the following:

- Background information on asbestos.
- Health effects of asbestos.
- Health effects of smoking - the relationship between smoking and asbestos exposure.

- Review of the O&M Plan.
- Recognition of ACM damage, delamination, and deterioration.
- Presence, quantity, and location of ACM located at the Subject Property.

The EPA's "Managing Asbestos In Place: A Building Owner's Guide to O&M Programs for ACMs", the OSHA Asbestos Standard for Construction 29 CFR 1926.1101, and the General Industry Standard 29 CFR 1910.1001 should be utilized as training references. Copies may be obtained from regional EPA or government publication centers. Copies of OSHA regulations are located in Appendix D.

Attendance sheets and other records of training activities shall be maintained by the O&M Plan Coordinator and attached to this O&M Plan using Forms 1 and 2 in Appendix B.

Prior to being allowed to perform any activities which may potentially disturb ACM or activities in which they may come into contact with ACM, and as a requirement of completing the EPA 16-hour O&M Asbestos Training Program, attendees shall successfully complete a written examination covering the information presented in the training program.

4.0 WORKER PROTECTION

The O&M Plan Coordinator, staff engineers, and maintenance personnel are allowed to perform Class III asbestos related work activities in accordance with this O&M Plan. The custodial and housekeeping personnel working at the Subject Property are not expected to be exposed to the conditions warranting participation in any of the following programs during their normal work activities because they will not be performing Class III asbestos work activities. These protection programs and guidelines will include the following:

- Establishment of a Medical Surveillance (Medical Monitoring) Program.
- Establishment of a Respiratory Protection Program.
- Use of Personal Protective Clothing and Equipment.
- Exposure Monitoring (Air Monitoring).

The following sections outline these various worker protection programs and guidelines.

4.1 Medical Surveillance (Medical Monitoring)

If the Subject Property owner establishes a "Hands-off" approach to ACM repair/removal or other response actions and makes a policy decision regarding the use of the services of an EPA AHERA licensed Abatement Contractor and Consultant to perform these tasks, then the Medical Surveillance Program requirements of an O&M Plan included in this document for necessary reference may not be required to be implemented by the Subject Property owner, if the "Hands-off" policy is in effect. These requirements are included in this plan as a function of complying with the required elements of an O&M Plan, should the policy on asbestos O&M change in the future.

If the Subject Property maintenance staff will pursue a "Hands-on" approach to asbestos maintenance, a Medical Surveillance Program (see Appendix K) will be required for Subject Property employees who:

- Wear negative-pressure respirators (see Attachment A of the Respiratory Protection Program in Appendix J for a copy of the written Respirator Program); or

- Are exposed to concentrations of airborne asbestos fibers expected to be above the OSHA Permissible Exposure Limit (PEL) of 0.1 per cubic centimeter (f/cc) for an 8-hour time-weighted average; or
- Are exposed to concentrations of airborne asbestos fibers expected to be above the OSHA Excursion Limit (EL) of 1 f/cc for a sampling period of 30 minutes for a combined total of 30 or more days a year.

Employees at the Subject Property who may conduct hands-on maintenance and emergency response asbestos work are expected to wear a negative-pressure respirator.

This program includes a pre-employment physical, annual physical re-examinations, and an exit physical when leaving the company at no cost to the employee. The physical shall include the following, at a minimum:

- Complete occupational/environmental medical history.
- Medical and work history to determine the presence of possible respiratory diseases.
- Pulmonary function tests (forced vital capacity and forced expiratory volume at one second) and physical exam focusing on pulmonary and gastrointestinal system.
- Chest X-rays - posterior-anterior, 14″×17″, read by the ILO Method (administered at the discretion of the physician).

In addition, the attending physician must approve the employee to wear a respirator and to work with asbestos. The O&M Plan Coordinator should designate a listing of physicians in the area and keep them on file.

OSHA regulation 29 CFR 1926.1101 (Construction Standard) outlines the requirements and components of Medical Surveillance Programs. Form 3 (Appendix E) is to be used to document medical surveillance for personnel included in the Medical Surveillance Program.

The designated physician should be informed of the type of examination required for the Medical Surveillance Program and the need to be familiar with OSHA regulations. The examining physician will be asked to sign a statement that the medical examination given is consistent with OSHA requirements and that the examined employee is physically able to perform the required work, which may include wearing a negative pressure air-purifying respirator.

All medical records will be maintained on file by the examining physician for at least 30 years after the employee leaves the Subject Property, and be available to each employee participating in the Medical Surveillance Program. Copies of medical records pertaining to the employees of the Subject Property will be stored separately from personnel files, maintained by the examining physician, and access to these medical records must be restricted to the O&M Plan Coordinator and to the individual affected employee. The examining physician will be notified that he/she will be the primary holder of the medical records. Prior to the disposal of any of these records, the O&M Plan Coordinator must be notified.

4.2 Respiratory Protection

Respiratory protection is mandatory for 16-hour trained Subject Property employees while performing the O&M activities specified in this O&M Plan. The respiratory protection requirements identified in 1910.134 are more fully set forth in the Subject Property written Respirator Program attached as Attachment A of the Respiratory Protection Program (Appendix J) and are summarized below. Respiratory protection is to be utilized:

- While conducting cleaning activities such as high efficiency particulate air (HEPA) vacuuming of carpets in areas where friable (ACM which when dry, may be crumbled, pulverized, or reduced to powder by hand pressure) or damaged ACM is present.
- While conducting repairs to ACM.
- While conducting maintenance activities that may potentially disturb ACM.

Half-face negative pressure air-purifying respirators equipped with HEPA cartridges shall be utilized for the above listed activities, at a minimum. Respirators and filter cartridges shall be NIOSH (National Institute for Occupational Safety and Health)-approved and certified for use in atmospheres containing ACM fibers. Under no circumstances shall disposable dust masks be used for any work involving ACMs, as they do not provide adequate protection.

Individual qualitative fit-testing and fit test certification shall be conducted by the O&M Plan Coordinator or the environmental consultant prior to issuing respirators and every six months thereafter. The Respirator Fit Test Record Form 4 (Appendix E) is to be used for personnel who will be required to wear respirators and this fit test record must be kept on file.

All employees who may be exposed to concentrations of airborne asbestos fibers expected to be above the OSHA PEL or EL should wear a respirator. OSHA requires that employers select and provide, at no cost to the employee, an appropriate respirator, and ensure that the employee uses the respirator.

Employees who may perform the Class III O&M activities as described in *Section 5.0 Operations and Maintenance Procedures* are required to wear a respirator. Only those employees who have been: (1) approved by a medical doctor for respirator use, (2) trained in the proper use of respirators, and (3) fit-tested with a specific respirator type/size to be used are permitted to wear a respirator.

The O&M Plan Coordinator should develop a list in the Respiratory Protection Program of personnel who may be required and are allowed to wear a respirator. Based on the results of fit-testing, the O&M Plan Coordinator should obtain the proper brands and sizes of respirator.

4.3 Personal Protective Clothing and Equipment

A variety of safety and personal protective equipment may be required as part of the O&M Plan. This equipment would be used for work activities that create a potential for ACM disturbance. This equipment includes:

- Respirators equipped with HEPA filters.
- Disposable coveralls with hoods and booties.
- Impervious gloves, such as PVC, nitrile, or polyethylene.
- HEPA-filtered vacuum.
- 6-mil thick polyethylene asbestos waste disposal bags with appropriate labels.
- 6-mil thick polyethylene sheeting (used as drop cloths and barriers).
- Duct tape.
- Water spray bottle.
- Disposable rags.

4.4 Exposure Monitoring (Air Monitoring)

If the O&M work practices specified in this O&M Plan are properly followed the OSHA PEL and EL should not be exceeded. However, if personal air monitoring is determined to be needed by the environmental consultant, the air monitoring techniques employed by the air sampling professional should be consistent with

the recommended methods as described in OSHA Regulations 29 CFR 1910.1001 and 29 CFR 1926.1101. Phase Contrast Microscopy (PCM) is the required method for analyzing personal air monitoring samples. The use of PCM as the primary method of analysis will continue until such time as revisions are warranted. PCM air samples shall be analyzed according to the NIOSH Counting Method 7400. The analytical laboratory utilized for analysis of the samples shall be a successful participant in the NIOSH Proficiency Analytical Testing (PAT) program. A secondary method of analysis employing TEM may be used on a case-by-case-basis, when recommended by an environmental consultant. Results of the personal air samples shall be posted or affected employees made be told of the sampling results and shall be retained by the O&M Plan Coordinator to be included in the O&M Plan. The specific air sampling strategies to be used will depend upon the activity. The environmental consultant will formulate the recommended strategies and conduct air monitoring.

5.0 OPERATIONS AND MAINTENANCE PROCEDURES

This section provides guidelines for contact with ACM, including the following:

- Addressing high and immediate hazards.
- Initial cleaning of areas where friable and/or damaged ACM is present prior to conducting allowable O&M activities.
- Labeling ACM.
- Procedures for normal maintenance activities.
- Work by outside contractors.
- Dealing with minor fiber release episodes.
- Dealing with major fiber release episodes.
- Proper disposal methods.
- Surveillance of ACM.

Under no circumstances shall an employee or contractor at the Subject Property intentionally disturb ACMs, unless done with the O&M Plan Coordinator's approval and in accordance with the O&M Plan requirements. All work that will involve contact with or potential disturbance of ACM, to be performed by employees or outside contractors shall first be reviewed by the O&M Plan Coordinator. The potential for disturbance of the ACM shall be evaluated by the O&M Plan Coordinator and a Maintenance Work Approval Form (Form 6 in Appendix G) will need to be completed prior to initiation of any work activities. The O&M Plan Coordinator will review the Maintenance Work Approval Form and approve or disapprove of the planned work in writing. In addition, the O&M Plan Coordinator can refer work to outside contractors if deemed appropriate.

5.1 Evaluation of Existing Material Conditions

In accordance with this O&M Plan, a visual and physical assessment of the conditions and potential for damage and/or fiber release of the ACMs and assumed ACMs at the Subject Property must be conducted by either the O&M Plan Coordinator and the 16-hour trained staff engineers and maintenance personnel or an accredited asbestos building inspector. Thereafter, the O&M Plan Coordinator and the 16-hour trained staff engineers and maintenance personnel will continue to monitor the condition of the identified ACMs per the six-month surveillance program identified in 5.12. The priorities shall be divided into the following categories:

- Low Hazard - Those non-friable ACMs in undamaged condition with low potential for disturbance. Non-friable is defined as any ACM that when dry, cannot be crumbled, pulverized, or reduced to powder by hand pressure. An example of a low hazard is undamaged 12″×12″ floor tile and mastic in low traffic areas.

- Moderate Hazard - Those currently non-friable ACMs, or friable ACMs in undamaged condition, that have a moderate potential for disturbance or damage rendering them friable and possibly releasing asbestos fibers into the air. Friable is defined as any ACM that when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. An example of a moderate hazard is undamaged textured ceiling paint material, vibration joint cloths, and kitchen exhaust duct insulation. Non-friable floor tiles located in an area with a high potential to be damaged, as in a Renovation areas, could also be considered a moderate hazard.

- High Hazard - Those friable ACMs that have become damaged, or non-friable ACMs that have become damaged and are likely to be disturbed by air currents, water damage, renovation, construction, or other activities that may distribute airborne asbestos fibers. An example of a high hazard is damaged textured ceiling paint, which has been saturated with water and has the potential to collapse. Abatement of high hazards may only be performed by an EPA AHERA licensed contractor supervisor. 16-hour trained employees may address small-scale (less than 3 lineal or square feet) of repairs at any one given time. It is the responsibility of the O&M Plan Coordinator to determine if the abatement contractor or on-site 16-hour trained employees will address a high hazard.

- Immediate Hazard - Those friable and non-friable ACMs that are significantly damaged, have released material, and/or are very likely to expose unprotected persons. An example of an immediate hazard would consist of significantly damaged textured ceiling paint that has been water damaged and dislodged from its substrate. Abatement of immediate hazards should be performed by an EPA AHERA licensed asbestos contractor. This abatement contractor is part of the emergency response team.

5.2 Addressing Low Hazards

These ACMs should be maintained in-place and periodically re-inspected and re-classified as necessary per section 5.12. If small quantities of these ACMs become

damaged and require repairs or clean-up, such activities should be conducted by a 16-hour O&M trained employees or an EPA AHERA licensed asbestos abatement contractor. A 16-hour O&M trained employee is allowed to perform Class III activities. According to OSHA, Class III O&M activities must generate less than a single standard waste bag. A waste bag is defined as no larger than 60 inches in length and width and to facilitate secure closure and avoid breakage, it is generally considered proper practice to fill a waste bag only one-third or one-half full. When O&M activities involving less than one waste bag of asbestos waste are addressed in a non-friable state, it is considered a Class III O&M project. Spray-on acoustic ceiling surfacing work practices must be performed in a non-friable state; the material shall not be sanded, ground, abraded, or mechanically chipped to make airborne dust. Refer to *Section 5.5 O&M Procedures For Maintenance and Repair Activities Which Involve Disturbing Spray-on Acoustic Ceiling Surfacing*.

5.3 Addressing Moderate Hazards

The guidelines listed in *Section 5.2 Addressing Low Hazards*, should be followed when addressing ACMs classified as a moderate hazard. An example of a moderate hazard would consist of drilling a hole in textured ceiling paint material. This work can be performed only by an employee with a minimum of 16-hour training. In addition, caution should be taken not to disturb these ACMs, if maintenance activities require work to be conducted in close proximity to the ACMs. Refer to *Section 5.5 O&M Procedures For Maintenance and Repair Activities Which Involve Disturbing Spray-on Acoustic Ceiling Surfacing*.

5.4 Addressing High and Immediate Hazards (Emergency Response)

The activities to be performed pursuant to specific work practices should not result in a high or immediate hazard. Work involving a high or immediate hazard can only be performed by the EPA AHERA licensed asbestos abatement contractor who is part of the emergency response team if the O&M activities to be performed exceed one ACM waste bag. The O&M Plan Coordinator is responsible for notifying the EPA AHERA licensed asbestos abatement contractor regarding emergency response activities. The emergency response team consists of the EPA AHERA licensed asbestos abatement contractor, O&M Plan Coordinator, and 16-hour O&M trained staff engineers and maintenance personnel. The Asbestos Abatement Project Notice (Form 5 in Appendix F) and the Fiber Release Report (Form 7 in Appendix H) shall be completed, approved, and signed by the O&M Plan Coordinator for each emergency response activity. These records shall include a description of the work,

the workers involved, controls used to reduce potential exposure, the results of any exposure monitoring, and disposal records for asbestos wastes. The following actions should be taken to address areas of ACM that may become re-classified as a high or immediate hazard due to inadvertent damage or disturbance.

- Complete a Fiber Release Report and the Asbestos Abatement Project Notice including the O&M Plan Coordinator's signature on both forms before starting work.

- To the extent possible, the area in question should be secured and sealed utilizing polyethylene sheeting, as necessary. The HVAC system for the area in question shall be shut off and secured to prevent distribution of any fibers generated during the fiber release. These duties can be performed by 16-hour trained personnel.

- 16-hour trained personnel can assist the EPA AHERA licensed asbestos abatement contractor by posting warning signs on entry-ways to affected areas or the entrance to the regulated area. These signs shall explicitly indicate that ACM is present and the areas are restricted. Doors shall be kept locked at all times. In addition, 16-hour trained personnel can enter the regulated area to turn off the HVAC units and to seal off the regulated area.

- The 16-hour O&M trained personnel entering the regulated area must wear, at a minimum, disposable coveralls and an approved air-purifying respirator with HEPA cartridges. Two suits of disposable coveralls must be worn by the 16-hour trained personnel. The outer coverall must have an attached hood and foot coverings. The 16-hour O&M trained personnel may seal off the regulated area, and enter the regulated area only to turn off the HVAC unit until the abatement contractor arrives on-site. The actual asbestos removal and clean up activities during an emergency response will only be performed by the asbestos abatement contractor.

- After completion of the work, the outer coverall is to be removed before leaving the regulated area. The outer coverall will then be placed with other contaminated materials in an appropriately labeled 6-mil asbestos disposal bag.

- The inner coverall will be HEPA-vacuumed and wet-wiped. The individual may then proceed to a change room or to an area deemed "clean" (absent of asbestos fibers) as identified by the asbestos abatement contractor.

- Upon task completion, ladders and tools should be wet-wiped while inside the secured and sealed area. All rags should be disposed of with other contaminated equipment in appropriately labeled 6-mil asbestos disposal bags. All waste materials will be required to be double-bagged.

- Only EPA AHERA licensed abatement contractors, using appropriate personal protective equipment, shall be allowed to work in the regulated area after it has been isolated by 16-hour trained personnel. Non-critical work by Subject Property employees in the regulated areas is prohibited until abatement and/or proper decontamination can be performed.

- Any ACM debris or asbestos contaminated materials (such as disposable rags or coveralls) generated by O&M activities shall be doubled-bagged in properly labeled ACM disposal bags. The asbestos abatement contractor must promptly remove any ACM debris or asbestos contaminated materials immediately upon completion of the emergency response action and properly disposed of in an approved landfill. Chain-of-custody manifests must be obtained from the EPA AHERA licensed asbestos contractor who transports the asbestos waste materials and from the operators of the accepting landfill. Chain-of-custody manifests shall be retained by the O&M Plan Coordinator.

5.5 O&M Procedures for Maintenance Activities Which Involve Vinyl Flooring

This work can be performed only by an employee with a minimum of 16-hour training. The O&M Plan Coordinator shall maintain records of maintenance activities which may disturb ACM. These records shall include a description of the work, the workers involved, controls used to reduce the potential of exposure, the results of any exposure monitoring, and disposal records for asbestos wastes. Form 6 in Appendix G shall be completed for each maintenance-related activity that may disturb ACM and approved and signed by the O&M Plan Coordinator. The procedures for maintenance of vinyl flooring are as follows:

- Stripping of vinyl asbestos floor coverings should be done as infrequently as possible (e.g., once per year maximum and preferably when the building is unoccupied). Excessive stripping of floors using aggressive techniques will result in increased levels of asbestos fibers in the air.

- Broken and damaged asbestos floor tiles must be removed by asbestos abatement workers.

- Prior to machine operation, apply an emulsion of chemical stripper in water to the floor. Use a mop to soften the wax or finish coat.

- When stripping floors becomes necessary, the machine used for stripping the finish should be equipped with the least abrasive pad as possible (black pads are usually the most abrasive and the white pads the least abrasive). Consult with your floor tile and floor finish product manufacturer for recommendations on which pad to use on a particular floor covering. Incorporate the manufacturer's recommendations into your floor maintenance work procedures.

- The machine used to remove the wax or finish coat should be run at a low rate of speed (i.e., ranging between 175-300 rpm) during the stripping operation. There is a direct correlation between machine speeds and the release of asbestos fibers from asbestos containing floor coverings. The higher the machine speed the greater the probability of asbestos fiber release.

- Never perform dry stripping. Always strip floors while wet. Do not operate a floor machine with an abrasive pad on unwaxed or unfinished floor containing-asbestos materials.

- Consult with floor tile and floor finish product manufacturers concerning specific or unique problem(s) on the maintenance of your floors.

- After stripping and before application of a high solids floor finish, the floor should be thoroughly cleaned, while wet, preferably with a Wet-Vac HEPA filtration vacuum system.

- Prior to applying a finish coat to a vinyl asbestos floor covering, apply 2 to 3 coats of sealer. Continue to finish the floor with a high percentage solids finish.

- It is an industry recommendation to apply several thin coats of a high percentage solid finish to obtain a good sealing of the floor's surface, thereby minimizing the release of asbestos fibers during finishing work.

- When spray-buffing floors, always operate the floor machine at the lowest rates of speed possible and equip the floor machine with the least abrasive pad as possible. A recent EPA study indicated that spray-buffing with high-speed floor machines resulted in significantly higher airborne asbestos fiber concentrations than spray-buffing with low speed machines.

- When dry-burnishing floors, always operate the floor machine at the lowest rate of speed possible to accomplish the task (i.e., 1200-1750 rpm), and equip the floor machine with the least abrasive pad as possible.

- After stripping a floor and applying a new coat of sealer and finish, use a wet mop for routine cleaning whenever possible. When dry mopping, a petroleum-based mop treatment is not recommended for use.

5.6 O&M Procedures for Clean Up of Debris

This work can be performed only by an employee with a minimum of 16-hour training. The O&M Plan Coordinator shall maintain records of maintenance activities which may disturb ACM. These records shall include a description of the work, the workers involved, controls used to reduce the potential of exposure, the results of any exposure monitoring, and disposal records for asbestos wastes. The Fiber Release Report (Form 7 in Appendix H) will be completed, approved, and signed by the O&M Plan Coordinator. The Fiber Release Report will need to be completed for each inadvertent disturbance which involves the falling or dislodging of textured ceiling paint material or other ACMs. The procedures for the clean up of spray-on acoustic ceiling surfacing are as follows:

- Complete a Fiber Release Report including the O&M Plan Coordinator's signature before starting work.

- Employees must be equipped with personal protection equipment consisting of disposable coveralls, gloves, and a negative pressure respirator with HEPA filters.

- Isolate the work area (using barrier tape as an example).

- Turn off the HVAC unit or system if feasible.

- HEPA vacuum all surfaces (carpeting, beds, curtains etc.) where visual contamination is observed. In addition, the ceiling should be wet wiped with disposable rags.

- Any ACM debris or asbestos contaminated materials (such as disposable rags or coveralls) generated by O&M activities shall be doubled-bagged in properly labeled ACM disposal bags. The O&M Plan Coordinator must promptly (within 72 hours of completion of the O&M activities) contact the abatement contractor to pick up the waste from the on-site locked up area. The ACM debris or asbestos contaminated materials shall be removed from the Subject Property and properly disposed of in an approved landfill by an EPA AHERA licensed asbestos contractor. Chain-of-custody manifests must be obtained from the EPA AHERA licensed asbestos contractor who transports the asbestos waste materials and from the operators of the accepting landfill. Chain-of-custody manifests shall be retained by the O&M Plan Coordinator.

5.7 Removal or Repair of Identified ACMs

- Large scale removal or repair (any disturbance greater than 3 lineal or square feet) of the identified ACMs should only be performed only by an EPA AHERA licensed abatement contractor.

5.8 Custodial and Housekeeping Activities

- Custodial personnel are not allowed to disturb or remove ACM.

5.9 Work by Outside Contractor

Outside contractors performing maintenance, repair, or Renovation work at the Subject Property shall meet with the O&M Plan Coordinator before performing any work. Outside contractors shall be informed of the presence, quantity, and locations of ACM in the areas in which they may perform work and shall be allowed to examine asbestos surveys completed and this O&M Plan. Outside contractors shall be required to follow proper work procedures and practices to minimize potential disturbance to ACM. Such work procedures and practices shall be outlined and approved by the environmental consultant. Contractors, other than EPA AHERA licensed asbestos abatement contractors, shall not be authorized to intentionally contact or disturb ACM at the Subject Property.

5.10 Minor Fiber Release Episodes

A minor fiber release episode is defined as "the inadvertent disturbance, which involves the falling or dislodging of less than 3 square or 3 linear feet of ACM." A minor fiber release episode shall not include the controlled disturbance of ACM as specified by the work practices in this O&M Plan. This work can be performed only by an employee with a minimum of 16-hour training. The following steps should be taken in the event of a minor fiber release episode:

- Complete a Fiber Release Report including the O&M Plan Coordinator's signature before starting work.
- Access to the area shall be restricted immediately. This can be accomplished through the use of barriers, locking doors, or other suitable means.
- Any debris shall be HEPA vacuumed and thoroughly wetted with water and double-bagged in properly labeled 6-mil asbestos disposal bags.
- The damaged area shall be repaired with a non-asbestos material, or sealed with an encapsulating material.
- Debris, cleaning materials, filters, etc., shall be disposed of as asbestos waste.

The O&M Plan Coordinator will keep records indicating the date of the release, the areas affected, actions taken, and chain-of-custody manifests for the disposal of the waste materials generated.

5.11 Disposal Procedures

The ACM waste will always be disposed of by an EPA AHERA licensed asbestos abatement contractor. In preparation for disposal the following procedures should be implemented. ACM wastes shall be thoroughly wetted and double-bagged in appropriately labeled asbestos disposal bags. Bags shall be sealed airtight while the ACM is still wet. Bag tops shall be twisted and sealed with duct tape, then bent over and sealed again with at least three wraps of duct tape. No bag shall be reopened after it has been sealed. Caution labels consistent with applicable state

laws and regulations and in accordance with OSHA Regulations 29 CFR 1910.1001 and 29 CFR 1926.1101 are to be placed on each bag.

Any ACM debris or asbestos contaminated materials (such as disposable rags or coveralls) generated by O&M activities shall be doubled-bagged in properly labeled ACM disposal bags. The properly labeled bags of ACM waste must be stored in a locked and restricted area until transported to a special waste landfill by the retained asbestos abatement contractor. This storage will be considered as a temporary measure until such time as arrangements can be made for final disposal. The O&M Plan Coordinator must promptly (within 72 hours of completion of the O&M activities) contact the abatement contractor to pick up the waste from the on-site locked up area. The ACM debris or asbestos contaminated materials shall be removed from the Subject Property and properly disposed of in an approved landfill by an EPA AHERA licensed asbestos contractor. A manifest document should be completed by the EPA AHERA licensed asbestos abatement contractor, signed by the O&M Plan Coordinator, and signed by the operators of the accepting landfill. Chain-of-custody manifests shall be retained by the O&M Plan Coordinator.

5.12 Re-evaluation of ACMs (Six-Month Surveillance)

The condition of the ACM shall be monitored semi-annually. This monitoring will serve to re-evaluate the condition of the ACM with regard to changes in friability and potential for fiber release. The six-month surveillance work will be performed by the O&M Plan Coordinator and the 16-hour trained staff engineers and maintenance personnel.

Conditions such as damage due to physical abrasion, vandalism, and/or water damage shall be observed, documented, and the appropriate response actions delineated. This documentation should include notes, photographs (if needed), and a written summary of any needed response actions, which should be kept in the O&M Plan. ACM that has been abated (removed) or encapsulated should also be documented and a record attached to this O&M Plan. The six-month surveillance form is located in Appendix A.

6.0 INTERIM CONTROL PLAN FOR ASBESTOS-RELATED ACTIVITIES

All remodeling or Renovation work to be performed must be approved by the O&M Plan Coordinator. How these activities may affect the ACM should be evaluated, and proper actions should be taken to prevent unnecessary disturbance of or contact with ACM prior to conducting work.

6.1 Work Procedures

The work areas can be inspected by the O&M Plan Coordinator, 16-hour trained personnel, and outside contractors for ACM prior to any work which has the potential to disturb ACM. In the event ACM is encountered, Form 6 (Appendix G) should be completed and written approval by the O&M Plan Coordinator shall be obtained prior to proceeding with work.

If ACM is disturbed, has fallen and/or becomes displaced, appropriate decontamination, repair or removal activities should be conducted as outlined in these OPERATIONS AND MAINTENANCE PROCEDURES and applicable CDPH, IDPH, EPA and OSHA regulations.

6.2 OSHA Classifications of Asbestos Work

In October 1994, OSHA added definitions for four classes of asbestos activities which trigger different provisions in the Construction Standard (29 CFR 1926.1101). Those activities presenting the greatest risk to workers are designated Class I work, with decreasing risk potential attaching to each successive class.

6.2.1 Class I Work

Activities involving the removal of sprayed-on, troweled-on, or otherwise applied surfacing ACMs and thermal system insulation (TSI) are Class I work. Examples of surfacing materials may include, but not be limited to, textured ceiling paint material and plaster. Examples of TSI may include, but not be limited to, exhaust duct insulation, pipe insulation, boiler insulation etc. OSHA has determined that the prevalence of these materials and their likelihood of significant fiber release when disturbed requires rigorous control methods. Class I work will always be performed by EPA AHERA licensed asbestos abatement contractor.

6.2.2 Class II Work

Activities involving the removal of any ACMs which are not TSI or surfacing ACM are Class II work. The EPA refers to these materials as "miscellaneous ACM." Examples of Class II work may include, but not be limited to, removal of floor tile and mastic, transite panels etc. Class II work will always be performed an EPA AHERA licensed asbestos abatement contractor.

6.2.3 Class III Work

Repair and maintenance activities involving intentional disturbance of ACM. Class III work is limited to incidental cutting away of small amounts (less than a single standard waste bag) of ACM. An example of Class III work may include, but not be limited to, drilling holes in textured ceiling paint material/drywall to hang fixtures or repair of damaged floor tile.

6.2.4 Class IV Work

Maintenance and custodial activities during which employees may contact ACM or activities involving the clean-up of waste and debris containing ACM. The maintenance and custodial activities may include dusting surfaces, buffing, and mopping floors around ACM. Workers may contact ACM when performing a wide variety of routine jobs that result in incidental disturbance.

7.0 RECORD KEEPING, LABELING, AND NOTIFICATIONS

7.1 Record Keeping

Records related to this O&M Plan, or any asbestos-related matter, shall be maintained by the O&M Plan Coordinator for the duration of ownership of the Subject Property and shall be transferred to any successor. This information includes:

- Attendance sheets and other records of training activities related to asbestos, including copies of certifications and accreditation.
- Records of any air sampling results conducted during asbestos O&M and removal activities.
- Asbestos survey documentation consisting of asbestos surveys completed, which specify ACM locations and conditions. In addition, copies of notification documentation should be retained.
- Documentation of actions taken to address high and immediate hazards.
- Employee medical surveillance records must be kept on file for the duration of employment plus 30 additional years.
- Documentation of normal maintenance activities performed around ACM and should include actions taken to reduce exposure.
- Records of outside contractors working with and/or around ACM.
- Records of occurrences during incidental, small, minor, and major asbestos projects, which should include actions taken to reduce exposure.
- Disposal records for all materials disposed of as asbestos waste.
- Records of all forms completed during the implementation of the O&M Plan.
- Air sampling documentation after completion of abatement work.

- Exposure monitoring data on workers performing routine activities to establish exposure assessments.

7.2 Labeling

The Subject Property owner must label surfacing materials found to contain asbestos to warn on-site contractors and Subject Property employees who are likely to be exposed so that inadvertent disturbances may be avoided. The O&M Plan Coordinator is responsible for coordinating labeling activities.

Asbestos-containing surfacing materials at the Subject Property, which should be labeled, include spray-on acoustic ceiling surfacing. Specifically, the labels will be placed in the following areas:

- Drawings showing the presence of the spray-on acoustic ceiling surfacing location should be posted in the employee locker rooms/cafeterias, maintenance shop areas, janitorial supply room etc., to notify staff of the presence of asbestos in these materials, since labeling of these materials is not practical. This should be discussed in staff safety meetings periodically.

7.3 Notifications

The Subject Property, in certain circumstances, must notify its employees and certain designated employers about the presence, location, and quantity of ACMs. The persons who must be notified include:

- Employers applying or bidding for work who reasonably can be expected to work in or adjacent to areas containing ACM;

- Subject Property employees who reasonably can be expected to work in or adjacent to areas containing ACM; and

- Other employers on multi-employer work sites with employees working in or adjacent to areas containing ACM.

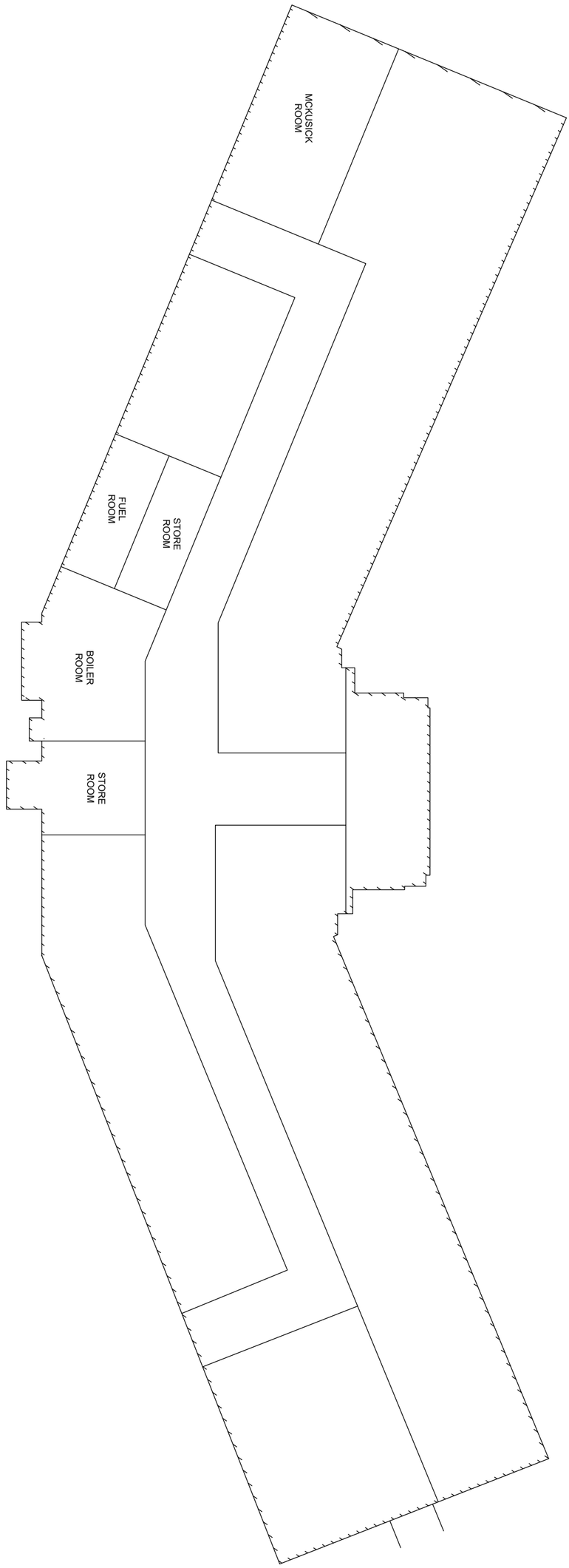
The various forms of notification are contained in Appendix L of this O&M Plan.

APPENDIX A

SITE PLANS AND SIX-MONTH PERIODIC ACM SURVEILLANCE RECORD

S:\Projects-BST\Gila County\1052000242 Gila County Grant\Phase 4 Bullion Plaza\CADD\1_SPLN_BASEMENT.dwg

NOT TO SCALE
NOTE: ALL LOCATIONS ARE APPROXIMATE

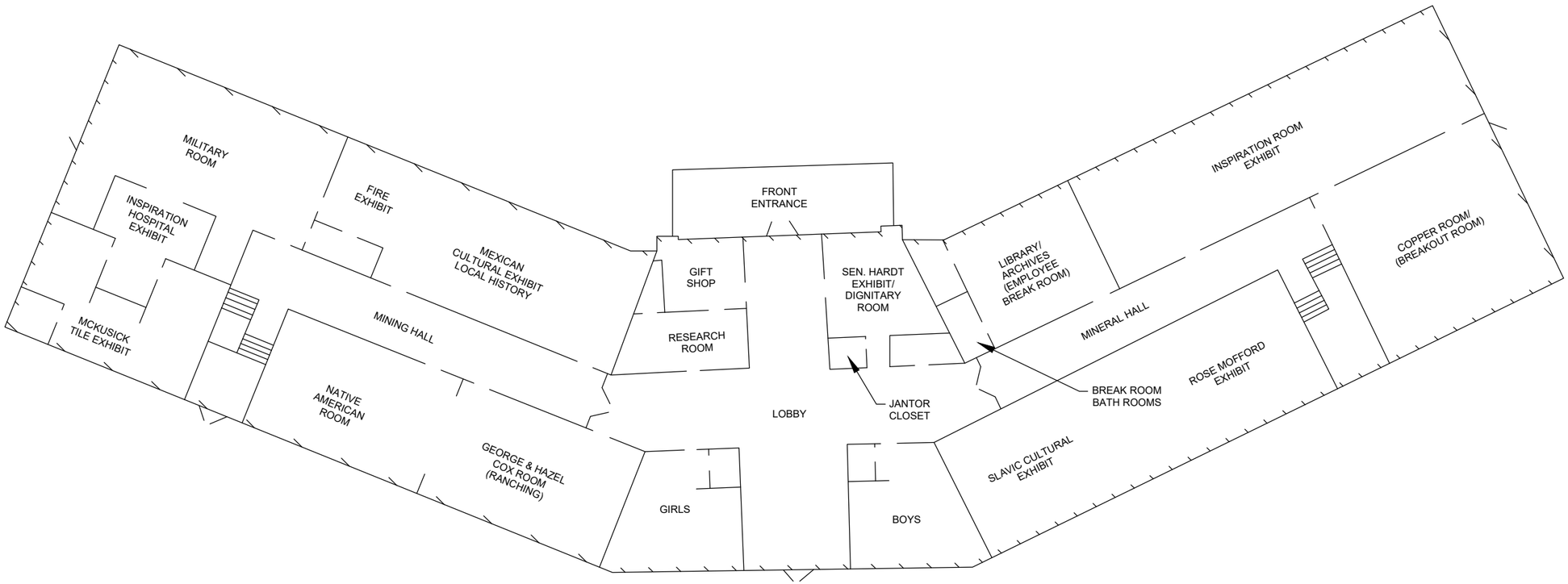


SITE PLAN
BASEMENT

BULLION PLAZA CULTURAL CENTER & MUSEAUM
150 N. PLAZA CIRCLE
MIAMI, AZ

PROJECT NUMBER: 1052000242		DATE: 1/10/23	FIGURE
APPROVED BY: TH		DRAWN BY: BK	1

ATLAS
9185 S. Farmer Ave., Ste. #111
Tempe, Arizona 85284-2912
Ph: (480) 894-2056 *** Fax: (480) 894-2497



NOT TO SCALE
NOTE: ALL LOCATIONS ARE APPROXIMATE

S:\Projects-BST\Gila County\1052000242 Gila County Grant\Phase 4 Bullion Plaza\CADD\2_SPLN_FLR1.dwg

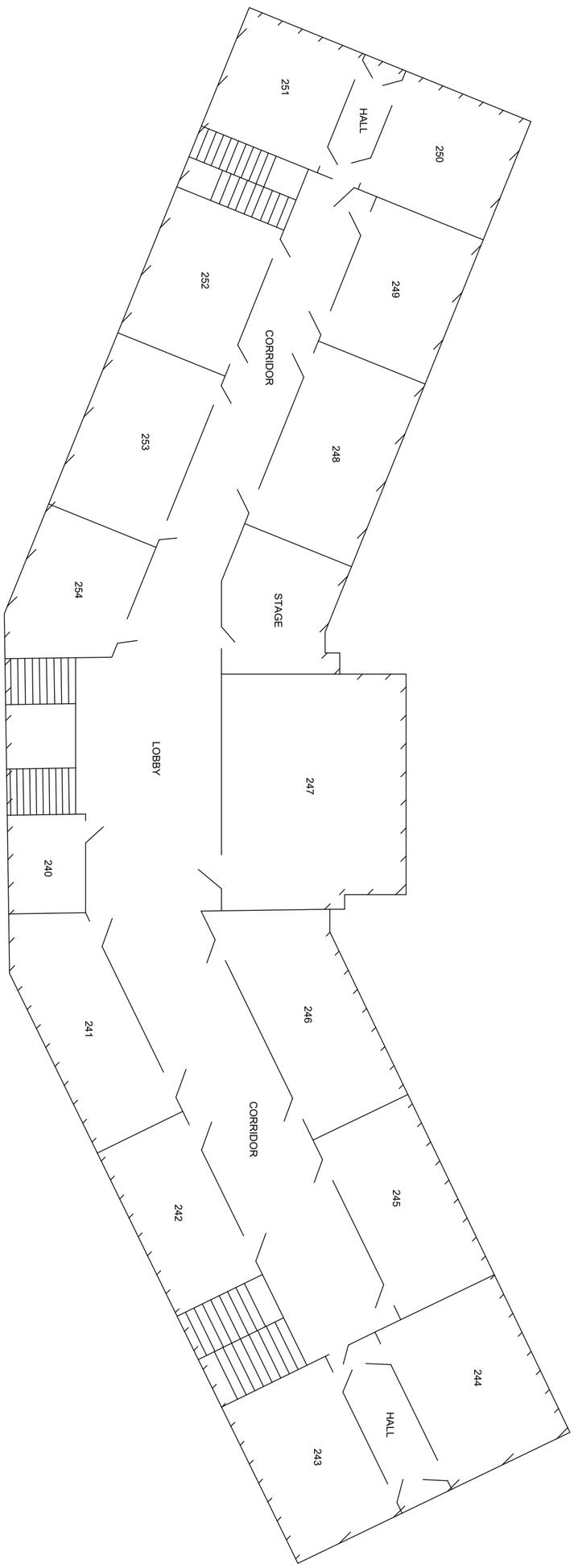
PROJECT NUMBER: 1052000242		DATE: 1/10/23	FIGURE 2
APPROVED BY: TH		DRAWN BY: BK	

ATLAS
9185 S. Farmer Ave., Ste. #111
Tempe, Arizona 85284-2912
Ph: (480) 894-2056 *** Fax: (480) 894-2497

SITE PLAN
FIRST FLOOR
BULLION PLAZA CULTURAL CENTER & MUSEUM
150 N. PLAZA CIRCLE
MIAMI, AZ

S:\Projects-BST\Gila County\1052000242 Gila County Grant\Phase 4 Bullion Plaza\CADD\3_SPLN_FLR2.dwg

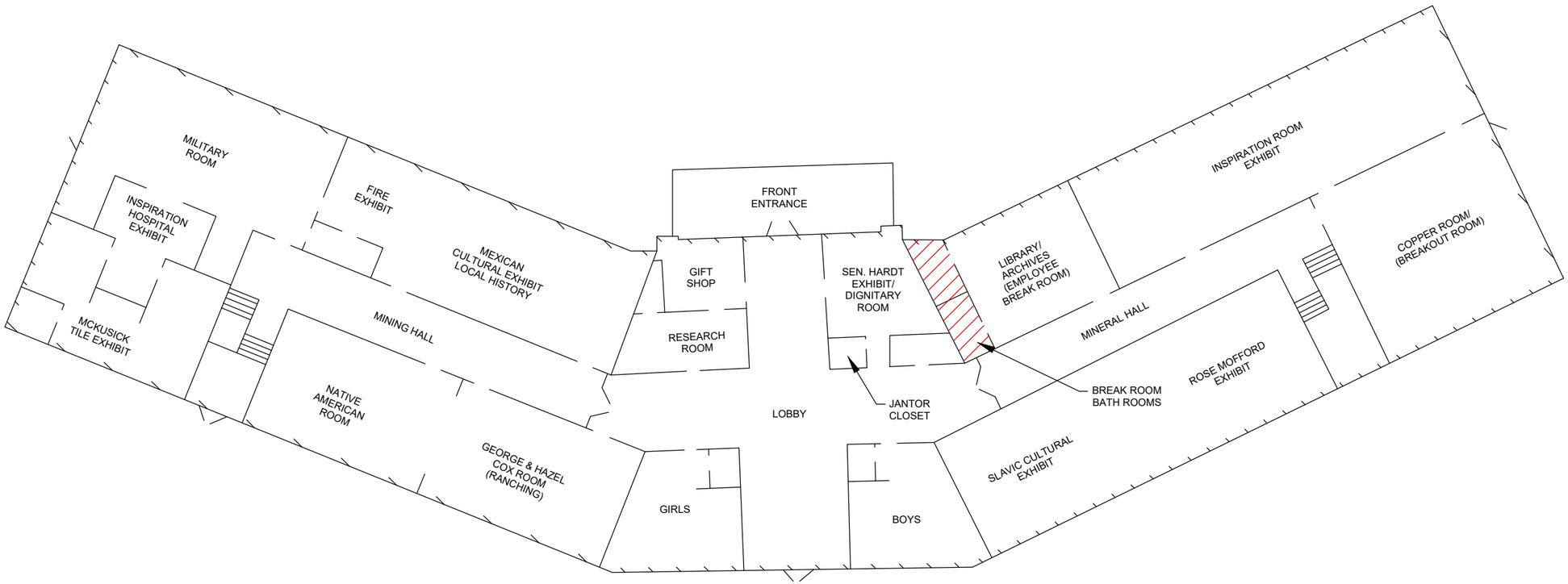
NOT TO SCALE
NOTE: ALL LOCATIONS ARE APPROXIMATE



SITE PLAN
SECOND FLOOR
BULLION PLAZA CULTURAL CENTER & MUSEUM
150 N. PLAZA CIRCLE
MIAMI, AZ

PROJECT NUMBER: 1052000242		DATE: 1/10/23	FIGURE
APPROVED BY: TH		DRAWN BY: BK	3

ATLAS
9185 S. Farmer Ave., Ste. #111
Tempe, Arizona 85284-2912
Ph: (480) 894-2056 *** Fax: (480) 894-2497



LEGEND

F19 - ACM FLOOR TILE, CREAM WITH LIGHT GRAY STREAKS & BLACK MASTIC, 2% CHRYSOTILE (~60 S.F.)

NOT TO SCALE

NOTE: ALL LOCATIONS ARE APPROXIMATE

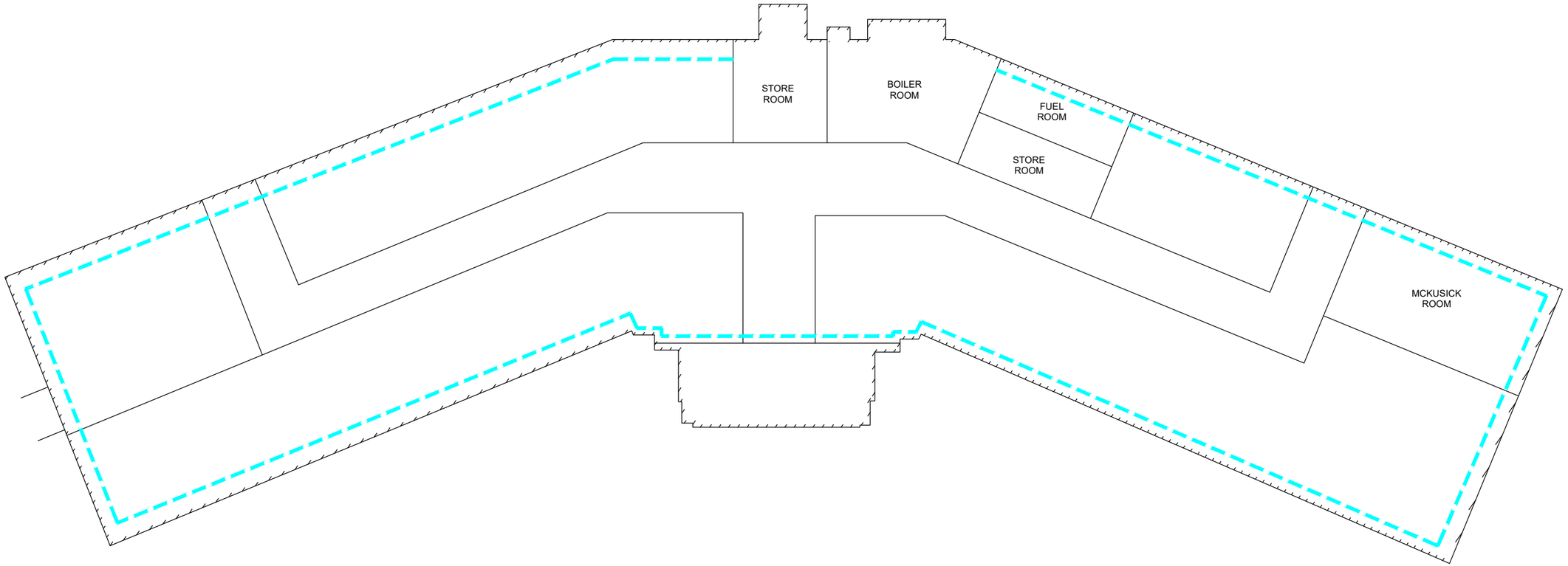
S:\Projects-BST\Gila County\1052000242 Gila County Grant\Phase 4 Bullion Plaza\CADD\7_ACM_FLR1.dwg

PROJECT NUMBER: 1052000242 | DATE: 12/16/22 | FIGURE 4

APPROVED BY: TH | DRAWN BY: BK

ATLAS
9185 S. Farmer Ave., Ste. #111
Tempe, Arizona 85284-2912
Ph: (480) 894-2056 *** Fax: (480) 894-2497

ACM LOCATION MAP
FIRST FLOOR
BULLION PLAZA CULTURAL CENTER & MUSEUM
150 N. PLAZA CIRCLE
MIAMI, AZ



LEGEND

M1 - ACM PIPE INSULATION, WHITE POWDERY, CHALKY, 50% CHRYSOTILE (~600 L. F.)

NOT TO SCALE

NOTE: ALL LOCATIONS ARE APPROXIMATE

S:\Projects-BST\Gila County\1052000242 Gila County Grant\Phase 4 Bullion Plaza\CADD\8_ACM_BASEMENT.dwg

PROJECT NUMBER: 1052000242	DATE: 12/16/22
APPROVED BY: TH	DRAWN BY: BK

FIGURE 5

ATLAS
9185 S. Farmer Ave., Ste. #111
Tempe, Arizona 85284-2912
Ph: (480) 894-2056 *** Fax: (480) 894-2497

ACM LOCATION MAP
BASEMENT
BULLION PLAZA CULTURAL CENTER & MUSEAUM
150 N. PLAZA CIRCLE
MIAMI, AZ

Historic Bullion Plaza Cultural Center and Museum
150 North Plaza Circle
Miami, Arizona 85539

SIX-MONTH PERIODIC ACM SURVEILLANCE RECORD

Inspected By:				*Date:*	
Material	Location	Current Condition	Any Changes	Comments	Response Action Needed

APPENDIX B

O&M TRAINING FORMS

Form 1: 2-Hour Asbestos Awareness Training Attendance Sheets

From 2: 16-Hour O&M Training Attendance Sheets
and Worker Acknowledgement and Understanding of the O&M Plan

FORM 1

2-HOUR ASBESTOS AWARENESS TRAINING
ATTENDANCE SHEET

DATE:_____

I have received 2-hours of Asbestos Awareness Training and have read and agree to abide by the terms of this O&M Plan in the performance of my duties as an employee for the Subject Property.

PRINTED NAME	SIGNED	SOCIAL SECURITY NUMBER

FORM 1 (CONTINUED)

PRINTED NAME	SIGNED	SOCIAL SECURITY NUMBER

FORM 2

16-HOUR ASBESTOS O&M TRAINED WORKER ACKNOWLEDGMENT AND UNDERSTANDING OF O&M PLAN SIGNATURE SHEET

Date: _____

I have received 16-hour Asbestos O&M training and have read and agree to abide by the terms of this O&M Plan in the performance of my duties as an employee for the Subject Property.

PRINTED NAME	SIGNED	SOCIAL SECURITY NUMBER

APPENDIX C

ASBESTOS SAFETY DATA SHEET

SAFETY DATA SHEET

SECTION 1: PRODUCT IDENTIFICATION	
Product Name: ASBESTOS	C.A.S. Numbers: 12001-2-9-5, 1309-38-2
Chemical Name: Chrysotile Asbestos	Formula/Composition: $Mg_6[(OH)_4Si_2O_5]_2$
Synonyms: Asbestos, White Asbestos, Hydrated Magnesium Silicate	

SECTION II: PHYSICAL DATA	
Sizes: Few micrometers to 2 cm. fiber lengths	Solubility in Water: Very slightly soluble
Specific Gravity: (H_2O=1) 2.45 approximately	Melting Point: ^{o}F (^{o}C) Dehydrates above 1112 (600)
Odor: None	Boiling Point: ^{o}F (^{o}C) Not applicable
Appearance: White fibrous	Vapor Pressure: Not applicable
Bulk Density: 15-45 lb/ft^3, as packaged (depends on product form)	Percent Volatile: Absorbed H_2O 1-4% by weight Structural $H_2O \approx$ 13% by weight
Molecular Weight: Not applicable	Evaporation Rate: Not applicable

SECTION III: HAZARDOUS INGREDIENTS		
Material or Component (CAS #)	Weight %	OSHA PEL Data (TWA Unless Noted), ACGIH
Chrysotile Asbestos (12001-29-5)	>95%	0.1 fiber/cc longer than 5µm (1) 2 fiber/cc longer than 5µm (2) Excursion Limit (3)
Magnetite Fe_3O_4 (1309-38-2)	0.5-2	None established (1) (2)
H.M.I.S. Rating Numbers		
Health: = (Possible Chronic Effect)		
Flammability: 0		
Reactivity: 0		

References: (1) OSHA Regulation
(2) ACGIH

(3) Excursion limit. The employer shall ensure that no employee is exposed to an airborne concentration of asbestos, tremolite, anthophyllite, actinolite, or a combination of these minerals in excess of 1.0 fiber per cubic centimeter of air (1 f/cc) as averaged over a sampling period of thirty (30) minutes.
[1910.1001© revised by 53 FR. 35625, September 14, 1988

SECTION IV: HEALTH HAZARD DATA

ACUTE EFFECTS OF OVEREXPOSURE

Route of Exposure:

Inhalation:	Any dust (including asbestos) which is inhaled in substantial amounts, may irritate the respiratory tract. Extreme exposures can overwhelm the normal respiratory defense mechanisms and result in temporary difficulty in breathing.
Skin Contact:	Asbestos splinters may penetrate the skin and cause asbestos "corns".
Skin Absorption:	Not applicable
Eye Contact:	May cause irritation and abrasions.
Ingestion:	No known effects.

CHRONIC EFFECTS OF OVEREXPOSURE

Inhalation:	Overexposure to Asbestos has caused damage to lungs (asbestosis), lung cancer and mesothelioma of the pleura and peritoneum. Symptoms, which are usually not manifested until 15-20 years after exposure, include labored breathing, chest pains, weakness, and chest tightness. Pleural thickening, plaques and effusion are non-disabling conditions, seen separately or together, that have been associated with prolonged asbestos exposure. The risk of lung cancer is greatly increased for those who smoke cigarettes regularly in addition to having asbestos exposures.
Skin Contact:	Not applicable
Skin Absorption:	Not applicable
Eye Contact:	Same as acute effects. Usually reversible on removal from exposure.
Ingestion:	Some studies indicate that asbestos overexposure is implicated as a cause of gastro-intestinal and laryngeal cancers, but the evidence is conflicting; no documented human effects.

EMERGENCY AND FIRST AID PROCEDURES

Inhalation:	No acute toxicity: Remove to fresh air. If breathing is difficult, oxygen may be administered. If breathing is stopped administer artificial respiration. Call a physician.
Skin Contact:	Remove asbestos slivers promptly. If "asbestos corn" develops, surgical removal may be required.
Eye Contact:	Irrigate gently with water for 15 minutes. Refer to ophthalmologist to rule out possibility of damage to cornea or eyeball by fibers.
Ingestion:	None indicated

NOTES TO PHYSICIAN

A medical surveillance program must be established for asbestos-exposed persons in accordance with the requirements of the Occupational Safety and Health Administration's standard for Asbestos (29 CFR 1910.1001).

SECTION V: FIRE AND EXPLOSION DATA	
Combustibility: Not combustible	Flammable Limits: Not applicable
Flash Point (Test Method): Not applicable	Autoignition Temperature: Not applicable
Explosion Tendency: Not applicable	
Extinguishing Media: Use media appropriate for surrounding material in fire situation.	
Special Fire-Fighting Procedures:	Avoid media and procedures that cause airborne dust. Personnel involved in fire-fighting should use NIOSH/MSHA-approved self-contained breathing apparatus and full protection clothing.
Unusual Fire and Explosive Hazard: See Below	

SECTION VI: REACTIVITY DATA
Stability: Stable (Temperature in excess of 1112 ^{o}F [600 ^{o}C] cause loss of bound water).
Conditions to Avoid: None
Hazardous Decomposition Products: None
Material to Avoid: None

SECTION VII: SPILL, LEAK, AND DISPOSAL INFORMATION
Steps to be Taken if Material is Spilled or Released: Avoid breathing dust. Notify Safety personnel of spill. Permit only trained clean-up personnel in the spill area. Use wet methods or approved vacuum cleaning system to pick up spilled materials. Use water or other dust suppressants where sweeping is unavoidable. Do not stir up dust. Clean-up personnel should wear protective clothing must be placed in dust-tight containers and be properly labeled for disposal.
Neutralizing Agents: Not applicable
Water Disposal Method: Bags, friable asbestos, waste and scrap material should be disposed of in a manner which will avoid airborne concentrations of asbestos, such as the use of dust-tight trash bags or containers. Such containers should be labeled in accordance with 40 CFR 61.20. Asbestos is classified as a hazardous material under CWA 307 (a) and has a reportable quantity of one pound. Deposit waste containers in a secured landfill in accordance with Federal, State, and local regulations.

SECTION VIII: SPECIAL PROTECTION INFORMATION	
Ventilation:	Provide adequate exhaust ventilation and capture filtration to remove asbestos particulate from the work place and minimize its dispersion into the environment. Isolate work areas and post signs where asbestos contamination may exceed PEL. Hand- or power-operated tools which may release asbestos in excess of the PEL must be equipped with local exhaust systems

SECTION: VIII SPECIAL PROTECTION INFORMATION (Continued)

Personal Protective Equipment:

Respirators: Where asbestos exposure in excess of the PEL is anticipated, wear a NIOSH/MSHA-approved respirator, as follows: up to 10 times the PEL - half-mask air-purifying respirator with high-efficiency filters; up to 50 times the PEL - full face piece air-purifying respirator with high-efficiency filters; up to 100 times the PEL - powered air-purifying respirator with high-efficiency filters or supplied-air respirator operated in continuous flow mode.

Eye Protection: Goggles are recommended. Follow Safety Rules.

Gloves/Clothing: Gloves are recommended during handling.

Other: For concentrations in excess of the OSHA PEL, special clothing, such as coveralls, whole-body clothing, hood coverings, gloves, and foot coverings, are required under CFR 1910.1001.

SECTION IX: SPECIAL PRECAUTIONS

Precautionary Statements: WARNING CANCER HAZARD

Breathing asbestos dust can cause lung damage and cancer. The risk of lung cancer is greatly increased for smokers.

Do not create or breathe dust.
Do not dry-sweep or use air hose for cleaning.
Do not take protective equipment or clothing home.

Do follow recommended work practices.
Do wear approved respiratory protection and protective clothing as required by applicable regulation.

Do use vacuum or wet cleaning methods.
Do dispose of dust, friable waste materials and contaminated protective equipment in dust-tight containers.

FOR INDUSTRIAL USE ONLY

Precautions for Handling and Storage:

Store asbestos in closed containers (dust-tight) in a clean, dry, secure area. Protect containers from damage. Do not open containers in a manner that can release dust without providing proper enclosure or control measures. Use dust suppression control measures at all stage or asbestos handling, use and disposal. Follow good housekeeping practices to prevent accumulation of asbestos-containing dusts. Avoid inhalation of asbestos.

Other Information:

Material Listed as Carcinogen in:

- National Toxicology Program Annual Report (NTP): Known carcinogen.
- International Agency for Research on Cancer (IARC): Group I - Carcinogenic to humans.

SAFETY DATA SHEET

Asbestos, Chrysotile

Section 1. Identification

GHS product identifier : Asbestos, Chrysotile

Product code : 02701A-AB; 02701-AB; 02740A-AB; 02740-AB

Chemical name : Chrysotile

Other means of identification : Chrysotile Asbestos; Serpentine chrysotile; White asbestos

Product type : Solid.

Relevant identified uses of the substance or mixture and uses advised against

Product use : Laboratory chemicals.

Area of application : Industrial applications, Professional applications.

Supplier's details : SPI Supplies Division Structure Probe, Inc.
206 Garfield Ave. West Chester, PA 19380
United States

Telephone: 1-(610)-436-5400
http://www.2spi.com

e-mail address of person responsible for this SDS : SDS@2spi.com

Emergency telephone number (with hours of operation) : **CHEMTREC**

Toll Free: 1-(800)-424-9300 (USA + Canada) (24/7)
International: 1-(703)-741-5970 (24/7)

Section 2. Hazards identification

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Classification of the substance or mixture :

H350	CARCINOGENICITY - Category 1A
H372	SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 1

GHS label elements

Hazard pictograms :

Signal word : Danger

Hazard statements : H350 - May cause cancer.
H372 - Causes damage to organs through prolonged or repeated exposure. (lungs)

Precautionary statements

Section 2. Hazards identification

Prevention : P201 - Obtain special instructions before use.
P280 - Wear protective gloves. Wear protective clothing. Wear eye or face protection.
P260 - Do not breathe dust.
P270 - Do not eat, drink or smoke when using this product.

Response : P308 + P313 - IF exposed or concerned: Get medical advice or attention.

Storage : Not applicable.

Disposal : P501 - Dispose of contents and container in accordance with all local, regional, national and international regulations.

Hazards not otherwise classified : None known.

Section 3. Composition/information on ingredients

Substance/mixture : Substance

Chemical name : Chrysotile

Other means of identification : Chrysotile Asbestos; Serpentine chrysotile; White asbestos

CAS number/other identifiers

CAS number : 12001-29-5

Ingredient name	Other names	%	CAS number
Chrysotile	-	>99.99	12001-29-5

Any concentration shown as a range is to protect confidentiality or is due to batch variation.

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health and hence require reporting in this section.

Section 4. First aid measures

Description of necessary first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Section 4. First aid measures

Most important symptoms/effects, acute and delayed

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : No known significant effects or critical hazards.

Over-exposure signs/symptoms

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Indication of immediate medical attention and special treatment needed, if necessary

Notes to physician : Treat symptomatically. Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

Specific treatments : No specific treatment.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

See toxicological information (Section 11)

Section 5. Fire-fighting measures

Extinguishing media

Suitable extinguishing media : In case of fire, use water spray (fog), foam or dry chemical.

Unsuitable extinguishing media : Do not use water jet.

Specific hazards arising from the chemical : No specific fire or explosion hazard.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
metal oxide/oxides
Toxic gases

Special protective actions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Section 6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialized clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also the information in "For non-emergency personnel".

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods and materials for containment and cleaning up

Small spill : Move containers from spill area. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Dispose of via a licensed waste disposal contractor.

Large spill : Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Avoid dust generation. Do not dry sweep. Vacuum dust with equipment fitted with a HEPA filter and place in a closed, labeled waste container. Dispose of via a licensed waste disposal contractor. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

Section 7. Handling and storage

Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Avoid exposure - obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not get in eyes or on skin or clothing. Do not ingest. If during normal use the material presents a respiratory hazard, use only with adequate ventilation or wear appropriate respirator. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

Conditions for safe storage, including any incompatibilities : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Store locked up. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination. See Section 10 for incompatible materials before handling or use.

Section 8. Exposure controls/personal protection

Control parameters

Occupational exposure limits

Ingredient name	Exposure limits
Chrysotile	**OSHA PEL (United States, 5/2018).** TWA: 0.1 f/cc 8 hours. **ACGIH TLV (United States, 3/2019).** TWA: 0.1 f/cc 8 hours. Form: Respirable fibers: length greater than 5 uM; aspect ratio equal to or greater than 3:1 as determined by the membrane filter method at 400-450X magnification (4-mm objective) phase contrast illumination.

Appropriate engineering controls : If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
Recommended: Rubber gloves.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Section 8. Exposure controls/personal protection

Respiratory protection : Based on the hazard and potential for exposure, select a respirator that meets the appropriate standard or certification. Respirators must be used according to a respiratory protection program to ensure proper fitting, training, and other important aspects of use. Recommended: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator w/ full or ½ face N95 cartridge masks if exposure limits are exceeded or symptoms are experienced.

Section 9. Physical and chemical properties

Appearance

Physical state : Solid. [Fibrous solid.]

Color : White/ Gray./ Green./ Yellowish.

Odor : Odorless.

Odor threshold : Not available.

pH : Not available.

Melting point : >500°C (>932°F)

Boiling point : Not available.

Flash point : Not available.

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Lower and upper explosive (flammable) limits : Not available.

Vapor pressure : Not available.

Vapor density : Not available.

Relative density : 2.2 to 2.6

Density : 2.2 to 2.6 g/cm³

Solubility : Insoluble in the following materials: cold water and hot water.

Partition coefficient: n-octanol/water : Not available.

Auto-ignition temperature : Not available.

Decomposition temperature : 1000°C (1832°F)

SADT : Not available.

Viscosity : Not available.

Flow time (ISO 2431) : Not available.

Section 10. Stability and reactivity

Reactivity : No specific test data related to reactivity available for this product or its ingredients.

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.
Under normal conditions of storage and use, hazardous polymerization will not occur.

Conditions to avoid : Avoid dust generation.

Section 10. Stability and reactivity

Incompatible materials : Reactive or incompatible with the following materials: oxidizing materials, acids and alkalis.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Section 11. Toxicological information

Information on toxicological effects

Acute toxicity

Not available.

Conclusion/Summary : Nuisance dust may affect the lungs but reactions are typically reversible.

Irritation/Corrosion

Not available.

Conclusion/Summary

Skin : Exposure to dust may cause mechanical irritation.

Eyes : Exposure to dust may cause mechanical irritation. Excessive concentrations of nuisance dust in the workplace may reduce visibility and may cause unpleasant deposits in eyes.

Sensitization

Not available.

Mutagenicity

Conclusion/Summary : Not available.

Carcinogenicity

Conclusion/Summary : Not available.

Classification

Product/ingredient name	OSHA	IARC	NTP
Chrysotile	+	1	Known to be a human carcinogen.

Reproductive toxicity

Conclusion/Summary : Not available.

Teratogenicity

Conclusion/Summary : Not available.

Specific target organ toxicity (single exposure)

Not available.

Specific target organ toxicity (repeated exposure)

Name	Category	Route of exposure	Target organs
Chrysotile	Category 1	-	lungs

Aspiration hazard

Not available.

Information on the likely routes of exposure : Routes of entry anticipated: Oral, Dermal, Inhalation.

Section 11. Toxicological information

Potential acute health effects

Eye contact : No known significant effects or critical hazards.

Inhalation : No known significant effects or critical hazards.

Skin contact : No known significant effects or critical hazards.

Ingestion : No known significant effects or critical hazards.

Symptoms related to the physical, chemical and toxicological characteristics

Eye contact : No specific data.

Inhalation : No specific data.

Skin contact : No specific data.

Ingestion : No specific data.

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Not available.

Conclusion/Summary : Chronic Effects May Include: Cancer, pulmonary fibrosis, pulmonary chronic lung disease.

General : Causes damage to organs through prolonged or repeated exposure.

Carcinogenicity : May cause cancer. Risk of cancer depends on duration and level of exposure.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Numerical measures of toxicity

Acute toxicity estimates

N/A

Section 12. Ecological information

Toxicity

Product/ingredient name	Result	Species	Exposure
Chrysotile	Chronic NOEC 3 mg/l Fresh water	Fish - Oncorhynchus kisutch - Egg	86 days

Conclusion/Summary : Not available.

Persistence and degradability

Not available.

Bioaccumulative potential

Not available.

Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Other adverse effects : No known significant effects or critical hazards.

Section 13. Disposal considerations

Disposal methods : The generation of waste should be avoided or minimized wherever possible. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Waste should not be disposed of untreated to the sewer unless fully compliant with the requirements of all authorities with jurisdiction. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Section 14. Transport information

	DOT Classification	IMDG	IATA
UN number	UN2590	UN2590	UN2590
UN proper shipping name	Asbestos, chrysotile	ASBESTOS, CHRYSOTILE	Asbestos, chrysotile
Transport hazard class(es)	9 	9 	9 
Packing group	III	III	III
Environmental hazards	No.	No.	No.

United States

Section 14. Transport information

Additional information

DOT Classification : **Limited quantity** Yes.
Packaging instruction Exceptions: 155. Non-bulk: 216. Bulk: 216, 240.
Quantity limitation Passenger aircraft/rail: 200 kg. Cargo aircraft: 200 kg.
Special provisions 156, IB8, IP2, IP3, T1, TP33

IMDG : **Emergency schedules** F-A, S-A
Special provisions 168

IATA : **Quantity limitation** Passenger and Cargo Aircraft: 200 kg. Packaging instructions: 958. Cargo Aircraft Only: 200 kg. Packaging instructions: 958. Limited Quantities - Passenger Aircraft: Forbidden. Packaging instructions: Forbidden.
Special provisions A61

Special precautions for user : **Transport within user's premises:** always transport in closed containers that are upright and secure. Ensure that persons transporting the product know what to do in the event of an accident or spillage.

Transport in bulk according to IMO instruments : Not available.

Section 15. Regulatory information

U.S. Federal regulations : **TSCA 5(a)2 final significant new use rules**: Chrysotile
TSCA 6 final risk management: Chrysotile
TSCA 8(a) CDR Exempt/Partial exemption: Not determined
TSCA 12(b) one-time export: Chrysotile
United States inventory (TSCA 8b): All components are active or exempted.
Clean Water Act (CWA) 307: Chrysotile

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

SARA 302/304

Composition/information on ingredients

No products were found.

SARA 304 RQ : Not applicable.

SARA 311/312

Classification : CARCINOGENICITY - Category 1A
SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 1

Composition/information on ingredients

Section 15. Regulatory information

Name	%	Classification
Chrysotile	>99.99	CARCINOGENICITY - Category 1A SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 1

SARA 313

	Product name	CAS number	%
Form R - Reporting requirements	Chrysotile	12001-29-5	>99.99
Supplier notification	Chrysotile	12001-29-5	>99.99

SARA 313 notifications must not be detached from the SDS and any copying and redistribution of the SDS shall include copying and redistribution of the notice attached to copies of the SDS subsequently redistributed.

State regulations

Massachusetts : The following components are listed: CHRYSOTILE ASBESTOS

New York : The following components are listed: Asbestos

New Jersey : The following components are listed: ASBESTOS, CHRYSOTILE

Pennsylvania : The following components are listed: CHRYSOTILE

California Prop. 65

⚠ **WARNING**: This product can expose you to Asbestos, which is known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov.

Ingredient name	No significant risk level	Maximum acceptable dosage level
Asbestos	Yes.	-

International regulations

Chemical Weapon Convention List Schedules I, II & III Chemicals

Not listed.

Montreal Protocol

Not listed.

Stockholm Convention on Persistent Organic Pollutants

Not listed.

Rotterdam Convention on Prior Informed Consent (PIC)

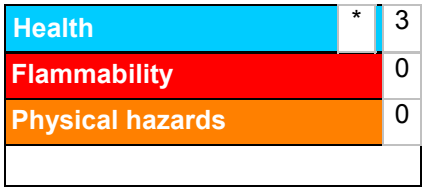
Not listed.

UNECE Aarhus Protocol on POPs and Heavy Metals

Not listed.

Section 16. Other information

Hazardous Material Information System (U.S.A.)



Section 16. Other information

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings and the associated label are not required on SDSs or products leaving a facility under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered trademark and service mark of the American Coatings Association, Inc.

The customer is responsible for determining the PPE code for this material. For more information on HMIS® Personal Protective Equipment (PPE) codes, consult the HMIS® Implementation Manual.

National Fire Protection Association (U.S.A.)

Procedure used to derive the classification

Classification	Justification
CARCINOGENICITY - Category 1A SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 1	Calculation method Calculation method

History

Date of issue/Date of revision : 07/02/2020

Date of previous issue : No previous validation

Version : 1

Prepared by : Sphera Solutions

Key to abbreviations : ATE = Acute Toxicity Estimate
AMP = Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift
BCF = Bioconcentration Factor
GHS = Globally Harmonized System of Classification and Labelling of Chemicals
IATA = International Air Transport Association
IBC = Intermediate Bulk Container
IMDG = International Maritime Dangerous Goods
LogPow = logarithm of the octanol/water partition coefficient
MARPOL = International Convention for the Prevention of Pollution From Ships, 1973 as modified by the Protocol of 1978. ("Marpol" = marine pollution)
N/A = Not available
UN = United Nations

References : HCS (U.S.A.)- Hazard Communication Standard
International transport regulations

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

APPENDIX D

OSHA – ASBESTOS CONSTRUCTION INDUSTRY STANDARD 29 CFR 1926.1101

Asbestos - 1926.1101

Regulations (Standards - 29 CFR) - Table of Contents

• Part Number:	1926
• Part Title:	Safety and Health Regulations for Construction
• Subpart:	Z
• Subpart Title:	Toxic and Hazardous Substances
• Standard Number:	1926.1101
• Title:	Asbestos
• Appendix:	A , B , C , D , E , F , G , H , I , J , K

1926.1101(a)
Scope and application. This section regulates asbestos exposure in all work as defined in 29 CFR 1910.12(b), including but not limited to the following:
1926.1101(a)(1)
Demolition or salvage of structures where asbestos is present;
1926.1101(a)(2)
Removal or encapsulation of materials containing asbestos;
1926.1101(a)(3)
Construction, alteration, repair, maintenance, or Renovation of structures, substrates, or portions thereof, that contain asbestos;
1926.1101(a)(4)
Installation of products containing asbestos;
1926.1101(a)(5)
Asbestos spill/emergency cleanup; and
1926.1101(a)(6)
Transportation, disposal, storage, containment of and housekeeping activities involving asbestos or products containing asbestos, on the site or location at which construction activities are performed.
1926.1101(a)(7)
Coverage under this standard shall be based on the nature of the work operation involving asbestos exposure.
1926.1101(a)(8)
This section does not apply to asbestos-containing asphalt roof coatings, cements and mastics.
1926.1101(b)
Definitions.

Aggressive method means removal or disturbance of building material by sanding, abrading, grinding or other method that breaks, crumbles, or disintegrates intact ACM.

Amended water means water to which surfactant (wetting agent) has been added to increase the ability of the liquid to penetrate ACM.

Asbestos includes chrysotile, amosite, crocidolite, tremolite asbestos, anthophyllite asbestos, actinolite asbestos, and any of these minerals that has been chemically treated and/or altered. For purposes of this standard, "asbestos" includes PACM, as defined below.

Asbestos-containing material (ACM), means any material containing more than one percent asbestos.

Assistant Secretary means the Assistant Secretary of Labor for Occupational Safety and Health, U.S. Department of Labor, or designee.

Authorized person means any person authorized by the employer and required by work duties to be present in regulated areas.

Building/facility owner is the legal entity, including a lessee, which exercises control over management and record keeping functions relating to a building and/or facility in which activities covered by this standard take place.

Certified Industrial Hygienist (CIH) means one certified in the practice of industrial hygiene by the American Board of Industrial Hygiene.

Class I asbestos work means activities involving the removal of TSI and surfacing ACM and PACM.

Class II asbestos work means activities involving the removal of ACM which is not thermal system insulation or surfacing material. This includes, but is not limited to, the removal of asbestos-containing wallboard, floor tile and sheeting, roofing and siding shingles, and construction mastics.

Class III asbestos work means repair and maintenance operations, where "ACM", including TSI and surfacing ACM and PACM, is likely to be disturbed.

Class IV asbestos work means maintenance and custodial activities during which employees contact but do not disturb ACM or PACM and activities to clean up dust, waste and debris resulting from Class I, II, and III activities.

Clean room means an uncontaminated room having facilities for the storage of employees' street clothing and uncontaminated materials and equipment.

Closely resemble means that the major workplace conditions which have contributed to the levels of historic asbestos exposure, are no more protective than conditions of the current workplace.

Competent person means, in addition to the definition in 29 CFR 1926.32 (f), one who is capable of identifying existing asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, who has the authority to take prompt corrective measures to eliminate them, as specified in 29 CFR 1926.32(f): in addition, for Class I and Class II work who is specially trained in a training course which meets the criteria of EPA's Model Accreditation Plan (40 CFR 763) for supervisor, or its equivalent and, for Class III and Class IV work, who is trained in a manner consistent with EPA requirements for training of local education agency maintenance and custodial staff as set forth at 40 CFR 763.92 (a)(2).

Critical barrier means one or more layers of plastic sealed over all openings into a work area or any other similarly placed physical barrier sufficient to prevent airborne asbestos in a work area from migrating to an adjacent area.

Decontamination area means an enclosed area adjacent and connected to the regulated area and consisting of an equipment room, shower area, and clean room, which is used for the decontamination of workers, materials, and equipment that are contaminated with asbestos.

Demolition means the wrecking or taking out of any load-supporting structural member and any related razing, removing, or stripping of asbestos products.

Director means the Director, National Institute for Occupational Safety and Health, U.S. Department of Health and Human Services, or designee.

Disturbance means activities that disrupt the matrix of ACM or PACM, crumble or pulverixe ACM or PACM, or generate visible debris from ACM or PACM. Disturbance includes cutting away small amounts of ACM and PACM, no greater than the amount which can be contained in one standard sized glove bag or waste bag in order to access a building component. In no event shall the amount of ACM or PACM so disturbed exceed that which can be contained in one glove bag or waste bag which shall not exceed 60 inches in length and width.

Employee exposure means that exposure to airborne asbestos that would occur if the employee were not using respiratory protective equipment.

Equipment room (change room) means a contaminated room located within the decontamination area that is supplied with impermeable bags or containers for the disposal of contaminated protective clothing and equipment.

Fiber means a particulate form of asbestos, 5 micrometers or longer, with a length-to-diameter ratio of at least 3 to 1.

Glovebag means not more than a 60 x 60 inch impervious plastic bag-like enclosure affixed around an asbestos-containing material, with glove-like appendages through which material and tools may be handled.

High-efficiency particulate air (HEPA) filter means a filter capable of trapping and retaining at least 99.97 percent of all mono-dispersed particles of 0.3 micrometers in diameter.

Homogeneous area means an area of surfacing material or thermal system insulation that is uniform in color and texture.

Industrial hygienist means a professional qualified by education, training, and experience to anticipate, recognize, evaluate and develop controls for occupational health hazards.

Intact means that the ACM has not crumbled, been pulverized, or otherwise deteriorated so that the asbestos is no longer likely to be bound with its matrix.

Modification for purposes of paragraph (g)(6)(ii), means a changed or altered procedure, material or component of a control system, which replaces a procedure, material or component of a required system. Omitting a procedure or component, or reducing or diminishing the stringency or strength of a material or component of the control system is not a "modification" for purposes of paragraph (g)(6) of this section.

Negative Initial Exposure Assessment means a demonstration by the employer, which complies with the criteria in paragraph (f)(2)(iii) of this section, that employee exposure during an operation is expected to be consistently below the PELs.

PACM means "presumed asbestos containing material".

Presumed Asbestos Containing Material means thermal system insulation and surfacing material found in buildings constructed no later than 1980. The designation of a material as "PACM" may be rebutted pursuant to paragraph (k)(5) of this section.

Project Designer means a person who has successfully completed the training requirements for an abatement project designer established by 40 U.S.C. Sec. 763.90(g).

Regulated area means: an area established by the employer to demarcate areas where Class I, II, and III asbestos work is conducted, and any adjoining area where debris and waste from such asbestos work accumulate; and a work area within which airborne concentrations of asbestos, exceed or there is a reasonable possibility they may exceed the permissible exposure limit. Requirements for regulated areas are set out in paragraph (e) of this section.

Removal means all operations where ACM and/or PACM is taken out or stripped from structures or substrates, and includes demolition operations.

Renovation means the modifying of any existing structure, or portion thereof.

Repair means overhauling, rebuilding, reconstructing, or reconditioning of structures or substrates, including encapsulation or other repair of ACM or PACM attached to structures or substrates.

Surfacing material means material that is sprayed, troweled-on or otherwise applied to surfaces (such as acoustical plaster on ceilings and fireproofing materials on structural members, or other materials on surfaces for acoustical, fireproofing, and other purposes).

Surfacing ACM means surfacing material which contains more than 1% asbestos.

Thermal system insulation (TSI) means ACM applied to pipes, fittings, boilers, breeching, tanks, ducts or other structural components to prevent heat loss or gain.

Thermal system insulation ACM is thermal system insulation which contains more than 1% asbestos.
..1926.1101(c)

1926.1101(c)
Permissible exposure limits (PELS).
1926.1101(c)(1)
Time-weighted average limit (TWA). The employer shall ensure that no employee is exposed to an airborne concentration of asbestos in excess of 0.1 fiber per cubic centimeter of air as an eight (8) hour time-weighted average (TWA), as determined by the method prescribed in Appendix A to this section, or by an equivalent method.
1926.1101(c)(2)
Excursion limit. The employer shall ensure that no employee is exposed to an airborne concentration of asbestos in excess of 1.0 fiber per cubic centimeter of air (1 f/cc) as averaged over a sampling period of thirty (30) minutes, as determined by the method prescribed in Appendix A to this section, or by an equivalent method.
1926.1101(d)
Multi-employer worksites.
1926.1101(d)(1)
On multi-employer worksites, an employer performing work requiring the establishment of a regulated area shall inform other employers on the site of the nature of the employer's work with asbestos and/or PACM, of the existence of and requirements pertaining to regulated areas, and the measures taken to ensure that employees of such other employers are not exposed to asbestos.
1926.1101(d)(2)
Asbestos hazards at a multi-employer work site shall be abated by the contractor who created or controls the source of asbestos contamination. For example, if there is a significant breach of an enclosure containing Class I work, the employer responsible for erecting the enclosure shall repair the breach immediately.
..1926.1101(d)(3)

1926.1101(d)(3)
In addition, all employers of employees exposed to asbestos hazards shall comply with applicable protective provisions to protect their employees. For example, if employees working immediately adjacent to a Class I asbestos job are exposed to asbestos due to the inadequate containment of such job, their employer shall either remove the employees from the area until the enclosure breach is repaired; or perform an initial exposure assessment pursuant to (f) of this section.
1926.1101(d)(4)
All employers of employees working adjacent to regulated areas established by another employer on a multi-employer work-site, shall take steps on a daily basis to ascertain the integrity of the enclosure and/or the effectiveness of the control method relied on by the primary asbestos contractor to assure that asbestos fibers do not migrate to such adjacent areas.
1926.1101(d)(5)
All general contractors on a construction project which includes work covered by this standard shall be deemed to exercise general supervisory authority over the work covered by this standard, even though the general contractor is not qualified to serve as the asbestos "competent person" as defined by paragraph (b) of this section. As supervisor of the entire project, the general contractor shall ascertain whether the asbestos contractor is in compliance with this standard, and shall require such contractor to come into compliance with this standard when necessary.
1926.1101(e)
Regulated areas.
1926.1101(e)(1)

All Class I, II and III asbestos work shall be conducted within regulated areas. All other operations covered by this standard shall be conducted within a regulated area where airborne concentrations of asbestos exceed, or there is a reasonable possibility they may exceed a PEL. Regulated areas shall comply with the requirements of paragraphs (2), (3),(4) and (5) of this section.
1926.1101(e)(2)
Demarcation. The regulated area shall be demarcated in any manner that minimizes the number of persons within the area and protects persons outside the area from exposure to airborne asbestos. Where critical barriers or negative pressure enclosures are used, they may demarcate the regulated area. Signs shall be provided and displayed pursuant to the requirements of paragraph (k)(7) of this section.
1926.1101(e)(3)
Access. Access to regulated areas shall be limited to authorized persons and to persons authorized by the Act or regulations issued pursuant thereto.
1926.1101(e)(4)
Respirators. All persons entering a regulated area where employees are required pursuant to paragraph (h)(1) of this section to wear respirators shall be supplied with a respirator selected in accordance with paragraph (h)(2) of this section.
1926.1101(e)(5)
Prohibited activities. The employer shall ensure that employees do not eat, drink, smoke, chew tobacco or gum, or apply cosmetics in the regulated area.
..1926.1101(e)(6)

1926.1101(e)(6)
Competent Persons. The employer shall ensure that all asbestos work performed within regulated areas is supervised by a competent person, as defined in paragraph (b) of this section. The duties of the competent person are set out in paragraph (o) of this section.
1926.1101(f)
Exposure assessments and monitoring.
1926.1101(f)(1)
General monitoring criteria.
1926.1101(f)(1)(i)
Each employer who has a workplace or work operation where exposure monitoring is required under this section shall perform monitoring to determine accurately the airborne concentrations of asbestos to which employees may be exposed.
1926.1101(f)(1)(ii)
Determinations of employee exposure shall be made from breathing zone air samples that are representative of the 8-hour TWA and 30-minute short-term exposures of each employee.
1926.1101(f)(1)(iii)
Representative 8-hour TWA employee exposure shall be determined on the basis of one or more samples representing full-shift exposure for employees in each work area. Representative 30-minute short-term employee exposures shall be determined on the basis of one or more samples representing 30 minute exposures associated with operations that are most likely to produce exposures above the excursion limit for employees in each work area.
1926.1101(f)(2)
Initial Exposure Assessment.
1926.1101(f)(2)(i)
Each employer who has a workplace or work operation covered by this standard shall ensure that a "competent person" conducts an exposure assessment immediately before or at the initiation of the operation to ascertain expected exposures during that operation or workplace. The assessment must be completed in time to comply with requirements which are triggered by exposure data or the lack of a "negative exposure assessment," and to provide information necessary to assure that all control systems planned are appropriate for that operation and will work properly.
1926.1101(f)(2)(ii)
Basis of Initial Exposure Assessment: Unless a negative exposure assessment has been made pursuant to paragraph (f)(2)(iii) of this section, the initial exposure assessment shall, if feasible, be based on monitoring conducted pursuant to paragraph (f)(1)(iii) of this section. The assessment shall take into consideration both the monitoring results and all observations, information or calculations which indicate employee exposure to asbestos, including any previous monitoring conducted in the workplace, or of the operations of the employer which indicate the levels of airborne asbestos likely to be encountered on the job. For Class I asbestos work, until the employer conducts exposure monitoring and documents that employees on that job will not be exposed in excess of the PELs, or otherwise makes a negative exposure assessment pursuant to paragraph

(f)(2)(iii) of this section, the employer shall presume that employees are exposed in excess of the TWA and excursion limit.
1926.1101(f)(2)(iii)
Negative Exposure Assessment: For any one specific asbestos job which will be performed by employees who have been trained in compliance with the standard, the employer may demonstrate that employee exposures will be below the PELs by data which conform to the following criteria;
..1926.1101(f)(2)(iii)(A)

1926.1101(f)(2)(iii)(A)
Objective data demonstrating that the product or material containing asbestos minerals or the activity involving such product or material cannot release airborne fibers in concentrations exceeding the TWA and excursion limit under those work conditions having the greatest potential for releasing asbestos; or
1926.1101(f)(2)(iii)(B)
Where the employer has monitored prior asbestos jobs for the PEL and the excursion limit within 12 months of the current or projected job, the monitoring and analysis were performed in compliance with the asbestos standard in effect; and the data were obtained during work operations conducted under workplace conditions "closely resembling" the processes, type of material, control methods, work practices, and environmental conditions used and prevailing in the employer's current operations, the operations were conducted by employees whose training and experience are no more extensive than that of employees performing the current job, and these data show that under the conditions prevailing and which will prevail in the current workplace there is a high degree of certainty that employee exposures will not exceed the TWA and excursion limit; or
1926.1101(f)(2)(iii)(C)
The results of initial exposure monitoring of the current job made from breathing zone air samples that are representative of the 8-hour TWA and 30-minute short-term exposures of each employee covering operations which are most likely during the performance of the entire asbestos job to result in exposures over the PELs.
1926.1101(f)(3)
Periodic monitoring.
1926.1101(f)(3)(i)
Class I and II operations. The employer shall conduct daily monitoring that is representative of the exposure of each employee who is assigned to work within a regulated area who is performing Class I or II work, unless the employer pursuant to (f)(2)(iii) of this section, has made a negative exposure assessment for the entire operation.
1926.1101(f)(3)(ii)
All operations under the standard other than Class I and II operations. The employer shall conduct periodic monitoring of all work where exposures are expected to exceed a PEL, at intervals sufficient to document the validity of the exposure prediction.
1926.1101(f)(3)(iii)
Exception: When all employees required to be monitored daily are equipped with supplied-air respirators operated in the pressure demand mode, or other positive pressure mode respirator, the employer may dispense with the daily monitoring required by this paragraph. However, employees performing Class I work using a control method which is not listed in paragraph (g)(4)(i), (ii), or (iii) of this section or using a modification of a listed control method, shall continue to be monitored daily even if they are equipped with supplied-air respirators.
1926.1101(f)(4)
Termination of monitoring.
1926.1101(f)(4)(i)
If the periodic monitoring required by paragraph (f)(3) of this section reveals that employee exposures, as indicated by statistically reliable measurements, are below the permissible exposure limit and excursion limit the employer may discontinue monitoring for those employees whose exposures are represented by such monitoring.
..1926.1101(f)(4)(ii)

1926.1101(f)(4)(ii)
Additional monitoring. Notwithstanding the provisions of paragraph (f)(2) and (3), and (f)(4) of this section, the employer shall institute the exposure monitoring required under paragraph (f)(3) of this section whenever there has been a change in process, control equipment, personnel or work practices that may result in new or additional exposures above the permissible exposure limit and/or excursion limit or when the employer has

any reason to suspect that a change may result in new or additional exposures above the permissible exposure limit and/or excursion limit. Such additional monitoring is required regardless of whether a "negative exposure assessment" was previously produced for a specific job.

1926.1101(f)(5)

Employee notification of monitoring results. The employer must, as soon as possible but no later than 5 working days after the receipt of the results of any monitoring performed under this section, notify each affected employee of these results either individually in writing or by posting the results in an appropriate location that is accessible to employees.

1926.1101(f)(5)(i)

The employer shall notify affected employees of the monitoring results that represent that employee's exposure as soon as possible following receipt of monitoring results.

1926.1101(f)(5)(ii)

The employer shall notify affected employees of the results of monitoring respresenting the employee's exposure in writing either individually or by posting at a centrally located place that is accessible to affected employees.

1926.1101(f)(6)

Observation of monitoring.

1926.1101(f)(6)(i)

The employer shall provide affected employees and their designated representatives an opportunity to observe any monitoring of employee exposure to asbestos conducted in accordance with this section.

1926.1101(f)(6)(ii)

When observation of the monitoring of employee exposure to asbestos requires entry into an area where the use of protective clothing or equipment is required, the observer shall be provided with and be required to use such clothing and equipment and shall comply with all other applicable safety and health procedures.

1926.1101(g)

Methods of compliance.

1926.1101(g)(1)

Engineering controls and work practices for all operations covered by this section. The employer shall use the following engineering controls and work practices in all operations covered by this section, regardless of the levels of exposure:

1926.1101(g)(1)(i)

Vacuum cleaners equipped with HEPA filters to collect all debris and dust containing ACM and PACM, except as provided in paragraph (g)(8)(ii) of this section in the case of roofing material.

1926.1101(g)(1)(ii)

Wet methods, or wetting agents, to control employee exposures during asbestos handling, mixing, removal, cutting, application, and cleanup, except where employers demonstrate that the use of wet methods is infeasible due to for example, the creation of electrical hazards, equipment malfunction, and, in roofing, except as provide in paragraph (g)(8)(ii) of this section; and

1926.1101(g)(1)(iii)

Prompt clean-up and disposal of wastes and debris contaminated with asbestos in leak-tight containers except in roofing operations, where the procedures specified in paragraph (g)(8)(ii) of this section apply.

1926.1101(g)(2)

In addition to the requirements of paragraph (g)(1) of this section, the employer shall use the following control methods to achieve compliance with the TWA permissible exposure limit and excursion limit prescribed by paragraph (c) of this section;

1926.1101(g)(2)(i)

Local exhaust ventilation equipped with HEPA filter dust collection systems;

..1926.1101(g)(2)(ii)

1926.1101(g)(2)(ii)

Enclosure or isolation of processes producing asbestos dust;

1926.1101(g)(2)(iii)

Ventilation of the regulated area to move contaminated air away from the breathing zone of employees and toward a filtration or collection device equipped with a HEPA filter;

1926.1101(g)(2)(iv)

Use of other work practices and engineering controls that the Assistant Secretary can show to be feasible.

1926.1101(g)(2)(v)

Wherever the feasible engineering and work practice controls described above are not sufficient to reduce employee exposure to or below the permissible exposure limit and/or excursion limit prescribed in paragraph (c) of this section, the employer shall use them to reduce employee exposure to the lowest levels attainable by these controls and shall supplement them by the use of respiratory protection that complies with the

requirements of paragraph (h) of this section.
1926.1101(g)(3)
Prohibitions. The following work practices and engineering controls shall not be used for work related to asbestos or for work which disturbs ACM or PACM, regardless of measured levels of asbestos exposure or the results of initial exposure assessments:
1926.1101(g)(3)(i)
High-speed abrasive disc saws that are not equipped with point of cut ventilator or enclosures with HEPA filtered exhaust air.
1926.1101(g)(3)(ii)
Compressed air used to remove asbestos, or materials containing asbestos, unless the compressed air is used in conjunction with an enclosed ventilation system designed to capture the dust cloud created by the compressed air.
1926.1101(g)(3)(iii)
Dry sweeping, shoveling or other dry clean-up of dust and debris containing ACM and PACM.
1926.1101(g)(3)(iv)
Employee rotation as a means of reducing employee exposure to asbestos.
1926.1101(g)(4)
Class I Requirements. In addition to the provisions of paragraphs (g)(1) and (2) of this section, the following engineering controls and work practices and procedures shall be used.
1926.1101(g)(4)(i)
All Class I work, including the installation and operation of the control system shall be supervised by a competent person as defined in paragraph (b) of this section;
1926.1101(g)(4)(ii)
For all Class I jobs involving the removal of more than 25 linear or 10 square feet of thermal system insulation or surfacing material; for all other Class I jobs, where the employer cannot produce a negative exposure assessment pursuant to paragraph (f)(2)(iii) of this section, or where employees are working in areas adjacent to the regulated area, while the Class I work is being performed, the employer shall use one of the following methods to ensure that airborne asbestos does not migrate from the regulated area:
..1926.1101(g)(4)(ii)(A)

1926.1101(g)(4)(ii)(A)
Critical barriers shall be placed over all the openings to the regulated area, except where activities are performed outdoors; or
1926.1101(g)(4)(ii)(B)
The employer shall use another barrier or isolation method which prevents the migration of airborne asbestos from the regulated area, as verified by perimeter area surveillance during each work shift at each boundary of the regulated area, showing no visible asbestos dust; and perimeter area monitoring showing that clearance levels contained in 40 CFR Part 763, Subpt. E, of the EPA Asbestos in Schools Rule are met, or that perimeter area levels, measured by Phase Contrast Microscopy (PCM) are no more than background levels representing the same area before the asbestos work began. The results of such monitoring shall be made known to the employer no later than 24 hours from the end of the work shift represented by such monitoring. Exception: For work completed outdoors where employees are not working in areas adjacent to the regulated areas, this paragraph (g)(4)(ii) is satisfied when the specific control methods in paragraph (g)(5) of this section are used.
1926.1101(g)(4)(iii)
For all Class I jobs, HVAC systems shall be isolated in the regulated area by sealing with a double layer of 6 mil plastic or the equivalent;
1926.1101(g)(4)(iv)
For all Class I jobs, impermeable dropcloths shall be placed on surfaces beneath all removal activity;
1926.1101(g)(4)(v)
For all Class I jobs, all objects within the regulated area shall be covered with impermeable dropcloths or plastic sheeting which is secured by duct tape or an equivalent.
1926.1101(g)(4)(vi)
For all Class I jobs where the employer cannot produce a negative exposure assessment, or where exposure monitoring shows that a PEL is exceeded, the employer shall ventilate the regulated area to move contaminated air away from the breathing zone of employees toward a HEPA filtration or collection device.
1926.1101(g)(5)
Specific control methods for Class I work. In addition, Class I asbestos work shall be performed using one or more of the following control methods pursuant to the limitations stated below:
1926.1101(g)(5)(i)
Negative Pressure Enclosure (NPE) systems: NPE systems may be used where the configuration of the work

area does not make the erection of the enclosure infeasible, with the following specifications and work practices.
1926.1101(g)(5)(i)(A)
Specifications:
1926.1101(g)(5)(i)(A)(1)
The negative pressure enclosure (NPE) may be of any configuration,
1926.1101(g)(5)(i)(A)(2)
At least 4 air changes per hour shall be maintained in the NPE,
..1926.1101(g)(5)(i)(A)(3)

1926.1101(g)(5)(i)(A)(3)
A minimum of -0.02 column inches of water pressure differential, relative to outside pressure, shall be maintained within the NPE as evidenced by manometric measurements,
1926.1101(g)(5)(i)(A)(4)
The NPE shall be kept under negative pressure throughout the period of its use, and
1926.1101(g)(5)(i)(A)(5)
Air movement shall be directed away from employees performing asbestos work within the enclosure, and toward a HEPA filtration or a collection device.
1926.1101(g)(5)(i)(B)
Work Practices:
1926.1101(g)(5)(i)(B)(1)
Before beginning work within the enclosure and at the beginning of each shift, the NPE shall be inspected for breaches and smoke-tested for leaks, and any leaks sealed.
1926.1101(g)(5)(i)(B)(2)
Electrical circuits in the enclosure shall be deactivated, unless equipped with ground-fault circuit interrupters.
1926.1101(g)(5)(ii)
Glove bag systems may be used to remove PACM and/or ACM from straight runs of piping and elbows and other connections with the following specifications and work practices:
1926.1101(g)(5)(ii)(A)
Specifications:
1926.1101(g)(5)(ii)(A)(1)
Glovebags shall be made of 6 mil thick plastic and shall be seamless at the bottom.
1926.1101(g)(5)(ii)(A)(2)
Glovebags used on elbows and other connections must be designed for that purpose and used without modifications.
1926.1101(g)(5)(ii)(B)
Work Practices:
1926.1101(g)(5)(ii)(B)(1)
Each glovebag shall be installed so that it completely covers the circumference of pipe or other structure where the work is to be done.
1926.1101(g)(5)(ii)(B)(2)
Glovebags shall be smoke-tested for leaks and any leaks sealed prior to use.
1926.1101(g)(5)(ii)(B)(3)
Glovebags may be used only once and may not be moved.
1926.1101(g)(5)(ii)(B)(4)
Glovebags shall not be used on surfaces whose temperature exceeds 150 deg. F.
1926.1101(g)(5)(ii)(B)(5)
Prior to disposal, glovebags shall be collapsed by removing air within them using a HEPA vacuum.
1926.1101(g)(5)(ii)(B)(6)
Before beginning the operation, loose and friable material adjacent to the glovebag/box operation shall be wrapped and sealed in two layers of six mil plastic or otherwise rendered intact,
..1926.1101(g)(5)(ii)(B)(7)

1926.1101(g)(5)(ii)(B)(7)
Where system uses attached waste bag, such bag shall be connected to collection bag using hose or other material which shall withstand pressure of ACM waste and water without losing its integrity:
1926.1101(g)(5)(ii)(B)(8)
Sliding valve or other device shall separate waste bag from hose to ensure no exposure when waste bag is disconnected:
1926.1101(g)(5)(ii)(B)(9)
At least two persons shall perform Class I glovebag removal operations.
1926.1101(g)(5)(iii)
Negative Pressure Glove Bag Systems. Negative pressure glove bag systems may be used to remove ACM or

PACM from piping.
1926.1101(g)(5)(iii)(A)
Specifications: In addition to specifications for glove bag systems above, negative pressure glove bag systems shall attach HEPA vacuum systems or other devices to bag to prevent collapse during removal.
1926.1101(g)(5)(iii)(B)
Work Practices:
1926.1101(g)(5)(iii)(B)(1)
The employer shall comply with the work practices for glove bag systems in paragraph (g)(5)(ii)(B)(4) of this section.
1926.1101(g)(5)(iii)(B)(2)
The HEPA vacuum cleaner or other device used to prevent collapse of bag during removal shall run continually during the operation until it is completed at which time the bag shall be collapsed prior to removal of the bag from the pipe.
1926.1101(g)(5)(iii)(B)(3)
Where a separate waste bag is used along with a collection bag and discarded after one use, the collection bag may be reused if rinsed clean with amended water before reuse.
1926.1101(g)(5)(iv)
Negative Pressure Glove Box Systems: Negative pressure glove boxes may be used to remove ACM or PACM from pipe runs with the following specifications and work practices.
1926.1101(g)(5)(iv)(A)
Specifications:
1926.1101(g)(5)(iv)(A)(1)
Glove boxes shall be constructed with rigid sides and made from metal or other material which can withstand the weight of the ACM and PACM and water used during removal:
1926.1101(g)(5)(iv)(A)(2)
A negative pressure generator shall be used to create negative pressure in the system:
1926.1101(g)(5)(iv)(A)(3)
An air filtration unit shall be attached to the box:
1926.1101(g)(5)(iv)(A)(4)
The box shall be fitted with gloved apertures:
1926.1101(g)(5)(iv)(A)(5)
An aperture at the base of the box shall serve as a bagging outlet for waste ACM and water:
1926.1101(g)(5)(iv)(A)(6)
A back-up generator shall be present on site:
..1926.1101(g)(5)(iv)(A)(7)

1926.1101(g)(5)(iv)(A)(7)
Waste bags shall consist of 6 mil thick plastic double-bagged before they are filled or plastic thicker than 6 mil.
1926.1101(g)(5)(iv)(B)
Work practices:
1926.1101(g)(5)(iv)(B)(1)
At least two persons shall perform the removal:
1926.1101(g)(5)(iv)(B)(2)
The box shall be smoke-tested for leaks and any leaks sealed prior to each use:
1926.1101(g)(5)(iv)(B)(3)
Loose or damaged ACM adjacent to the box shall be wrapped and sealed in two layers of 6 mil plastic prior to the job, or otherwise made intact prior to the job.
1926.1101(g)(5)(iv)(B)(4)
A HEPA filtration system shall be used to maintain pressure barrier in box.
1926.1101(g)(5)(v)
Water Spray Process System. A water spray process system may be used for removal of ACM and PACM from cold line piping if, employees carrying out such process have completed a 40-hour separate training course in its use, in addition to training required for employees performing Class I work. The system shall meet the following specifications and shall be performed by employees using the following work practices.
1926.1101(g)(5)(v)(A)
Specifications:
1926.1101(g)(5)(v)(A)(1)
Piping shall be surrounded on 3 sides by rigid framing,
1926.1101(g)(5)(v)(A)(2)
A 360 degree water spray, delivered through nozzles supplied by a high pressure separate water line, shall be formed around the piping.
1926.1101(g)(5)(v)(A)(3)

The spray shall collide to form a fine aerosol which provides a liquid barrier between workers and the ACM and PACM.
1926.1101(g)(5)(v)(B)
Work Practices:
1926.1101(g)(5)(v)(B)(1)
The system shall be run for at least 10 minutes before removal begins.
1926.1101(g)(5)(v)(B)(2)
All removal shall take place within the water barrier.
1926.1101(g)(5)(v)(B)(3)
The system shall be operated by at least three persons, one of whom shall not perform removal, but shall check equipment, and ensure proper operation of the system.
1926.1101(g)(5)(v)(B)(4)
After removal, the ACM and PACM shall be bagged while still inside the water barrier.
..1926.1101(g)(5)(vi)

1926.1101(g)(5)(vi)
A small walk-in enclosure which accommodates no more than two persons (mini-enclosure) may be used if the disturbance or removal can be completely contained by the enclosure with the following specifications and work practices.
1926.1101(g)(5)(vi)(A)
Specifications:
1926.1101(g)(5)(vi)(A)(1)
The fabricated or job-made enclosure shall be constructed of 6 mil plastic or equivalent:
1926.1101(g)(5)(vi)(A)(2)
The enclosure shall be placed under negative pressure by means of a HEPA filtered vacuum or similar ventilation unit:
1926.1101(g)(5)(vi)(B)
Work practices:
1926.1101(g)(5)(vi)(B)(1)
Before use, the mini-enclosure shall be inspected for leaks and smoke-tested to detect breaches, and breaches sealed.
1926.1101(g)(5)(vi)(B)(2)
Before reuse, the interior shall be completely washed with amended water and HEPA-vacuumed.
1926.1101(g)(5)(vi)(B)(3)
During use, air movement shall be directed away from the employee's breathing zone within the mini-enclosure.
1926.1101(g)(6)
Alternative control methods for Class I work. Class I work may be performed using a control method which is not referenced in paragraph (g)(5) of this section, or which modifies a control method referenced in paragraph (g)(5)of this section, if the following provisions are complied with:
1926.1101(g)(6)(i)
The control method shall enclose, contain or isolate the processes or source of airborne asbestos dust, or otherwise capture or redirect such dust before it enters the breathing zone of employees.
1926.1101(g)(6)(ii)
A certified industrial hygienist or licensed professional engineer who is also qualified as a project designer as defined in paragraph (b) of this section, shall evaluate the work area, the projected work practices and the engineering controls and shall certify in writing that the planned control method is adequate to reduce direct and indirect employee exposure to below the PELs under worst-case conditions of use, and that the planned control method will prevent asbestos contamination outside the regulated area, as measured by clearance sampling which meets the requirements of EPA's Asbestos in Schools rule issued under AHERA, or perimeter monitoring which meets the criteria in paragraph (g)(4)(ii)(B) of this section.
1926.1101(g)(6)(ii)(A)
Where the TSI or surfacing material to be removed is 25 linear or 10 square feet or less , the evaluation required in paragraph (g)(6) of this section may be performed by a "competent person", and may omit consideration of perimeter or clearance monitoring otherwise required.
..1926.1101(g)(6)(ii)(B)

1926.1101(g)(6)(ii)(B)
The evaluation of employee exposure required in paragraph (g)(6) of this section, shall include and be based on sampling and analytical data representing employee exposure during the use of such method under worst-case conditions and by employees whose training and experience are equivalent to employees who are to

perform the current job.
1926.1101(g)(7)
Work Practices and Engineering Controls for Class II work.
1926.1101(g)(7)(i)
All Class II work shall be supervised by a competent person as defined in paragraph (b) of this section.
1926.1101(g)(7)(ii)
For all indoor Class II jobs, where the employer has not produced a negative exposure assessment pursuant to paragraph (f)(2)(iii) of this section, or where during the job, changed conditions indicate there may be exposure above the PEL or where the employer does not remove the ACM in a substantially intact state, the employer shall use one of the following methods to ensure that airborne asbestos does not migrate from the regulated area;
1926.1101(g)(7)(ii)(A)
Critical barriers shall be placed over all openings to the regulated area; or,
1926.1101(g)(7)(ii)(B)
The employer shall use another barrier or isolation method which prevents the migration of airborne asbestos from the regulated area, as verified by perimeter area monitoring or clearance monitoring which meets the criteria set out in paragraph (g)(4)(ii)(B) of this section.
1926.1101(g)(7)(ii)(C)
Impermeable dropcloths shall be placed on surfaces beneath all removal activity;
1926.1101(g)(7)(iii)
[Reserved]
1926.1101(g)(7)(iv)
All Class II asbestos work shall be performed using the work practices and requirements set out above in paragraph (g)(1)(i) through (g)(1)(iii) of this section.
1926.1101(g)(8)
Additional Controls for Class II work. Class II asbestos work shall also be performed by complying with the work practices and controls designated for each type of asbestos work to be performed, set out in this paragraph. Where more than one control method may be used for a type of asbestos work, the employer may choose one or a combination of designated control methods. Class II work also may be performed using a method allowed for Class I work, except that glove bags and glove boxes are allowed if they fully enclose the Class II material to be removed.
..1926.1101(g)(8)(i)

1926.1101(g)(8)(i)
For removing vinyl and asphalt flooring materials which contain ACM or for which in buildings constructed no later than 1980, the employer has not verified the absence of ACM pursuant to paragraph (g)(8)(i)(I) of this section. The employer shall ensure that employees comply with the following work practices and that employees are trained in these practices pursuant to paragraph (k)(9) of this section:
1926.1101(g)(8)(i)(A)
Flooring or its backing shall not be sanded.
1926.1101(g)(8)(i)(B)
Vacuums equipped with HEPA filter, disposable dust bag, and metal floor tool (no brush) shall be used to clean floors.
1926.1101(g)(8)(i)(C)
Resilient sheeting shall be removed by cutting with wetting of the snip point and wetting during delamination. Rip-up of resilient sheet floor material is prohibited.
1926.1101(g)(8)(i)(D)
All scraping of residual adhesive and/or backing shall be performed using wet methods.
1926.1101(g)(8)(i)(E)
Dry sweeping is prohibited.
1926.1101(g)(8)(i)(F)
Mechanical chipping is prohibited unless performed in a negative pressure enclosure which meets the requirements of paragraph (g)(5)(i) of this section.
1926.1101(g)(8)(i)(G)
Tiles shall be removed intact, unless the employer demonstrates that intact removal is not possible.
1926.1101(g)(8)(i)(H)
When tiles are heated and can be removed intact, wetting may be omitted.
1926.1101(g)(8)(i)(I)
Resilient flooring material including associated mastic and backing shall be assumed to be asbestos-containing unless an industrial hygienist determines that it is asbestos-free using recognized analytical techniques.
1926.1101(g)(8)(ii)

For removing roofing material which contains ACM the employer shall ensure that the following work practices are followed:

1926.1101(g)(8)(ii)(A)

Roofing material shall be removed in an intact state to the extent feasible.

1926.1101(g)(8)(ii)(B)

Wet methods shall be used to remove roofing materials that are not intact, or that will be rendered not intact during removal, unless such wet methods are not feasible or will create safety hazards.

1926.1101(g)(8)(ii)(C)

Cutting machines shall be continuously misted during use, unless a competent person determines that misting substantially decreases worker safety.

..1926.1101(g)(8)(ii)(D)

1926.1101(g)(8)(ii)(D)

When removing built-up roofs with asbestos-containing roofing felts and an aggregate surface using a power roof cutter, all dust resulting from the cutting operation shall be collected by a HEPA dust collector, or shall be HEPA vacuumed by vacuuming along the cut line. When removing built-up roofs with asbestos-containing roofing felts and a smooth surface using a power roof cutter, the dust resulting from the cutting operation shall be collected either by a HEPA dust collector or HEPA vacuuming along the cut line, or by gently sweeping and then carefully and completely wiping up the still-wet dust and debris left along the cut line.

1926.1101(g)(8)(ii)(E)

Asbestos-containing material that has been removed from a roof shall not be dropped or thrown to the ground. Unless the material is carried or passed to the ground by hand, it shall be lowered to the ground via covered, dust-tight chute, crane or hoist:

1926.1101(g)(8)(ii)(E)(1)

Any ACM that is not intact shall be lowered to the ground as soon as is practicable, but in any event no later than the end of the work shift. While the material remains on the roof it shall either be kept wet, placed in an impermeable waste bag, or wrapped in plastic sheeting.

1926.1101(g)(8)(ii)(E)(2)

Intact ACM shall be lowered to the ground as soon as is practicable, but in any event no later than the end of the work shift.

1926.1101(g)(8)(ii)(F)

Upon being lowered, unwrapped material shall be transferred to a closed receptacle in such manner so as to preclude the dispersion of dust.

1926.1101(g)(8)(ii)(G)

Roof level heating and ventilation air intake sources shall be isolated or the ventilation system shall be shut down.

1926.1101(g)(8)(ii)(H)

Notwithstanding any other provision of this section, removal or repair of sections of intact roofing less than 25 square feet in area does not require use of wet methods or HEPA vacuuming as long as manual methods which do not render the material non-intact are used to remove the material and no visible dust is created by the removal method used. In determining whether a job involves less than 25 square feet, the employer shall include all removal and repair work performed on the same roof on the same day.

1926.1101(g)(8)(iii)

When removing cementitious asbestos-containing siding and shingles or transite panels containing ACM on building exteriors (other than roofs, where paragraph (g)(8)(ii) of this section applies) the employer shall ensure that the following work practices are followed:

1926.1101(g)(8)(iii)(A)

Cutting, abrading or breaking siding, shingles, or transite panels, shall be prohibited unless the employer can demonstrate that methods less likely to result in asbestos fiber release cannot be used.

1926.1101(g)(8)(iii)(B)

Each panel or shingle shall be sprayed with amended water prior to removal.

1926.1101(g)(8)(iii)(C)

Unwrapped or unbagged panels or shingles shall be immediately lowered to the ground via covered dust-tight chute, crane or hoist, or placed in an impervious waste bag or wrapped in plastic sheeting and lowered to the ground no later than the end of the work shift.

1926.1101(g)(8)(iii)(D)

Nails shall be cut with flat, sharp instruments.

1926.1101(g)(8)(iv)

When removing gaskets containing ACM, the employer shall ensure that the following work practices are followed:

1926.1101(g)(8)(iv)(A)

If a gasket is visibly deteriorated and unlikely to be removed intact, removal shall be undertaken within a glovebag as described in paragraph (g)(5)(ii) of this section.
1926.1101(g)(8)(iv)(B)
[Reserved]
1926.1101(g)(8)(iv)(C)
The gasket shall be immediately placed in a disposal container.
1926.1101(g)(8)(iv)(D)
Any scraping to remove residue must be performed wet.
1926.1101(g)(8)(v)
When performing any other Class II removal of asbestos containing material for which specific controls have not been listed in paragraph (g)(8)(iv)(A) through (D) of this section, the employer shall ensure that the following work practices are complied with.
1926.1101(g)(8)(v)(A)
The material shall be thoroughly wetted with amended water prior to and during its removal.
1926.1101(g)(8)(v)(B)
The material shall be removed in an intact state unless the employer demonstrates that intact removal is not possible.
1926.1101(g)(8)(v)(C)
Cutting, abrading or breaking the material shall be prohibited unless the employer can demonstrate that methods less likely to result in asbestos fiber release are not feasible.
..1926.1101(g)(8)(v)(D)

1926.1101(g)(8)(v)(D)
Asbestos-containing material removed, shall be immediately bagged or wrapped, or kept wetted until transferred to a closed receptacle, no later than the end of the work shift.
1926.1101(g)(8)(vi)
Alternative Work Practices and Controls. Instead of the work practices and controls listed in paragraph (g)(8)(i) through (v) of this section, the employer may use different or modified engineering and work practice controls if the following provisions are complied with.
1926.1101(g)(8)(vi)(A)
The employer shall demonstrate by data representing employee exposure during the use of such method under conditions which closely resemble the conditions under which the method is to be used, that employee exposure will not exceed the PELs under any anticipated circumstances.
1926.1101(g)(8)(vi)(B)
A competent person shall evaluate the work area, the projected work practices and the engineering controls, and shall certify in writing, that the different or modified controls are adequate to reduce direct and indirect employee exposure to below the PELs under all expected conditions of use and that the method meets the requirements of this standard. The evaluation shall include and be based on data representing employee exposure during the use of such method under conditions which closely resemble the conditions under which the method is to be used for the current job, and by employees whose training and experience are equivalent to employees who are to perform the current job.
1926.1101(g)(9)
Work Practices and Engineering Controls for Class III asbestos work. Class III asbestos work shall be conducted using engineering and work practice controls which minimize the exposure to employees performing the asbestos work and to bystander employees.
1926.1101(g)(9)(i)
The work shall be performed using wet methods.
1926.1101(g)(9)(ii)
To the extent feasible, the work shall be performed using local exhaust ventilation.
1926.1101(g)(9)(iii)
Where the disturbance involves drilling, cutting, abrading, sanding, chipping, breaking, or sawing of thermal system insulation or surfacing material, the employer shall use impermeable dropcloths, and shall isolate the operation using mini-enclosures or glove bag systems pursuant to paragraph (g)(5) of this section or another isolation method.
1926.1101(g)(9)(iv)
Where the employer does not produce a "negative exposure assessment" for a job, or where monitoring results show the PEL has been exceeded, the employer shall contain the area using impermeable dropcloths and plastic barriers or their equivalent, or shall isolate the operation using a control system listed in and in compliance with paragraph (g)(5) of this section.
1926.1101(g)(9)(v)
Employees performing Class III jobs, which involve the disturbance of thermal system insulation or surfacing

material, or where the employer does not produce a "negative exposure assessment" or where monitoring results show a PEL has been exceeded, shall wear respirators which are selected, used and fitted pursuant to provisions of paragraph (h) of this section.

1926.1101(g)(10)

Class IV asbestos work. Class IV asbestos jobs shall be conducted by employees trained pursuant to the asbestos awareness training program set out in paragraph (k)(9) of this section. In addition, all Class IV jobs shall be conducted in conformity with the requirements set out in paragraph (g)(1) of this section, mandating wet methods, HEPA vacuums, and prompt clean up of debris containing ACM or PACM.

1926.1101(g)(10)(i)

Employees cleaning up debris and waste in a regulated area where respirators are required shall wear respirators which are selected, used and fitted pursuant to provisions of paragraph (h) of this section.

1926.1101(g)(10)(ii)

Employers of employees who clean up waste and debris in, and employers in control of, areas where friable thermal system insulation or surfacing material is accessible, shall assume that such waste and debris contain asbestos.

..1926.1101(g)(11)

1926.1101(g)(11)

Alternative methods of compliance for installation, removal, repair, and maintenance of certain roofing and pipeline coating materials. Notwithstanding any other provision of this section, an employer who complies with all provisions of this paragraph (g)(11) when installing, removing, repairing, or maintaining intact pipeline asphaltic wrap, or roof flashings which contain asbestos fibers encapsulated or coated by bituminous or resinous compounds shall be deemed to be in compliance with this section. If an employer does not comply with all provisions of this paragraph (g)(11) or if during the course of the job the material does not remain intact, the provisions of paragraph (g)(8) of this section apply instead of this paragraph (g)(11).

1926.1101(g)(11)(i)

Before work begins and as needed during the job, a competent person who is capable of identifying asbestos hazards in the workplace and selecting the appropriate control strategy for asbestos exposure, and who has the authority to take prompt corrective measures to eliminate such hazards, shall conduct an inspection of the worksite and determine that the roofing material is intact and will likely remain intact.

1926.1101(g)(11)(ii)

All employees performing work covered by this paragraph (g)(11) shall be trained in a training program that meets the requirements of paragraph (k)(9)(viii) of this section.

1926.1101(g)(11)(iii)

The material shall not be sanded, abraded, or ground. Manual methods which do not render the material non-intact shall be used.

1926.1101(g)(11)(iv)

Material that has been removed from a roof shall not be dropped or thrown to the ground. Unless the material is carried or passed to the ground by hand, it shall be lowered to the ground via covered, dust-tight chute, crane or hoist. All such material shall be removed from the roof as soon as is practicable, but in any event no later than the end of the work shift.

1926.1101(g)(11)(v)

Where roofing products which have been labeled as containing asbestos pursuant to paragraph (k)(8) of this section are installed on non-residential roofs during operations covered by this paragraph (g)(11), the employer shall notify the building owner of the presence and location of such materials no later than the end of the job.

1926.1101(g)(11)(vi)

All removal or disturbance of pipeline asphaltic wrap shall be performed using wet methods.

1926.1101(h)

Respiratory protection.

1926.1101(h)(1)

General. For employees who use respirators required by this section, the employer must provide respirators that comply with the requirements of this paragraph. Respirators must be used during:

1926.1101(h)(1)(i)

Class I asbestos work.

1926.1101(h)(1)(ii)

Class II asbestos work when ACM is not removed in a substantially intact state.

1926.1101(h)(1)(iii)

Class II and III asbestos work that is not performed using wet methods, except for removal of ACM from sloped roofs when a negative-exposure assessment has been conducted and ACM is removed in an intact

state.
1926.1101(h)(1)(iv)
Class II and III asbestos work for which a negative-exposure assessment has not been conducted.
1926.1101(h)(v)
Class III asbestos work when TSI or surfacing ACM or PACM is being disturbed.
1926.1101(h)(1)(vi)
Class IV asbestos work performed within regulated areas where employees who are performing other work are required to use respirators.
1926.1101(h)(1)(vii)
Work operations covered by this section for which employees are exposed above the TWA or excursion limit.
1926.1101(h)(1)(viii)
Emergencies.
1926.1101(h)(2)
Respirator program.
1926.1101(h)(2)(i)
The employer must implement a respiratory protection program in accordance with 29 CFR 1910.134 (b) through (d) (except (d)(1)(iii)), and (f) through (m).
1926.1101(h)(2)(ii)
No employee shall be assigned to asbestos work that requires respirator use if, based on their most recent medical examination, the examining physician determines that the employee will be unable to function normally while using a respirator, or that the safety or health of the employee or other employees will be impaired by the employee's respirator use. Such employees must be assigned to another job or given the opportunity to transfer to a different position that they can perform. If such a transfer position is available, it must be with the same employer, in the same geographical area, and with the same seniority, status, rate of pay, and other job benefits the employee had just prior to such transfer.
1926.1101(h)(3)
Respirator selection.
1926.1101(h)(3)(i)
The employer must select the appropriate respirator from Table 1 of this section.

TABLE 1.—RESPIRATORY PROTECTION FOR ASBESTOS FIBERS

Airborne concentrations of asbestos or conditions of use	Required respirator
Not in excess of 1 f/cc (10 X PEL), or otherwise as required independent of exposure pursuant to paragraph (h)(2)(iv) of this section	Half-mask air purifying respirator other than a disposable respirator, equipped with high efficiency filters.
Not in excess of 5 f/cc (50 X PEL)	Full facepiece air-purifying respirator equipped with high efficiency filters.
Not in excess of 10 f/cc (100 X PEL)	Any powered air-purifying respirator equipped with high efficiency filter or any supplied air respirator operated in continuous flow mode.
Not in excess of 100 f/cc (1,000 X PEL) or unknown concentration.	Full facepiece supplied air respirator operated in pressure demand mode.
Greater than 100 f/cc (1,000 X PEL) or unknown concentration.	Full facepiece supplied air respirator operated in pressure demand mode, equipped with an auxiliary positive pressure self-contained breathing apparatus.

NOTE: a. Respirators assigned for high environmental concentrations may be used at lower concentrations, or when required respirator use is independent of concentration.
b. A high efficiency filter means a filter that is at least 99.97 percent efficient against mono-dispersed particles of 0.3 micrometers in diameters in diameter or larger.

1926.1101(h)(3)(ii)
The employer must provide an employee with a tight-fitting, powered air-purifying respirator instead of a negative-pressure respirator from Table 1 when the employee chooses to use this type of respirator and such a respirator will provide adequate protection to the employee.
1926.1101(h)(3)(iii)
The employer must provide a half-mask air-purifying respirator, other than a disposable respirator, that is equipped with high-efficiency filters when the employee performs:
1926.1101(h)(3)(iii)(A)
(A) Class II and III asbestos work and a negative-exposure assessment has not been conducted by the employer.
1926.1101(h)(3)(iii)(B)
(B) Class III asbestos work when TSI or surfacing ACM or PACM is being disturbed.
1926.1101(h)(3)(iv)
In addition to the above selection criteria, when employees are in a regulated area where Class I work is being performed, a negative exposure assessment of the area has not been produced, and the exposure assessment of the area indicates the exposure level will not exceed 1 f/cc as an 8-hour time weighted average, employers must provide the employees with one of the following respirators:
1926.1101(h)(3)(iv)(A)

A tight-fitting powered air-purifying respirator equipped with high efficiency filters;
1926.1101(h)(3)(iv)(B)
A full facepiece supplied-air respirator operated in the pressure-demand mode equipped with HEPA egress cartrides; or
1926.1101(h)(3)(iv)(C)
A full facepiece supplied-air respirator operated in the pressure-demand mode equipped with an auxiliary positive pressure self-contained breathing apparatus. A full facepiece supplied-air respirator operated in the pressure-demand mode equipped with an auxiliary positive pressure self-contained breathing apparatus must be provided under such conditions when the exposure assessment indicates exposure levels above 1 f/cc as an 8-hour time weighted average.
..1926.1101(i)

1926.1101(i)
Protective clothing.
1926.1101(i)(1)
General. The employer shall provide and require the use of protective clothing, such as coveralls or similar whole-body clothing, head coverings, gloves, and foot coverings for any employee exposed to airborne concentrations of asbestos that exceed the TWA and/or excursion limit prescribed in paragraph (c) of this section, or for which a required negative exposure assessment is not produced, or for any employee performing Class I operations which involve the removal of over 25 linear or 10 square feet of TSI or surfacing ACM and PACM.
1926.1101(i)(2)
Laundering.
1926.1101(i)(2)(i)
The employer shall ensure that laundering of contaminated clothing is done so as to prevent the release of airborne asbestos in excess of the TWA or excursion limit prescribed in paragraph (c) of this section.
1926.1101(i)(2)(ii)
Any employer who gives contaminated clothing to another person for laundering shall inform such person of the requirement in paragraph (i)(2)(i) of this section to effectively prevent the release of airborne asbestos in excess of the TWA and excursion limit prescribed in paragraph (c) of this section.
1926.1101(i)(3)
Contaminated clothing. Contaminated clothing shall be transported in sealed impermeable bags, or other closed, impermeable containers, and be labeled in accordance with paragraph (k) of this section.
1926.1101(i)(4)
Inspection of protective clothing.
1926.1101(i)(4)(i)
The competent person shall examine worksuits worn by employees at least once per workshift for rips or tears that may occur during performance of work.
1926.1101(i)(4)(ii)
When rips or tears are detected while an employee is working, rips and tears shall be immediately mended, or the worksuit shall be immediately replaced.
1926.1101(j)
Hygiene facilities and practices for employees.
1926.1101(j)(1)
Requirements for employees performing Class I asbestos jobs involving over 25 linear or 10 square feet of TSI or surfacing ACM and PACM.
1926.1101(j)(1)(i)
Decontamination areas. the employer shall establish a decontamination area that is adjacent and connected to the regulated area for the decontamination of such employees. The decontamination area shall consist of an equipment room, shower area, and clean room in series. The employer shall ensure that employees enter and exit the regulated area through the decontamination area.
1926.1101(j)(1)(i)(A)
Equipment room. The equipment room shall be supplied with impermeable, labeled bags and containers for the containment and disposal of contaminated protective equipment.
1926.1101(j)(1)(i)(B)
Shower area. Shower facilities shall be provided which comply with 29 CFR 1910.141(d)(3), unless the employer can demonstrate that they are not feasible. The showers shall be adjacent both to the equipment room and the clean room, unless the employer can demonstrate that this location is not feasible. Where the employer can demonstrate that it is not feasible to locate the shower between the equipment room and the clean room, or where the work is performed outdoors, the employers shall ensure that employees:
1926.1101(j)(1)(i)(B)(1)

Remove asbestos contamination from their worksuits in the equipment room using a HEPA vacuum before proceeding to a shower that is not adjacent to the work area; or
1926.1101(j)(1)(i)(B)(2)
Remove their contaminated worksuits in the equipment room, then don clean worksuits, and proceed to a shower that is not adjacent to the work area.
1926.1101(j)(1)(i)(C)
Clean change room. The clean room shall be equipped with a locker or appropriate storage container for each employee's use. When the employer can demonstrate that it is not feasible to provide a clean change area adjacent to the work area or where the work is performed outdoors, the employer may permit employees engaged in Class I asbestos jobs to clean their protective clothing with a portable HEPA-equipped vacuum before such employees leave the regulated area. Following showering, such employees however must then change into street clothing in clean change areas provided by the employer which otherwise meet the requirements of this section.
1926.1101(j)(1)(ii)
Decontamination area entry procedures. The employer shall ensure that employees:
1926.1101(j)(1)(ii)(A)
Enter the decontamination area through the clean room;
1926.1101(j)(1)(ii)(B)
Remove and deposit street clothing within a locker provided for their use; and
..1926.1101(j)(1)(ii)(C)

1926.1101(j)(1)(ii)(C)
Put on protective clothing and respiratory protection before leaving the clean room.
1926.1101(j)(1)(ii)(D)
Before entering the regulated area, the employer shall ensure that employees pass through the equipment room.
1926.1101(j)(1)(iii)
Decontamination area exit procedures. The employer shall ensure that:
1926.1101(j)(1)(iii)(A)
Before leaving the regulated area, employees shall remove all gross contamination and debris from their protective clothing.
1926.1101(j)(1)(iii)(B)
Employees shall remove their protective clothing in the equipment room and deposit the clothing in labeled impermeable bags or containers.
1926.1101(j)(1)(iii)(C)
Employees shall not remove their respirators in the equipment room.
1926.1101(j)(1)(iii)(D)
Employees shall shower prior to entering the clean room.
1926.1101(j)(1)(iii)(E)
After showering, employees shall enter the clean room before changing into street clothes.
1926.1101(j)(1)(iv)
Lunch Areas. Whenever food or beverages are consumed at the worksite where employees are performing Class I asbestos work, the employer shall provide lunch areas in which the airborne concentrations of asbestos are below the permissible exposure limit and/or excursion limit.
1926.1101(j)(2)
Requirements for Class I work involving less than 25 linear or 10 square feet of TSI or surfacing ACM and PACM, and for Class II and Class III asbestos work operations where exposures exceed a PEL or where there is no negative exposure assessment produced before the operation.
1926.1101(j)(2)(i)
The employer shall establish an equipment room or area that is adjacent to the regulated area for the decontamination of employees and their equipment which is contaminated with asbestos which shall consist of an area covered by a impermeable drop cloth on the floor or horizontal working surface.
1926.1101(j)(2)(ii)
The area must be of sufficient size as to accommodate cleaning of equipment and removing personal protective equipment without spreading contamination beyond the area (as determined by visible accumulations).
1926.1101(j)(2)(iii)
Work clothing must be cleaned with a HEPA vacuum before it is removed.
1926.1101(j)(2)(iv)
All equipment and surfaces of containers filled with ACM must be cleaned prior to removing them from the equipment room or area.
1926.1101(j)(2)(v)

The employer shall ensure that employees enter and exit the regulated area through the equipment room or area.
..1926.1101(j)(3)

1926.1101(j)(3)
Requirements for Class IV work. Employers shall ensure that employees performing Class IV work within a regulated area comply with the hygiene practice required of employees performing work which has a higher classification within that regulated area. Otherwise employers of employees cleaning up debris and material which is TSI or surfacing ACM or identified as PACM shall provide decontamination facilities for such employees which are required by paragraph (j)(2) of this section.
1926.1101(j)(4)
Smoking in work areas. The employer shall ensure that employees do not smoke in work areas where they are occupationally exposed to asbestos because of activities in that work area.
1926.1101(k)
Communication of hazards.
1926.1101(k)(1)
This section applies to the communication of information concerning asbestos hazards in construction activities to facilitate compliance with this standard. Most asbestos-related construction activities involve previously installed building materials. Building owners often are the only and/or best sources of information concerning them. Therefore, they, along with employers of potentially exposed employees, are assigned specific information conveying and retention duties under this section. Installed Asbestos Containing Building Material. Employers and building owners shall identify TSI and sprayed or troweled on surfacing materials in buildings as asbestos-containing, unless they determine in compliance with paragraph (k)(5) of this section that the material is not asbestos-containing. Asphalt and vinyl flooring material installed no later than 1980 must also be considered as asbestos containing unless the employer, pursuant to paragraph (g)(8)(i)(I) of this section determines that it is not asbestos-containing. If the employer/building owner has actual knowledge, or should have known through the exercise of due diligence, that other materials are asbestos-containing, they too must be treated as such. When communicating information to employees pursuant to this standard, owners and employers shall identify "PACM" as ACM. Additional requirements relating to communication of asbestos work on multi-employer worksites are set out in paragraph (d) of this section.
1926.1101(k)(2)
Duties of building and facility owners.
1926.1101(k)(2)(i)
Before work subject to this standard is begun, building and facility owners shall determine the presence, location, and quantity of ACM and/or PACM at the work site pursuant to paragraph (k)(1) of this section.
1926.1101(k)(2)(ii)
Building and/or facility owners shall notify the following persons of the presence, location and quantity of ACM or PACM, at the work sites in their buildings and facilities. Notification either shall be in writing, or shall consist of a personal communication between the owner and the person to whom notification must be given or their authorized representatives:
1926.1101(k)(2)(ii)(A)
Prospective employers applying or bidding for work whose employees reasonably can be expected to work in or adjacent to areas containing such material;
1926.1101(k)(2)(ii)(B)
Employees of the owner who will work in or adjacent to areas containing such material:
1926.1101(k)(2)(ii)(C)
On multi-employer worksites, all employers of employees who will be performing work within or adjacent to areas containing such materials;
1926.1101(k)(2)(ii)(D)
Tenants who will occupy areas containing such material.
1926.1101(k)(3)
Duties of employers whose employees perform work subject to this standard in or adjacent to areas containing ACM and PACM. Building/facility owners whose employees perform such work shall comply with these provisions to the extent applicable.
1926.1101(k)(3)(i)
Before work in areas containing ACM and PACM is begun; employers shall identify the presence, location, and quantity of ACM, and/or PACM therein pursuant to paragraph (k)(1) of this section.
1926.1101(k)(3)(ii)
Before work under this standard is performed employers of employees who will perform such work shall inform the following persons of the location and quantity of ACM and/or PACM present in the area and the

precautions to be taken to insure that airborne asbestos is confined to the area.
1926.1101(k)(3)(ii)(A)
Owners of the building/facility;
1926.1101(k)(3)(ii)(B)
Employees who will perform such work and employers of employees who work and/or will be working in adjacent areas.
..1926.1101(k)(3)(iii)

1926.1101(k)(3)(iii)
Within 10 days of the completion of such work, the employer whose employees have performed work subject to this standard, shall inform the building/facility owner and employers of employees who will be working in the area of the current location and quantity of PACM and/or ACM remaining in the area and final monitoring results, if any.
1926.1101(k)(4)
In addition to the above requirements, all employers who discover ACM and/or PACM on a worksite shall convey information concerning the presence, location and quantity of such newly discovered ACM and/or PACM to the owner and to other employers of employees working at the work site, within 24 hours of the discovery.
1926.1101(k)(5)
Criteria to rebut the designation of installed material as PACM.
1926.1101(k)(5)(i)
At any time, an employer and/or building owner may demonstrate, for purposes of this standard, that PACM does not contain asbestos. Building owners and/or employers are not required to communicate information about the presence of building material for which such a demonstration pursuant to the requirements of paragraph (k)(5)(ii) of this section has been made. However, in all such cases, the information, data and analysis supporting the determination that PACM does not contain asbestos, shall be retained pursuant to paragraph (n) of this section.
1926.1101(k)(5)(ii)
An employer or owner may demonstrate that PACM does not contain more than 1 percent asbestos by the following:
1926.1101(k)(5)(ii)(A)
Having a completed inspection conducted pursuant to the requirements of AHERA (40 CFR Part 763, Subpart E) which demonstrates that the material is not ACM; or
..1926.1101(k)(5)(ii)(B)

1926.1101(k)(5)(ii)(B)
Performing tests of the material containing PACM which demonstrate that no ACM is present in the material. Such tests shall include analysis of bulk samples collected in the manner described in 40 CFR 763.86. The tests, evaluation and sample collection shall be conducted by an accredited inspector or by a CIH. Analysis of samples shall be performed by persons or laboratories with proficiency demonstrated by current successful participation in a nationally recognized testing program such as the National Voluntary Laboratory Accreditation Program (NVLAP) or the National Institute for Standards and Technology (NIST) or the Round Robin for bulk samples administered by the American Industrial Hygiene Association (AIHA) or an equivalent nationally-recognized round robin testing program.
1926.1101(k)(5)(iii)
The employer and/or building owner may demonstrate that flooring material including associated mastic and backing does not contain asbestos, by a determination of an industrial hygienist based upon recognized analytical techniques showing that the material is not ACM.
1926.1101(k)(6)
At the entrance to mechanical rooms/areas in which employees reasonably can be expected to enter and which contain ACM and/or PACM, the building owner shall post signs which identify the material which is present, its location, and appropriate work practices which, if followed, will ensure that ACM and/or PACM will not be disturbed. The employer shall ensure, to the extent feasible, that employees who come in contact with these signs can comprehend them. Means to ensure employee comprehension may include the use of foreign languages, pictographs, graphics, and awareness training.
1926.1101(k)(7)
Signs.
1926.1101(k)(7)(i)
Warning signs that demarcate the regulated area shall be provided and displayed at each location where a regulated area is required to be established by paragraph (e) of this section. Signs shall be posted at such a

distance from such a location that an employee may read the signs and take necessary protective steps before entering the area marked by the signs.

1926.1101(k)(7)(ii)(A)

The warning signs required by paragraph (k)(7) of this section shall bear the following information.

DANGER

ASBESTOS

CANCER AND LUNG DISEASE HAZARD

AUTHORIZED PERSONNEL ONLY

1926.1101(k)(7)(ii)(B)

In addition, where the use of respirators and protective clothing is required in the regulated area under this section, the warning signs shall include the following:

RESPIRATORS AND PROTECTION CLOTHING ARE REQUIRED IN THIS AREA

1926.1101(k)(7)(iii)

The employer shall ensure that employees working in and contiguous to regulated areas comprehend the warning signs required to be posted by paragraph (k)(7)(i) of this section. Means to ensure employee comprehension may include the use of foreign languages, pictographs and graphics.

1926.1101(k)(8)

Labels.

1926.1101(k)(8)(i)

Labels shall be affixed to all products containing asbestos and to all containers containing such products, including waste containers. Where feasible, installed asbestos products shall contain a visible label.

1926.1101(k)(8)(ii)

Labels shall be printed in large, bold letters on a contrasting background.

1926.1101(k)(8)(iii)

Labels shall be used in accordance with the requirements of 29 CFR 1910.1200(f) of OSHA's Hazard Communication standard, and shall contain the following information:

DANGER
CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

..1926.1101(k)(8)(iv)

1926.1101(k)(8)(iv)

[Reserved]

1926.1101(k)(8)(v)

Labels shall contain a warning statement against breathing asbestos fibers.

1926.1101(k)(8)(vi)

The provisions for labels required by paragraphs (k)(8)(i) through (k)(8)(iii) of this section do not apply where:

1926.1101(k)(8)(vi)(A)

Asbestos fibers have been modified by a bonding agent, coating, binder, or other material, provided that the manufacturer can demonstrate that, during any reasonably foreseeable use, handling, storage, disposal, processing, or transportation, no airborne concentrations of asbestos fibers in excess of the permissible exposure limit and/or excursion limit will be released, or

1926.1101(k)(8)(vi)(B)

Asbestos is present in a product in concentrations less than 1.0 percent.

1926.1101(k)(8)(vii)

When a building owner or employer identifies previously installed PACM and/or ACM, labels or signs shall be affixed or posted so that employees will be notified of what materials contain PACM and/or ACM. The employer shall attach such labels in areas where they will clearly be noticed by employees who are likely to be exposed, such as at the entrance to mechanical room/areas. Signs required by paragraph (k)(6) of this section may be posted in lieu of labels so long as they contain information required for labelling. The employer shall ensure, to the extent feasible, that employees who come in contact with these signs or labels can comprehend them. Means to ensure employee comprehension may include the use of foreign languages,

pictographs, graphics, and awareness training.
1926.1101(k)(9)
Employee Information and Training.
1926.1101(k)(9)(i)
The employer shall, at no cost to the employee, institute a training program for all employees who are likely to be exposed in excess of a PEL and for all employees who perform Class I through IV asbestos operations, and shall ensure their participation in the program.
1926.1101(k)(9)(ii)
Training shall be provided prior to or at the time of initial assignment and at least annually thereafter.
1926.1101(k)(9)(iii)
Training for Class I operations and for Class II operations that require the use of critical barriers (or equivalent isolation methods) and/or negative pressure enclosures under this section shall be the equivalent in curriculum, training method and length to the EPA Model Accreditation Plan (MAP) asbestos abatement workers training (40 CFR Part 763, subpart E, appendix C).
1926.1101(k)(9)(iv)
Training for other Class II work.
..1926.1101(k)(9)(iv)(A)

1926.1101(k)(9)(iv)(A)
For work with asbestos containing roofing materials, flooring materials, siding materials, ceiling tiles, or transite panels, training shall include at a minimum all the elements included in paragraph (k)(9)(viii) of this section and in addition, the specific work practices and engineering controls set forth in paragraph (g) of this section which specifically relate to that category. Such course shall include "hands-on" training and shall take at least 8 hours.
1926.1101(k)(9)(iv)(B)
An employee who works with more than one of the categories of material specified in paragraph (k)(9)(iv)(A) of this section shall receive training in the work practices applicable to each category of material that the employee removes and each removal method that the employee uses.
1926.1101(k)(9)(iv)(C)
For Class II operations not involving the categories of material specified in paragraph (k)(9)(iv)(A) of this section, training shall be provided which shall include at a minimum all the elements included in paragraph (k)(9)(viii) of this section and in addition, the specific work practices and engineering controls set forth in paragraph (g) of this section which specifically relate to the category of material being removed, and shall include "hands-on" training in the work practices applicable to each category of material that the employee removes and each removal method that the employee uses.
1926.1101(k)(9)(v)
Training for Class III employees shall be consistent with EPA requirements for training of local education agency maintenance and custodial staff as set forth at 40 CFR 763.92(a)(2). Such a course shall also include "hands-on" training and shall take at least 16 hours. Exception: For Class III operations for which the competent person determines that the EPA curriculum does not adequately cover the training needed to perform that activity, training shall include as a minimum all the elements included in paragraph (k)(9)(viii) of this section and in addition, the specific work practices and engineering controls set forth in paragraph (g) of this section which specifically relate to that activity, and shall include "hands-on" training in the work practices applicable to each category of material that the employee disturbs.
1926.1101(k)(9)(vi)
Training for employees performing Class IV operations shall be consistent with EPA requirements for training of local education agency maintenance and custodial staff as set forth at 40 CFR 763.92(a)(1). Such a course shall include available information concerning the locations of thermal system insulation and surfacing ACM/PACM, and asbestos-containing flooring material, or flooring material where the absence of asbestos has not yet been certified; and instruction in recognition of damage, deterioration, and delamination of asbestos containing building materials. Such course shall take at least 2 hours.
1926.1101(k)(9)(vii)
Training for employees who are likely to be exposed in excess of the PEL and who are not otherwise required to be trained under paragraph (k)(9)(iii) through (vi) of this section, shall meet the requirements of paragraph (k)(9)(viii) of this section.
1926.1101(k)(9)(viii)
The training program shall be conducted in a manner that the employee is able to understand. In addition to the content required by provisions in paragraphs (k)(9)(iii) through (vi) of this section, the employer shall ensure that each such employee is informed of the following:
1926.1101(k)(9)(viii)(A)

Methods of recognizing asbestos, including the requirement in paragraph (k)(1) of this section to presume that certain building materials contain asbestos;
1926.1101(k)(9)(viii)(B)
The health effects associated with asbestos exposure;
1926.1101(k)(9)(viii)(C)
The relationship between smoking and asbestos in producing lung cancer;
1926.1101(k)(9)(viii)(D)
The nature of operations that could result in exposure to asbestos, the importance of necessary protective controls to minimize exposure including, as applicable, engineering controls, work practices, respirators, housekeeping procedures, hygiene facilities, protective clothing, decontamination procedures, emergency procedures, and waste disposal procedures, and any necessary instruction in the use of these controls and procedures; where Class III and IV work will be or is performed, the contents of EPA 20T-2003, "Managing Asbestos In-Place" July 1990 or its equivalent in content;
1926.1101(k)(9)(viii)(E)
The purpose, proper use, fitting instructions, and limitations of respirators as required by 29 CFR 1910.134;
1926.1101(k)(9)(viii)(F)
The appropriate work practices for performing the asbestos job;
1926.1101(k)(9)(viii)(G)
Medical surveillance program requirements;
1926.1101(k)(9)(viii)(H)
The content of this standard including appendices;
..1926.1101(k)(9)(viii)(I)

1926.1101(k)(9)(viii)(I)
The names, addresses and phone numbers of public health organizations which provide information, materials and/or conduct programs concerning smoking cessation. The employer may distribute the list of such organizations contained in Appendix J to this section, to comply with this requirement; and
1926.1101(k)(9)(viii)(J)
The requirements for posting signs and affixing labels and the meaning of the required legends for such signs and labels.
1926.1101(k)(10)
Access to training materials.
1926.1101(k)(10)(i)
The employer shall make readily available to affected employees without cost, written materials relating to the employee training program, including a copy of this regulation.
1926.1101(k)(10)(ii)
The employer shall provide to the Assistant Secretary and the Director, upon request, all information and training materials relating to the employee information and training program.
1926.1101(k)(10)(iii)
The employer shall inform all employees concerning the availability of self-help smoking cessation program material. Upon employee request, the employer shall distribute such material, consisting of NIH Publication No, 89-1647, or equivalent self-help material, which is approved or published by a public health organization listed in Appendix J to this section.
1926.1101(l)
Housekeeping --
1926.1101(l)(1)
Vacuuming. Where vacuuming methods are selected, HEPA filtered vacuuming equipment must be used. The equipment shall be used and emptied in a manner that minimizes the reentry of asbestos into the workplace.
1926.1101(l)(2)
Waste disposal. Asbestos waste, scrap, debris, bags, containers, equipment, and contaminated clothing consigned for disposal shall be collected and disposed of in sealed, labeled, impermeable bags or other closed, labeled, impermeable containers except in roofing operations where the procedures specified in paragraph (g)(8)(ii) of this section apply.
1926.1101(l)(3)
Care of asbestos-containing flooring material.
1926.1101(l)(3)(i)
All vinyl and asphalt flooring material shall be maintained in accordance with this paragraph unless the building/facility owner demonstrates, pursuant to paragraph (g)(8)(i)(I) of this section that the flooring does not contain asbestos.
1926.1101(l)(3)(ii)
Sanding of flooring material is prohibited.
1926.1101(l)(3)(iii)

Stripping of finishes shall be conducted using low abrasion pads at speeds lower than 300 rpm and wet methods.
1926.1101(l)(3)(iv)
Burnishing or dry buffing may be performed only on flooring which has sufficient finish so that the pad cannot contact the flooring material.
..1926.1101(l)(4)

1926.1101(l)(4)
Waste and debris and accompanying dust in an area containing accessible thermal system insulation or surfacing ACM/PACM or visibly deteriorated ACM:
1926.1101(l)(4)(i)
shall not be dusted or swept dry, or vacuumed without using a HEPA filter;
1926.1101(l)(4)(ii)
shall be promptly cleaned up and disposed of in leak tight containers.
1926.1101(m)
Medical surveillance.
1926.1101(m)(1)
General --
1926.1101(m)(1)(i)
Employees covered.
1926.1101(m)(1)(i)(A)
The employer shall institute a medical surveillance program for all employees who for a combined total of 30 or more days per year are engaged in Class I, II and III work or are exposed at or above a permissible exposure limit. For purposes of this paragraph, any day in which a worker engages in Class II or Class III operations or a combination thereof on intact material for one hour or less (taking into account the entire time spent on the removal operation, including cleanup) and, while doing so, adheres fully to the work practices specified in this standard, shall not be counted.
1926.1101(m)(1)(i)(B)
For employees otherwise required by this standard to wear a negative pressure respirator, employers shall ensure employees are physically able to perform the work and use the equipment. This determination shall be made under the supervision of a physician.
1926.1101(m)(1)(ii)
Examination.
1926.1101(m)(1)(ii)(A)
The employer shall ensure that all medical examinations and procedures are performed by or under the supervision of a licensed physician, and are provided at no cost to the employee and at a reasonable time and place.
1926.1101(m)(1)(ii)(B)
Persons other than such licensed physicians who administer the pulmonary function testing required by this section shall complete a training course in spirometry sponsored by an appropriate academic or professional institution.
1926.1101(m)(2)
Medical examinations and consultations.
1926.1101(m)(2)(i)
Frequency. The employer shall make available medical examinations and consultations to each employee covered under paragraph (m)(1)(i) of this section on the following schedules:
1926.1101(m)(2)(i)(A)
Prior to assignment of the employee to an area where negative-pressure respirators are worn;
..1926.1101(m)(2)(i)(B)

1926.1101(m)(2)(i)(B)
When the employee is assigned to an area where exposure to asbestos may be at or above the permissible exposure limit for 30 or more days per year, or engage in Class I, II, or III work for a combined total of 30 or more days per year, a medical examination must be given within 10 working days following the thirtieth day of exposure;
1926.1101(m)(2)(i)(C)
And at least annually thereafter.
1926.1101(m)(2)(i)(D)
If the examining physician determines that any of the examinations should be provided more frequently than specified, the employer shall provide such examinations to affected employees at the frequencies specified by the physician.

1926.1101(m)(2)(i)(E)
Exception: No medical examination is required of any employee if adequate records show that the employee has been examined in accordance with this paragraph within the past 1-year period.
1926.1101(m)(2)(ii)
Content. Medical examinations made available pursuant to paragraphs (m)(2)(i)(A) through (m)(2)(i)(C) of this section shall include:
1926.1101(m)(2)(ii)(A)
A medical and work history with special emphasis directed to the pulmonary, cardiovascular, and gastrointestinal systems.
1926.1101(m)(2)(ii)(B)
On initial examination, the standardized questionnaire contained in Part 1 of Appendix D to this section, and, on annual examination, the abbreviated standardized questionnaire contained in Part 2 of Appendix D to this section.
1926.1101(m)(2)(ii)(C)
A physical examination directed to the pulmonary and gastrointestinal systems, including a chest roentgenogram to be administered at the discretion of the physician, and pulmonary function tests of forced vital capacity (FVC) and forced expiratory volume at one second (FEV(1)). Interpretation and classification of chest shall be conducted in accordance with Appendix E to this section.
1926.1101(m)(2)(ii)(D)
Any other examinations or tests deemed necessary by the examining physician.
1926.1101(m)(3)
Information provided to the physician. The employer shall provide the following information to the examining physician:
1926.1101(m)(3)(i)
A copy of this standard and Appendices D, E, and I to this section;
1926.1101(m)(3)(ii)
A description of the affected employee's duties as they relate to the employee's exposure;
1926.1101(m)(3)(iii)
The employee's representative exposure level or anticipated exposure level;
1926.1101(m)(3)(iv)
A description of any personal protective and respiratory equipment used or to be used; and
1926.1101(m)(3)(v)
Information from previous medical examinations of the affected employee that is not otherwise available to the examining physician.
..1926.1101(m)(4)

1926.1101(m)(4)
Physician's written opinion.
1926.1101(m)(4)(i)
The employer shall obtain a written opinion from the examining physician. This written opinion shall contain the results of the medical examination and shall include:
1926.1101(m)(4)(i)(A)
The physician's opinion as to whether the employee has any detected medical conditions that would place the employee at an increased risk of material health impairment from exposure to asbestos;
1926.1101(m)(4)(i)(B)
Any recommended limitations on the employee or on the use of personal protective equipment such as respirators; and
1926.1101(m)(4)(i)(C)
A statement that the employee has been informed by the physician of the results of the medical examination and of any medical conditions that may result from asbestos exposure.
1926.1101(m)(4)(i)(D)
A statement that the employee has been informed by the physician of the increased risk of lung cancer attributable to the combined effect of smoking and asbestos exposure.
1926.1101(m)(4)(ii)
The employer shall instruct the physician not to reveal in the written opinion given to the employer specific findings or diagnoses unrelated to occupational exposure to asbestos.
1926.1101(m)(4)(iii)
The employer shall provide a copy of the physician's written opinion to the affected employee within 30 days from its receipt.
1926.1101(n)
Recordkeeping.
1926.1101(n)(1)

Objective data relied on pursuant to paragraph (f) to this section.
1926.1101(n)(1)(i)
Where the employer has relied on objective data that demonstrates that products made from or containing asbestos or the activity involving such products or material are not capable of releasing fibers of asbestos in concentrations at or above the permissible exposure limit and/or excursion limit under the expected conditions of processing, use, or handling to satisfy the requirements of paragraph (f), the employer shall establish and maintain an accurate record of objective data reasonably relied upon in support of the exemption.
1926.1101(n)(1)(ii)
The record shall include at least the following information:
1926.1101(n)(1)(ii)(A)
The product qualifying for exemption;
1926.1101(n)(1)(ii)(B)
The source of the objective data;
1926.1101(n)(1)(ii)(C)
The testing protocol, results of testing, and/or analysis of the material for the release of asbestos;
1926.1101(n)(1)(ii)(D)
A description of the operation exempted and how the data support the exemption; and
1926.1101(n)(1)(ii)(E)
Other data relevant to the operations, materials, processing, or employee exposures covered by the exemption.
1926.1101(n)(1)(iii)
The employer shall maintain this record for the duration of the employer's reliance upon such objective data.
..1926.1101(n)(2)

1926.1101(n)(2)
Exposure measurements.
1926.1101(n)(2)(i)
The employer shall keep an accurate record of all measurements taken to monitor employee exposure to asbestos as prescribed in paragraph (f) of this section. NOTE: The employer may utilize the services of competent organizations such as industry trade associations and employee associations to maintain the records required by this section.
1926.1101(n)(2)(ii)
This record shall include at least the following information:
1926.1101(n)(2)(ii)(A)
The date of measurement;
1926.1101(n)(2)(ii)(B)
The operation involving exposure to asbestos that is being monitored;
1926.1101(n)(2)(ii)(C)
Sampling and analytical methods used and evidence of their accuracy;
1926.1101(n)(2)(ii)(D)
Number, duration, and results of samples taken;
1926.1101(n)(2)(ii)(E)
Type of protective devices worn, if any; and
1926.1101(n)(2)(ii)(F)
Name, social security number, and exposure of the employees whose exposures are represented.
1926.1101(n)(2)(iii)
The employer shall maintain this record for at least thirty (30) years, in accordance with 29 CFR 1910.20.
1926.1101(n)(3)
Medical surveillance.
1926.1101(n)(3)(i)
The employer shall establish and maintain an accurate record for each employee subject to medical surveillance by paragraph (m) of this section, in accordance with 29 CFR 1910.20.
..1926.1101(n)(3)(ii)

1926.1101(n)(3)(ii)
The record shall include at least the following information:
1926.1101(n)(3)(ii)(A)
The name and social security number of the employee;
1926.1101(n)(3)(ii)(B)
A copy of the employee's medical examination results, including the medical history, questionnaire responses, results of any tests, and physician's recommendations.
1926.1101(n)(3)(ii)(C)

Physician's written opinions;
1926.1101(n)(3)(ii)(D)
Any employee medical complaints related to exposure to asbestos; and
1926.1101(n)(3)(ii)(E)
A copy of the information provided to the physician as required by paragraph (m) of this section.
1926.1101(n)(3)(iii)
The employer shall ensure that this record is maintained for the duration of employment plus thirty (30) years, in accordance with 29 CFR 1910.20.
1926.1101(n)(4)
Training records. The employer shall maintain all employee training records for one (1) year beyond the last date of employment by that employer.
1926.1101(n)(5)
Data to Rebut PACM. Where the building owner and employer have relied on data to demonstrate that PACM is not asbestos-containing, such data shall be maintained for as long as they are relied upon to rebut the presumption.
1926.1101(n)(6)
Records of Required Notifications. Where the building owner has communicated and received information concerning the identification, location and quantity of ACM and PACM, written records of such notifications and their content shall be maintained by the building owner for the duration of ownership and shall be transferred to successive owners of such buildings/facilities.
1926.1101(n)(7)
Availability.
1926.1101(n)(7)(i)
The employer, upon written request, shall make all records required to be maintained by this section available to the Assistant Secretary and the Director for examination and copying.
1926.1101(n)(7)(ii)
The employer, upon request, shall make any exposure records required by paragraphs (f) and (n) of this section available for examination and copying to affected employees, former employees, designated representatives, and the Assistant Secretary, in accordance with 29 CFR 1910.20(a) through (e) and (g) through (i).
..1926.1101(n)(7)(iii)

1926.1101(n)(7)(iii)
The employer, upon request, shall make employee medical records required by paragraphs (m) and (n) of this section available for examination and copying to the subject employee, anyone having the specific written consent of the subject employee, and the Assistant Secretary, in accordance with 29 CFR 1910.20.
1926.1101(n)(8)
Transfer of records.
1926.1101(n)(8)(i)
The employer shall comply with the requirements concerning transfer of records set forth in 29 CFR 1910.20(h).
1926.1101(n)(8)(ii)
Whenever the employer ceases to do business and there is no successor employer to receive and retain the records for the prescribed period, the employer shall notify the Director at least 90 days prior to disposal and, upon request, transmit them to the Director.
1926.1101(o)
Competent person.
1926.1101(o)(1)
General. On all construction worksites covered by this standard, the employer shall designate a competent person, having the qualifications and authorities for ensuring worker safety and health required by Subpart C, General Safety and Health Provisions for Construction (29 CFR 1926.20 through 1926.32).
1926.1101(o)(2)
Required Inspections by the Competent Person. Section 1926.20(b)(2) which requires health and safety prevention programs to provide for frequent and regular inspections of the job sites, materials, and equipment to be made by competent persons, is incorporated.
1926.1101(o)(3)
Additional Inspections. In addition, the competent person shall make frequent and regular inspections of the job sites, in order to perform the duties set out below in paragraph (o)(3)(i) and (ii) of this section. For Class I jobs, on-site inspections shall be made at least once during each work shift, and at any time at employee request. For Class II, III, and IV jobs, on-site inspections shall be made at intervals sufficient to assess whether conditions have changed, and at any reasonable time at employee request.

1926.1101(o)(3)(i)

On all worksites where employees are engaged in Class I or II asbestos work, the competent person designated in accordance with paragraph (e)(6) of this section shall perform or supervise the following duties, as applicable:

1926.1101(o)(3)(i)(A)

Set up the regulated area, enclosure, or other containment;

1926.1101(o)(3)(i)(B)

Ensure (by on-site inspection) the integrity of the enclosure or containment;

1926.1101(o)(3)(i)(C)

Set up procedures to control entry to and exit from the enclosure and/or area;

1926.1101(o)(3)(i)(D)

Supervise all employee exposure monitoring required by this section and ensure that it is conducted as required by paragraph (f) of this section;

1926.1101(o)(3)(i)(E)

Ensure that employees working within the enclosure and/or using glove bags wear respirators and protective clothing as required by paragraphs (h) and (i) of this section;

..1926.1101(o)(3)(i)(F)

1926.1101(o)(3)(i)(F)

Ensure through on-site supervision, that employees set up, use and remove engineering controls, use work practices and personal protective equipment in compliance with all requirements;

1926.1101(o)(3)(i)(G)

Ensure that employees use the hygiene facilities and observe the decontamination procedures specified in paragraph (j) of this section;

1926.1101(o)(3)(i)(H)

Ensure that through on-site inspection, engineering controls are functioning properly and employees are using proper work practices; and,

1926.1101(o)(3)(i)(I)

Ensure that notification requirement in paragraph (k) of this section are met.

1926.1101(o)(3)(ii)

[Reserved]

1926.1101(o)(4)

Training for the competent person.

1926.1101(o)(4)(i)

For Class I and II asbestos work the competent person shall be trained in all aspects of asbestos removal and handling, including: abatement, installation, removal and handling; the contents of this standard; the identification of asbestos; removal procedures, where appropriate; and other practices for reducing the hazard. Such training shall be obtained in a comprehensive course for supervisors that meets the criteria of EPA's Model Accredited Plan (40 CFR part 763, subpart E, Appendix C), such as a course conducted by an EPA-approved or state-approved training provider, certified by EPA or a state, or a course equivalent in stringency, content, and length.

1926.1101(o)(4)(ii)

For Class III and IV asbestos work, the competent person shall be trained in aspects of asbestos handling appropriate for the nature of the work, to include procedures for setting up glove bags and mini-enclosures, practices for reducing asbestos exposures, use of wet methods, the contents of this standard, and the identification of asbestos. Such training shall include successful completion of a course that is consistent with EPA requirements for training of local education agency maintenance and custodial staff as set forth at 40 CFR 763.92(a)(2), or its equivalent in stringency, content, and length. Competent persons for Class III and IV work, may also be trained pursuant to the requirements of paragraph (o)(4)(i) of this section.

1926.1101(p)

Appendices.

1926.1101(p)(1)

Appendices A, C, D, and E to this section are incorporated as part of this section and the contents of these appendices are mandatory.

1926.1101(p)(2)

Appendices B, F, H, I, J, and K to this section are informational and are not intended to create any additional obligations not otherwise imposed or to detract from any existing obligations.

1926.1101(q)

Dates.

1926.1101(q)(1)

This standard shall become effective October 11, 1994.

1926.1101(q)(2)

The provisions of 29 CFR 1926.58 remain in effect until the start-up dates of the equivalent provisions of this standard.

1926.1101(q)(3)

Start-up dates. All obligations of this standard commence on the effective date except as follows:

1926.1101(q)(3)(i)

Methods of compliance. The engineering and work practice controls required by paragraph (g) of this section shall be implemented by October 1, 1995.

1926.1101(q)(3)(ii)

Respiratory protection. Respiratory protection required by paragraph (h) of this section shall be provided by October 1, 1995.

..1926.1101(q)(3)(iii)

1926.1101(q)(3)(iii)

Hygiene facilities and practices for employees. Hygiene facilities and practices required by paragraph (j) of this section shall be provided by October 1, 1995.

1926.1101(q)(3)(iv)

Communication of hazards. Identification, notification, labeling and sign posting, and training required by paragraph (k) of this section shall be provided by October 1, 1995.

1926.1101(q)(3)(v)

Housekeeping. Housekeeping practices and controls required by paragraph (1) of this section shall be provided by October 1, 1995.

1926.1101(q)(3)(vi)

Medical surveillance required by paragraph (m) of this section shall be provided by October 1, 1995.

1926.1101(q)(3)(vii)

The designation and training of competent persons required by paragraph (o) of this section shall be completed by October 1, 1995.

[59 FR 40964, Aug. 10, 1994; 60 FR 9624, Feb. 21, 1995; 60 FR 33343, June 28, 1995; 60 FR 33972, June 29, 1995; 60 FR 36043, July 13, 1995; 60 FR 50411, Sept. 29, 1995; 61 FR 5507, Feb. 13, 1996; 61 FR 43454, August 23, 1996; 63 FR 1152, Jan. 8, 1998; 63 FR 20098, April 23, 1998; 63 FR 35138, June 29, 1998; 70 FR 1143, Jan. 5, 2005]

OSHA Reference Method - Mandatory - 1926.1101 App A

Regulations (Standards - 29 CFR) - Table of Contents

• Part Number:	1926
• Part Title:	Safety and Health Regulations for Construction
• Subpart:	Z
• Subpart Title:	Toxic and Hazardous Substances
• Standard Number:	1926.1101 App A
• Title:	OSHA Reference Method - Mandatory

This mandatory appendix specifies the procedure for analyzing air samples for asbestos and specifies quality control procedures that must be implemented by laboratories performing the analysis. The sampling and analytical methods described below represent the elements of the available monitoring methods (such as Appendix B of this regulation, the most current version of the OSHA method ID-160, or the most current version of the NIOSH Method 7400). All employers who are required to conduct air monitoring under paragraph (f) of the standard are required to utilize analytical laboratories that use this procedure, or an equivalent method, for collecting and analyzing samples.

Sampling and Analytical Procedure

1. The sampling medium for air samples shall be mixed cellulose ester filter membranes. These shall be designated by the manufacturer as suitable for asbestos counting. See below for rejection of blanks.

2. The preferred collection device shall be the 25-mm diameter cassette with an open-faced 50-mm electrically conductive extension cowl. The 37-mm cassette may be used if necessary but only if written justification for the need to use the 37-mm filter cassette accompanies the sample results in the employee's exposure monitoring record. Do not reuse or reload cassettes for asbestos sample collection.

3. An air flow rate between 0.5 liter/min and 2.5 liters/min shall be selected for the 25/mm cassette. If the 37-mm cassette is used, an air flow rate between 1 liter/min and 2.5 liters/min shall be selected.

4. Where possible, a sufficient air volume for each air sample shall be collected to yield between 100 and 1,300 fibers per square millimeter on the membrane filter. If a filter darkens in appearance or if loose dust is seen on the filter, a second sample shall be started.

5. Ship the samples in a rigid container with sufficient packing material to prevent

dislodging the collected fibers. Packing material that has a high electrostatic charge on its surface (e.g., expanded polystyrene) cannot be used because such material can cause loss of fibers to the sides of the cassette.

6. Calibrate each personal sampling pump before and after use with a representative filter cassette installed between the pump and the calibration devices.

7. Personal samples shall be taken in the "breathing zone" of the employee (i.e., attached to or near the collar or lapel near the worker's face).

8. Fiber counts shall be made by positive phase contrast using a microscope with an 8 to 10 X eyepiece and a 40 to 45 X objective for a total magnification of approximately 400 X and a numerical aperture of 0.65 to 0.75. The microscope shall also be fitted with a green or blue filter.

9. The microscope shall be fitted with a Walton-Beckett eyepiece graticule calibrated for a field diameter of 100 micrometers (+/- 2 micrometers).

10. The phase-shift detection limit of the microscope shall be about 3 degrees measured using the HSE phase shift test slide as outlined below.

a. Place the test slide on the microscope stage and center it under the phase objective.

b. Bring the blocks of grooved lines into focus.

Note: The slide consists of seven sets of grooved lines (ca. 20 grooves to each block) in descending order of visibility from sets 1 to 7, seven being the least visible. The requirements for asbestos counting are that the microscope optics must resolve the grooved lines in set 3 completely, although they may appear somewhat faint, and that the grooved lines in sets 6 and 7 must be invisible. Sets 4 and 5 must be at least partially visible but may vary slightly in visibility between microscopes. A microscope that fails to meet these requirements has either too low or too high a resolution to be used for asbestos counting.

c. If the image deteriorates, clean and adjust the microscope optics. If the problem persists, consult the microscope manufacturer.

11. Each set of samples taken will include 10% field blanks or a minimum of 2 field blanks. These blanks must come from the same lot as the filters used for sample collection. The field blank results shall be averaged and subtracted from the analytical results before reporting. A set consists of any sample or group of samples for which an evaluation for this standard must be made. Any samples represented by a field blank having a fiber count in excess of the detection limit of the method being used shall be

rejected.

12. The samples shall be mounted by the acetone/triacetin method or a method with an equivalent index of refraction and similar clarity.

13. Observe the following counting rules.

a. Count only fibers equal to or longer than 5 micrometers. Measure the length of curved fibers along the curve.

b. In the absence of other information, count all particles as asbestos that have a length-to-width ratio (aspect ratio) of 3:1 or greater.

c. Fibers lying entirely within the boundary of the Walton-Beckett graticule field shall receive a count of 1. Fibers crossing the boundary once, having one end within the circle, shall receive the count of one half (1/2). Do not count any fiber that crosses the graticule boundary more than once. Reject and do not count any other fibers even though they may be visible outside the graticule area.

d. Count bundles of fibers as one fiber unless individual fibers can be identified by observing both ends of an individual fiber.

e. Count enough graticule fields to yield 100 fibers. Count a minimum of 20 fields; stop counting at 100 fields regardless of fiber count.

14. Blind recounts shall be conducted at the rate of 10 percent.

Quality Control Procedures

1. Intralaboratory program. Each laboratory and/or each company with more than one microscopist counting slides shall establish a statistically designed quality assurance program involving blind recounts and comparisons between microscopists to monitor the variability of counting by each microscopist and between microscopists. In a company with more than one laboratory, the program shall include all laboratories, and shall also evaluate the laboratory-to-laboratory variability.

2.a. Interlaboratory program. Each laboratory analyzing asbestos samples for compliance determination shall implement an interlaboratory quality assurance program that, as a minimum, includes participation of at least two other independent laboratories. Each laboratory shall participate in round robin testing at least once every 6 months with at least all the other laboratories in its interlaboratory quality assurance group. Each laboratory shall submit slides typical of its own workload for use in this program. The round robin shall be designed and results analyzed using appropriate statistical methodology.

2.b. All laboratories should also participate in a national sample testing scheme such as the Proficiency Analytical Testing Program (PAT), or the Asbestos Registry sponsored by the American Industrial Hygiene Association (AIHA).

3. All individuals performing asbestos analysis must have taken the NIOSH course for sampling and evaluating airborne asbestos dust or an equivalent course.

4. When the use of different microscopes contributes to differences between counters and laboratories, the effect of the different microscope shall be evaluated and the microscope shall be replaced, as necessary.

5. Current results of these quality assurance programs shall be posted in each laboratory to keep the microscopists informed.

Sampling and Analysis - Non-mandatory - 1926.1101 App B

Regulations (Standards - 29 CFR) - Table of Contents

- Part Number: 1926
- Part Title: Safety and Health Regulations for Construction
- Subpart: Z
- Subpart Title: Toxic and Hazardous Substances
- Standard Number: 1926.1101 App B
- Title: Sampling and Analysis - Non-mandatory

Matrix

Matrix:
OSHA Permissible Exposure Limits:
Time Weighted Average..... 0.1 fiber/cc
Excursion Level (30 minutes)..... 1.0 fiber/cc
Collection Procedure:
A known volume of air is drawn through a 25-mm diameter cassette containing a mixed-cellulose ester filter. The cassette must be equipped with an electrically conductive 50-mm extension cowl. The sampling time and rate are chosen to give a fiber density of between 100 to 1,300 fibers/mm2 on the filter.

Recommended Sampling Rate..... 0.5 to 5.0 liters/minute (L/min)
Recommended Air Volumes:
Minimum..... 25 L
Maximum..... 2,400 L

Analytical Procedure:

A portion of the sample filter is cleared and prepared for asbestos fiber counting by Phase Contrast Microscopy (PCM) at 400X.

Commercial manufacturers and products mentioned in this method are for descriptive use only and do not constitute endorsements by USDOL-OSHA. Similar products from

other sources can be substituted.

1. Introduction

This method describes the collection of airborne asbestos fibers using calibrated sampling pumps with mixed-cellulose ester (MCE) filters and analysis by phase contrast microscopy (PCM). Some terms used are unique to this method and are defined below: Asbestos: A term for naturally occurring fibrous minerals. Asbestos includes chrysotile, crocidolite, amosite (cummingtonite-grunerite asbestos), tremolite asbestos, actinolite asbestos, anthophyllite asbestos, and any of these minerals that have been chemically treated and/or altered. The precise chemical formulation of each species will vary with the location from which it was mined. Nominal compositions are listed:

Chrysotile..... Mg(3)Si(2)O(5)(OH)(4)
Crocidolite..... Na(2)Fe(3)(2)+Fe(2)(3)+Si(8)O(22)(OH)(2)
Amosite..... (Mg,Fe)(7)Si(8)O(22)(OH)(2)
Tremolite-actinolite..... Ca(2)(Mg,Fe)(5)Si(8)O(22)(OH)(2)
Anthophyllite..... (Mg,Fe)(7)Si(8)O(22)(OH)(2)

Asbestos Fiber: A fiber of asbestos which meets the criteria specified below for a fiber.

Aspect Ratio: The ratio of the length of a fiber to it's diameter (e.g. 3:1, 5:1 aspect ratios).

Cleavage Fragments: Mineral particles formed by comminution of minerals, especially those characterized by parallel sides and a moderate aspect ratio (usually less than 20:1).

Detection Limit: The number of fibers necessary to be 95% certain that the result is greater than zero.

Differential Counting: The term applied to the practice of excluding certain kinds of fibers from the fiber count because they do not appear to be asbestos.

Fiber: A particle that is 5 um or longer, with a length-to-width ratio of 3 to 1 or longer.

Field: The area within the graticule circle that is superimposed on the microscope image.

Set: The samples which are taken, submitted to the laboratory, analyzed, and for which, interim or final result reports are generated.

Tremolite, Anthophyllite, and Actinolite: The non-asbestos form of these minerals which meet the definition of a fiber. It includes any of these minerals that have been

chemically treated and/or altered.

Walton-Beckett Graticule: An eyepiece graticule specifically designed for asbestos fiber counting. It consists of a circle with a projected diameter of 100 plus or minus 2 um (area of about 0.00785 mm(2)) with a crosshair having tic-marks at 3-um intervals in one direction and 5-um in the orthogonal direction. There are marks around the periphery of the circle to demonstrate the proper sizes and shapes of fibers. This design is reproduced in Figure 1. The disk is placed in one of the microscope eyepieces so that the design is superimposed on the field of view.

1.1. History

Early surveys to determine asbestos exposures were conducted using impinger counts of total dust with the counts expressed as million particles per cubic foot. The British Asbestos Research Council recommended filter membrane counting in 1969. In July 1969, the Bureau of Occupational Safety and Health published a filter membrane method for counting asbestos fibers in the United States. This method was refined by NIOSH and published as P & CAM 239. On May 29, 1971, OSHA specified filter membrane sampling with phase contrast counting for evaluation of asbestos exposures at work sites in the United States. The use of this technique was again required by OSHA in 1986. Phase contrast microscopy has continued to be the method of choice for the measurement of occupational exposure to asbestos.

1.2. Principle

Air is drawn through a MCE filter to capture airborne asbestos fibers. A wedge shaped portion of the filter is removed, placed on a glass microscope slide and made transparent. A measured area (field) is viewed by PCM. All the fibers meeting defined criteria for asbestos are counted and considered a measure of the airborne asbestos concentration.

1.3. Advantages and Disadvantages

There are four main advantages of PCM over other methods:

(1) The technique is specific for fibers. Phase contrast is a fiber counting technique which excludes non-fibrous particles from the analysis.

(2) The technique is inexpensive and does not require specialized knowledge to carry out the analysis for total fiber counts.

(3) The analysis is quick and can be performed on-site for rapid determination of air concentrations of asbestos fibers.

(4) The technique has continuity with historical epidemiological studies so that

estimates of expected disease can be inferred from long-term determinations of asbestos exposures.

The main disadvantage of PCM is that it does not positively identify asbestos fibers. Other fibers which are not asbestos may be included in the count unless differential counting is performed. This requires a great deal of experience to adequately differentiate asbestos from non-asbestos fibers. Positive identification of asbestos must be performed by polarized light or electron microscopy techniques. A further disadvantage of PCM is that the smallest visible fibers are about 0.2 um in diameter while the finest asbestos fibers may be as small as 0.02 um in diameter. For some exposures, substantially more fibers may be present than are actually counted.

1.4. Workplace Exposure

Asbestos is used by the construction industry in such products as shingles, floor tiles, asbestos cement, roofing felts, insulation and acoustical products. Non-construction uses include brakes, clutch facings, paper, paints, plastics, and fabrics. One of the most significant exposures in the workplace is the removal and encapsulation of asbestos in schools, public buildings, and homes. Many workers have the potential to be exposed to asbestos during these operations.

About 95% of the asbestos in commercial use in the United States is chrysotile. Crocidolite and amosite make up most of the remainder. Anthophyllite and tremolite or actinolite are likely to be encountered as contaminants in various industrial products.

1.5. Physical Properties

Asbestos fiber possesses a high tensile strength along its axis, is chemically inert, non-combustible, and heat resistant. It has a high electrical resistance and good sound absorbing properties. It can be weaved into cables, fabrics or other textiles, and also matted into asbestos papers, felts, or mats.

2. Range and Detection Limit

2.1. The ideal counting range on the filter is 100 to 1,300 fibers/mm(2). With a Walton-Beckett graticule this range is equivalent to 0.8 to 10 fibers/field. Using NIOSH counting statistics, a count of 0.8 fibers/field would give an approximate coefficient of variation (CV) of 0.13.

2.2. The detection limit for this method is 4.0 fibers per 100 fields or 5.5 fibers/mm(2). This was determined using an equation to estimate the maximum CV possible at a specific concentration (95% confidence) and a Lower Control Limit of zero. The CV value was then used to determine a corresponding concentration from historical CV vs

fiber relationships. As an example:

Lower Control Limit (95% Confidence) = AC -- 1.645(CV)(AC)

Where:

AC = Estimate of the airborne fiber concentration (fibers/cc) Setting the
Lower Control Limit = 0 and solving for CV:
0 = AC -- 1.645(CV)(AC)
CV = 0.61

This value was compared with CV vs. count curves. The count at which CV = 0.61 for Leidel-Busch counting statistics or for an OSHA Salt Lake Technical Center (OSHA-SLTC) CV curve (see Appendix A for further information) was 4.4 fibers or 3.9 fibers per 100 fields, respectively. Although a lower detection limit of 4 fibers per 100 fields is supported by the OSHA-SLTC data, both data sets support the 4.5 fibers per 100 fields value.

3. Method Performance -- Precision and Accuracy

Precision is dependent upon the total number of fibers counted and the uniformity of the fiber distribution on the filter. A general rule is to count at least 20 and not more than 100 fields. The count is discontinued when 100 fibers are counted, provided that 20 fields have already been counted. Counting more than 100 fibers results in only a small gain in precision. As the total count drops below 10 fibers, an accelerated loss of precision is noted.

At this time, there is no known method to determine the absolute accuracy of the asbestos analysis. Results of samples prepared through the Proficiency Analytical Testing (PAT) Program and analyzed by the OSHA-SLTC showed no significant bias when compared to PAT reference values. The PAT samples were analyzed from 1987 to 1989 (N = 36) and the concentration range was from 120 to 1,300 fibers/mm(2).

4. Interferences

Fibrous substances, if present, may interfere with asbestos analysis.

Some common fibers are:

Fiberglass
Anhydrite
Plant Fibers
Perlite Veins
Gypsum
Some Synthetic Fibers
Membrane Structures
Sponge Spicules

Diatoms
Microorganisms
Wollastonite

The use of electron microscopy or optical tests such as polarized light, and dispersion staining may be used to differentiate these materials from asbestos when necessary.

5. Sampling

5.1. Equipment

5.1.1. Sample assembly (The assembly is shown in Figure 3). Conductive filter holder consisting of a 25-mm diameter, 3-piece cassette having a 50-mm long electrically conductive extension cowl. Backup pad, 25-mm, cellulose. Membrane filter, mixed-cellulose ester (MCE), 25-mm, plain, white, 0.4 to 1.2-um pore size.

Notes:

(a) DO NOT RE-USE CASSETTES.

(b) Fully conductive cassettes are required to reduce fiber loss to the sides of the cassette due to electrostatic attraction.

(c) Purchase filters which have been selected by the manufacturer for asbestos counting or analyze representative filters for fiber background before use. Discard the filter lot if more than 4 fibers/ 100 fields are found.

(d) To decrease the possibility of contamination, the sampling system (filter-backup pad-cassette) for asbestos is usually preassembled by the manufacturer.

(e) Other cassettes, such as the Bell-mouth, may be used within the limits of their validation.

5.1.2. Gel bands for sealing cassettes.

5.1.3. Sampling pump.

Each pump must be a battery operated, self-contained unit small enough to be placed on the monitored employee and not interfere with the work being performed. The pump must be capable of sampling at the collection rate for the required sampling time.

5.1.4. Flexible tubing, 6-mm bore.

5.1.5. Pump calibration.

Stopwatch and bubble tube/burette or electronic meter.

5.2. Sampling Procedure

5.2.1. Seal the point where the base and cowl of each cassette meet with a gel band or tape.

5.2.2. Charge the pumps completely before beginning.

5.2.3. Connect each pump to a calibration cassette with an appropriate length of 6-mm bore plastic tubing. Do not use luer connectors -- the type of cassette specified above has built-in adapters.

5.2.4. Select an appropriate flow rate for the situation being monitored. The sampling flow rate must be between 0.5 and 5.0 L/min for personal sampling and is commonly set between 1 and 2 L/min. Always choose a flow rate that will not produce overloaded filters.

5.2.5. Calibrate each sampling pump before and after sampling with a calibration cassette in-line (Note: This calibration cassette should be from the same lot of cassettes used for sampling). Use a primary standard (e.g. bubble burette) to calibrate each pump. If possible, calibrate at the sampling site.

Note: If sampling site calibration is not possible, environmental influences may affect the flow rate. The extent is dependent on the type of pump used. Consult with the pump manufacturer to determine dependence on environmental influences. If the pump is affected by temperature and pressure changes, correct the flow rate using the formula shown in the section "Sampling Pump Flow Rate Corrections" at the end of this appendix.

5.2.6. Connect each pump to the base of each sampling cassette with flexible tubing. Remove the end cap of each cassette and take each air sample open face. Assure that each sample cassette is held open side down in the employee's breathing zone during sampling. The distance from the nose/mouth of the employee to the cassette should be about 10 cm. Secure the cassette on the collar or lapel of the employee using spring clips or other similar devices.

5.2.7. A suggested minimum air volume when sampling to determine TWA compliance is 25 L. For Excursion Limit (30 min sampling time) evaluations, a minimum air volume of 48 L is recommended.

5.2.8. The most significant problem when sampling for asbestos is overloading the filter with non-asbestos dust. Suggested maximum air sample volumes for specific

environments are:

Environment	Air Vol. (L)
Asbestos removal operations (visible dust)	100.
Asbestos removal operations (little dust)	240.
Office environments	400 to 2,400.

CAUTION: Do not overload the filter with dust. High levels of non-fibrous dust particles may obscure fibers on the filter and lower the count or make counting impossible. If more than about 25 to 30% of the field area is obscured with dust, the result may be biased low. Smaller air volumes may be necessary when there is excessive non-asbestos dust in the air.

While sampling, observe the filter with a small flashlight. If there is a visible layer of dust on the filter, stop sampling, remove and seal the cassette, and replace with a new sampling assembly. The total dust loading should not exceed 1 mg.

5.2.9. Blank samples are used to determine if any contamination has occurred during sample handling. Prepare two blanks for the first 1 to 20 samples. For sets containing greater than 20 samples, prepare blanks as 10% of the samples. Handle blank samples in the same manner as air samples with one exception: Do not draw any air through the blank samples. Open the blank cassette in the place where the sample cassettes are mounted on the employee. Hold it open for about 30 seconds. Close and seal the cassette appropriately. Store blanks for shipment with the sample cassettes.

5.2.10. Immediately after sampling, close and seal each cassette with the base and plastic plugs. Do not touch or puncture the filter membrane as this will invalidate the analysis.

5.2.11. Attach and secure a sample seal around each sample cassette in such a way as to assure that the end cap and base plugs cannot be removed without destroying the seal. Tape the ends of the seal together since the seal is not long enough to be wrapped end-to-end. Also wrap tape around the cassette at each joint to keep the seal secure.

5.3. Sample Shipment

5.3.1. Send the samples to the laboratory with paperwork requesting asbestos analysis. List any known fibrous interferences present during sampling on the paperwork. Also,

note the workplace operation(s) sampled.

5.3.2. Secure and handle the samples in such that they will not rattle during shipment nor be exposed to static electricity. Do not ship samples in expanded polystyrene peanuts, vermiculite, paper shreds, or excelsior. Tape sample cassettes to sheet bubbles and place in a container that will cushion the samples in such a manner that they will not rattle.

5.3.3. To avoid the possibility of sample contamination, always ship bulk samples in separate mailing containers.

6. Analysis

6.1. Safety Precautions

6.1.1. Acetone is extremely flammable and precautions must be taken not to ignite it. Avoid using large containers or quantities of acetone. Transfer the solvent in a ventilated laboratory hood. Do not use acetone near any open flame. For generation of acetone vapor, use a spark free heat source.

6.1.2. Any asbestos spills should be cleaned up immediately to prevent dispersal of fibers. Prudence should be exercised to avoid contamination of laboratory facilities or exposure of personnel to asbestos. Asbestos spills should be cleaned up with wet methods and/ or a High Efficiency Particulate-Air (HEPA) filtered vacuum.

CAUTION: Do not use a vacuum without a HEPA filter -- It will disperse fine asbestos fibers in the air.

6.2. Equipment

6.2.1. Phase contrast microscope with binocular or trinocular head.

6.2.2. Widefield or Huygenian 10X eyepieces (NOTE: The eyepiece containing the graticule must be a focusing eyepiece. Use a 40X phase objective with a numerical aperture of 0.65 to 0.75).

6.2.3. Kohler illumination (if possible) with green or blue filter.

6.2.4. Walton-Beckett Graticule, type G-22 with 100 plus or minus 2 um projected diameter.

6.2.5. Mechanical stage. A rotating mechanical stage is convenient for use with polarized light.

6.2.6. Phase telescope.

6.2.7. Stage micrometer with 0.01-mm subdivisions.

6.2.8. Phase-shift test slide, mark II (Available from PTR optics Ltd., and also McCrone).

6.2.9. Precleaned glass slides, 25 mm X 75 mm. One end can be frosted for convenience in writing sample numbers, etc., or paste-on labels can be used.

6.2.10. Cover glass #1 1/2.

6.2.11. Scalpel (#10, curved blade).

6.2.12. Fine tipped forceps.

6.2.13. Aluminum block for clearing filter (see Appendix D and Figure 4).

6.2.14. Automatic adjustable pipette, 100- to 500-uL.

6.2.15. Micropipette, 5 uL.

6.3. Reagents

6.3.1. Acetone (HPLC grade).

6.3.2. Triacetin (glycerol triacetate).

6.3.3. Lacquer or nail polish.

6.4. Standard Preparation

A way to prepare standard asbestos samples of known concentration has not been developed. It is possible to prepare replicate samples of nearly equal concentration. This has been performed through the PAT program. These asbestos samples are distributed by the AIHA to participating laboratories.

Since only about one-fourth of a 25-mm sample membrane is required for an asbestos count, any PAT sample can serve as a "standard" for replicate counting.

6.5. Sample Mounting

Note: See Safety Precautions in Section 6.1. before proceeding. The objective is to produce samples with a smooth (non-grainy) background in a medium with a refractive index of approximately 1.46. The technique below collapses the filter for easier focusing and produces permanent mounts which are useful for quality control

and interlaboratory comparison.

An aluminum block or similar device is required for sample preparation.

6.5.1. Heat the aluminum block to about 70 deg.C. The hot block should not be used on any surface that can be damaged by either the heat or from exposure to acetone.

6.5.2. Ensure that the glass slides and cover glasses are free of dust and fibers.

6.5.3. Remove the top plug to prevent a vacuum when the cassette is opened. Clean the outside of the cassette if necessary. Cut the seal and/or tape on the cassette with a razor blade. Very carefully separate the base from the extension cowl, leaving the filter and backup pad in the base.

6.5.4. With a rocking motion cut a triangular wedge from the filter using the scalpel. This wedge should be one-sixth to one-fourth of the filter. Grasp the filter wedge with the forceps on the perimeter of the filter which was clamped between the cassette pieces. DO NOT TOUCH the filter with your finger. Place the filter on the glass slide sample side up. Static electricity will usually keep the filter on the slide until it is cleared.

6.5.5. Place the tip of the micropipette containing about 200 uL acetone into the aluminum block. Insert the glass slide into the receiving slot in the aluminum block. Inject the acetone into the block with slow, steady pressure on the plunger while holding the pipette firmly in place. Wait 3 to 5 seconds for the filter to clear, then remove the pipette and slide from the aluminum block.

6.5.6. Immediately (less than 30 seconds) place 2.5 to 3.5 uL of triacetin on the filter (NOTE: Waiting longer than 30 seconds will result in increased index of refraction and decreased contrast between the fibers and the preparation. This may also lead to separation of the cover slip from the slide).

6.5.7. Lower a cover slip gently onto the filter at a slight angle to reduce the possibility of forming air bubbles. If more than 30 seconds have elapsed between acetone exposure and triacetin application, glue the edges of the cover slip to the slide with lacquer or nail polish.

6.5.8. If clearing is slow, warm the slide for 15 min on a hot plate having a surface temperature of about 50 deg.C to hasten clearing. The top of the hot block can be used if the slide is not heated too long.

6.5.9. Counting may proceed immediately after clearing and mounting are completed.

6.6. Sample Analysis

Completely align the microscope according to the manufacturer's instructions. Then, align the microscope using the following general alignment routine at the beginning of every counting session and more often if necessary.

6.6.1. Alignment

(1) Clean all optical surfaces. Even a small amount of dirt can significantly degrade the image.

(2) Rough focus the objective on a sample.

(3) Close down the field iris so that it is visible in the field of view. Focus the image of the iris with the condenser focus. Center the image of the iris in the field of view.

(4) Install the phase telescope and focus on the phase rings. Critically center the rings. Misalignment of the rings results in astigmatism which will degrade the image.

(5) Place the phase-shift test slide on the microscope stage and focus on the lines. The analyst must see line set 3 and should see at least parts of 4 and 5 but, not see line set 6 or 6. A microscope/microscopist combination which does not pass this test may not be used.

6.6.2. Counting Fibers

(1) Place the prepared sample slide on the mechanical stage of the microscope. Position the center of the wedge under the objective lens and focus upon the sample.

(2) Start counting from one end of the wedge and progress along a radial line to the other end (count in either direction from perimeter to wedge tip). Select fields randomly, without looking into the eyepieces, by slightly advancing the slide in one direction with the mechanical stage control.

(3) Continually scan over a range of focal planes (generally the upper 10 to 15 um of the filter surface) with the fine focus control during each field count. Spend at least 5 to 15 seconds per field.

(4) Most samples will contain asbestos fibers with fiber diameters less than 1 um. Look carefully for faint fiber images. The small diameter fibers will be very hard to see. However, they are an important contribution to the total count.

(5) Count only fibers equal to or longer than 5 um. Measure the length of curved fibers along the curve.

(6) Count fibers which have a length to width ratio of 3:1 or greater.

(7) Count all the fibers in at least 20 fields. Continue counting until either 100 fibers are counted or 100 fields have been viewed; whichever occurs first. Count all the fibers in the final field.

(8) Fibers lying entirely within the boundary of the Walton-Beckett graticule field shall receive a count of 1. Fibers crossing the boundary once, having one end within the circle shall receive a count of 1/2. Do not count any fiber that crosses the graticule boundary more than once. Reject and do not count any other fibers even though they may be visible outside the graticule area. If a fiber touches the circle, it is considered to cross the line.

(9) Count bundles of fibers as one fiber unless individual fibers can be clearly identified and each individual fiber is clearly not connected to another counted fiber. See Figure 1 for counting conventions.

(10) Record the number of fibers in each field in a consistent way such that filter non-uniformity can be assessed.

(11) Regularly check phase ring alignment.

(12) When an agglomerate (mass of material) covers more than 25% of the field of view, reject the field and select another. Do not include it in the number of fields counted.

(13) Perform a "blind recount" of 1 in every 10 filter wedges (slides). Re-label the slides using a person other than the original counter.

6.7. Fiber Identification

As previously mentioned in Section 1.3., PCM does not provide positive confirmation of asbestos fibers. Alternate differential counting techniques should be used if discrimination is desirable. Differential counting may include primary discrimination based on morphology, polarized light analysis of fibers, or modification of PCM data by Scanning Electron or Transmission Electron Microscopy.

A great deal of experience is required to routinely and correctly perform differential counting. It is discouraged unless it is legally necessary. Then, only if a fiber is obviously not asbestos should it be excluded from the count. Further discussion of this technique can be found in reference 8.10.

If there is a question whether a fiber is asbestos or not, follow the rule:

"WHEN IN DOUBT, COUNT."

6.8. Analytical Recommendations -- Quality Control System

6.8.1. All individuals performing asbestos analysis must have taken the NIOSH course for sampling and evaluating airborne asbestos or an equivalent course.

6.8.2. Each laboratory engaged in asbestos counting shall set up a slide trading arrangement with at least two other laboratories in order to compare performance and eliminate inbreeding of error. The slide exchange occurs at least semiannually. The round robin results shall be posted where all analysts can view individual analyst's results.

6.8.3. Each laboratory engaged in asbestos counting shall participate in the Proficiency Analytical Testing Program, the Asbestos Analyst Registry or equivalent.

6.8.4. Each analyst shall select and count prepared slides from a "slide bank". These are quality assurance counts. The slide bank shall be prepared using uniformly distributed samples taken from the workload. Fiber densities should cover the entire range routinely analyzed by the laboratory. These slides are counted blind by all counters to establish an original standard deviation. This historical distribution is compared with the quality assurance counts. A counter must have 95% of all quality control samples counted within three standard deviations of the historical mean. This count is then integrated into a new historical mean and standard deviation for the slide.

The analyses done by the counters to establish the slide bank may be used for an interim quality control program if the data are treated in a proper statistical fashion.

7. Calculations

7.1. Calculate the estimated airborne asbestos fiber concentration on the filter sample using the following formula:

(For Equation A, Click Here)

where:

AC = Airborne fiber concentration
FB = Total number of fibers greater than 5 um counted
FL = Total number of fields counted on the filter
BFB = Total number of fibers greater than 5 um counted in the blank
BFL = Total number of fields counted on the blank
ECA = Effective collecting area of filter (385 mm(2) nominal for a 25-mm filter.)
FR = Pump flow rate (L/min)
MFA = Microscope count field area (mm(2)). This is 0.00785 mm(2) for a Walton-Beckett Graticule.
T = Sample collection time (min)

1,000 = Conversion of L to cc

Note: The collection area of a filter is seldom equal to 385 mm(2). It is appropriate for laboratories to routinely monitor the exact diameter using an inside micrometer. The collection area is calculated according to the formula:

Area = pi(d/2)(2)

7.2. Short-Cut Calculation

Since a given analyst always has the same interpupillary distance, the number of fields per filter for a particular analyst will remain constant for a given size filter. The field size for that analyst is constant (i.e. the analyst is using an assigned microscope and is not changing the reticle).

For example, if the exposed area of the filter is always 385 mm(2) and the size of the field is always 0.00785 mm(2) the number of fields per filter will always be 49,000. In addition it is necessary to convert liters of air to cc. These three constants can then be combined such that ECA/(1,000 x MFA) = 49. The previous equation simplifies to:

(For Equation B, Click Here)

7.3. Recount Calculations

As mentioned in step 13 of Section 6.6.2., a "blind recount" of 10% of the slides is performed. In all cases, differences will be observed between the first and second counts of the same filter wedge. Most of these differences will be due to chance alone, that is, due to the random variability (precision) of the count method. Statistical recount criteria enables one to decide whether observed differences can be explained due to chance alone or are probably due to systematic differences between analysts, microscopes, or other biasing factors.

The following recount criterion is for a pair of counts that estimate AC in fibers/cc. The criterion is given at the type-I error level. That is, there is 5% maximum risk that we will reject a pair of counts for the reason that one might be biased, when the large observed difference is really due to chance.

Reject a pair of counts if:

(For Equation C, Click Here)

Where:

AC(1) = lower estimated airborne fiber concentration
AC(2) = higher estimated airborne fiber concentration

AC(avg) = average of the two concentration estimates
CV(FB) = CV for the average of the two concentration estimates

If a pair of counts are rejected by this criterion then, recount the rest of the filters in the submitted set. Apply the test and reject any other pairs failing the test. Rejection shall include a memo to the industrial hygienist stating that the sample failed a statistical test for homogeneity and the true air concentration may be significantly different than the reported value.

7.4. Reporting Results

Report results to the industrial hygienist as fibers/cc. Use two significant figures. If multiple analyses are performed on a sample, an average of the results is to be reported unless any of the results can be rejected for cause.

8. References

8.1. Dreesen, W.C., et al., U.S. Public Health Service: A Study of Asbestosis in the Asbestos Textile Industry (Public Health Bulletin No. 241), U.S. Treasury Dept., Washington, DC, 1938.

8.2. Asbestos Research Council: The Measurement of Airborne Asbestos Dust by the Membrane Filter Method (Technical Note), Asbestos Research Council, Rockdale, Lancashire, Great Britain, 1969.

8.3. Bayer, S.G., Zumwalde, R.D., Brown, T.A., Equipment and Procedure for Mounting Millipore Filters and Counting Asbestos Fibers by Phase Contrast Microscopy, Bureau of Occupational Health, U.S. Dept. of Health, Education and Welfare, Cincinnati, OH, 1969.

8.4. NIOSH Manual of Analytical Methods, 2nd ed., Vol. 1 (DHEW/ NIOSH Pub. No. 77-157-A). National Institute for Occupational Safety and Health, Cincinnati, OH, 1977. pp. 239-1 -- 239-21.

8.5. Asbestos, Code of Federal Regulations 29 CFR 1910.1001. 1971.

8.6. Occupational Exposure to Asbestos, Tremolite, Anthophyllite, and Actinolite. Final Rule, Federal Register 51:119 (20 June 1986). pp. 22612-22790.

8.7. Asbestos, Tremolite, Anthophyllite, and Actinolite, Code of Federal Regulations 1910.1001. 1988. pp. 711-752.

8.8. Criteria for a Recommended Standard -- Occupational Exposure to Asbestos (DHEW/NIOSH Pub. No. HSM 72-10267), National Institute for Occupational Safety and

Health, NIOSH, Cincinnati, OH, 1972. pp. III-1 -- III-24.

8.9. Leidel, N.A., Bayer, S.G., Zumwalde, R.D., Busch, K.A., USPHS/NIOSH Membrane Filter Method for Evaluating Airborne Asbestos Fibers (DHEW/NIOSH Pub. No. 79-127). National Institute for Occupational Safety and Health, Cincinnati, OH, 1979.

8.10. Dixon, W.C., Applications of Optical Microscopy in Analysis of Asbestos and Quartz, Analytical Techniques in Occupational Health Chemistry, edited by D.D. Dollberg and A.W. Verstuyft. Wash. D.C.: American Chemical Society, (ACS Symposium Series 120) 1980. pp. 13-41.

Quality Control

The OSHA asbestos regulations require each laboratory to establish a quality control program. The following is presented as an example of how the OSHA-SLTC constructed its internal CV curve as part of meeting this requirement. Data is from 395 samples collected during OSHA compliance inspections and analyzed from October 1980 through April 1986.

Each sample was counted by 2 to 5 different counters independently of one another. The standard deviation and the CV statistic was calculated for each sample. This data was then plotted on a graph of CV vs. fibers/mm(2). A least squares regression was performed using the following equation:

CV = antilog(10)[A(log(10)(x))(2)+B(log(10)(x))+C]

where:

x = the number of fibers/mm(2)

Application of least squares gave:

A = 0.182205
B = 0.973343
C = 0.327499

Using these values, the equation becomes:

CV = antilog(10)[0.182205(log(10)(x))(2)-0.973343(log (10)(x))+0.327499]

Sampling Pump Flow Rate Corrections

This correction is used if a difference greater than 5% in ambient temperature and/or pressure is noted between calibration and sampling sites and the pump does not compensate for the differences.

(For Equation D, Click Here)

Where:

Q(act) = actual flow rate
Q(cal) = calibrated flow rate (if a rotameter was used, the rotameter value)
P(cal) = uncorrected air pressure at calibration
P(act) = uncorrected air pressure at sampling site
T(act) = temperature at sampling site (K)
T(cal) = temperature at calibration (K)

Walton-Beckett Graticule

When ordering the Graticule for asbestos counting, specify the exact disc diameter needed to fit the ocular of the microscope and the diameter (mm) of the circular counting area. Instructions for measuring the dimensions necessary are listed:

(1) Insert any available graticule into the focusing eyepiece and focus so that the graticule lines are sharp and clear.

(2) Align the microscope.

(3) Place a stage micrometer on the microscope object stage and focus the microscope on the graduated lines.

(4) Measure the magnified grid length, PL (um), using the stage micrometer.

(5) Remove the graticule from the microscope and measure its actual grid length, AL (mm). This can be accomplished by using a mechanical stage fitted with verniers, or a jeweler's loupe with a direct reading scale.

(6) Let D = 100 um. Calculate the circle diameter, d(c)(mm), for the Walton-Beckett graticule and specify the diameter when making a purchase:

$$d(c) = \frac{AL \times D}{PL}$$

Example:

If PL = 108 um, AL = 2.93 mm and D = 100 um,

then,

$$d(c) = \frac{2.93 \times 100}{108} = 2.71\text{mm}$$

(7) Each eyepiece-objective-reticle combination on the microscope must be calibrated. Should any of the three be changed (by zoom adjustment, disassembly, replacement, etc.), the combination must be recalibrated. Calibration may change if interpupillary distance is changed.

Measure the field diameter, D (acceptable range: 100 plus or minus 2 um) with a stage micrometer upon receipt of the graticule from the manufacturer. Determine the field area (mm(2)).

Field Area = pi(D/2)(2)
If D = 100 um = 0.1 mm, then
Field Area = pi(0.1 mm/2)(2) = 0.00785 mm(2)

The Graticule is available from: Graticules Ltd., Morley Road, Tonbridge TN9 IRN, Kent, England (Telephone 011-44-732-359061). Also available from PTR Optics Ltd., 145 Newton Street, Waltham, MA 02154 [telephone (617) 891-6000] or McCrone Accessories and Components, 2506 S. Michigan Ave., Chicago, IL 60616 [phone (312)-842-7100]. The graticule is custom made for each microscope.

(For Figure 1 of Walton-Beckett Graticule, Click Here)

Counts for the Fibers in the Figure

Structure No.	Count	Explanation
1 to 6.....	1	Single fibers all contained within the Circle.
7.....	1/2	Fiber crosses circle once.
8.....	0	Fiber too short.
9.....	2	Two crossing fibers.
10.....	0	Fiber outside graticule.
11.....	0	Fiber crosses graticule twice.
12.....	1/2	Although split, fiber only crosses once.

[60 FR 33972, June 29, 1995]

Qualitative and quantitative fit testing procedures - Mandatory - 1926.1101 App C

Regulations (Standards - 29 CFR) - Table of Contents

• Part Number:	1926
• Part Title:	Safety and Health Regulations for Construction
• Subpart:	Z
• Subpart Title:	Toxic and Hazardous Substances
• Standard Number:	1926.1101 App C
• Title:	Qualitative and quantitative fit testing procedures - Mandatory

[Reserved]

[63 FR 1152, Jan. 8, 1998]

Medical questionnaires; mandatory - 1926.1101 App D

Regulations (Standards - 29 CFR) - Table of Contents

• Part Number:	1926
• Part Title:	Safety and Health Regulations for Construction
• Subpart:	Z
• Subpart Title:	Toxic and Hazardous Substances
• Standard Number:	1926.1101 App D
• Title:	Medical questionnaires; mandatory

This mandatory appendix contains the medical questionnaires that must be administered to all employees who are exposed to asbestos above the permissible exposure limit, and who will therefore be included in their employer's medical surveillance program. Part 1 of the appendix contains the Initial Medical Questionnaire, which must be obtained for all new hires who will be covered by the medical surveillance requirements. Part 2 includes the abbreviated Periodical Medical Questionnaire, which must be administered to all employees who are provided periodic medical examinations under the medical surveillance provisions of the standard.

Part 1
INITIAL MEDICAL QUESTIONNAIRE

1. NAME _____

2. SOCIAL SECURITY NUMBER # _____

3. CLOCK NUMBER _____

4. PRESENT OCCUPATION _____

5. PLANT _____

6. ADDRESS _____

7. _____
(Zip Code)

8. TELEPHONE NUMBER _____

9. INTERVIEWER _____

10. DATE _____

11. Date of Birth _____

Month Day Year

12. Place of Birth _____

13. Sex 1. Male ____
2. Female ____

14. What is your marital status? 1. Single ____ 4. Separated/
2. Married ____ Divorced ____
3. Widowed ____

15. Race 1. White ____ 4. Hispanic ____

2. Black ____ 5. Indian ____

3. Asian ____ 6. Other ____

16. What is the highest grade completed in school? _____

(For example 12 years is completion of high school)

OCCUPATIONAL HISTORY

17A. Have you ever worked full time (30 hours per week or more) for 6 months or more? 1. Yes ____ 2. No ____

IF YES TO 17A:

B. Have you ever worked for a year or more in any dusty job? 1. Yes ____ 2. No ____ 3. Does Not Apply ____

Specify job/industry _____ Total Years Worked _____

Was dust exposure:
1. Mild _____ 2. Moderate _____ 3. Severe _____

C. Have you ever been exposed to gas or chemical fumes in your work? 1. Yes ____ 2. No ____
Specify job/industry _____ Total Years Worked ____

Was exposure :
1. Mild _____ 2. Moderate _____ 3. Severe _____

D. What has been your usual occupation or job -- the one you have worked at the longest?

1. Job occupation _____

2. Number of years employed in this occupation _____

3. Position/job title _____

4. Business, field or industry _____
(Record on lines the years in which you have worked in any of these industries, e.g. 1960-1969)

Have you ever worked: YES NO

E. In a mine? ..... _____ _____

F. In a quarry? ..... _____ _____

G. In a foundry? ..... _____ _____

H. In a pottery? ..... _____ _____

I. In a cotton, flax or hemp mill? .... _____ _____

J. With asbestos? ..... _____ _____

18. PAST MEDICAL HISTORY

YES NO

A. Do you consider yourself to be in good health? _____ _____

If "NO" state reason _____

B. Have you any defect of vision? ..... _____ _____

If "YES" state nature of defect _____

C. Have you any hearing defect? ..... _____ _____

If "YES" state nature of defect _____

D. Are you suffering from or have you ever suffered from:

YES NO

a. Epilepsy (or fits, seizures, convulsions)? _____ _____

b. Rheumatic fever? _____ _____

c. Kidney disease? _____ _____

d. Bladder disease? _____ _____

e. Diabetes? _____ _____

f. Jaundice? _____ _____

19. CHEST COLDS AND CHEST ILLNESSES

19A. If you get a cold, does it "usually" go to your chest? (Usually means more than 1/2 the time)

1. Yes ____ 2. No ____ 3. Don't get colds ____

20A. During the past 3 years, have you had any chest illnesses that have kept you off work, indoors at home, or in bed?
1. Yes ____ 2. No ____

IF YES TO 20A:

B. Did you produce phlegm with any of these chest illnesses?
1. Yes ____ 2. No ____ 3. Does Not Apply ____

C. In the last 3 years, how many such illnesses with (increased) phlegm did you have which lasted a week or more?
Number of illnesses ____ No such illnesses ____

21. Did you have any lung trouble before the age of 16?
1. Yes ____ 2. No ____

22. Have you ever had any of the following?

1A. Attacks of bronchitis? 1. Yes ____ 2. No ____

IF YES TO 1A:
B. Was it confirmed by a doctor? 1. Yes ____ 2. No ____
3. Does Not Apply ____

C. At what age was your first attack? Age in Years ____
Does Not Apply ____

2A. Pneumonia (include bronchopneumonia)? 1. Yes ____ 2. No ____

IF YES TO 2A:
B. Was it confirmed by a doctor? 1. Yes ____ 2. No ____
3. Does Not Apply ____

C. At what age did you first have it? Age in Years ____
Does Not Apply ____

3A. Hay Fever? 1. Yes ____ 2. No ____
IF YES TO 3A:
B. Was it confirmed by a doctor? 1. Yes ____ 2. No ____
3. Does Not Apply ____

C. At what age did it start? Age in Years ____
Does Not Apply ____

23A. Have you ever had chronic bronchitis? 1. Yes ____ 2. No ____

IF YES TO 23A:
B. Do you still have it? 1. Yes ____ 2. No ____
3. Does Not Apply ____

C. Was it confirmed by a doctor? 1. Yes ____ 2. No ____
3. Does Not Apply ____

D. At what age did it start? Age in Years ___
Does Not Apply ___

24A. Have you ever had emphysema? 1. Yes ___ 2. No ___
IF YES TO 24A:
B. Do you still have it? 1. Yes ___ 2. No ___
3. Does Not Apply ___

C. Was it confirmed by a doctor? 1. Yes ___ 2. No ___
3. Does Not Apply ___

D. At what age did it start? Age in Years ___
Does Not Apply ___

25A. Have you ever had asthma? 1. Yes ___ 2. No ___
IF YES TO 25A:

B. Do you still have it? 1. Yes ___ 2. No ___
3. Does Not Apply ___

C. Was it confirmed by a doctor? 1. Yes ___ 2. No ___
3. Does Not Apply ___

D. At what age did it start? Age in Years ___
Does Not Apply ___
E. If you no longer have it, at what age did it stop?
Age stopped ___
Does Not Apply ___

26. Have you ever had:

A. Any other chest illness? 1. Yes ___ 2. No ___

If yes, please specify _____

B. Any chest operations? 1. Yes ___ 2. No ___

If yes, please specify _____

C. Any chest injuries? 1. Yes ___ 2. No ___

If yes, please specify _____

27A. Has a doctor ever told you that you had heart trouble?
1. Yes ___ 2. No ___

IF YES TO 27A:

B. Have you ever had treatment for heart trouble in the past 10 years?
1. Yes ___ 2. No ___
3. Does Not Apply ___

28A. Has a doctor told you that you had high blood pressure?
1. Yes ___ 2. No ___

IF YES TO 28A:

B. Have you had any treatment for high blood pressure (hypertension) in the past 10 years?
1. Yes ___ 2. No ___
3. Does Not Apply ___

29. When did you last have your chest X-rayed?
(Year) ___ ___ ___ ___

30. Where did you last have your chest X-rayed (if known)?
_____

What was the outcome? _____

FAMILY HISTORY

31. Were either of your natural parents ever told by a doctor that they had a chronic lung condition such as:

	FATHER			MOTHER		
	1. Yes	2. No	3. Don't know	1. Yes	2. No	3. Don't know
A. Chronic Bronchitis?	___	___	___	___	___	___
B. Emphysema?	___	___	___	___	___	___
C. Asthma?	___	___	___	___	___	___
D. Lung cancer?	___	___	___	___	___	___
E. Other chest conditions?	___	___	___	___	___	___
F. Is parent currently alive?	___	___	___	___	___	___

G. Please Specify ___ Age if Living ___ Age if Living
___ Age at Death ___ Age at Death
___ Don't Know ___ Don't Know

H. Please specify cause of death
_____ _____

COUGH

32A. Do you usually have a cough? (Count a cough with first smoke or on first going out of doors. Exclude clearing of throat.)
(If no, skip to question 32C.)

1. Yes ____ 2. No ____

B. Do you usually cough as much as 4 to 6 times a day 4 or more days out of the week?

1. Yes ____ 2. No ____

C. Do you usually cough at all on getting up or first thing in the morning?

1. Yes ____ 2. No ____

D. Do you usually cough at all during the rest of the day or at night?

1. Yes ____ 2. No ____

IF YES TO ANY OF ABOVE (32A, B, C, OR D,), ANSWER THE FOLLOWING.
IF NO TO ALL, CHECK "DOES NOT APPLY" AND SKIP TO NEXT PAGE

E. Do you usually cough like this on most days for 3 consecutive months or more during the year?

1. Yes ____ 2. No ____
3. Does not apply ____

F. For how many years have you had the cough?

Number of years ____
Does not apply ____

33A. Do you usually bring up phlegm from your chest?
(Count phlegm with the first smoke or on first going out of doors.
Exclude phlegm from the nose. Count swallowed phlegm.)
(If no, skip to 33C)

1. Yes ____ 2. No ____

B. Do you usually bring up phlegm like this as much as twice a day 4 or more days out of the week?

1. Yes ____ 2. No ____

C. Do you usually bring up phlegm at all on getting up or first thing in the morning?

1. Yes ____ 2. No ____

D. Do you usually bring up phlegm at all on during the rest of the day or at night?

1. Yes ____ 2. No ____

IF YES TO ANY OF THE ABOVE (33A, B, C, OR D), ANSWER THE FOLLOWING:

IF NO TO ALL, CHECK "DOES NOT APPLY" AND SKIP TO 34A

E. Do you bring up phlegm like this on most days for 3 consecutive months or more during the year?

1. Yes ____ 2. No ____
3. Does not apply ____

F. For how many years have you had trouble with phlegm?

Number of years ____
Does not apply ____

EPISODES OF COUGH AND PHLEGM

34A. Have you had periods or episodes of (increased*) cough and phlegm lasting for 3 weeks or more each year?

* (For persons who usually have cough and/or phlegm)

1. Yes ____ 2. No ____

IF YES TO 34A

B. For how long have you had at least 1 such episode per year?

Number of years ____
Does not apply ____

WHEEZING

35A. Does your chest ever sound wheezy or whistling

1. When you have a cold? 1. Yes ____ 2. No ____

2. Occasionally apart from colds? 1. Yes ____ 2. No ____

3. Most days or nights? 1. Yes ____ 2. No ____

IF YES TO 1, 2, or 3 in 35A

B. For how many years has this been present?

Number of years ____
Does not apply ____

36A. Have you ever had an attack of wheezing that has made you feel short of breath?

1. Yes ____ 2. No ____

IF YES TO 36A

B. How old were you when you had your first such attack?

Age in years ____
Does not apply ____

C. Have you had 2 or more such episodes?

1. Yes ____ 2. No ____
3. Does not apply ____

D. Have you ever required medicine or treatment for the(se) attack(s)?

1. Yes ____ 2. No ____
3. Does not apply ____

BREATHLESSNESS

37. If disabled from walking by any condition other than heart or lung disease, please describe and proceed to question 39A.

Nature of condition(s) _____
_____

38A. Are you troubled by shortness of breath when hurrying on the level or walking up a slight hill?

1. Yes ____ 2. No ____

IF YES TO 38A

B. Do you have to walk slower than people of your age on the level because of breathlessness?

1. Yes ____ 2. No ____
3. Does not apply ____

C. Do you ever have to stop for breath when walking at your own pace on the level?

1. Yes ____ 2. No ____
3. Does not apply ____

D. Do you ever have to stop for breath after walking about 100 yards (or after a few minutes) on the level?

1. Yes ____ 2. No ____
3. Does not apply ____

E. Are you too breathless to leave the house or breathless on dressing or climbing one flight of stairs?

1. Yes ____ 2. No ____
3. Does not apply ____

TOBACCO SMOKING

39A. Have you ever smoked cigarettes? (No means less than 20 packs of cigarettes or 12 oz. of tobacco in a lifetime or less than 1 cigarette a day for 1 year.)

1. Yes ____ 2. No ____

IF YES TO 39A

B. Do you now smoke cigarettes (as of one month ago)

1. Yes ____ 2. No ____
3. Does not apply ____

C. How old were you when you first started regular cigarette smoking?

Age in years ____
Does not apply ____

D. If you have stopped smoking cigarettes completely, how old were you when you stopped?

Age stopped ____

Check if still smoking ____
Does not apply ____

E. How many cigarettes do you smoke per day now?
Cigarettes per day ____
Does not apply ____

F. On the average of the entire time you smoked, how many cigarettes did you smoke per day?
Cigarettes per day ____
Does not apply ____

G. Do or did you inhale the cigarette smoke?
1. Does not apply ____
2. Not at all ____
3. Slightly ____
4. Moderately ____
5. Deeply ____

40A. Have you ever smoked a pipe regularly?
(Yes means more than 12 oz. of tobacco in a lifetime.)
1. Yes ____ 2. No ____

IF YES TO 40A:
FOR PERSONS WHO HAVE EVER SMOKED A PIPE

B. 1. How old were you when you started to smoke a pipe regularly?
Age ____

2. If you have stopped smoking a pipe completely, how old were you when you stopped?
Age stopped ____
Check if still smoking pipe ____
Does not apply ____

C. On the average over the entire time you smoked a pipe, how much pipe tobacco did you smoke per week?
____ oz. per week
(a standard pouch of tobacco contains 1 1/2 oz.)
____ Does not apply

D. How much pipe tobacco are you smoking now?
oz. per week ____
Not currently smoking a pipe ____

E. Do you or did you inhale the pipe smoke?
1. Never smoked ____
2. Not at all ____
3. Slightly ____
4. Moderately ____
5. Deeply ____

41A. Have you ever smoked cigars regularly?
1. Yes ____ 2. No ____

(Yes means more than 1 cigar a week for a year)

IF YES TO 41A

FOR PERSONS WHO HAVE EVER SMOKED A CIGARS

B. 1. How old were you when you started smoking cigars regularly? Age ___

2. If you have stopped smoking cigars completely, how old were you when you stopped. Age stopped ___
Check if still smoking cigars ___
Does not apply ___

C. On the average over the entire time you smoked cigars, how many cigars did you smoke per week? Cigars per week ___
Does not apply ___

D. How many cigars are you smoking per week now? Cigars per week ___
Check if not smoking cigars currently ___

E. Do or did you inhale the cigar smoke? 1. Never smoked ___
2. Not at all ___
3. Slightly ___
4. Moderately ___
5. Deeply ___

Signature _____ Date _____

Part 2
PERIODIC MEDICAL QUESTIONNAIRE

1. NAME _____

2. SOCIAL SECURITY # ___ ___ ___ ___ ___ ___ ___ ___ ___

3. CLOCK NUMBER ___ ___ ___ ___ ___ ___ ___

4. PRESENT OCCUPATION_____

5. PLANT _____

6. ADDRESS _____

7. _____
(Zip Code)

8. TELEPHONE NUMBER _____

9. INTERVIEWER _____

10. DATE _____ ___ ___ ___ ___ ___ ___

11. What is your marital status? 1. Single ____ 4. Separated/.
2. Married ____ Divorced ____
3. Widowed ____

12. OCCUPATIONAL HISTORY

12A. In the past year, did you work full time (30 hours per week or more) for 6 months or more? 1. Yes ____ 2. No ____

IF YES TO 12A:

12B. In the past year, did you work in a dusty job? 1. Yes ____ 2. No ____ 3. Does not Apply ____

12C. Was dust exposure:
1. Mild ____ 2. Moderate ____ 3. Severe ____

12D. In the past year, were you exposed to gas or chemical fumes in your work? 1. Yes ____ 2. No ____

12E. Was exposure: 1. Mild ____ 2. Moderate ____ 3. Severe ____

12F. In the past year, what was your:
1. Job/occupation? _____
2. Position/job title? _____

13. RECENT MEDICAL HISTORY

13A. Do you consider yourself to be in good health? Yes ____ No ____

If NO, state reason _____

13B. In the past year, have you developed:

	Yes	No
Epilepsy?	____	____
Rheumatic fever?	____	____
Kidney disease?	____	____
Bladder disease?	____	____
Diabetes?	____	____
Jaundice?	____	____
Cancer?	____	____

14. CHEST COLDS AND CHEST ILLNESSES

14A. If you get a cold, does it "usually" go to your chest? (usually means more than 1/2 the time)
1. Yes ____ 2. No ____
3. Don't get colds ____

15A. During the past year, have you had any chest illnesses that have kept you off work, indoors at home, or in bed? 1. Yes ____ 2. No ____ 3. Does Not Apply ____

IF YES TO 15A:

15B. Did you produce phlegm with any of these chest illnesses? 1. Yes ____ 2. No ____ 3. Does Not Apply ____

15C. In the past year, how many such illnesses with (increased) phlegm did you have which lasted a week or more? Number of illnesses ____ No such illnesses ____

16. RESPIRATORY SYSTEM

In the past year have you had:

	Yes or No	Further Comment on Positive Answers
Asthma	_____	
Bronchitis	_____	
Hay Fever	_____	
Other Allergies	_____	

	Yes or No	Further Comment on Positive Answers
Pneumonia	_____	
Tuberculosis	_____	
Chest Surgery	_____	
Other Lung Problems	_____	
Heart Disease	_____	

Do you have:

	Yes or No	Further Comment on Positive Answers
Frequent colds	_____	
Chronic cough	_____	
Shortness of breath when walking or climbing one flight or stairs	_____	

Do you:

Wheeze _____

Cough up phlegm _____

Smoke cigarettes _____

Packs per day _____ How many years ____

Date _____ Signature _____

[59 FR 40964, Aug. 10, 1994]

Interpretation and classification of chest roentgenograms - mandatory - 1926.1101 App E

Regulations (Standards - 29 CFR) - Table of Contents

• Part Number:	1926
• Part Title:	Safety and Health Regulations for Construction
• Subpart:	Z
• Subpart Title:	Toxic and Hazardous Substances
• Standard Number:	1926.1101 App E
• Title:	Interpretation and classification of chest roentgenograms - mandatory

(a) Chest roentgenograms shall be interpreted and classified in accordance with a professionally accepted classification system and recorded on an interpretation form following the format of the CDC/NIOSH (M) 2.8 form. As a minimum, the content within the bold lines of this form (items 1 through 4) shall be included. This form is not to be submitted to NIOSH..

(b) Roentgenograms shall be interpreted and classified only by a B-reader, a board eligible/certified radiologist, or an experienced physician with known expertise in pneumoconioses.

(c) All interpreters, whenever interpreting chest roentgenograms made under this section, shall have immediately available for reference a complete set of the ILO-U/C International Classification of Radiographs for Pneumoconioses, 1980.

Work practices and engineering controls for Class I Asbestos Operations - non-mandatory - 1926.1101 App F

Regulations (Standards - 29 CFR) - Table of Contents

• Part Number:	1926
• Part Title:	Safety and Health Regulations for Construction
• Subpart:	Z
• Subpart Title:	Toxic and Hazardous Substances
• Standard Number:	1926.1101 App F
• Title:	Work practices and engineering controls for Class I Asbestos Operations - non-mandatory

This is a non-mandatory appendix to the asbestos standards for construction and for shipyards. It describes criteria and procedures for erecting and using negative pressure enclosures for Class I Asbestos Work, when NPEs are used as an allowable control method to comply with paragraph (g)(5)(i) of this section. Many small and variable details are involved in the erection of a negative pressure enclosure. OSHA and most participants in the rulemaking agreed that only the major, more performance oriented criteria should be made mandatory. These criteria are set out in paragraph (g) of this section. In addition, this appendix includes these mandatory specifications and procedures in its guidelines in order to make this appendix coherent and helpful. The mandatory nature of the criteria which appear in the regulatory text is not changed because they are included in this "non-mandatory" appendix. Similarly, the additional criteria and procedures included as guidelines in the appendix, do not become mandatory because mandatory criteria are also included in these comprehensive guidelines.

In addition, none of the criteria, both mandatory and recommended, are meant to specify or imply the need for use of patented or licensed methods or equipment. Recommended specifications included in this attachment should not discourage the use of creative alternatives which can be shown to reliably achieve the objectives of negative-pressure enclosures.

Requirements included in this appendix, cover general provisions to be followed in all asbestos jobs, provisions which must be followed for all Class I asbestos jobs, and provisions governing the construction and testing of negative pressure enclosures. The first category includes the requirement for use of wet methods, HEPA vacuums, and immediate bagging of waste; Class I work must conform to the following provisions:

* oversight by competent person
* use of critical barriers over all openings to work area
* isolation of HVAC systems
* use of impermeable dropcloths and coverage of all objects within

regulated areas

In addition, more specific requirements for NPEs include:

* maintenance of -0.02 inches water gauge within enclosure
* manometric measurements
* air movement away from employees performing removal work
* smoke testing or equivalent for detection of leaks and air direction
* deactivation of electrical circuits, if not provided with ground-fault circuit interrupters.

Planning the Project

The standard requires that an exposure assessment be conducted before the asbestos job is begun [Sec. 1926.1101 (f)(1)]. Information needed for that assessment, includes data relating to prior similar jobs, as applied to the specific variables of the current job. The information needed to conduct the assessment will be useful in planning the project, and in complying with any reporting requirements under this standard, when significant changes are being made to a control system listed in the standard, [see also those of USEPA (40 CFR 61, subpart M). Thus, although the standard does not explicitly require the preparation of a written asbestos removal plan, the usual constituents of such a plan, i.e., a description of the enclosure, the equipment, and the procedures to be used throughout the project, must be determined before the enclosure can be erected. The following information should be included in the planning of the system:

A physical description of the work area;
A description of the approximate amount of material to be removed;
A schedule for turning off and sealing existing ventilation systems;
Personnel hygiene procedures;
A description of personal protective equipment and clothing to be worn by employees;
A description of the local exhaust ventilation systems to be used and how they are to be tested;
A description of work practices to be observed by employees;
An air monitoring plan;
A description of the method to be used to transport waste material; and
The location of the dump site.

Materials and Equipment Necessary for Asbestos Removal

Although individual asbestos removal projects vary in terms of the equipment required to accomplish the removal of the materials, some equipment and materials are common to most asbestos removal operations.

Plastic sheeting used to protect horizontal surfaces, seal HVAC openings or to seal

vertical openings and ceilings should have a minimum thickness of 6 mils. Tape or other adhesive used to attach plastic sheeting should be of sufficient adhesive strength to support the weight of the material plus all stresses encountered during the entire duration of the project without becoming detached from the surface.

Other equipment and materials which should be available at the beginning of each project are:

-- HEPA Filtered Vacuum is essential for cleaning the work area after the asbestos has been removed. It should have a long hose capable of reaching out-of-the-way places, such as areas above ceiling tiles, behind pipes, etc.
-- Portable air ventilation systems installed to provide the negative air pressure and air removal from the enclosure must be equipped with a HEPA filter. The number and capacity of units required to ventilate an enclosure depend on the size of the area to be ventilated. The filters for these systems should be designed in such a manner that they can be replaced when the air flow volume is reduced by the build-up of dust in the filtration material. Pressure monitoring devices with alarms and strip chart recorders attached to each system to indicate the pressure differential and the loss due to dust buildup on the filter are recommended.
-- Water sprayers should be used to keep the asbestos material as saturated as possible during removal; the sprayers will provide a fine mist that minimizes the impact of the spray on the material.
-- Water used to saturate the asbestos containing material can be amended by adding at least 15 milliliters (1/4 ounce) of wetting agent in 1 liter (1 pint) of water. An example of a wetting agent is a 50/50 mixture of polyoxyethylene ether and polyoxyethylene polyglycol ester.
-- Backup power supplies are recommended, especially for ventilation systems.
-- Shower and bath water should be with mixed hot and cold water faucets. Water that has been used to clean personnel or equipment should either be filtered or be collected and discarded as asbestos waste. Soap and shampoo should be provided to aid in removing dust from the workers' skin and hair.
-- See paragraphs (h) and (i) of this section for appropriate respiratory protection and protective clothing.
-- See paragraph (k) of this section for required signs and labels.

Preparing the Work Area

Disabling HVAC Systems: The power to the heating, ventilation, and air conditioning systems that service the restricted area must be deactivated and locked off. All ducts, grills, access ports, windows and vents must be sealed off with two layers of plastic to prevent entrainment of contaminated air.

Operating HVAC Systems in the Restricted Area: If components of a HVAC system

located in the restricted area are connected to a system that will service another zone during the project, the portion of the duct in the restricted area must be sealed and pressurized. Necessary precautions include caulking the duct joints, covering all cracks and openings with two layers of sheeting, and pressurizing the duct throughout the duration of the project by restricting the return air flow. The power to the fan supplying the positive pressure should be locked "on" to prevent pressure loss.

Sealing Elevators: If an elevator shaft is located in the restricted area, it should be either shut down or isolated by sealing with two layers of plastic sheeting. The sheeting should provide enough slack to accommodate the pressure changes in the shaft without breaking the air-tight seal.

Removing Mobile Objects: All movable objects should be cleaned and removed from the work area before an enclosure is constructed unless moving the objects creates a hazard. Mobile objects will be assumed to be contaminated and should be either cleaned with amended water and a HEPA vacuum and then removed from the area or wrapped and then disposed of as hazardous waste.

Cleaning and Sealing Surfaces: After cleaning with water and a HEPA vacuum, surfaces of stationary objects should be covered with two layers of plastic sheeting. The sheeting should be secured with duct tape or an equivalent method to provide a tight seal around the object.

Bagging Waste: In addition to the requirement for immediate bagging of waste for disposal, it is further recommended that the waste material be double-bagged and sealed in plastic bags designed for asbestos disposal. The bags should be stored in a waste storage area that can be controlled by the workers conducting the removal. Filters removed from air handling units and rubbish removed from the area are to be bagged and handled as hazardous waste.

Constructing the Enclosure

The enclosure should be constructed to provide an air-tight seal around ducts and openings into existing ventilation systems and around penetrations for electrical conduits, telephone wires, water lines, drain pipes, etc. Enclosures should be both airtight and watertight except for those openings designed to provide entry and/or air flow control.

Size: An enclosure should be the minimum volume to encompass all of the working surfaces yet allow unencumbered movement by the worker(s), provide unrestricted air flow past the worker(s), and ensure walking surfaces can be kept free of tripping hazards.

Shape: The enclosure may be any shape that optimizes the flow of ventilation air past

the worker(s).

Structural Integrity: The walls, ceilings and floors must be supported in such a manner that portions of the enclosure will not fall down during normal use.

Openings: It is not necessary that the structure be airtight; openings may be designed to direct air flow. Such openings should be located at a distance from active removal operations. They should be designed to draw air into the enclosure under all anticipated circumstances. In the event that negative pressure is lost, they should be fitted with either HEPA filters to trap dust or automatic trap doors that prevent dust from escaping the enclosure. Openings for exits should be controlled by an airlock or a vestibule.

Barrier Supports: Frames should be constructed to support all unsupported spans of sheeting.

Sheeting: Walls, barriers, ceilings, and floors should be lined with two layers of plastic sheeting having a thickness of at least 6 mil.

Seams: Seams in the sheeting material should be minimized to reduce the possibilities of accidental rips and tears in the adhesive or connections. All seams in the sheeting should overlap, be staggered and not be located at corners or wall-to-floor joints.
Areas Within an Enclosure: Each enclosure consists of a work area, a decontamination area, and waste storage area. The work area where the asbestos removal operations occur should be separated from both the waste storage area and the contamination control area by physical curtains, doors, and/or airflow patterns that force any airborne contamination back into the work area.

See paragraph (j) of this section for requirements for hygiene facilities.

During egress from the work area, each worker should step into the equipment room, clean tools and equipment, and remove gross contamination from clothing by wet cleaning and HEPA vacuuming. Before entering the shower area, foot coverings, head coverings, hand coverings, and coveralls are removed and placed in impervious bags for disposal or cleaning. Airline connections from airline respirators with HEPA disconnects and power cables from powered air-purifying respirators (PAPRs) will be disconnected just prior to entering the shower room.

Establishing Negative Pressure Within the Enclosure

Negative Pressure: Air is to be drawn into the enclosure under all anticipated conditions and exhausted through a HEPA filter for 24 hours a day during the entire duration of the project.

Air Flow Tests: Air flow patterns will be checked before removal operations begin, at

least once per operating shift and any time there is a question regarding the integrity of the enclosure. The primary test for air flow is to trace air currents with smoke tubes or other visual methods. Flow checks are made at each opening and at each doorway to demonstrate that air is being drawn into the enclosure and at each worker's position to show that air is being drawn away from the breathing zone.

Monitoring Pressure Within the Enclosure: After the initial air flow patterns have been checked, the static pressure must be monitored within the enclosure. Monitoring may be made using manometers, pressure gauges, or combinations of these devices. It is recommended that they be attached to alarms and strip chart recorders at points identified by the design engineer.

Corrective Actions: If the manometers or pressure gauges demonstrate a reduction in pressure differential below the required level, work should cease and the reason for the change investigated and appropriate changes made. The air flow patterns should be retested before work begins again.

Pressure Differential: The design parameters for static pressure differentials between the inside and outside of enclosures typically range from 0.02 to 0.10 inches of water gauge, depending on conditions. All zones inside the enclosure must have less pressure than the ambient pressure outside of the enclosure (-0.02 inches water gauge differential). Design specifications for the differential vary according to the size, configuration, and shape of the enclosure as well as ambient and mechanical air pressure conditions around the enclosure.

Air Flow Patterns: The flow of air past each worker shall be enhanced by positioning the intakes and exhaust ports to remove contaminated air from the worker's breathing zone, by positioning HEPA vacuum cleaners to draw air from the worker's breathing zone, by forcing relatively uncontaminated air past the worker toward an exhaust port, or by using a combination of methods to reduce the worker's exposure.

Air Handling Unit Exhaust: The exhaust plume from air handling units should be located away from adjacent personnel and intakes for HVAC systems.

Air Flow Volume: The air flow volume (cubic meters per minute) exhausted (removed) from the workplace must exceed the amount of makeup air supplied to the enclosure. The rate of air exhausted from the enclosure should be designed to maintain a negative pressure in the enclosure and air movement past each worker. The volume of air flow removed from the enclosure should replace the volume of the container at every 5 to 15 minutes. Air flow volume will need to be relatively high for large enclosures, enclosures with awkward shapes, enclosures with multiple openings, and operations employing several workers in the enclosure.

Air Flow Velocity: At each opening, the air flow velocity must visibly "drag" air into the enclosure. The velocity of air flow within the enclosure must be adequate to remove

airborne contamination from each worker's breathing zone without disturbing the asbestos-containing material on surfaces.

Airlocks: Airlocks are mechanisms on doors and curtains that control the air flow patterns in the doorways. If air flow occurs, the patterns through doorways must be such that the air flows toward the inside of the enclosure. Sometimes vestibules, double doors, or double curtains are used to prevent air movement through the doorways. To use a vestibule, a worker enters a chamber by opening the door or curtain and then closing the entry before opening the exit door or curtain.

Airlocks should be located between the equipment room and shower room, between the shower room and the clean room, and between the waste storage area and the outside of the enclosure. The air flow between adjacent rooms must be checked using smoke tubes or other visual tests to ensure the flow patterns draw air toward the work area without producing eddies.

Monitoring for Airborne Concentrations

In addition to the breathing zone samples taken as outlined in paragraph (f) of this section, samples of air should be taken to demonstrate the integrity of the enclosure, the cleanliness of the clean room and shower area, and the effectiveness of the HEPA filter. If the clean room is shown to be contaminated, the room must be relocated to an uncontaminated area.

Samples taken near the exhaust of portable ventilation systems must be done with care.

General Work Practices

Preventing dust dispersion is the primary means of controlling the spread of asbestos within the enclosure. Whenever practical, the point of removal should be isolated, enclosed, covered, or shielded from the workers in the area. Waste asbestos containing materials must be bagged during or immediately after removal; the material must remain saturated until the waste container is sealed.

Waste material with sharp points or corners must be placed in hard air-tight containers rather than bags.

Whenever possible, large components should be sealed in plastic sheeting and removed intact.

Bags or containers of waste will be moved to the waste holding area, washed, and wrapped in a bag with the appropriate labels.

Cleaning the Work Area

Surfaces within the work area should be kept free of visible dust and debris to the extent feasible. Whenever visible dust appears on surfaces, the surfaces within the enclosure must be cleaned by wiping with a wet sponge, brush, or cloth and then vacuumed with a HEPA vacuum.

All surfaces within the enclosure should be cleaned before the exhaust ventilation system is deactivated and the enclosure is disassembled. An approved encapsulant may be sprayed onto areas after the visible dust has been removed.

[59 FR 40964, Aug. 10, 1994; 60 FR 33972, June 29, 1995]

[Reserved] - 1926.1101 App G

Regulations (Standards - 29 CFR) - Table of Contents

• Part Number:	1926
• Part Title:	Safety and Health Regulations for Construction
• Subpart:	Z
• Subpart Title:	Toxic and Hazardous Substances
• Standard Number:	1926.1101 App G
• Title:	[Reserved]

[Reserved]

Substance Technical Information for Asbestos - Non-Mandatory - 1926.1101 App H

Regulations (Standards - 29 CFR) - Table of Contents

• Part Number:	1926
• Part Title:	Safety and Health Regulations for Construction
• Subpart:	Z
• Subpart Title:	Toxic and Hazardous Substances
• Standard Number:	1926.1101 App H
• Title:	Substance Technical Information for Asbestos - Non-Mandatory

I. Substance Identification

A. Substance: "Asbestos" is the name of a class of magnesium-silicate minerals that occur in fibrous form. Minerals that are included in this group are chrysotile, crocidolite, amosite, anthophyllite asbestos, tremolite asbestos, and actinolite asbestos.

B. Asbestos is and was used in the manufacture of heat-resistant clothing, automotive brake and clutch linings, and a variety of building materials including floor tiles, roofing felts, ceiling tiles, asbestos-cement pipe and sheet, and fire-resistant drywall. Asbestos is also present in pipe and boiler insulation materials and in sprayed-on materials located on beams, in crawlspaces, and between walls.

C. The potential for an asbestos-containing product to release breathable fibers depends largely on its degree of friability. Friable means that the material can be crumbled with hand pressure and is therefore likely to emit fibers. The fibrous fluffy sprayed-on materials used for fireproofing, insulation, or sound proofing are considered to be friable, and they readily release airborne fibers if disturbed. Materials such as vinyl-asbestos floor tile or roofing felt are considered non-friable if intact and generally do not emit airborne fibers unless subjected to sanding, sawing and other aggressive operations. Asbestos-cement pipe or sheet can emit airborne fibers if the materials are cut or sawed, or if they are broken.

D. Permissible exposure: Exposure to airborne asbestos fibers may not exceed 0.1 fibers per cubic centimeter of air (0.1 f/cc) averaged over the 8-hour workday, and 1 fiber per cubic centimeter of air (1.0 f/cc) averaged over a 30 minute work period.

II. Health Hazard Data

A. Asbestos can cause disabling respiratory disease and various types of cancers if the fibers are inhaled. Inhaling or ingesting fibers from contaminated clothing or skin can also result in these diseases. The symptoms of these diseases generally do not appear

for 20 or more years after initial exposure.

B. Exposure to asbestos has been shown to cause lung cancer, mesothelioma, and cancer of the stomach and colon. Mesothelioma is a rare cancer of the thin membrane lining of the chest and abdomen. Symptoms of mesothelioma include shortness of breath, pain in the walls of the chest, and/or abdominal pain.

III. Respirators and Protective Clothing

A. Respirators: You are required to wear a respirator when performing tasks that result in asbestos exposure that exceeds the permissible exposure limit (PEL) of 0.1 f/cc and when performing certain designated operations. Air-purifying respirators equipped with a high-efficiency particulate air (HEPA) filter can be used where airborne asbestos fiber concentrations do not exceed 1.0 f/cc; otherwise, more protective respirators such as air-supplied, positive-pressure, full facepiece respirators must be used. Disposable respirators or dust masks are not permitted to be used for asbestos work. For effective protection, respirators must fit your face and head snugly. Your employer is required to conduct a fit test when you are first assigned a respirator and every 6 months thereafter. Respirators should not be loosened or removed in work situations where their use is required.

B. Protective Clothing: You are required to wear protective clothing in work areas where asbestos fiber concentrations exceed the permissible exposure limit (PEL) of 0.1 f/cc.

IV. Disposal Procedures and Clean-up

A. Wastes that are generated by processes where asbestos is present include:

1. Empty asbestos shipping containers.

2. Process wastes such as cuttings, trimmings, or reject materials.

3. Housekeeping waste from wet-sweeping or HEPA-vacuuming.

4. Asbestos fireproofing or insulating material that is removed from buildings.

5. Asbestos-containing building products removed during building Renovation or demolition.

6. Contaminated disposable protective clothing.

B. Empty shipping bags can be flattened under exhaust hoods and packed into airtight containers for disposal. Empty shipping drums are difficult to clean and should be

sealed.

C. Vacuum bags or disposable paper filters should not be cleaned, but should be sprayed with a fine water mist and placed into a labeled waste container.

D. Process waste and housekeeping waste should be wetted with water or a mixture of water and surfactant prior to packaging in disposable containers.

E. Asbestos-containing material that is removed from buildings must be disposed of in leak-tight 6-mil plastic bags, plastic-lined cardboard containers, or plastic-lined metal containers. These wastes, which are removed while wet, should be sealed in containers before they dry out to minimize the release of asbestos fibers during handling.

V. Access to Information

A. Each year, your employer is required to inform you of the information contained in this standard and appendices for asbestos. In addition, your employer must instruct you in the proper work practices for handling asbestos-containing materials, and the correct use of protective equipment.

B. Your employer is required to determine whether you are being exposed to asbestos. Your employer must treat exposure to thermal system insulation and sprayed-on and troweled-on surfacing material as asbestos exposure, unless results of laboratory analysis show that the material does not contain asbestos. You or your representative has the right to observe employee measurements and to record the results obtained. Your employer is required to inform you of your exposure, and, if you are exposed above the permissible exposure limit, he or she is required to inform you of the actions that are being taken to reduce your exposure to within the permissible limit.

C. Your employer is required to keep records of your exposures and medical examinations. These exposure records must be kept for at least thirty (30) years. Medical records must be kept for the period of your employment plus thirty (30) years.

D. Your employer is required to release your exposure and medical records to your physician or designated representative upon your written request.

[59 FR 40964, Aug. 10, 1994; 60 FR 33972, June 29, 1995]

Medical surveillance guidelines for asbestos, non-mandatory - 1926.1101 App I

Regulations (Standards - 29 CFR) - Table of Contents

• Part Number:	1926
• Part Title:	Safety and Health Regulations for Construction
• Subpart:	Z
• Subpart Title:	Toxic and Hazardous Substances
• Standard Number:	1926.1101 App I
• Title:	Medical surveillance guidelines for asbestos, non-mandatory

I. Route of Entry

Inhalation, ingestion.

II. Toxicology

Clinical evidence of the adverse effects associated with exposure to asbestos is present in the form of several well-conducted epidemiological studies of occupationally exposed workers, family contacts of workers, and persons living near asbestos mines. These studies have shown a definite association between exposure to asbestos and an increased incidence of lung cancer, pleural and peritoneal mesothelioma, gastrointestinal cancer, and asbestosis. The latter is a disabling fibrotic lung disease that is caused only by exposure to asbestos. Exposure to asbestos has also been associated with an increased incidence of esophageal, kidney, laryngeal, pharyngeal, and buccal cavity cancers. As with other known chronic occupational diseases, disease associated with asbestos generally appears about 20 years following the first occurrence of exposure: There are no known acute effects associated with exposure to asbestos.

Epidemiological studies indicate that the risk of lung cancer among exposed workers who smoke cigarettes is greatly increased over the risk of lung cancer among non-exposed smokers or exposed nonsmokers. These studies suggest that cessation of smoking will reduce the risk of lung cancer for a person exposed to asbestos, but will not reduce it to the same level of risk as that existing for an exposed worker who has never smoked.

III. Signs and Symptoms of Exposure-Related Disease

The signs and symptoms of lung cancer or gastrointestinal cancer induced by exposure to asbestos are not unique, except that a chest X-ray of an exposed patient with lung cancer may show pleural plaques, pleural calcification, or pleural fibrosis. Symptoms characteristic of mesothelioma include shortness of breath, pain in the walls

of the chest, or abdominal pain. Mesothelioma has a much longer latency period compared with lung cancer (40 years versus 15-20 years), and mesothelioma is therefore more likely to be found among workers who were first exposed to asbestos at an early age. Mesothelioma is always fatal.

Asbestosis is pulmonary tibrosis caused by the accumulation of asbestos fibers in the lungs. Symptoms include shortness of breath, coughing, fatigue, and vague feelings of sickness. When the fibrosis worsens, shortness of breath occurs even at rest. The diagnosis of asbestosis is based on a history of exposure to asbestos, the presence of characteristics radiologic changes, end-inspiratory crackles (rales), and other clinical features of fibrosing lung disease. Pleural plaques and thickening are observed on X-rays taken during the early stages of the disease. Asbestosis is often a progressive disease even in the absence of continued exposure, although this appears to be a highly individualized characteristic. In severe cases, death may be caused by respiratory or cardiac failure.

IV. Surveillance and Preventive Considerations

As noted above, exposure to asbestos has been linked to an increased risk of lung cancer, mesothelioma, gastrointestinal cancer, and asbestosis among occupationally exposed workers. Adequate screening tests to determine an employee's potential for developing serious chronic diseases, such as a cancer, from exposure to asbestos do not presently exist. However, some tests, particularly chest X-rays and pulmonary function tests, may indicate that an employee has been overexposed to asbestos, increasing his or her risk of developing exposure related chronic diseases. It is important for the physician to become familiar with the operating conditions in which occupational exposure to asbestos is likely to occur. This is particularly important in evaluating medical and work histories and in conducting physical examinations. When an active employee has been identified as having been overexposed to asbestos measures taken by the employer to eliminate or mitigate further exposure should also lower the risk of serious long-term consequences.

The employer is required to institute a medical surveillance program for all employees who are or will be exposed to asbestos at or above the permissible exposure limit (0.1 fiber per cubic centimeter of air). All examinations and procedures must be performed by or under the supervision of a licensed physician, at a reasonable time and place, and at no cost to the employee.

Although broad latitude is given to the physician in prescribing specific tests to be included in the medical surveillance program, OSHA requires inclusion of the following elements in the routine examination:

(i) Medical and work histories with special emphasis directed to symptoms of the respiratory system, cardiovascular system, and digestive tract.

(ii) Completion of the respiratory disease questionnaire contained in Appendix D.

(iii) A physical examination including a chest roentgenogram and pulmonary function test that includes measurement of the employee's forced vital capacity (FVC) and forced expiratory volume at one second (FEV1).

(iv) Any laboratory or other test that the examining physician deems by sound medical practice to be necessary.

The employer is required to make the prescribed tests available at least annually to those employees covered; more often than specified if recommended by the examining physician; and upon termination of employment.

The employer is required to provide the physician with the following information: A copy of this standard and appendices; a description of the employee's duties as they relate to asbestos exposure; the employee's representative level of exposure to asbestos; a description of any personal protective and respiratory equipment used; and information from previous medical examinations of the affected employee that is not otherwise available to the physician. Making this information available to the physician will aid in the evaluation of the employee's health in relation to assigned duties and fitness to wear personal protective equipment, if required.

The employer is required to obtain a written opinion from the examining physician containing the results of the medical examination; the physician's opinion as to whether the employee has any detected medical conditions that would place the employee at an increased risk of exposure-related disease; any recommended limitations on the employee or on the use of personal protective equipment; and a statement that the employee has been informed by the physician of the results of the medical examination and of any medical conditions related to asbestos exposure that require further explanation or treatment. This written opinion must not reveal specific findings or diagnoses unrelated to exposure to asbestos and a copy of the opinion must be provided to the affected employee.

[59 FR 40964, Aug. 10, 1994]

Smoking cessation program information for asbestos, non-mandatory - 1926.1101 App J

Regulations (Standards - 29 CFR) - Table of Contents

• Part Number:	1926
• Part Title:	Safety and Health Regulations for Construction
• Subpart:	Z
• Subpart Title:	Toxic and Hazardous Substances
• Standard Number:	1926.1101 App J
• Title:	Smoking cessation program information for asbestos, non-mandatory

The following organizations provide smoking cessation information.

1. The National Cancer Institute operates a toll-free Cancer Information Service (CIS) with trained personnel to help you. Call 1-800-4-CANCER to reach the CIS offices serving your area or write: Office of Cancer Communications, National Cancer Institute, National Institutes of Health, Building 31, Room 10A24, Bethesda, Maryland, 20892.

2. American Cancer Society, 3340 Peachtree Road, N.E., Atlanta, Georgia 30026, (404)320-3333.

The American Cancer Society (ACS) is a voluntary organization composed of 58 divisions and 3,100 local units. Through "The Great American Smokeout" in November, the annual Cancer Crusade in April, and numerous educational materials, ACS helps people learn about the health hazards of smoking and become successful ex-smokers.

3. American Heart Association, 7320 Greenville Avenue, Dallas, Texas 75231, (214)750-5300.

The American Heart Association (AHA) is a voluntary organization with 130,000 members (physicians, scientists, and laypersons) in 55 state and regional groups. AHA produces a variety of publications and audiovisual materials about the effects of smoking on the heart. AHA also has developed a guidebook for incorporating a weight-control component into smoking cessation programs.

4. American Lung Association, 1740 Broadway, New York, New York 10019, (212)245-8000.

A voluntary organization of 7,500 members (physicians, nurses, and laypersons), the American Lung Association (ALA) conducts numerous public information programs about the health effects of smoking. ALA has 59 state and 85 local units. The organization actively supports legislation and information campaigns for non-smokers'

rights and provides help for smokers who want to quit, for example, through "Freedom From Smoking," a self-help smoking cessation program.

5. Office on Smoking and Health, U.S. Department of Health and Human Services, 5600 Fishers Lane, Park Building, Room 110, Rockville, Maryland 20857.

The Office on Smoking and Health (OSH) is the Department of Health and Human Services' lead agency in smoking control. OSH has sponsored distribution of publications on smoking-related topics, such as free flyers on relapse after initial quitting, helping a friend or family member quit smoking, the health hazards of smoking, and the effects of parental smoking on teenagers.

- In Hawaii, on Oahu call 524-1234 (call collect from neighboring islands).

Spanish-speaking staff members are available during daytime hours to callers from the following areas: California, Florida, Georgia, Illinois, New Jersey (area code 201), New York, and Texas. Consult your local telephone directory for listings of local chapters.

[59 FR 40964, Aug. 10, 1994]

Polarized Light Microscopy of Asbestos - Non-Mandatory - 1926.1101 App K

Regulations (Standards - 29 CFR) - Table of Contents

• Part Number:	1926
• Part Title:	Safety and Health Regulations for Construction
• Subpart:	Z
• Subpart Title:	Toxic and Hazardous Substances
• Standard Number:	1926.1101 App K
• Title:	Polarized Light Microscopy of Asbestos - Non-Mandatory

Method number:
ID-191
Matrix: Bulk
Collection Procedure:
Collect approximately 1 to 2 grams of each type of material and place into separate 20 mL scintillation vials.
Analytical Procedure:
A portion of each separate phase is analyzed by gross examination, phase-polar examination, and central stop dispersion microscopy.

Commercial manufacturers and products mentioned in this method are for descriptive use only and do not constitute endorsements by USDOL-OSHA. Similar products from other sources may be substituted.

1. Introduction

This method describes the collection and analysis of asbestos bulk materials by light microscopy techniques including phase-polar illumination and central-stop dispersion microscopy. Some terms unique to asbestos analysis are defined below:

Amphibole: A family of minerals whose crystals are formed by long, thin units which have two thin ribbons of double chain silicate with a brucite ribbon in between. The shape of each unit is similar to an "I beam". Minerals important in asbestos analysis include cummingtonite-grunerite, crocidolite, tremolite-actinolite and anthophyllite.

Asbestos: A term for naturally occurring fibrous minerals. Asbestos includes chrysotile, cummingtonite-grunerite asbestos (amosite), anthophyllite asbestos, tremolite asbestos, crocidolite, actinolite asbestos and any of these minerals which have been chemically treated or altered. The precise chemical formulation of each species varies with the location from which it was mined. Nominal compositions are listed:

Chrysotile..... Mg(3)Si(2)O(5)(OH)(4)
Crocidolite (Riebeckite asbestos)

..... Na(2)Fe(3)(2)+Fe(2)(3)+Si(8)O(22)(OH)(2)
Cummingtonite-Grunerite asbestos (Amosite)
..... (Mg,Fe)(7)Si(8)O(22)(OH)(2)
Tremolite-Actinolite asbestos
..... Ca(2)(Mg,Fe)(5)Si(8)O(22)(OH)(2)
Anthophyllite asbestos..... (Mg,Fe)(7)Si(8)O(22)(OH)(2)

Asbestos Fiber: A fiber of asbestos meeting the criteria for a fiber. (See section 3.5. of this Appendix)

Aspect Ratio: The ratio of the length of a fiber to its diameter usually defined as "length : width", e.g. 3:1.

Brucite: A sheet mineral with the composition Mg(OH)(2).

Central Stop Dispersion Staining (microscope): This is a dark field microscope technique that images particles using only light refracted by the particle, excluding light that travels through the particle unrefracted. This is usually accomplished with a McCrone objective or other arrangement which places a circular stop with apparent aperture equal to the objective aperture in the back focal plane of the microscope.

Cleavage Fragments: Mineral particles formed by the comminution of minerals, especially those characterized by relatively parallel sides and moderate aspect ratio.

Differential Counting: The term applied to the practice of excluding certain kinds of fibers from a phase contrast asbestos count because they are not asbestos.

Fiber: A particle longer than or equal to 5 um with a length to width ratio greater than or equal to 3:1. This may include cleavage fragments. (see section 3.5 of this appendix).

Phase Contrast: Contrast obtained in the microscope by causing light scattered by small particles to destructively interfere with unscattered light, thereby enhancing the visibility of very small particles and particles with very low intrinsic contrast.

Phase Contrast Microscope: A microscope configured with a phase mask pair to create phase contrast. The technique which uses this is called Phase Contrast Microscopy (PCM).

Phase-Polar Analysis: This is the use of polarized light in a phase contrast microscope. It is used to see the same size fibers that are visible in air filter analysis. Although fibers finer than 1 um are visible, analysis of these is inferred from analysis of larger bundles that are usually present.

Phase-Polar Microscope: The phase-polar microscope is a phase contrast microscope which has an analyzer, a polarizer, a first order red plate and a rotating phase

condenser all in place so that the polarized light image is enhanced by phase contrast.

Sealing Encapsulant: This is a product which can be applied, preferably by spraying, onto an asbestos surface which will seal the surface so that fibers cannot be released.

Serpentine: A mineral family consisting of minerals with the general composition Mg(3)(Si(2)O(5)(OH)(4) having the magnesium in brucite layer over a silicate layer. Minerals important in asbestos analysis included in this family are chrysotile, lizardite, antigorite.

1.1. History

Light microscopy has been used for well over 100 years for the determination of mineral species. This analysis is carried out using specialized polarizing microscopes as well as bright field microscopes. The identification of minerals is an on-going process with many new minerals described each year. The first recorded use of asbestos was in Finland about 2500 B.C. where the material was used in the mud wattle for the wooden huts the people lived in as well as strengthening for pottery. Adverse health aspects of the mineral were noted nearly 2000 years ago when Pliny the Younger wrote about the poor health of slaves in the asbestos mines. Although known to be injurious for centuries, the first modern references to its toxicity were by the British Labor Inspectorate when it banned asbestos dust from the workplace in 1898. Asbestosis cases were described in the literature after the turn of the century. Cancer was first suspected in the mid 1930's and a causal link to mesothelioma was made in 1965. Because of the public concern for worker and public safety with the use of this material, several different types of analysis were applied to the determination of asbestos content. Light microscopy requires a great deal of experience and craft. Attempts were made to apply less subjective methods to the analysis. X-ray diffraction was partially successful in determining the mineral types but was unable to separate out the fibrous portions from the non-fibrous portions. Also, the minimum detection limit for asbestos analysis by X-ray diffraction (XRD) is about 1%. Differential Thermal Analysis (DTA) was no more successful. These provide useful corroborating information when the presence of asbestos has been shown by microscopy; however, neither can determine the difference between fibrous and non-fibrous minerals when both habits are present. The same is true of Infrared Absorption (IR).

When electron microscopy was applied to asbestos analysis, hundreds of fibers were discovered present too small to be visible in any light microscope. There are two different types of electron microscope used for asbestos analysis: Scanning Electron Microscope (SEM) and Transmission Electron Microscope (TEM). Scanning Electron Microscopy is useful in identifying minerals. The SEM can provide two of the three pieces of information required to identify fibers by electron microscopy: morphology and chemistry. The third is structure as determined by Selected Area Electron Diffraction -- SAED which is performed in the TEM. Although the resolution of the SEM is sufficient for very fine fibers to be seen, accuracy of chemical analysis that can be

performed on the fibers varies with fiber diameter in fibers of less than 0.2 um diameter. The TEM is a powerful tool to identify fibers too small to be resolved by light microscopy and should be used in conjunction with this method when necessary. The TEM can provide all three pieces of information required for fiber identification. Most fibers thicker than 1 um can adequately be defined in the light microscope. The light microscope remains as the best instrument for the determination of mineral type. This is because the minerals under investigation were first described analytically with the light microscope. It is inexpensive and gives positive identification for most samples analyzed. Further, when optical techniques are inadequate, there is ample indication that alternative techniques should be used for complete identification of the sample.

1.2. Principle

Minerals consist of atoms that may be arranged in random order or in a regular arrangement. Amorphous materials have atoms in random order while crystalline materials have long range order. Many materials are transparent to light, at least for small particles or for thin sections. The properties of these materials can be investigated by the effect that the material has on light passing through it. The six asbestos minerals are all crystalline with particular properties that have been identified and cataloged. These six minerals are anisotropic. They have a regular array of atoms, but the arrangement is not the same in all directions. Each major direction of the crystal presents a different regularity. Light photons traveling in each of these main directions will encounter different electrical neighborhoods, affecting the path and time of travel. The techniques outlined in this method use the fact that light traveling through fibers or crystals in different directions will behave differently, but predictably. The behavior of the light as it travels through a crystal can be measured and compared with known or determined values to identify the mineral species. Usually, Polarized Light Microscopy (PLM) is performed with strain-free objectives on a bright-field microscope platform. This would limit the resolution of the microscope to about 0.4 um. Because OSHA requires the counting and identification of fibers visible in phase contrast, the phase contrast platform is used to visualize the fibers with the polarizing elements added into the light path. Polarized light methods cannot identify fibers finer than about 1 um in diameter even though they are visible. The finest fibers are usually identified by inference from the presence of larger, identifiable fiber bundles. When fibers are present, but not identifiable by light microscopy, use either SEM or TEM to determine the fiber identity.

1.3. Advantages and Disadvantages

The advantages of light microcopy are:

(a) Basic identification of the materials was first performed by light microscopy and gross analysis. This provides a large base of published information against which to check analysis and analytical technique.

(b) The analysis is specific to fibers. The minerals present can exist in asbestiform, fibrous, prismatic, or massive varieties all at the same time. Therefore, bulk methods of analysis such as X-ray diffraction, IR analysis, DTA, etc. are inappropriate where the material is not known to be fibrous.

(c) The analysis is quick, requires little preparation time, and can be performed on-site if a suitably equipped microscope is available.

The disadvantages are:

(a) Even using phase-polar illumination, not all the fibers present may be seen. This is a problem for very low asbestos concentrations where agglomerations or large bundles of fibers may not be present to allow identification by inference.

(b) The method requires a great degree of sophistication on the part of the microscopist. An analyst is only as useful as his mental catalog of images. Therefore, a microscopist's accuracy is enhanced by experience. The mineralogical training of the analyst is very important. It is the basis on which subjective decisions are made.

(c) The method uses only a tiny amount of material for analysis. This may lead to sampling bias and false results (high or low). This is especially true if the sample is severely inhomogeneous.

(d) Fibers may be bound in a matrix and not distinguishable as fibers so identification cannot be made.

1.4. Method Performance

1.4.1. This method can be used for determination of asbestos content from 0 to 100% asbestos. The detection limit has not been adequately determined, although for selected samples, the limit is very low, depending on the number of particles examined. For mostly homogeneous, finely divided samples, with no difficult fibrous interferences, the detection limit is below 1%. For inhomogeneous samples (most samples), the detection limit remains undefined. NIST has conducted proficiency testing of laboratories on a national scale. Although each round is reported statistically with an average, control limits, etc., the results indicate a difficulty in establishing precision especially in the low concentration range. It is suspected that there is significant bias in the low range especially near 1%. EPA tried to remedy this by requiring a mandatory point counting scheme for samples less than 10%. The point counting procedure is tedious, and may introduce significant biases of its own. It has not been incorporated into this method.

1.4.2. The precision and accuracy of the quantitation tests performed in this method are unknown. Concentrations are easier to determine in commercial products where asbestos was deliberately added because the amount is usually more than a few

percent. An analyst's results can be "calibrated" against the known amounts added by the manufacturer. For geological samples, the degree of homogeneity affects the precision.

1.4.3. The performance of the method is analyst dependent. The analyst must choose carefully and not necessarily randomly the portions for analysis to assure that detection of asbestos occurs when it is present. For this reason, the analyst must have adequate training in sample preparation, and experience in the location and identification of asbestos in samples. This is usually accomplished through substantial on-the-job training as well as formal education in mineralogy and microscopy.

1.5. Interferences

Any material which is long, thin, and small enough to be viewed under the microscope can be considered an interference for asbestos. There are literally hundreds of interferences in workplaces. The techniques described in this method are normally sufficient to eliminate the interferences. An analyst's success in eliminating the interferences depends on proper training.

Asbestos minerals belong to two mineral families: the serpentines and the amphiboles. In the serpentine family, the only common fibrous mineral is chrysotile. Occasionally, the mineral antigorite occurs in a fibril habit with morphology similar to the amphiboles. The amphibole minerals consist of a score of different minerals of which only five are regulated by federal standard: amosite, crocidolite, anthophyllite asbestos, tremolite asbestos and actinolite asbestos. These are the only amphibole minerals that have been commercially exploited for their fibrous properties; however, the rest can and do occur occasionally in asbestiform habit.

In addition to the related mineral interferences, other minerals common in building material may present a problem for some microscopists: gypsum, anhydrite, brucite, quartz fibers, talc fibers or ribbons, wollastonite, perlite, attapulgite, etc. Other fibrous materials commonly present in workplaces are: fiberglass, mineral wool, ceramic wool, refractory ceramic fibers, kevlar, nomex, synthetic fibers, graphite or carbon fibers, cellulose (paper or wood) fibers, metal fibers, etc.

Matrix embedding material can sometimes be a negative interference. The analyst may not be able to easily extract the fibers from the matrix in order to use the method. Where possible, remove the matrix before the analysis, taking careful note of the loss of weight. Some common matrix materials are: vinyl, rubber, tar, paint, plant fiber, cement, and epoxy. A further negative interference is that the asbestos fibers themselves may be either too small to be seen in Phase contrast Microscopy (PCM) or of a very low fibrous quality, having the appearance of plant fibers. The analyst's ability to deal with these materials increases with experience.

1.6. Uses and Occupational Exposure

Asbestos is ubiquitous in the environment. More than 40% of the land area of the United States is composed of minerals which may contain asbestos. Fortunately, the actual formation of great amounts of asbestos is relatively rare. Nonetheless, there are locations in which environmental exposure can be severe such as in the Serpentine Hills of California.

There are thousands of uses for asbestos in industry and the home. Asbestos abatement workers are the most current segment of the population to have occupational exposure to great amounts of asbestos. If the material is undisturbed, there is no exposure. Exposure occurs when the asbestos-containing material is abraded or otherwise disturbed during maintenance operations or some other activity. Approximately 95% of the asbestos in place in the United States is chrysotile.

Amosite and crocidolite make up nearly all the difference. Tremolite and anthophyllite make up a very small percentage. Tremolite is found in extremely small amounts in certain chrysotile deposits. Actinolite exposure is probably greatest from environmental sources, but has been identified in vermiculite containing, sprayed-on insulating materials which may have been certified as asbestos-free.

1.7. Physical and Chemical Properties

The nominal chemical compositions for the asbestos minerals were given in Section 1. Compared to cleavage fragments of the same minerals, asbestiform fibers possess a high tensile strength along the fiber axis. They are chemically inert, non-combustible, and heat resistant. Except for chrysotile, they are insoluble in Hydrochloric acid (HCl). Chrysotile is slightly soluble in HCl. Asbestos has high electrical resistance and good sound absorbing characteristics. It can be woven into cables, fabrics or other textiles, or matted into papers, felts, and mats.

1.8. Toxicology (This Section is for Information Only and Should Not Be Taken as OSHA Policy)

Possible physiologic results of respiratory exposure to asbestos are mesothelioma of the pleura or peritoneum, interstitial fibrosis, asbestosis, pneumoconiosis, or respiratory cancer. The possible consequences of asbestos exposure are detailed in the NIOSH Criteria Document or in the OSHA Asbestos Standards 29 CFR 1910.1001 and 29 CFR 1926.1101 and 29 CFR 1915.1001.

2. Sampling Procedure

2.1. Equipment for sampling

(a) Tube or cork borer sampling device

(b) Knife

(c) 20 mL scintillation vial or similar vial

(d) Sealing encapsulant

2.2. Safety Precautions

Asbestos is a known carcinogen. Take care when sampling. While in an asbestos-containing atmosphere, a properly selected and fit-tested respirator should be worn. Take samples in a manner to cause the least amount of dust. Follow these general guidelines:

(a) Do not make unnecessary dust.

(b) Take only a small amount (1 to 2 g).

(c) Tightly close the sample container.

(d) Use encapsulant to seal the spot where the sample was taken, if necessary.

2.3. Sampling Procedure

Samples of any suspect material should be taken from an inconspicuous place. Where the material is to remain, seal the sampling wound with an encapsulant to eliminate the potential for exposure from the sample site. Microscopy requires only a few milligrams of material. The amount that will fill a 20 mL scintillation vial is more than adequate. Be sure to collect samples from all layers and phases of material. If possible, make separate samples of each different phase of the material. This will aid in determining the actual hazard. DO NOT USE ENVELOPES, PLASTIC OR PAPER BAGS OF ANY KIND TO COLLECT SAMPLES. The use of plastic bags presents a contamination hazard to laboratory personnel and to other samples. When these containers are opened, a bellows effect blows fibers out of the container onto everything, including the person opening the container.

If a cork-borer type sampler is available, push the tube through the material all the way, so that all layers of material are sampled. Some samplers are intended to be disposable. These should be capped and sent to the laboratory. If a non-disposable cork borer is used, empty the contents into a scintillation vial and send to the laboratory. Vigorously and completely clean the cork borer between samples.

2.4 Shipment

Samples packed in glass vials must not touch or they might break in shipment.

(a) Seal the samples with a sample seal over the end to guard against tampering and to identify the sample.

(b) Package the bulk samples in separate packages from the air samples. They may cross-contaminate each other and will invalidate the results of the air samples.

(c) Include identifying paperwork with the samples, but not in contact with the suspected asbestos.

(d) To maintain sample accountability, ship the samples by certified mail, overnight express, or hand carry them to the laboratory.

3. Analysis

The analysis of asbestos samples can be divided into two major parts: sample preparation and microscopy. Because of the different asbestos uses that may be encountered by the analyst, each sample may need different preparation steps. The choices are outlined below. There are several different tests that are performed to identify the asbestos species and determine the percentage. They will be explained below.

3.1. Safety

(a) Do not create unnecessary dust. Handle the samples in HEPA-filter equipped hoods. If samples are received in bags, envelopes or other inappropriate container, open them only in a hood having a face velocity at or greater than 100 fpm. Transfer a small amount to a scintillation vial and only handle the smaller amount.

(b) Open samples in a hood, never in the open lab area.

(c) Index of refraction oils can be toxic. Take care not to get this material on the skin. Wash immediately with soap and water if this happens.

(d) Samples that have been heated in the muffle furnace or the drying oven may be hot. Handle them with tongs until they are cool enough to handle.

(e) Some of the solvents used, such as THF (tetrahydrofuran), are toxic and should only be handled in an appropriate fume hood and according to instructions given in the Safety Data Sheet (SDS).

3.2. Equipment

(a) Phase contrast microscope with 10x, 16x and 40x objectives, 10x wide-field

eyepieces, G-22 Walton-Beckett graticule, Whipple disk, polarizer, analyzer and first order red or gypsum plate, 100 Watt illuminator, rotating position condenser with oversize phase rings, central stop dispersion objective, Kohler illumination and a rotating mechanical stage.

(b) Stereo microscope with reflected light illumination, transmitted light illumination, polarizer, analyzer and first order red or gypsum plate, and rotating stage.

(c) Negative pressure hood for the stereo microscope

(d) Muffle furnace capable of 600 deg.C

(e) Drying oven capable of 50 -- 150 deg.C

(f) Aluminum specimen pans

(g) Tongs for handling samples in the furnace

(h) High dispersion index of refraction oils (Special for dispersion staining.)

n = 1.550
n = 1.585
n = 1.590
n = 1.605
n = 1.620
n = 1.670
n = 1.680
n = 1.690

(i) A set of index of refraction oils from about n = 1.350 to n = 2.000 in n = 0.005 increments. (Standard for Becke line analysis.)

(j) Glass slides with painted or frosted ends 1x3 inches 1mm (thick, precleaned.)

(k) Cover Slips 22x22 mm, #1 1/2

(l) Paper clips or dissection needles

(m) Hand grinder

(n) Scalpel with both #10 and #11 blades

(o) 0.1 molar HCl

(p) Decalcifying solution (Baxter Scientific Products) Ethylenediaminetetraacetic Acid,

Tetrasodium ..... 0.7 g/l
Sodium Potassium Tartrate ..... 8.0 mg/liter
Hydrochloric Acid ..... 99.2 g/liter
Sodium Tartrate ..... 0.14 g/liter

(q) Tetrahydrofuran (THF)

(r) Hotplate capable of 60 deg.C

(s) Balance

(t) Hacksaw blade

(u) Ruby mortar and pestle

3.3. Sample Pre-Preparation

Sample preparation begins with pre-preparation which may include chemical reduction of the matrix, heating the sample to dryness or heating in the muffle furnace. The end result is a sample which has been reduced to a powder that is sufficiently fine to fit under the cover slip. Analyze different phases of samples separately, e.g., tile and the tile mastic should be analyzed separately as the mastic may contain asbestos while the tile may not.

(a) Wet Samples

Samples with a high water content will not give the proper dispersion colors and must be dried prior to sample mounting. Remove the lid of the scintillation vial, place the bottle in the drying oven and heat at 100 deg.C to dryness (usually about 2 h). Samples which are not submitted to the lab in glass must be removed and placed in glass vials or aluminum weighing pans before placing them in the drying oven.

(b) Samples With Organic Interference -- Muffle Furnace

These may include samples with tar as a matrix, vinyl asbestos tile, or any other organic that can be reduced by heating. Remove the sample from the vial and weigh in a balance to determine the weight of the submitted portion. Place the sample in a muffle furnace at 500 deg.C for 1 to 2 h or until all obvious organic material has been removed. Retrieve, cool and weigh again to determine the weight loss on ignition. This is necessary to determine the asbestos content of the submitted sample, because the analyst will be looking at a reduced sample.

Note: Heating above 600 deg.C will cause the sample to undergo a structural change

which, given sufficient time, will convert the chrysotile to forsterite. Heating even at lower temperatures for 1 to 2 h may have a measurable effect on the optical properties of the minerals. If the analyst is unsure of what to expect, a sample of standard asbestos should be heated to the same temperature for the same length of time so that it can be examined for the proper interpretation.

(c) Samples With Organic Interference -- THF

Vinyl asbestos tile is the most common material treated with this solvent, although, substances containing tar will sometimes yield to this treatment. Select a portion of the material and then grind it up if possible. Weigh the sample and place it in a test tube. Add sufficient THF to dissolve the organic matrix. This is usually about 4 to 5 mL. Remember, THF is highly flammable. Filter the remaining material through a tared silver membrane, dry and weigh to determine how much is left after the solvent extraction. Further process the sample to remove carbonate or mount directly.

(d) Samples With Carbonate Interference

Carbonate material is often found on fibers and sometimes must be removed in order to perform dispersion microscopy. Weigh out a portion of the material and place it in a test tube. Add a sufficient amount of 0.1 M HCl or decalcifying solution in the tube to react all the carbonate as evidenced by gas formation; i.e., when the gas bubbles stop, add a little more solution. If no more gas forms, the reaction is complete. Filter the material out through a tared silver membrane, dry and weigh to determine the weight lost.

3.4. Sample Preparation

Samples must be prepared so that accurate determination can be made of the asbestos type and amount present. The following steps are carried out in the low-flow hood (a low-flow hood has less than 50 fpm flow):

(1) If the sample has large lumps, is hard, or cannot be made to lie under a cover slip, the grain size must be reduced. Place a small amount between two slides and grind the material between them or grind a small amount in a clean mortar and pestle. The choice of whether to use an alumina, ruby, or diamond mortar depends on the hardness of the material. Impact damage can alter the asbestos mineral if too much mechanical shock occurs. (Freezer mills can completely destroy the observable crystallinity of asbestos and should not be used). For some samples, a portion of material can be shaved off with a scalpel, ground off with a hand grinder or hack saw blade.

The preparation tools should either be disposable or cleaned thoroughly. Use vigorous scrubbing to loosen the fibers during the washing. Rinse the implements with copious

amounts of water and air-dry in a dust-free environment.

(2) If the sample is powder or has been reduced as in (1) above, it is ready to mount. Place a glass slide on a piece of optical tissue and write the identification on the painted or frosted end. Place two drops of index of refraction medium n = 1.550 on the slide. (The medium n = 1.550 is chosen because it is the matching index for chrysotile. Dip the end of a clean paper-clip or dissecting needle into the droplet of refraction medium on the slide to moisten it. Then dip the probe into the powder sample. Transfer what sticks on the probe to the slide. The material on the end of the probe should have a diameter of about 3 mm for a good mount. If the material is very fine, less sample may be appropriate. For non-powder samples such as fiber mats, forceps should be used to transfer a small amount of material to the slide. Stir the material in the medium on the slide, spreading it out and making the preparation as uniform as possible. Place a cover-slip on the preparation by gently lowering onto the slide and allowing it to fall "trapdoor" fashion on the preparation to push out any bubbles. Press gently on the cover slip to even out the distribution of particulate on the slide. If there is insufficient mounting oil on the slide, one or two drops may be placed near the edge of the coverslip on the slide. Capillary action will draw the necessary amount of liquid into the preparation. Remove excess oil with the point of a laboratory wiper.

Treat at least two different areas of each phase in this fashion. Choose representative areas of the sample. It may be useful to select particular areas or fibers for analysis. This is useful to identify asbestos in severely inhomogeneous samples.

When it is determined that amphiboles may be present, repeat the above process using the appropriate high-dispersion oils until an identification is made or all six asbestos minerals have been ruled out. Note that percent determination must be done in the index medium 1.550 because amphiboles tend to disappear in their matching mediums.

3.5. Analytical procedure

Note: This method presumes some knowledge of mineralogy and optical petrography.

The analysis consists of three parts: The determination of whether there is asbestos present, what type is present and the determination of how much is present. The general flow of the analysis is:

(1) Gross examination.

(2) Examination under polarized light on the stereo microscope.

(3) Examination by phase-polar illumination on the compound phase microscope.

(4) Determination of species by dispersion stain. Examination by Becke line analysis

may also be used; however, this is usually more cumbersome for asbestos determination.

(5) Difficult samples may need to be analyzed by SEM or TEM, or the results from those techniques combined with light microscopy for a definitive identification.

Identification of a particle as asbestos requires that it be asbestiform. Description of particles should follow the suggestion of Campbell. (Figure 1)

(For Figure 1 of Asbestos Particles, Click Here)

For the purpose of regulation, the mineral must be one of the six minerals covered and must be in the asbestos growth habit. Large specimen samples of asbestos generally have the gross appearance of wood. Fibers are easily parted from it. Asbestos fibers are very long compared with their widths. The fibers have a very high tensile strength as demonstrated by bending without breaking. Asbestos fibers exist in bundles that are easily parted, show longitudinal fine structure and may be tufted at the ends showing "bundle of sticks" morphology. In the microscope some of these properties may not be observable. Amphiboles do not always show striations along their length even when they are asbestos. Neither will they always show tufting. They generally do not show a curved nature except for very long fibers. Asbestos and asbestiform minerals are usually characterized in groups by extremely high aspect ratios (greater than 100:1). While aspect ratio analysis is useful for characterizing populations of fibers, it cannot be used to identify individual fibers of intermediate to short aspect ratio. Observation of many fibers is often necessary to determine whether a sample consists of "cleavage fragments" or of asbestos fibers.

Most cleavage fragments of the asbestos minerals are easily distinguishable from true asbestos fibers. This is because true cleavage fragments usually have larger diameters than 1 um. Internal structure of particles larger than this usually shows them to have no internal fibrillar structure. In addition, cleavage fragments of the monoclinic amphiboles show inclined extinction under crossed polars with no compensator. Asbestos fibers usually show extinction at zero degrees or ambiguous extinction if any at all. Morphologically, the larger cleavage fragments are obvious by their blunt or stepped ends showing prismatic habit. Also, they tend to be acicular rather than filiform.

Where the particles are less than 1 um in diameter and have an aspect ratio greater than or equal to 3:1, it is recommended that the sample be analyzed by SEM or TEM if there is any question whether the fibers are cleavage fragments or asbestiform particles.

Care must be taken when analyzing by electron microscopy because the interferences are different from those in light microscopy and may structurally be very similar to

asbestos. The classic interference is between anthophyllite and biopyribole or intermediate fiber. Use the same morphological clues for electron microscopy as are used for light microscopy, e.g. fibril splitting, internal longitudinal striation, fraying, curvature, etc.

(1) Gross examination:

Examine the sample, preferably in the glass vial. Determine the presence of any obvious fibrous component. Estimate a percentage based on previous experience and current observation. Determine whether any pre-preparation is necessary. Determine the number of phases present. This step may be carried out or augmented by observation at 6 to 40 x under a stereo microscope.

(2) After performing any necessary pre-preparation, prepare slides of each phase as described above. Two preparations of the same phase in the same index medium can be made side-by-side on the same glass for convenience. Examine with the polarizing stereo microscope. Estimate the percentage of asbestos based on the amount of birefringent fiber present.

(3) Examine the slides on the phase-polar microscopes at magnifications of 160 and 400 x . Note the morphology of the fibers. Long, thin, very straight fibers with little curvature are indicative of fibers from the amphibole family. Curved, wavy fibers are usually indicative of chrysotile. Estimate the percentage of asbestos on the phase-polar microscope under conditions of crossed polars and a gypsum plate. Fibers smaller than 1.0 um in thickness must be identified by inference to the presence of larger, identifiable fibers and morphology. If no larger fibers are visible, electron microscopy should be performed. At this point, only a tentative identification can be made. Full identification must be made with dispersion microscopy. Details of the tests are included in the appendices.

(4) Once fibers have been determined to be present, they must be identified. Adjust the microscope for dispersion mode and observe the fibers. The microscope has a rotating stage, one polarizing element, and a system for generating dark-field dispersion microscopy (see Section 4.6. of this appendix). Align a fiber with its length parallel to the polarizer and note the color of the Becke lines. Rotate the stage to bring the fiber length perpendicular to the polarizer and note the color. Repeat this process for every fiber or fiber bundle examined. The colors must be consistent with the colors generated by standard asbestos reference materials for a positive identification. In n = 1.550, amphiboles will generally show a yellow to straw-yellow color indicating that the fiber indices of refraction are higher than the liquid. If long, thin fibers are noted and the colors are yellow, prepare further slides as above in the suggested matching liquids listed below:

|

Type of asbestos	Index of refraction
Chrysotile	n = 1.550.
Amosite	n = 1.670 r 1.680.
Crocidolite	n = 1.690.
Anthophyllite	n = 1.605 nd 1.620.
Tremolite	n = 1.605 and 1.620.
Actinolite	n = 1.620.

Where more than one liquid is suggested, the first is preferred; however, in some cases this liquid will not give good dispersion color. Take care to avoid interferences in the other liquid; e.g., wollastonite in n = 1.620 will give the same colors as tremolite. In n = 1.605 wollastonite will appear yellow in all directions. Wollastonite may be determined under crossed polars as it will change from blue to yellow as it is rotated along its fiber axis by tapping on the cover slip. Asbestos minerals will not change in this way.

Determination of the angle of extinction may, when present, aid in the determination of anthophyllite from tremolite. True asbestos fibers usually have 0 deg. extinction or ambiguous extinction, while cleavage fragments have more definite extinction.

Continue analysis until both preparations have been examined and all present species of asbestos are identified. If there are no fibers present, or there is less than 0.1% present, end the analysis with the minimum number of slides (2).

(5) Some fibers have a coating on them which makes dispersion microscopy very difficult or impossible. Becke line analysis or electron microscopy may be performed in those cases. Determine the percentage by light microscopy. TEM analysis tends to overestimate the actual percentage present.

(6) Percentage determination is an estimate of occluded area, tempered by gross observation. Gross observation information is used to make sure that the high magnification microscopy does not greatly over- or under-estimate the amount of fiber present. This part of the analysis requires a great deal of experience. Satisfactory models for asbestos content analysis have not yet been developed, although some models based on metallurgical grain-size determination have found some utility. Estimation is more easily handled in situations where the grain sizes visible at about 160 x are about the same and the sample is relatively homogeneous.

View all of the area under the cover slip to make the percentage determination. View the fields while moving the stage, paying attention to the clumps of material. These are not usually the best areas to perform dispersion microscopy because of the interference from other materials. But, they are the areas most likely to represent the accurate percentage in the sample. Small amounts of asbestos require slower scanning

and more frequent analysis of individual fields.

Report the area occluded by asbestos as the concentration. This estimate does not generally take into consideration the difference in density of the different species present in the sample. For most samples this is adequate. Simulation studies with similar materials must be carried out to apply microvisual estimation for that purpose and is beyond the scope of this procedure.

(7) Where successive concentrations have been made by chemical or physical means, the amount reported is the percentage of the material in the "as submitted" or original state. The percentage determined by microscopy is multiplied by the fractions remaining after pre-preparation steps to give the percentage in the original sample. For example:

Step 1. 60% remains after heating at 550 deg.C for 1 h.
Step 2. 30% of the residue of step 1 remains after dissolution of carbonate in 0.1 m HCl.
Step 3. Microvisual estimation determines that 5% of the sample is chrysotile asbestos.

The reported result is:

R = (Microvisual result in percent) x (Fraction remaining after step 2) x (Fraction remaining of original sample after step 1)
R = (5) x (.30) x (.60) = 0.9%

(8) Report the percent and type of asbestos present. For samples where asbestos was identified, but is less than 1.0%, report "Asbestos present, less than 1.0%." There must have been at least two observed fibers or fiber bundles in the two preparations to be reported as present. For samples where asbestos was not seen, report as "None Detected."

Auxiliary Information

Because of the subjective nature of asbestos analysis, certain concepts and procedures need to be discussed in more depth. This information will help the analyst understand why some of the procedures are carried out the way they are.

4.1. Light

Light is electromagnetic energy. It travels from its source in packets called quanta. It is instructive to consider light as a plane wave. The light has a direction of travel. Perpendicular to this and mutually perpendicular to each other, are two vector components. One is the magnetic vector and the other is the electric vector. We shall only be concerned with the electric vector. In this description, the interaction of the vector and the mineral will describe all the observable phenomena. From a light source

such a microscope illuminator, light travels in all different direction from the filament.

In any given direction away from the filament, the electric vector is perpendicular to the direction of travel of a light ray. While perpendicular, its orientation is random about the travel axis. If the electric vectors from all the light rays were lined up by passing the light through a filter that would only let light rays with electric vectors oriented in one direction pass, the light would then be POLARIZED.

Polarized light interacts with matter in the direction of the electric vector. This is the polarization direction. Using this property it is possible to use polarized light to probe different materials and identify them by how they interact with light.

The speed of light in a vacuum is a constant at about 2.99 x 10(8) m/s. When light travels in different materials such as air, water, minerals or oil, it does not travel at this speed. It travels slower. This slowing is a function of both the material through which the light is traveling and the wavelength or frequency of the light. In general, the more dense the material, the slower the light travels. Also, generally, the higher the frequency, the slower the light will travel. The ratio of the speed of light in a vacuum to that in a material is called the index of refraction (n). It is usually measured at 589 nm (the sodium D line). If white light (light containing all the visible wavelengths) travels through a material, rays of longer wavelengths will travel faster than those of shorter wavelengths, this separation is called dispersion. Dispersion is used as an identifier of materials as described in Section 4.6.

4.2. Material Properties

Materials are either amorphous or crystalline. The difference between these two descriptions depends on the positions of the atoms in them. The atoms in amorphous materials are randomly arranged with no long range order. An example of an amorphous material is glass. The atoms in crystalline materials, on the other hand, are in regular arrays and have long range order. Most of the atoms can be found in highly predictable locations. Examples of crystalline material are salt, gold, and the asbestos minerals.

It is beyond the scope of this method to describe the different types of crystalline materials that can be found, or the full description of the classes into which they can fall. However, some general crystallography is provided below to give a foundation to the procedures described.

With the exception of anthophyllite, all the asbestos minerals belong to the monoclinic crystal type. The unit cell is the basic repeating unit of the crystal and for monoclinic crystals can be described as having three unequal sides, two 90 deg. angles and one angle not equal to 90 deg.. The orthorhombic group, of which anthophyllite is a member has three unequal sides and three 90 deg. angles. The unequal sides are a consequence of the complexity of fitting the different atoms into the unit cell.

Although the atoms are in a regular array, that array is not symmetrical in all directions. There is long range order in the three major directions of the crystal. However, the order is different in each of the three directions. This has the effect that the index of refraction is different in each of the three directions. Using polarized light, we can investigate the index of refraction in each of the directions and identify the mineral or material under investigation. The indices alpha, beta, and gamma are used to identify the lowest, middle, and highest index of refraction respectively. The x direction, associated with alpha is called the fast axis. Conversely, the z direction is associated with gamma and is the slow direction. Crocidolite has alpha along the fiber length making it "length-fast". The remainder of the asbestos minerals have the gamma axis along the fiber length. They are called "length-slow". This orientation to fiber length is used to aid in the identification of asbestos.

4.3. Polarized Light Technique

Polarized light microscopy as described in this section uses the phase-polar microscope described in Section 3.2. A phase contrast microscope is fitted with two polarizing elements, one below and one above the sample. The polarizers have their polarization directions at right angles to each other. Depending on the tests performed, there may be a compensator between these two polarizing elements. A compensator is a piece of mineral with known properties that "compensates" for some deficiency in the optical train. Light emerging from a polarizing element has its electric vector pointing in the polarization direction of the element. The light will not be subsequently transmitted through a second element set at a right angle to the first element. Unless the light is altered as it passes from one element to the other, there is no transmission of light.

4.4. Angle of Extinction

Crystals which have different crystal regularity in two or three main directions are said to be anisotropic. They have a different index of refraction in each of the main directions. When such a crystal is inserted between the crossed polars, the field of view is no longer dark but shows the crystal in color. The color depends on the properties of the crystal. The light acts as if it travels through the crystal along the optical axes. If a crystal optical axis were lined up along one of the polarizing directions (either the polarizer or the analyzer) the light would appear to travel only in that direction, and it would blink out or go dark. The difference in degrees between the fiber direction and the angle at which it blinks out is called the angle of extinction. When this angle can be measured, it is useful in identifying the mineral. The procedure for measuring the angle of extinction is to first identify the polarization direction in the microscope. A commercial alignment slide can be used to establish the polarization directions or use anthophyllite or another suitable mineral. This mineral has a zero degree angle of extinction and will go dark to extinction as it aligns with the polarization directions. When a fiber of anthophyllite has gone to extinction, align the eyepiece reticle or graticule with the fiber so that there is a visual cue as to the

direction of polarization in the field of view. Tape or otherwise secure the eyepiece in this position so it will not shift.

After the polarization direction has been identified in the field of view, move the particle of interest to the center of the field of view and align it with the polarization direction. For fibers, align the fiber along this direction. Note the angular reading of the rotating stage. Looking at the particle, rotate the stage until the fiber goes dark or "blinks out". Again note the reading of the stage. The difference in the first reading and the second is an angle of extinction.

The angle measured may vary as the orientation of the fiber changes about its long axis. Tables of mineralogical data usually report the maximum angle of extinction. Asbestos forming minerals, when they exhibit an angle of extinction, usually do show an angle of extinction close to the reported maximum, or as appropriate depending on the substitution chemistry.

4.5. Crossed Polars with Compensator

When the optical axes of a crystal are not lined up along one of the polarizing directions (either the polarizer or the analyzer) part of the light travels along one axis and part travels along the other visible axis. This is characteristic of birefringent materials.

The color depends on the difference of the two visible indices of refraction and the thickness of the crystal. The maximum difference available is the difference between the alpha and the gamma axes. This maximum difference is usually tabulated as the birefringence of the crystal.

For this test, align the fiber at 45 deg. to the polarization directions in order to maximize the contribution to each of the optical axes. The colors seen are called retardation colors. They arise from the recombination of light which has traveled through the two separate directions of the crystal. One of the rays is retarded behind the other since the light in that direction travels slower. On recombination, some of the colors which make up white light are enhanced by constructive interference and some are suppressed by destructive interference. The result is a color dependent on the difference between the indices and the thickness of the crystal. The proper colors, thicknesses, and retardations are shown on a Michel-Levy chart. The three items, retardation, thickness and birefringence are related by the following relationship:

R = t(n(gamma) - n(alpha))
R = retardation, t = crystal thickness in um, and
n(alpha, gamma) = indices of refraction.

Examination of the equation for asbestos minerals reveals that the visible colors for

almost all common asbestos minerals and fiber sizes are shades of gray and black. The eye is relatively poor at discriminating different shades of gray. It is very good at discriminating different colors. In order to compensate for the low retardation, a compensator is added to the light train between the polarization elements. The compensator used for this test is a gypsum plate of known thickness and birefringence. Such a compensator when oriented at 45 deg. to the polarizer direction, provides a retardation of 530 nm of the 530 nm wavelength color. This enhances the red color and gives the background a characteristic red to red-magenta color. If this "full-wave" compensator is in place when the asbestos preparation is inserted into the light train, the colors seen on the fibers are quite different. Gypsum, like asbestos has a fast axis and a slow axis. When a fiber is aligned with its fast axis in the same direction as the fast axis of the gypsum plate, the ray vibrating in the slow direction is retarded by both the asbestos and the gypsum. This results in a higher retardation than would be present for either of the two minerals. The color seen is a second order blue. When the fiber is rotated 90 deg. using the rotating stage, the slow direction of the fiber is now aligned with the fast direction of the gypsum and the fast direction of the fiber is aligned with the slow direction of the gypsum. Thus, one ray vibrates faster in the fast direction of the gypsum, and slower in the slow direction of the fiber; the other ray will vibrate slower in the slow direction of the gypsum and faster in the fast direction of the fiber. In this case, the effect is subtractive and the color seen is a first order yellow. As long as the fiber thickness does not add appreciably to the color, the same basic colors will be seen for all asbestos types except crocidolite. In crocidolite the colors will be weaker, may be in the opposite directions, and will be altered by the blue absorption color natural to crocidolite. Hundreds of other materials will give the same colors as asbestos, and therefore, this test is not definitive for asbestos. The test is useful in discriminating against fiberglass or other amorphous fibers such as some synthetic fibers. Certain synthetic fibers will show retardation colors different than asbestos; however, there are some forms of polyethylene and aramid which will show morphology and retardation colors similar to asbestos minerals. This test must be supplemented with a positive identification test when birefringent fibers are present which can not be excluded by morphology. This test is relatively ineffective for use on fibers less than 1 um in diameter. For positive confirmation TEM or SEM should be used if no larger bundles or fibers are visible.

4.6. Dispersion Staining

Dispersion microscopy or dispersion staining is the method of choice for the identification of asbestos in bulk materials. Becke line analysis is used by some laboratories and yields the same results as does dispersion staining for asbestos and can be used in lieu of dispersion staining. Dispersion staining is performed on the same platform as the phase-polar analysis with the analyzer and compensator removed. One polarizing element remains to define the direction of the light so that the different indices of refraction of the fibers may be separately determined. Dispersion microscopy is a dark-field technique when used for asbestos. Particles are imaged with scattered light. Light which is unscattered is blocked from reaching the eye either by

the back field image mask in a McCrone objective or a back field image mask in the phase condenser. The most convenient method is to use the rotating phase condenser to move an oversized phase ring into place. The ideal size for this ring is for the central disk to be just larger than the objective entry aperture as viewed in the back focal plane. The larger the disk, the less scattered light reaches the eye. This will have the effect of diminishing the intensity of dispersion color and will shift the actual color seen. The colors seen vary even on microscopes from the same manufacturer. This is due to the different bands of wavelength exclusion by different mask sizes. The mask may either reside in the condenser or in the objective back focal plane. It is imperative that the analyst determine by experimentation with asbestos standards what the appropriate colors should be for each asbestos type. The colors depend also on the temperature of the preparation and the exact chemistry of the asbestos. Therefore, some slight differences from the standards should be allowed. This is not a serious problem for commercial asbestos uses. This technique is used for identification of the indices of refraction for fibers by recognition of color. There is no direct numerical readout of the index of refraction. Correlation of color to actual index of refraction is possible by referral to published conversion tables. This is not necessary for the analysis of asbestos. Recognition of appropriate colors along with the proper morphology are deemed sufficient to identify the commercial asbestos minerals. Other techniques including SEM, TEM, and XRD may be required to provide additional information in order to identify other types of asbestos.

Make a preparation in the suspected matching high dispersion oil, e.g., n = 1.550 for chrysotile. Perform the preliminary tests to determine whether the fibers are birefringent or not. Take note of the morphological character. Wavy fibers are indicative of chrysotile while long, straight, thin, frayed fibers are indicative of amphibole asbestos. This can aid in the selection of the appropriate matching oil. The microscope is set up and the polarization direction is noted as in Section 4.4. Align a fiber with the polarization direction. Note the color. This is the color parallel to the polarizer. Then rotate the fiber rotating the stage 90 deg. so that the polarization direction is across the fiber. This is the perpendicular position. Again note the color. Both colors must be consistent with standard asbestos minerals in the correct direction for a positive identification of asbestos. If only one of the colors is correct while the other is not, the identification is not positive. If the colors in both directions are bluish-white, the analyst has chosen a matching index oil which is higher than the correct matching oil, e.g. the analyst has used n = 1.620 where chrysotile is present. The next lower oil (Section 3.5.) should be used to prepare another specimen. If the color in both directions is yellow-white to straw-yellow-white, this indicates that the index of the oil is lower than the index of the fiber, e.g. the preparation is in n = 1.550 while anthophyllite is present. Select the next higher oil (Section 3.5.) and prepare another slide. Continue in this fashion until a positive identification of all asbestos species present has been made or all possible asbestos species have been ruled out by negative results in this test. Certain plant fibers can have similar dispersion colors as asbestos. Take care to note and evaluate the morphology of the fibers or remove the plant fibers in pre-preparation. Coating material on the fibers such as carbonate or

vinyl may destroy the dispersion color. Usually, there will be some outcropping of fiber which will show the colors sufficient for identification. When this is not the case, treat the sample as described in Section 3.3. and then perform dispersion staining. Some samples will yield to Becke line analysis if they are coated or electron microscopy can be used for identification.

5. References

5.1. Crane, D.T., Asbestos in Air, OSHA method ID160, Revised November 1992.

5.2. Ford, W.E., Dana's Textbook of Mineralogy; Fourth Ed.; John Wiley and Son, New York, 1950, p. vii.

5.3. Selikoff, I.J., Lee, D.H.K., Asbestos and Disease, Academic Press, New York, 1978, pp. 3,20.

5.4. Women Inspectors of Factories. Annual Report for 1898, H.M. Statistical Office, London, p. 170 (1898).

5.5. Selikoff,.I.J., Lee, D.H.K., Asbestos and Disease, Academic Press, New York, 1978, pp. 26,30.

5.6. Campbell, W.J., et al, Selected Silicate Minerals and Their Asbestiform Varieties, United States Department of the Interior, Bureau of Mines, Information Circular 8751, 1977.

5.7. Asbestos, Code of Federal Regulations, 29 CFR 1910.1001 and 29 CFR 1926.58.

5.8. National Emission Standards for Hazardous Air Pollutants; Asbestos NESHAP Revision, Federal Register, Vol. 55, No. 224, 20 November 1990, p. 48410.

5.9. Ross, M. The Asbestos Minerals: Definitions, Description, Modes of Formation, Physical and Chemical Properties and Health Risk to the Mining Community, Nation Bureau of Standards Special Publication, Washington, D.C., 1977.

5.10. Lilis, R., Fibrous Zeolites and Endemic Mesothelioma in Cappadocia, Turkey, J. Occ Medicine, 1981, 23,(8), 548-550.

5.11. Occupational Exposure to Asbestos -- 1972, U.S. Department of Health Education and Welfare, Public Health Service, Center for Disease Control, National Institute for Occupational Safety and Health, HSM-72-10267.

5.12. Campbell,W.J., et al, Relationship of Mineral Habit to Size Characteristics for Tremolite Fragments and Fibers, United States Department of the Interior, Bureau of

Mines, Information Circular 8367, 1979.

5.13. Mefford, D., DCM Laboratory, Denver, private communication, July 1987.

5.14. Deer, W.A., Howie, R.A., Zussman, J., Rock Forming Minerals, Longman, Thetford, UK, 1974.

5.15. Kerr, P.F., Optical Mineralogy; Third Ed. McGraw-Hill, New York, 1959.

5.16. Veblen, D.R. (Ed.), Amphiboles and Other Hydrous Pyriboles -- Mineralogy, Reviews in Mineralogy, Vol 9A, Michigan, 1982, pp 1-102.

5.17. Dixon, W.C., Applications of Optical Microscopy in the Analysis of Asbestos and Quartz, ACS Symposium Series, No. 120, Analytical Techniques in Occupational Health Chemistry, 1979.

5.18. Polarized Light Microscopy, McCrone Research Institute, Chicago, 1976.

5.19. Asbestos Identification, McCrone Research Institute, G & G printers, Chicago, 1987.

5.20. McCrone, W.C., Calculation of Refractive Indices from Dispersion Staining Data, The Microscope, No 37, Chicago, 1989.

5.21. Levadie, B. (Ed.), Asbestos and Other Health Related Silicates, ASTM Technical Publication 834, ASTM, Philadelphia 1982.

5.22. Steel, E. and Wylie, A., Riordan, P.H. (Ed.), Mineralogical Characteristics of Asbestos, Geology of Asbestos Deposits, pp. 93-101, SME-AIME, 1981.

5.23. Zussman, J., The Mineralogy of Asbestos, Asbestos: Properties, Applications and Hazards, pp. 45-67 Wiley, 1979.

[51 FR 22756, June 20, 1986, as amended at 51 FR 37004, Oct. 17, 1986; 52 FR 15723, Apr. 30, 1987; 52 FR 17755-56, May 12, 1987; 53 FR 27346, July 20, 1988; 53 FR 35627, Sept. 14, 1988; 54 FR 33705, July 21, 1989; 54 FR 52028, Dec. 20, 1989; 55 FR 3732, Feb. 5, 1990; 55 FR 50687, Dec. 10, 1990; 57 FR 24331, June 8, 1992; 57 FR 24119, June 30, 1992; 59 FR 40964, Aug. 10, 1994; 60 FR 9624, Feb. 21, 1995; 60 FR 33343, June 28, 1995; 60 FR 33972, June 29, 1995; 60 FR 36043, July 13, 1995; 60 FR 50411, Sept. 29, 1995; 61 FR 5507, Feb. 13, 1996; 61 FR 43454, August 23, 1996]

APPENDIX E

O&M MEDICAL PROGRAM FORM

FORM 3

WORKER MEDICAL SURVEILLANCE RECORD

Date:_____

I have received the proper asbestos physical examination under the direction of a licensed physician in accordance with 29 CFR 1926.1101 and may wear a respirator. I am also aware of the medical surveillance plan in place at the Subject Property.

PRINTED NAME	SIGNED	SOCIAL SECURITY NUMBER (LAST 4 DIGITS)

FORM 4

RESPIRATOR FIT TEST RECORD

Employee Name (Please Print) _____
Department _____
Social Security Number _____
Prescription Glasses Required Yes_____ No_____

Respirator Manufacturer/Type/Model/Size: _____
_____
_____

Initial Fit OK	Yes _____	No____
Negative Pressure Test	Yes _____	No____
Positive Pressure Test	Yes	
No____		
Irritant Smoke Test	Yes _____	No____
Sweetener Test	Yes _____	No____
Isoamyl Acetate Test	Yes	
No____		

_____
Employee Signature

_____
Date

_____
Signature of the O&M Plan Administrator

Periodic reevaluations will be performed in accordance with the written Respiratory Protection Program found in Appendix J.

APPENDIX F

NOTIFICATION OF DEMOLITION AND RENOVATION FORMS
FOR EPA NESHAPS

FORM 5

ASBESTOS ABATEMENT PROJECT NOTICE

Location of Project: _____

_____

Notice sent to (if applicable): _____

_____

_____

Estimated quantity of ACM _____
Date/time work started _____
EPA AHERA licensed Asbestos Abatement Contractor _____

_____

Type of work:

_____ removal _____ repair _____ encapsulation
_____ enclosure _____ decontamination _____ (other)

O&M Plan Coordinator _____
Date _____

Asbestos Abatement Closeout Documentation Checklist

To be kept on file with the O&M Plan and will be provided by the EPA AHERA licensed asbestos abatement contractor upon completion of the work.

1. Copies of asbestos abatement notifications (if applicable)_____
2. Specifications or written work practices_____
3. EPA AHERA licensed asbestos abatement contractor closeout submittal documentation (licenses, daily logs, waste manifest, workers physical, etc.) _____
4. Air monitoring or other documentation provided by the on-site environmental consultant (if applicable)_____

APPENDIX G

MAINTENANCE WORK FORM

FORM 6

REQUEST FOR MAINTENANCE WORK
"ASBESTOS WORK PERMIT"

Exact location of area involved (including building, room number, location within room, etc.)

_____

_____

Description of Work Involved _____

_____

_____

Individual performing the above listed work activities _____

TO BE FILLED OUT BY O&M PROGRAM COORDINATOR

Starting Date _____

Anticipated Completion Date _____

Approximate amount of asbestos present (linear feet, square feet, etc.) _____

_____

_____

_____

Asbestos Control Methods to be used (i.e., glovebag, HEPA vacuum, wet methods, etc.) __

_____

_____

Protective Equipment to be used (respirator, coveralls, etc.) _____

_____

Permit _____ Accepted _____ Rejected _____

O&M Program Coordinator Comments_____

Signed _____ Print _____

Date _____ Project Reviewed By_____

Acceptance of Following O&M Plan Guidelines_____

APPENDIX H

ACM RELEASE FORM

FORM 7

FIBER RELEASE REPORT

1. Address, building, and room number(s) (or description of area) where the release occurred:

_____

_____

_____

2. The release was reported by _____ on (date) _____ .

3. Describe the release: _____

_____

_____

_____

_____

_____

_____

4. Describe the proper clean-up procedures utilized: _____

_____

_____

_____

_____

_____

O&M Program Coordinator _____

Date _____

Documentation generated during this fiber release should be kept in the O&M Program.

APPENDIX I

PRIOR SAMPLING REPORTS, O&M ACTIVITIES,
FUTURE SAMPLING REPORTS AND ASBESTOS ABATEMENT REPORTS
(INCLUDE ALL ACM SAMPLING REPORTS AND RESULTS &
ABATEMENT REPORTS IN THIS APPENDIX)

ASBESTOS CONTAINING MATERIAL SURVEY REPORT
OF
HISTORIC BULLION PLAZA CULTURAL CENTER AND MUSEUM

FUNDED BY: COPPER CORRIDOR BLIGHT BUSTERS
USEPA BROWNFIELDS COALITION ASSESSMENT GRANT

150 NORTH PLAZA CIRCLE
MIAMI, GILA COUNTY, ARIZONA 85539
APN: 204-15-012A

ATLAS PROJECT NO. 1052000242, PHASE 4

REPORT DATE: February 10, 2023

Prepared by:

Atlas Technical Consultants LLC
9185 South Farmer Road, Suite 111
Tempe, Arizona 85284
Phone: (480) 894-2056
Fax: (480) 894-2497

Prepared for:

Copper Corridor Blight Busters USEPA
Brownfields Coalition
1400 East Ash Street
Globe, Gila County, Arizona 85501
Phone: (928) 402-4392

Project Responsibility

This report has been prepared consistent with good customary industry practices for the evaluation of asbestos-containing materials (ACM) in structures scheduled for renovation. Atlas Technical Consultants LLC (Atlas) presents the data from this Asbestos Survey, based on the conditions observed during the site survey conducted from November 16 through November 18, 2022. Atlas makes no determinations and warrants no conclusions beyond those stated herein. Further, Atlas submits this report to Copper Corridor Blight Busters Coalition (CC BB Coalition) for the exclusive use of CC BB Coalition and the United States Environmental Protection Agency (USEPA) Region IX.

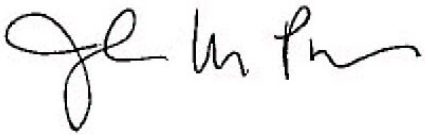
Atlas appreciates this opportunity to assist CC BB Coalition with this project. Thank you for allowing our firm to perform these consulting services. Your business is important to us and we sincerely appreciate your patronage. Please contact the undersigned if you have any questions or need additional information.

This survey was completed by:

Thomas Nelson, Staff Scientist
Email: thomas.nelson@oneatlas.com
AHERA Asbestos Building Inspector
4380-14993-110922

Chad Wells, Industrial Hygiene Technician
Email: chad.wells @oneatlas.com
AHERA Asbestos Building Inspector
ON-4649-12331-111521

This report was reviewed by:



Julie Powers, Due Diligence Department Manager
Email: julie.powers@oneatlas.com
Direct Line: 480-355-4620

Robyn Steiner, Industrial Hygiene Manager, CIH CSP
Email: robyn.steiner@oneatlas.com
Direct Line: 480-355-4633

Executive Summary

The Copper Corridor Blight Busters Coalition (CC BB Coalition) authorized Atlas Technical Consultants LLC (Atlas) to conduct an Asbestos Survey, collectively referred to as "the Survey," of the Historic Bullion Plaza Cultural Center and Museum; hereinafter, referred to as the Site. The assessment was funded by the United States Environmntal Protection agendy (USEPA) Grant awarded to the CCBB Coalition. The purpose of the Survey was to determine the asbestos content of suspect asbestos-containing materials (ACMs) that may be impacted by future renovations, additions or demolitions of the structures at the Site.

Mr. Chad Wells and Mr. Thomas Nelson, Atlas Asbestos Hazard Emergency Response Act (AHERA) accredited building inspectors, conducted this survey from November 16 to November 18, 2022. A summary of the identifed ACM at the Site during Atlas' Survey are noted in Tables E-1.

Table E-1: Identifed ACM Historic Bullion Plaza Cultural Center and Museum

Summary of Identified ACM Historic Bullion Plaza Cultural Center and Museum 150 North Plaza Circle Miami, Arizona 85539 Survey Date: November 16-18, 2022							
Sample No.	Homogenous Material	Material Location	Asbestos Content	Friable	Condition	Quantity	NESHAP Category
*F19-A *F19-B *F19-C	Floor Tile & Mastic – 12"x12", Cream with Light Gray Streaks and Black Mastic	1st Floor Breakroom Bathroom (2 rooms)	Floor Tile - 2.30 to 2.53% % Chrysotile by TEM Black Mastic – 1.08 to 1.25% Chrysotile by TEM	No	Good	60 SF	CAT I/CAT II
*M1-A *M1-B *M1-C	**Pipe Insulation –White Powdery Chalky	Basement / Crawl Space	Pipe Insulation = 50% Chrysotile by TEM	Yes	Fair to Poor	600 LF	RACM
*% = Percent; SF = Square Feet; CAT I = Category I Non-Friable ACM; CAT II = Category II Non-Friable ACM; RACM = Regulated Asbestos Containing Material; PLM=Polarized Light Microscopy; TEM= Transmission Electron Microscopy; * = Sample also analyzed by TEM*							

The results of this Survey indicate that ACM is present within Building and must be removed/abated prior to renovation and/or demolition.–

Table of Contents

Appendices

Tables

1 Project Information

The Copper Corridor Blight Busters Coalition (CC BB Brownfields Coalition) authorized Atlas Technical Consultants LLC (Atlas) to conduct an asbestos survey at the historic Bullion Plaza Cultural Center and Museum located at 150 North Plaza Circle in Miami, Gila County, Arizona; hereinafter, referred to as the Site. The purpose of the Survey was to determine the asbestos content of suspect asbestos-containing materials (ACMs) that may be impacted by the upcoming planned renovation and/or demolition of the structures at the Site.

This Survey was conducted in general accordance with CC BB Coalition Sampling and Analysis Plan, dated April 30, 2022, and approved by the United States Environmental Protection Agency (USEPA) in July 2022.

Mr. Chad Wells and Mr. Thomas Nelson, Atlas USEPA Asbestos Hazard Emergency Response Act (AHERA) accredited building inspectors, conducted this survey from November 16 to November 19, 2022. Copies of their certifications are included in Appendix A.

1.1 Site Description

The Site is located at 150 North Plaza Circle, Miami, Gila County, Arizona 85539. The Site is improved with one approximately 48,000 square-foot two-story building with a basement. The historic building was designed by Henry C. Trost Architects and Engineers of El Paso, Texas with a neoclassical architectural design. The building was constructed in 1923 and was opened as a grammar school from 1934 until 1994. In 1997, the Town of Miami purchased Bullion Plaza from the school district and committed to using it as a cultural center and museum. The building was accepted for listing in the National Register of Historic Places in 2000. The surrounding area primarily consists of residential and commercial uses. The Site Plan with floor plan layouts are included in Appendix B.

1.2 Asbestos Hazard Background

Asbestos is a hazardous substance. Its condition, handling and disposal are regulated by Federal, State, and local agencies. ACMs generally do not pose a health threat unless the asbestos fibers are disturbed, become airborne and are inhaled. Contractors working in an area where asbestos is present must be informed of the type and location of ACMs. Abatement of ACMs, including non-friable ACMs, must be performed by a licensed, certified and registered asbestos abatement contractor in accordance with State and Federal Occupational Safety and Health Administration (OSHA) and local air quality management regulations.

2 Asbestos Survey

CC BB Brownfields Coalition authorized Atlas to perform an Asbestos Survey (the Survey), at the Site. The purpose of this Survey was to identify ACM that may be impacted by future renovation and/or demolition of the building. The asbestos survey was performed between November 16 and November 18, 2022, by Mr. Chad Wells, and Mr. Thomas Nelson, Atlas AHERA accredited building inspectors.

The Survey was conducted in compliance with all applicable Federal, State and local regulations including regulations promulgated under the USEPA AHERA, the National Emissions Standard for Hazardous Air Pollutants (NESHAP) and the OSHA Construction Industry Standard as defined in 29 Code of Federal Regulations (CFR) 1926.1101.

2.1 Prior Asbestos Sampling Reports

Atlas was provided a prior asbestos survey report for the Site, *Asbestos and Lead Survey Report of 150 North Plaza Circle in Miami, Arizona* by AMEC Foster Wheeler Environment & Infrastructure, Inc. (AMEC) dated October 20, 2016. The 2016 prior asbestos survey report sampled only the basement level of the Site, which included four areas described as entry, boiler room, left room and right room as well as crawlspace under two wings of the building. AMEC identified 17 suspect ACMs and collected a total of 45 samples during the survey. Of the 15 suspect materials, five were identified as ACMs. The table below summarizes the ACMs identified by AMEC in the October 2016 survey report.

Summary of ACMs Identified by AMEC
Historic Bullion Plaza Cultural Center and Museum
150 North Plaza Circle
Miami, Arizona 85539
Survey Date: October 2016

Sample No.	Homogenous Material	Material Location	Asbestos Content	Friable	Condition	Quantity	NESHAP Category
3A-C	Pipe Run Insulation Straight Runs	Basement - Straight Runs throughout basement and crawlspaces	50-80 % Chrysotile	Yes	Poor	400 SF	RACM
4A-C	Pipe Elbows	Basement – Pipe Elbows	10-20% Chrysotile	Yes	Poor	15 Each	RACM
15A-C	Gray Gasket	Basement –Boiler Room Gasket	30-40% Chrysotile	No	Fair	2 Each	CAT 1
Assumed ACM	Boiler Insulation Wrap	Basement –Boiler Room	Assumed ACM	Yes	Fair	2 Each	RACM
Assumed ACM	Disposed Bags of Removed Building Materials	Basement	Assumed ACM	No	NA	NA	CAT I

% = Percent; SF = Square Feet; CAT I = Category I Non-Friable ACM; CAT II = Category II Non-Friable ACM; RACM = Regulated Asbestos Containing Material; ND = Non-detect, NA = Not applicable

AMEC noted that pipe run insulation was in poor condition and had deteriorated in the basement rooms and crawlspaces. Give the condition, it is possible the surrounding building materials, material stored in the areas and the bare soil may be impacted by asbestos from the deteriorated pipe insulation.

AMEC recommended that ACMs be removed by a licensed asbestos abatement contractor. Surfaces in the basement and materials stored in the basement should be cleaned of visible dust which may contain asbestos. The crawlspaces should also be cleaned by an abatement contractor.

In addition to this prior report, Atlas was provided email correspondence and abatement bids for the Site. In an email dated November 14, 2017, from Mr. Dylan Whitwer, Environmental Specialist with GeoTek, Inc

to Arizona Department of Environmental Quality (ADEQ) and Town of Miami representatives, Mr Whitwer stated "last, week the remainder of the TSI, boiler, associated pipe runs/elbow, ACM debris bags and other miscellaneous debris were abated and disposed of at their appropriate landfills." GeoTek was reportedly waiting for the landfills to send back the signed waste manifest.

During the survey, Atlas verified with Mr. Thomas N. Foster, Executive Director and Founding Member of Bullion Plaza Cultural Center and Museum, stated that the boiler wrap insulation/boiler, gaskets, pipe elbows and pipe run insulation were abated in the Basement boiler room in 2017. Additionally, the bags of removed building materials that were assumed ACM were also abated. The boiler wrap insulation, boiler, gaskets, pipe elbows and pipe run insulation were not present in the basement boiler room during Atlas' 2022 survey. Atlas requested that ADEQ, Gila County and the Town of Miami provide any records or report of the 2017 abatement activities. Aside from the email GeoTek, Inc dated, November 14, 2017 discussed above no other records of the abatement activities were provided to Atlas for review.

2.2 Asbestos Sampling Methodology

The location of samples collected for laboratory analysis of asbestos content are shown on the sample location maps included in Appendix B. These plans show the location of floor and wall samples, ceiling samples, and samples of miscellaneous material. Appendix B also contains ACM location maps based on the results of this Survey.

2.2.1 Homogeneous Areas

Prior to collecting any samples, homogeneous areas (HAs) were identified and listed to develop a sampling strategy. An HA can be described as one or more areas of material that are similar in appearance and texture and that have the same installation date and function. The actual number of samples collected from each HA may vary, based on the type of material and the professional judgment of the inspector.

2.2.2 Condition Assessment Factors

From the list of suspect homogeneous materials, a condition assessment was performed for each material on the list. A condition assessment includes evaluating the condition and determining the friability of each material. By definition, "friable" materials are those that can be crumbled or reduced to powder by hand pressure when dry. Each material on the list was further classified into one of three categories, which have specific sampling requirements for each category.

Surfacing Materials:	Refers to spray-applied or troweled surfaces such as plaster ceilings and walls, fireproofing, textured paints, textured plasters, and spray-applied acoustical surfaces.
Thermal System Insulation:	Refers to insulation used to inhibit heat gain or loss on pipes, boilers, tanks, ducts, and various other building components.
Miscellaneous Materials:	Refers to friable and non-friable products and materials that do not fit in any of the above two categories such as resilient floor covering, baseboards, mastics, adhesives, roofing material, caulking, glazing, and siding. This category also contains wallboard and ceiling tile.

All confirmed ACMs were then assessed by their condition as good, fair, or poor (damaged). Material with localized significant damage was also assessed as poor when observed.

2.2.3 Sampling Strategy

The survey was conducted in general accordance with the AHERA requirements using a minimum number of samples collected from each HA, which also meets the sampling requirement found in 29 CFR 1926.1101.

Sampling strategy was executed with primary emphasis on the "3-5-7 rule." Sample collection depends on the category that the HA falls into and the amount of material present, as shown in the table below.

Table 2-1 Asbestos Sampling Strategy

AHERA GUIDELINES FOR DETERMINING THE NUMBER OF SAMPLES TO BE COLLECTED		
HA CATEGORY	HA SIZE	SAMPLES REQUIRED
Surfacing Materials	<1,000 SF	3
	1,000 – 5,000 SF	5
	>5,000 SF	7 or more
Thermal System Insulation	No Stipulation	3+ (Must also sample all repair patches)
Miscellaneous Materials	No Stipulation	Per AHERA, these materials must be sampled "in a manner sufficient to determine whether or not they contain asbestos" typically 1 – 3 samples based upon inspector judgment.
SF= square feet		

Once the HAs were identified for each similar material, the required quantity of bulk samples of each suspect ACM were collected for subsequent analysis. Bulk samples were collected by spraying the suspect material with water, where appropriate, removing a small portion of the material and placing it into a laboratory-provided or generic zip-lock plastic bag. Sample containers were marked with a unique identification number, which is also noted in the field notes. Materials visually determined to be non-asbestos (i.e., unpainted metal, glass, wood, etc.) by the accredited inspector were not sampled. Samples were handled according to accepted procedures for the collection, packaging, chain-of-custody documentation and transport of bulk samples to the laboratory for analysis.

Miscellaneous materials require adequately representative sampling, which is typically done by collecting from one to three samples per material. Inspectors typically rely on other survey observations such as the condition, friability, and quantity of material to determine what would be a sufficient amount of samples to accurately evaluate the presence or absence of asbestos content.

Atlas collected a total of 119 bulk samples at the Site that were analyzed by the analytical laboratory as 180 layers based on the number of distinct layers (materials) associated with each bulk sample. For example, floor tile and associated mastic are collected as one bulk sample, but are analyzed as two distinct materials by the asbestos laboratory as required by National Voluntary Laboratory Accreditation Program (NVLAP) guidelines.

Samples were submitted to Eurofins EMLab P&K (EMLab) in Phoenix, Arizona EMLab is NVLAP-accredited laboratory for asbestos analysis. EMLab NVLAP code is 500031-0. A copy of the accreditation for EMLab is included in Appendix A.

A total of 180 samples were submitted to EMLab for analysis using Polarized Light Microscopy (PLM) in accordance with the USEPA *"Method for the Determination of Asbestos in Bulk Building Materials" (USEPA/600/R93/116, July 1993)*.

Any material that was determined to contain less than one percent (<1%) asbestos by PLM is not considered to contain asbestos. Conversely, materials that tested greater than one percent (>1%) asbestos are ACM and must be handled according to OSHA, USEPA, and applicable state NESHAP and local regulations.

Friable materials often require additional analyses to determine asbestos content. If friable materials are determined, via PLM analytical method, to be "non-detectable (ND) for asbestos fibers," no further verification of the sample results are needed. If friable materials are determined, via PLM analytical method, to contain "Trace" or less than 10% asbestos, the material may require further verification of the amount by Point Counting Methods. The Point Count method has a greater precision range than the standard PLM method. By subjecting the material exhibiting trace amounts of asbestos fiber to further Point Count analyses, a refinement of the asbestos content may be achieved and potentially the elimination of a material from ACM status may result. Materials analysed by PLM as less than 1% were sent for 400 point count analysis to determine if they needed to be classified as ACM.

For non-friable materials, when the amount of asbestos in the sample material is reported at greater than 1% by PLM analysis, no further verification of the sample results by alternative methods of identification such as Transmission Electron Microscopy (TEM) Chatfield method is recommended.

For non-friable materials, when the amount of asbestos in the sample material is reported as "None-Detected" or less than 1% by PLM analysis, due to the difficulty in analyzing non-friable or resinously bound materials, Atlas recommends that these types of materials, which were reported as non-ACMs by PLM, be analyzed using TEM Chatfield method. Floor tiles that were analysed as non-detect by PLM were submitted for TEM Chatfield analysis to verify that they did not contain asbestos.

Materials determined by laboratory analyses to contain asbestos were properly classified as either Regulated Asbestos Containing Materials (RACM), Non-Friable Category I (CAT I) or Non-Friable Category II (CAT II), per USEPA NESHAP regulations, Title 40 CFR Part 61, Subpart M, Asbestos.

2.3 Results of Asbestos Survey

Results of laboratory analysis of samples are included in Appendix C. Asbestos Sample Location Maps and ACM Location Maps are included in Appendix B. Atlas has presented the appropriate NESHAP categories for identified ACM in the following tables to assist with the planning of future renovation and/or demolition activities. The NESHAP category was not determined for non-ACM building materials.

A total of 119 representative bulk samples of suspect ACMs were collected from 35 identified HAs at the Site. Subsequent laboratory analyses determined that 33 of the HAs were not considered ACM. Laboratory analyses confirmed two HA was identified as an ACM. Atlas has denoted the applicable NESHAP categories of CAT I, CAT II or RACM for the identified ACM.

Table 2-2 Asbestos Sampling Results

Summary of Identified ACM Historic Bullion Plaza Cultural Center and Museum 150 North Plaza Circle Miami, Arizona 85539 Survey Date: November 16-18, 2022							
Sample No.	Homogenous Material	Location/ Functional Space	Asbestos Content	Friable	Condition	Approx. Quantity	NESHAP Category
Flooring Materials							
F1-A F1-B F1-C	Residual Floor Mastic – Yellow (over plank flooring)	Rooms - 243, 250, 251, 254	ND	No	NA	NA	NA
F2-A F2-B F2-C	Carpet & Mastic – Blue Fibrous with Yellow Mastic	Rooms -244, 246, 1st Floor George and Hazel Cox Room, Native American Exhibit	ND	No	NA	NA	NA
F3-A F3-B F3-C	Carpet & Mastic – Rust Fibrous with Yellow Mastic	South 2nd Floor Corridor Hall, North Hall, 2nd Floor South Stairwell Landing	ND	No	NA	NA	NA
F4-A F4-B F4-C	Stair Tread and Mastic – Red with Black Mastic	Stairwells	ND	No	NA	NA	NA
F5-A F5-B F5-C	Carpet & Mastic - Burgundy Carpet with Yellow Mastic and Light Brown Woven Material	North 2nd Floor Corridor	ND	No	NA	NA	NA
F6-A F6-B F6-C	Vinyl Sheet Flooring, 3'x3' Sections, Light Gray Marble	2nd Floor Lobby	ND	No	NA	NA	NA
*F7-A *F7-B *F7-C	Floor Tile & Mastic – 12"x12' Red with Mottling Tile and Yellow Mastic	Stairwell Landing (3)	ND	No	NA	NA	NA
F8-A F8-B F8-C	Flooring Coating- Beige	1st Floor Lobby behind Stairwell Center Exit Area	ND	No	NA	NA	NA
F9-A F9-B F9-C	Carpet & Mastic – Brown Fibrous with Yellow Mastic and Light Brown Woven Material	1st Floor Lobby, Research Room, Gift Shop	ND	No	NA	NA	NA
F10-A F10-B F10-C	Vinyl Sheet Flooring - Multi-Colored Green, Beige, Tan	Military, Inspiration Hospital Area	ND	No	NA	NA	NA
F11-A F11-B F11-C	Epoxy Coated Concrete with Expansion Joint	Mining Hall	ND	No	NA	NA	NA
F12-A F12-B F12-C	Ceramic Tile & Grout – Mosaic Brown and Beige	Men/Boys & Women's/Girls Restrooms	ND	No	NA	NA	NA
F13-A F13-B F13-C	Carpet & Mastic – Tan Fibrous with Yellow Mastic	Mineral Hall	ND	No	NA	NA	NA

Summary of Identified ACM Historic Bullion Plaza Cultural Center and Museum 150 North Plaza Circle Miami, Arizona 85539 Survey Date: November 16-18, 2022							
Sample No.	Homogenous Material	Location/ Functional Space	Asbestos Content	Friable	Condition	Approx. Quantity	NESHAP Category
F14-A F14-B F14-C	Carpet & Mastic – Green Fibrous with Yellow Mastic	Governor Rose Moffott Exhibit and Slavic Cultural Exhibit	ND	No	NA	NA	NA
F15-A F15-B F15-C	Vinyl Sheet Flooring – Light Gray Tile Marble-like Design	Slavic Cultural Exhibit	ND	No	NA	NA	NA
F16-A F16-B F16-C	Ceramic Tile & Grout – 2'x2', Tan Tile with Gray Grout	South Exit, 1st Floor	ND	No	NA	NA	NA
F17-A F17-B F17-C	Carpet & Mastic – Beige Fibrous with Yellow Mastic	Library/Archives	ND	No	NA	NA	NA
F18-A F18-B F18-C	Concrete Gray with Multilayered Coating	Foundation, Basement	ND	No	NA	NA	NA
*F19-A *F19-B *F19-C	Floor Tile & Mastic – 12"x12", Cream with Light Gray Streaks and Black Mastic	1st Floor Breakroom Bathroom (2 rooms)	Floor Tile - 2.30 to 2.53% % Chrysotile by TEM Black Mastic – 1.08 to 1.25% Chrysotile by TEM	No	Good	60 SF	CAT I/ CAT II
F20-A F20-B F20-C	Ceramic Tile - 1" White, Octagon Shape	Custodial Closet	ND	No	NA	NA	NA
Wall Systems							
W1-A W1-B W1-C W1-D W1-E W1-F W1-G	Plaster Walls – Eggshell Texture Finish, Skim Coat with Multilayered Paint	Walls Throughout	ND	No	NA	NA	NA
W2-A W2-B W2-C W2-D W2-E	Plaster Walls – Sandy Texture Finish with White Paint	Room Closest in Selected Room – 243, 244, 245, 242, 246, 248, 249, 253, 250, 251, 1st Floor Slavic Cultural Exhibit, George & Hazel Cox Ranching Exhibit	ND	No	NA	NA	NA
W3-A W3-B W3-C	Vinyl Covered Drywall – White (Faux Brick)	1st Floor Mexican Cultural/Local Exhibit, Fire Exhibit, Military, Inspiration Hospital Area	ND	No	NA	NA	NA
W4-A W4-B W4-C	4" Black Covebase & Brown Mastic -	1st Floor Lobby, 2nd Floor Corridor and Halls	ND	No	NA	NA	NA
W5-A W5-B W5-C	Glazed Wall Tile – 6" White Tile	Men/Boys & Women's/Girls Restrooms	ND	No	NA	NA	NA
W6-A W6-B W6-C	Concrete- Gray	Basement Wall Throughout	ND	No	NA	NA	NA
W7-A W7-B W7-C	Brick & Mortar – Red Brick with Gray Mortar and White Compound with Yellow Mastic	Basement Walls	ND	No	NA	NA	NA

Summary of Identified ACM Historic Bullion Plaza Cultural Center and Museum 150 North Plaza Circle Miami, Arizona 85539 Survey Date: November 16-18, 2022							
Sample No.	Homogenous Material	Location/ Functional Space	Asbestos Content	Friable	Condition	Approx. Quantity	NESHAP Category
Ceiling Materials							
C1-A C1-B C1-C C1-D C1-E C1-F C1-G	Plaster Ceiling – Eggshell Texture	Ceiling Throughout Building – above drop ceilings as well as 1st and 2nd Floors	ND	No	NA	NA	NA
C2-A C2-B C2-C C2-D C2-E C2-F C2-G	Acoustical Ceiling Panel – 2'x4', pinhole and fissures	1st Floor Lobby and Corridors, 2nd Floor Lobby and Corridors/Halls	ND	Yes	NA	NA	NA
C3-A C3-B C3-C	Fiberboard Ceiling – Cork-like with multilayered paint	1st Floor Inspiration Room	ND	No	NA	NA	NA
C4-A C4-B C4-C	Concrete –Gray	Basement Ceiling Throughout	ND	No	NA	NA	NA
Miscellaneous Materials							
*M1-A *M1-B *M1-C	**Pipe Insulation –White Powdery Chalky	Basement / Crawl Space	Pipe Insulation = 50% Chrysotile by TEM	Yes	Fair to Poor	600 LF	RACM
M2-A M2-B M2-C	Patch Material – White, Chalky	Basement	ND	No	NA	NA	NA
M3-A M3-B M3-C	Window Glazing Compound - Red/Gray, Brittle with Gray Non-Fibrous Material	Basement Window (2)	ND	No	NA	NA	NA
M4-A M4-B M4-C	Transite Panel – Green (Chalk Boards)	2nd Floor – Rooms – 243, 246	ND	No	NA	NA	NA
*ND = Non Detect; NA = Not Applicable; SF = Square Feet; TEM = Transmission Electron Microscopy; * = Sample also analyzed by TEM; Friability, Condition, quantity, and NESHAP categories provided for ACMs only.* ***Bold*** *indicates ACM. Bulk sample colors observed in the field may not reflect colors identified within the lab report.*							

**It should be noted that the pipe insulation in the Basement and Crawl Space was noted to be in fair to poor condition and had deteriorated in the crawlspace. Given the condition of the pipe insulation, it is possible that the surrounding materials and the bare soil may be impacted by asbestos from the deteriorated pipe insulation.

2.4 Sampling Limitations and Exclusions

Atlas was unable to conduct a destructive investigation (cutting selective access holes in walls, ceilings, pipe chases, mechanical equipment, etc.) to assess concealed materials that were not readily apparent. Atlas could not conduct fully destructive investigation on floors to identify multi-layered tile/underlayment systems/concealed paper, vapor barriers, floor tiles/mastics under wood floor systems even though we attempted to classify multiple layers when noted. Atlas was unable to conduct destructive investigation of doors in the building to determine if the doors were insulated for fire-rating purposes.

Additional ACM may be present at the Site in inaccessible or concealed spaces. These spaces include, but are not limited to, pipe chases, spaces between wall/ceiling/door/floor cavities, interior of mechanical components such as boiler cavities, interior ducts, beneath foundation pads, etc. If the buildings are being demolished, Atlas recommends that all unidentified materials should be treated as assumed ACM, until analytical tests prove otherwise.

As agreed with the CC BB Brownfields Coalition, prior to the commencement of this ACM survey, Atlas was to exclude sampling of the roofing. Under separate cover, Atlas will provide an ACM Operations and Maintenance Plan for the inaccessible, concealed, and roofing areas excluded from the survey.

Prior to any disturbance of the assumed ACMs in this report, Atlas recommends sampling them to test for the presence of asbestos.

A lead-based paint survey was conducted at the Site as part of this scope of work. Information regarding the lead-based paint survey results will be presented in a separate report.

2.5 Asbestos Regulatory Standards

OSHA and USEPA regulate airborne levels of asbestos fibers. These governmental agencies have promulgated standards for permissible airborne concentrations of asbestos fibers and specific requirements for repair and abatement. The laws are designed to protect the worker (OSHA) and the general environment (USEPA). In addition, each state may have adopted its own requirements, which may be more stringent than those called for by OSHA or the USEPA.

OSHA established an asbestos general industry standard in 1971, primarily directed toward industrial applications, as found in 29 CFR 1910.1001. In response to the growing asbestos abatement industry and the additional concern regarding asbestos exposure, a standard for the construction industry (29 CFR 1926.58) became effective on July 21, 1986. These standards specifically outline asbestos removal procedures, respirator selection and fit testing, air sampling, the analysis of asbestos air samples, and employee protection from exposure to airborne asbestos fibers. The standards include a time-weighted average (TWA) permissible exposure limit (PEL) of 0.2 fibers per cubic centimeter of air (f/cc), and a short-term excursion limit of 1.0 f/cc. Concentrations above these levels require specific employer-initiated activities such as instituting a respiratory protection program and medical surveillance for exposed employees.

OSHA changed these standards in October of 1994 to include the reduction of the PEL for an 8-hour TWA to 0.1 f/cc in its revised construction industry standard of 29 CFR 1926.1101 and the revised general industry standard 29 CFR 1910.1001. These revisions specify that building owners are now required to communicate to employees, subcontractors, and tenants the location and quantity of ACM identified in this survey.

The USEPA has established regulations regarding renovation and demolition projects. These regulations are known as the Asbestos NESHAP regulations found in Title 40, CFR, Part 61, Subpart M. The USEPA Asbestos NESHAP regulations require a thorough inspection for the presence of asbestos prior to any demolition and/or renovation activity. If any asbestos is identified over the established threshold amounts, the USEPA requires a renovation notification to the proper regulatory jurisdiction, proper handling and disposal of any friable ACM or RACM, and the deposit of the asbestos-containing waste material (ACWM) at an approved landfill. In addition, if any structural or load-bearing demolition (total or partial demolition of the building) will occur during the course of the project, a demolition notification must be submitted to the proper regulatory jurisdiction and the friable ACM or RACM must be removed prior to the demolition activity.

Because the Site is located in Gila County, it falls within the ADEQ NESHAP program jurisdiction. According to the ADEQ asbestos NESHAP program, for all demolitions (even when no asbestos is present) and renovation activities involving threshold amounts of RACM, provide the Asbestos NESHAP agency overseeing the project site with a NESHAP notification at least 10 working days prior to the demolition or renovation activity. Threshold amounts of RACM are:

- 260 linear feet or more on pipes
- 160 square feet or more on other facility components
- 35 cubic feet or more off facility components

There are no state notification or permitting fees involved with this program for jurisdictional counties.

2.6 Asbestos Recommendations and Conclusions

Atlas recommends that identified ACM be removed by a qualified asbestos abatement contractor prior to the renovation and/or demolition of the Site buildings.

Atlas recommends an Asbestos Abatement Specification be prepared for use in obtaining bids for the asbestos abatement and subsequent demolition of the buildings.

Contractors and employees working in this building should be made aware of the possibility that concealed ACMs may be found during demolition. They should be advised not to disturb known or suspect ACMs without owner approval.

At the present time, if any renovation or demolition activities are planned and additional suspect ACM is encountered in inaccessible or concealed areas, these materials should be assumed to be ACMs and treated as such until properly sampled by a qualified individual.

The USEPA has not prohibited the manufacture and import of miscellaneous materials containing asbestos, such as vinyl floorings, mastics, roofing materials, etc. As a result, any future replacement materials should be checked for the presence of asbestos prior to installation.

2.7 Asbestos Assumptions and Limitations

The results, findings, conclusions, and recommendations expressed in the report are based only on conditions that were noted during Atlas' survey of the Site. This survey was conducted from November 16 through November 18, 2022.

The selection of sample locations and frequency of sampling was based on Atlas' observations and the assumption that like materials in the same area were homogeneous in content. Destructive investigation was not conducted at the Site. Concealed ACMs may exist in areas not accessible during the inspection. Reasonable efforts have been made by Atlas personnel to locate and sample all suspect ACM. However, the existence of unique or concealed ACM and debris is a possibility. If any additional suspect ACM, not listed in the Survey, will be impacted during future demolition and/or renovation activities, Atlas recommends additional sampling of any suspect ACM.

The report is designed to aid the client in understanding the extent of ACM issues as they pertain to the planned renovation and/or demolition of the buildings. Atlas does not warrant, guarantee or profess to have the ability to locate or identify all ACM in a facility. The intent of this report is to be used in planning for the specific renovation/demolition project only, and is based on the scope of work provided to Atlas by the CC BB Brownfields Coalition. Should the scope of the project change, Atlas recommends that an

additional investigation, including but not limited to, a review of the revised scope of work be performed to determine if ACM or suspect ACM will be impacted.

Appendix A

Certifications: Atlas Staff and Analytical Laboratories

THE ASBESTOS INSTITUTE

Certifies that

Thomas Nelson

has attended and received instruction in the EPA approved course

AHERA Building Inspector Initial

on

November 7-9 2022

and successfully completed and passed the competency exam.

Certificate:
4380-14993-110922

Date of Examination:
09-Nov-2022

Date of Expiration:
09-Nov-2023

William T. Cavness
Director

Approved Instructor

THE ASBESTOS INSTITUTE
20033 N. 19th Ave, Building 6, Phoenix, AZ 85027
602-864-6564 – www.theasbestosinstitute.com

This training meets all requirements for asbestos certification under Toxic Substance Control Act Title II.

THE ASBESTOS INSTITUTE

Certifies that

Chad Wells

has attended and received instruction in the EPA approved course

AHERA Building Inspector Refresher

on

July 26, 2022

and successfully completed and passed the competency exam.

Certificate:
ON-4644-12331-072622

Date of Examination:
26-Jul-2022
Date of Expiration:
26-Jul-2023

William T. Cavness
Director

Approved Instructor

THE ASBESTOS INSTITUTE
20033 N. 19th Ave, Building 6, Phoenix, AZ 85027
602-864-6564 – www.theasbestosinstitute.com

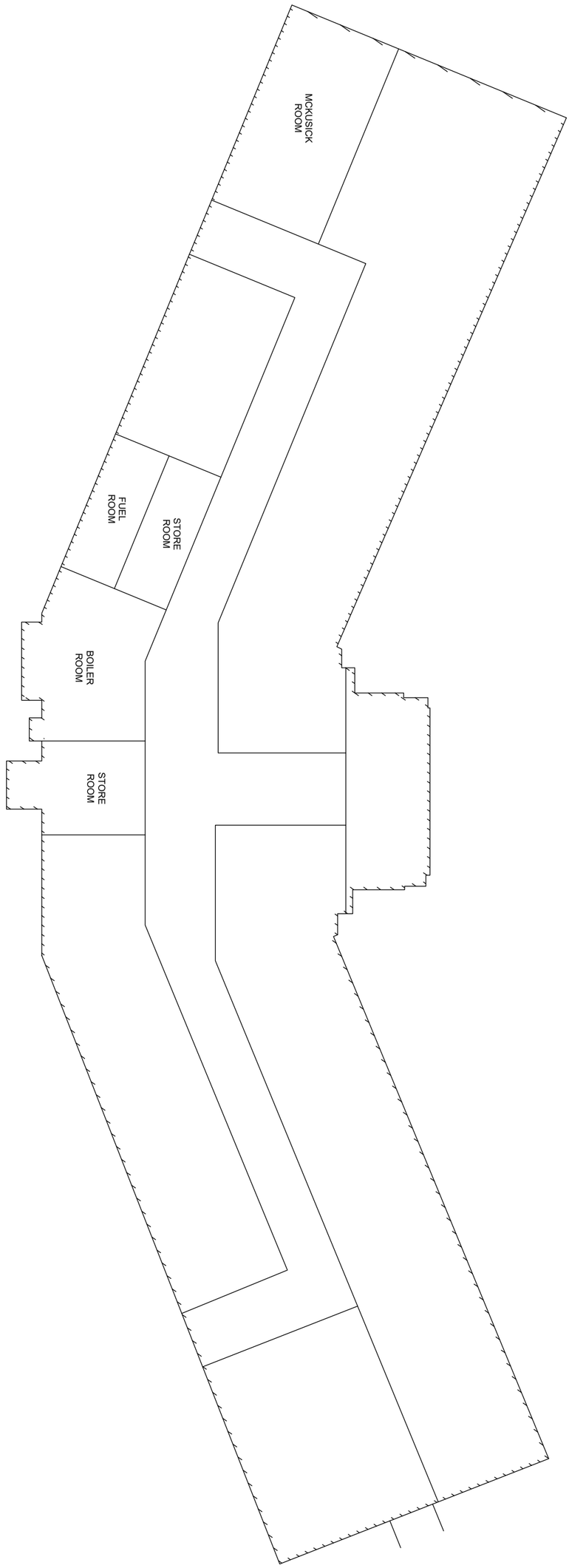
This training meets all requirements for asbestos certification under Toxic Substance Control Act Title II.

Appendix B

Site Plan, Asbestos Sample Location Maps, ACM Location Maps

S:\Projects-BST\Gila County\1052000242 Gila County Grant\Phase 4 Bullion Plaza\CADD\1_SPLN_BASEMENT.dwg

NOT TO SCALE
NOTE: ALL LOCATIONS ARE APPROXIMATE

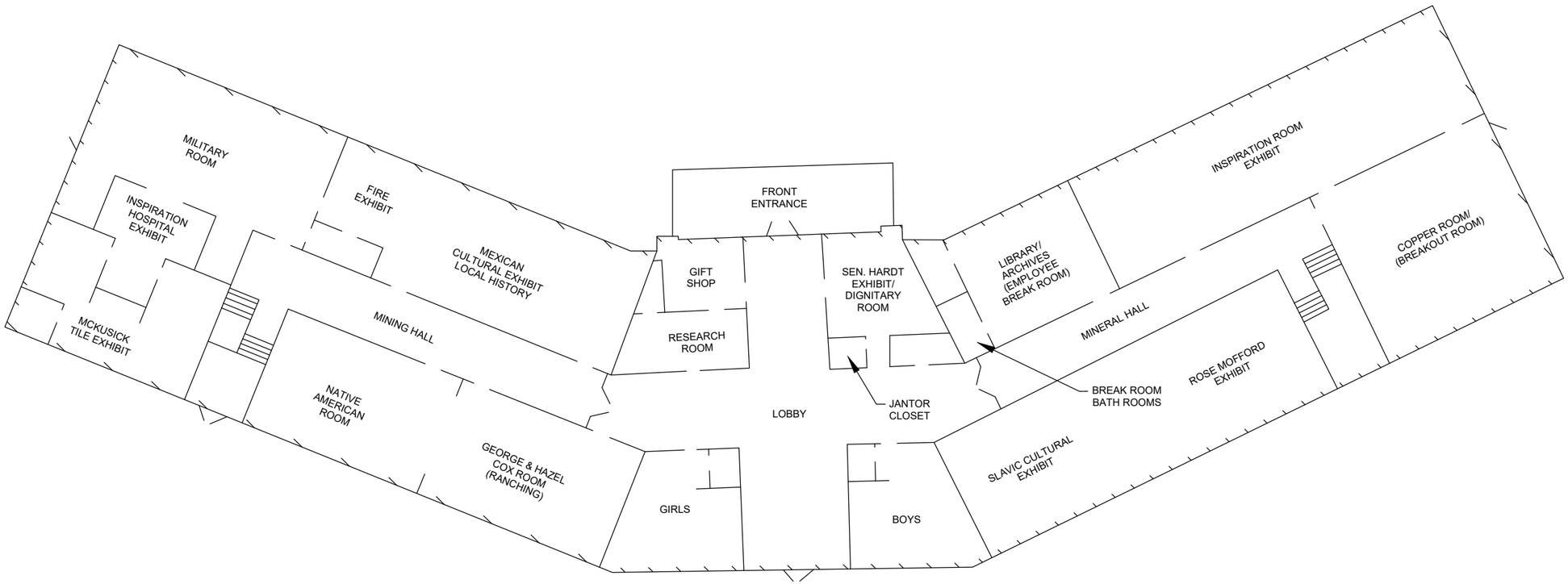


SITE PLAN
BASEMENT

BULLION PLAZA CULTURAL CENTER & MUSEAUM
150 N. PLAZA CIRCLE
MIAMI, AZ

PROJECT NUMBER: 1052000242		DATE: 1/10/23	FIGURE
APPROVED BY: TH		DRAWN BY: BK	1

ATLAS
9185 S. Farmer Ave., Ste. #111
Tempe, Arizona 85284-2912
Ph: (480) 894-2056 *** Fax: (480) 894-2497



NOT TO SCALE
NOTE: ALL LOCATIONS ARE APPROXIMATE

S:\Projects-BST\Gila County\1052000242 Gila County Grant\Phase 4 Bullion Plaza\CADD\2_SPLN_FLR1.dwg

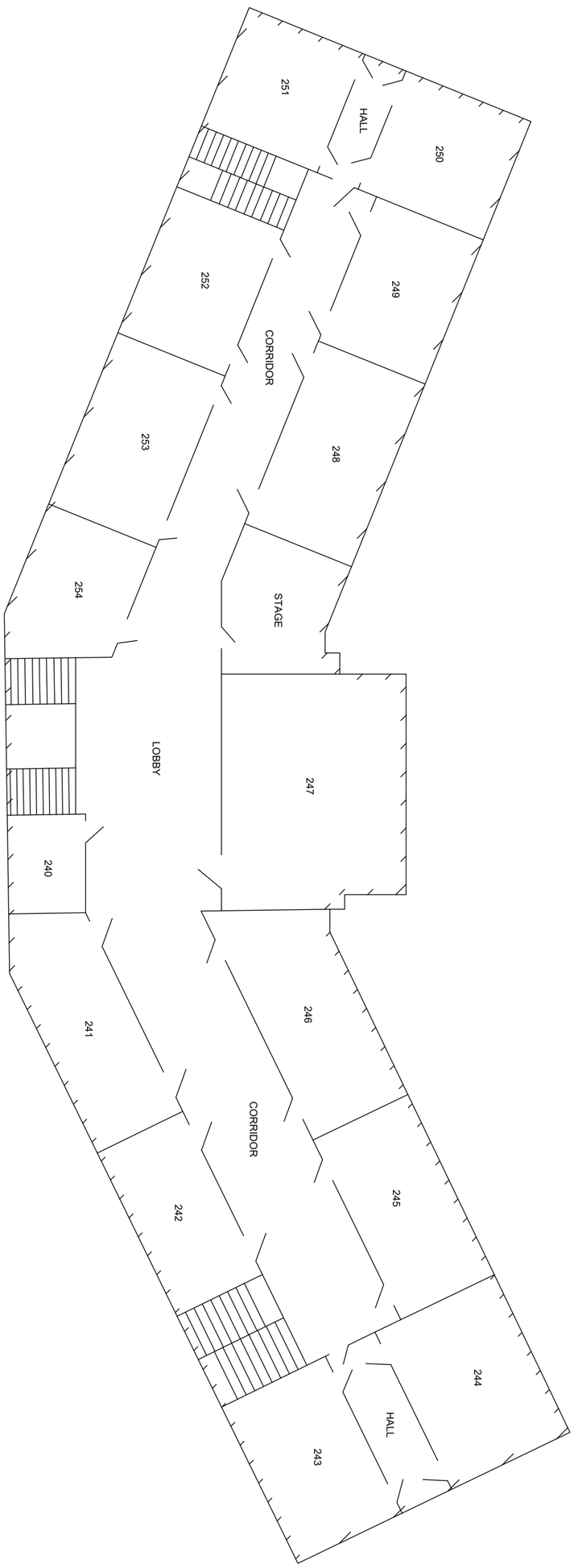
PROJECT NUMBER: 1052000242		DATE: 1/10/23	FIGURE 2
APPROVED BY: TH		DRAWN BY: BK	

ATLAS
9185 S. Farmer Ave., Ste. #111
Tempe, Arizona 85284-2912
Ph: (480) 894-2056 *** Fax: (480) 894-2497

SITE PLAN
FIRST FLOOR
BULLION PLAZA CULTURAL CENTER & MUSEUM
150 N. PLAZA CIRCLE
MIAMI, AZ

S:\Projects-BST\Gila County\1052000242 Gila County Grant\Phase 4 Bullion Plaza\CADD\3_SPLN_FLR2.dwg

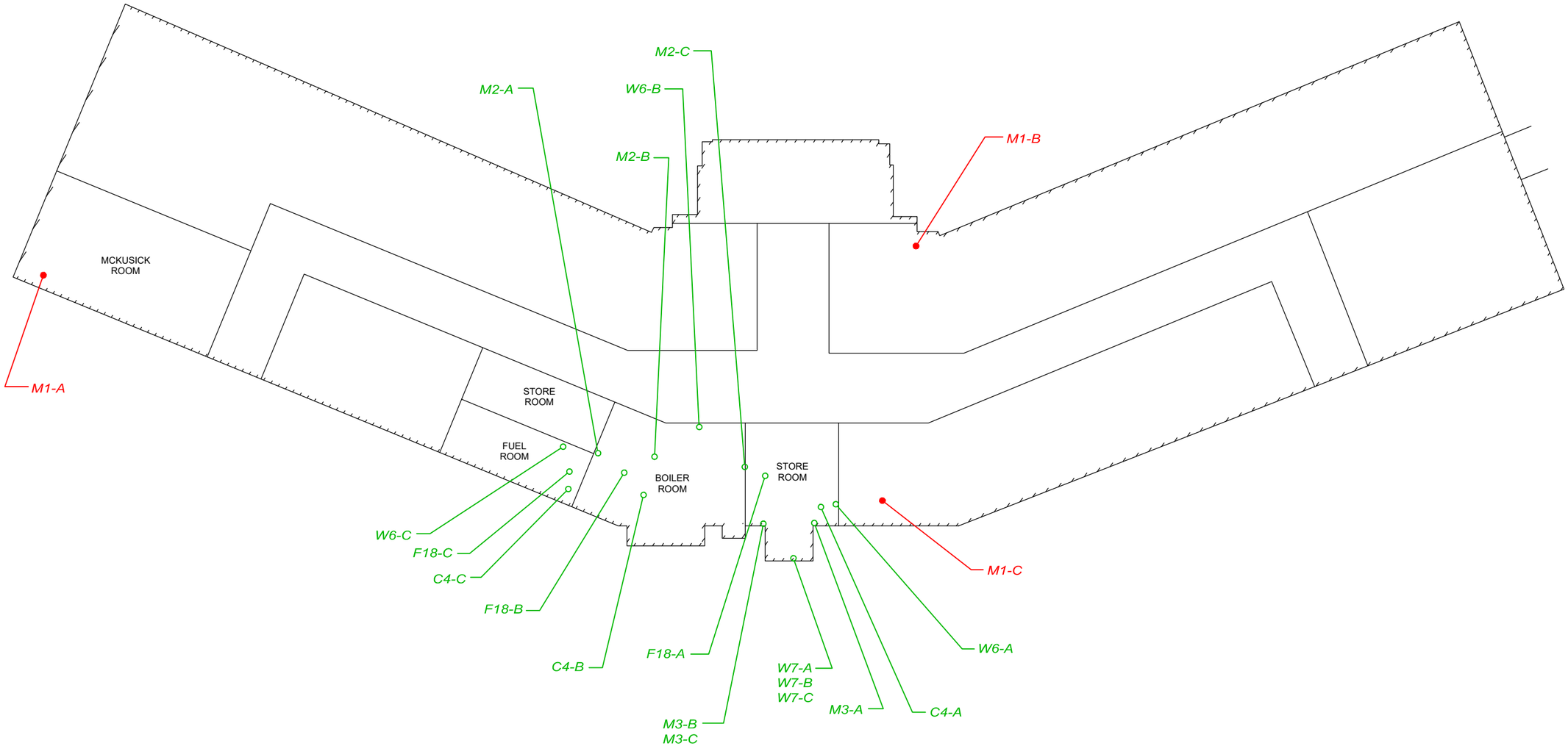
NOT TO SCALE
NOTE: ALL LOCATIONS ARE APPROXIMATE



SITE PLAN
SECOND FLOOR
BULLION PLAZA CULTURAL CENTER & MUSEUM
150 N. PLAZA CIRCLE
MIAMI, AZ

PROJECT NUMBER: 1052000242		DATE: 1/10/23	FIGURE
APPROVED BY: TH		DRAWN BY: BK	3

ATLAS
9185 S. Farmer Ave., Ste. #111
Tempe, Arizona 85284-2912
Ph: (480) 894-2056 *** Fax: (480) 894-2497



LEGEND

- ACM NEGATIVE SAMPLE
- ACM POSITIVE SAMPLE

NOT TO SCALE

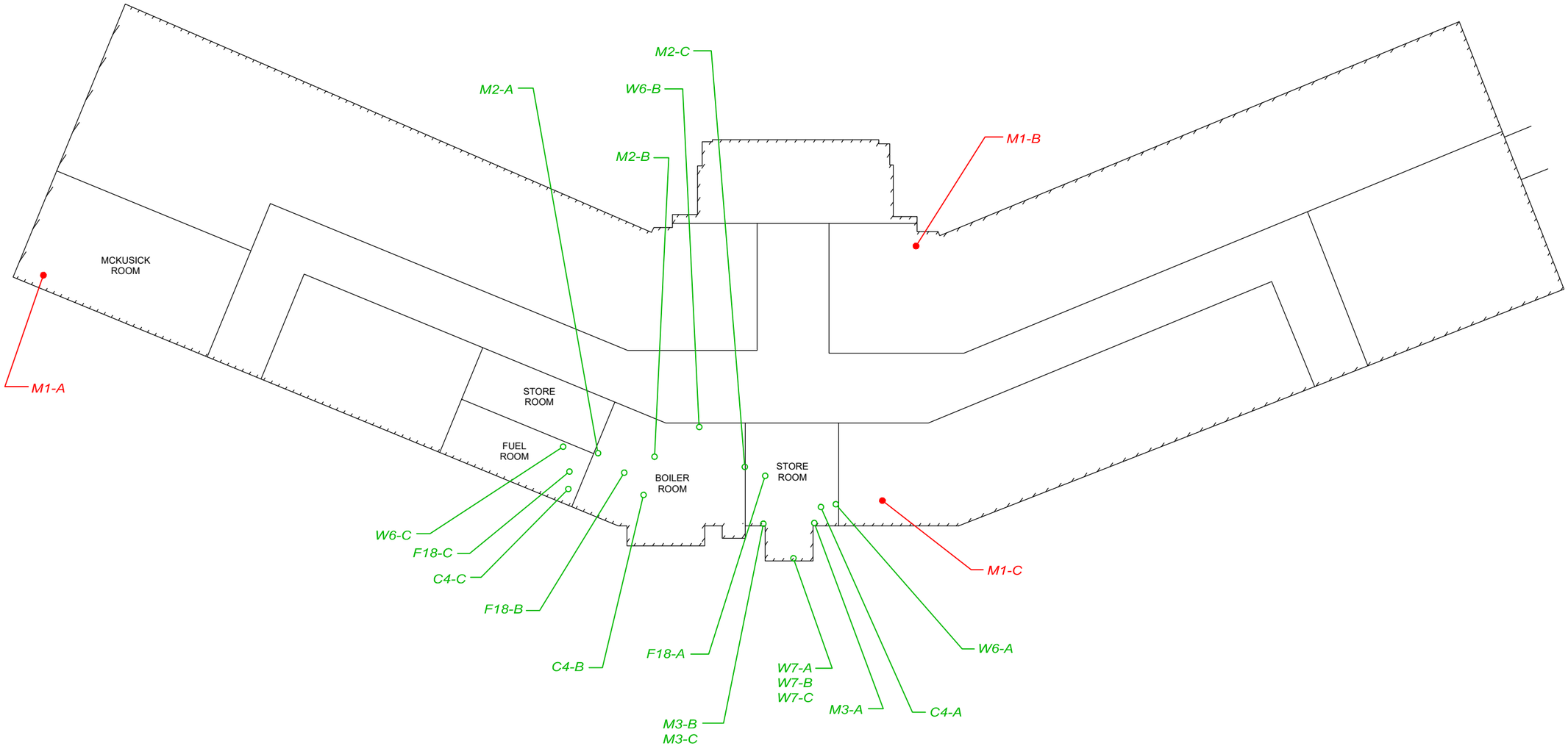
NOTE: ALL LOCATIONS ARE APPROXIMATE

S:\Projects-BST\Gila County\1052000242 Gila County Grant\Phase 4 Bullion Plaza\CADD\4_SMP_BASEMENT.dwg

PROJECT NUMBER: 1052000242
APPROVED BY: TH
DATE: 12/16/22
DRAWN BY: BK
FIGURE 4

ATLAS
9185 S. Farmer Ave., Ste. #111
Tempe, Arizona 85284-2912
Ph: (480) 894-2056 *** Fax: (480) 894-2497

SAMPLE LOCATION MAP
BASEMENT
BULLION PLAZA CULTURAL CENTER & MUSEAUM
150 N. PLAZA CIRCLE
MIAMI, AZ



LEGEND

- ACM NEGATIVE SAMPLE
- ACM POSITIVE SAMPLE

NOT TO SCALE

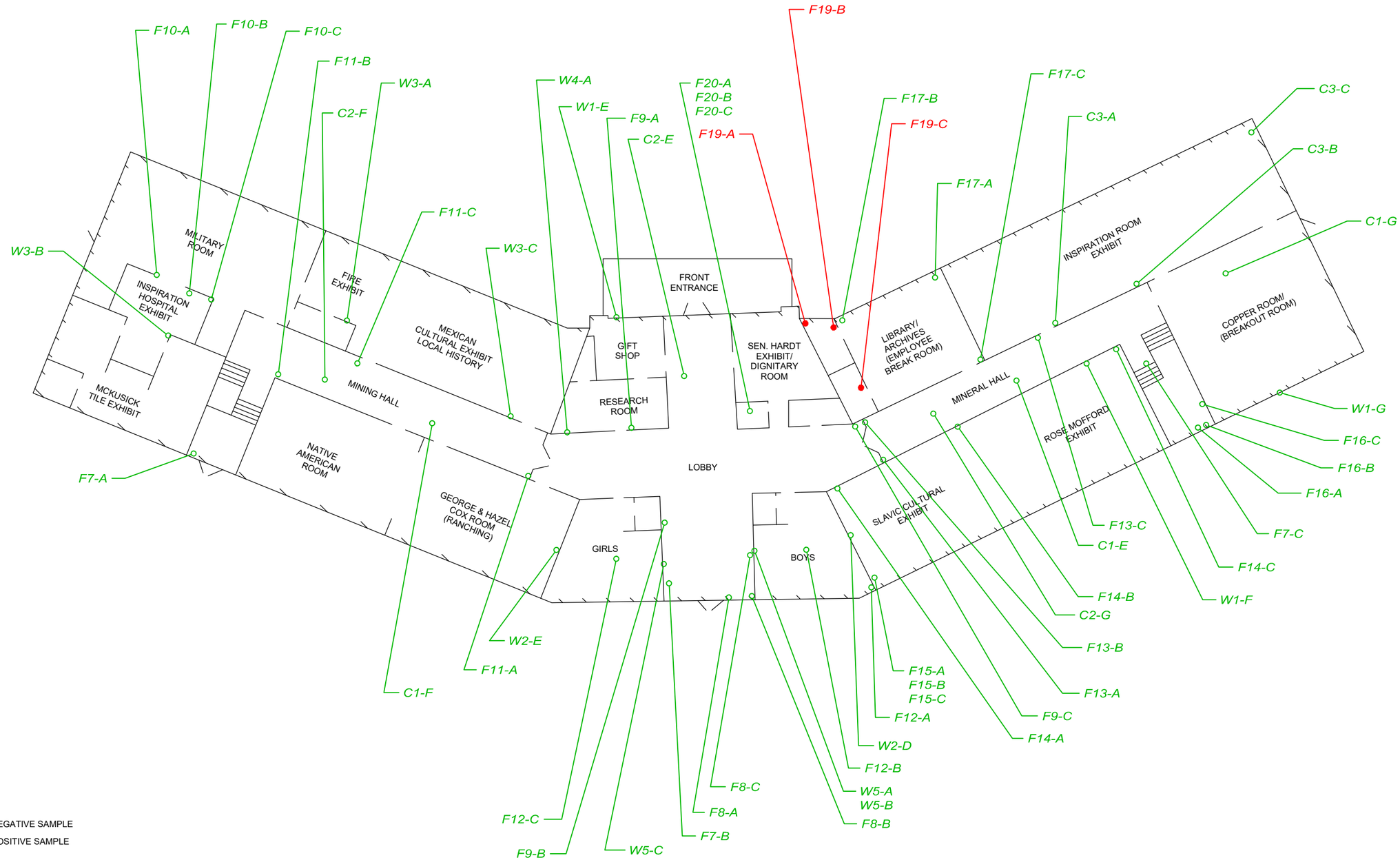
NOTE: ALL LOCATIONS ARE APPROXIMATE

S:\Projects-BST\Gila County\1052000242 Gila County Grant\Phase 4 Bullion Plaza\CADD\4_SMP_BASEMENT.dwg

PROJECT NUMBER: 1052000242
APPROVED BY: TH
DATE: 12/16/22
DRAWN BY: BK
FIGURE 4

ATLAS
9185 S. Farmer Ave., Ste. #111
Tempe, Arizona 85284-2912
Ph: (480) 894-2056 *** Fax: (480) 894-2497

SAMPLE LOCATION MAP
BASEMENT
BULLION PLAZA CULTURAL CENTER & MUSEAUM
150 N. PLAZA CIRCLE
MIAMI, AZ



LEGEND

- ACM NEGATIVE SAMPLE
- ACM POSITIVE SAMPLE

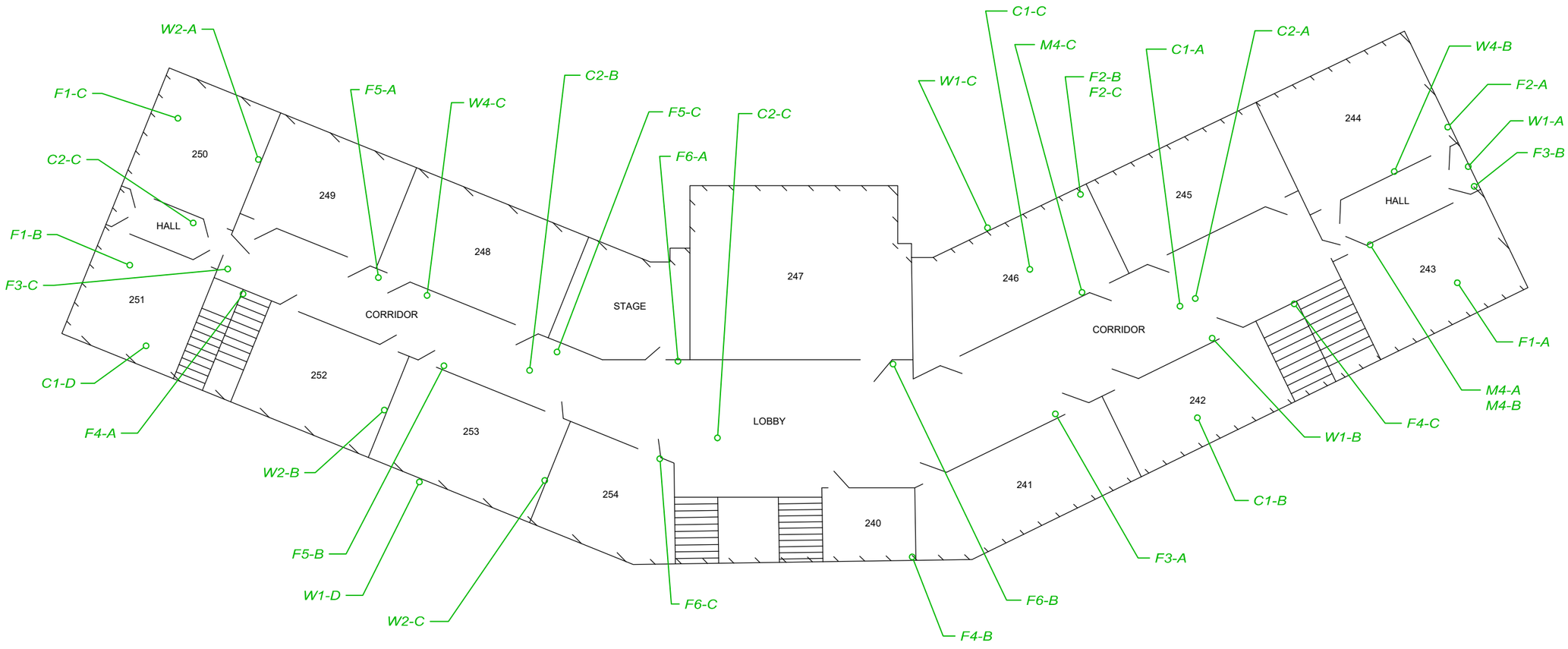
NOT TO SCALE
NOTE: ALL LOCATIONS ARE APPROXIMATE

S:\Projects-BST\Gila County\1052000242 Gila County Grant\Phase 4 Bullion Plaza\CADD\5_SMP_FLR1.dwg

PROJECT NUMBER: 1052000242
APPROVED BY: TH
DATE: 12/16/22
DRAWN BY: BK
FIGURE 5

ATLAS
9185 S. Farmer Ave., Ste. #111
Tempe, Arizona 85284-2912
Ph: (480) 894-2056 *** Fax: (480) 894-2497

SAMPLE LOCATION MAP
FIRST FLOOR
BULLION PLAZA CULTURAL CENTER & MUSEUM
150 N. PLAZA CIRCLE
MIAMI, AZ



LEGEND

- ACM NEGATIVE SAMPLE

NOT TO SCALE
NOTE: ALL LOCATIONS ARE APPROXIMATE

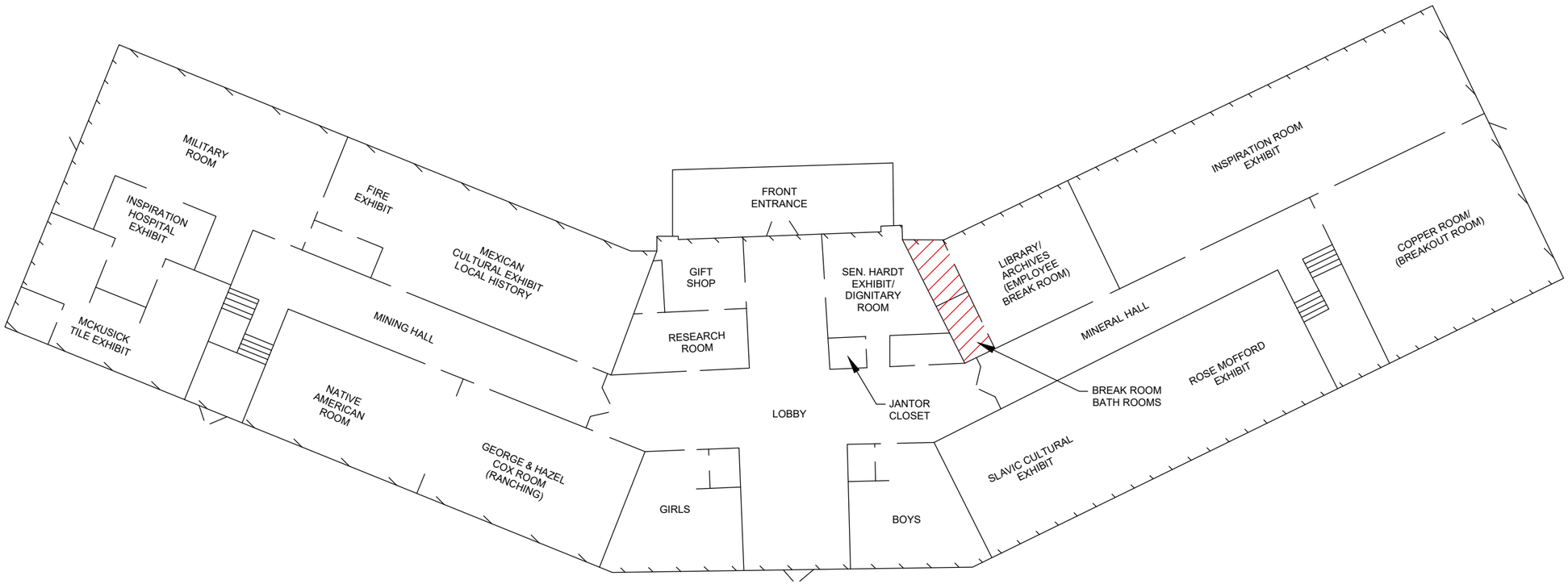
S:\Projects-BST\Gila County\1052000242 Gila County Grant\Phase 4 Bullion Plaza\CADD\6_SMP_FLR2.dwg

PROJECT NUMBER: 1052000242
APPROVED BY: TH
DATE: 12/15/22
DRAWN BY: BK

FIGURE 6

ATLAS
9185 S. Farmer Ave., Ste. #111
Tempe, Arizona 85284-2912
Ph: (480) 894-2056 *** Fax: (480) 894-2497

SAMPLE LOCATION MAP
SECOND FLOOR
BULLION PLAZA CULTURAL CENTER & MUSEUM
150 N. PLAZA CIRCLE
MIAMI, AZ



LEGEND

F19 - ACM FLOOR TILE, CREAM WITH LIGHT GRAY STREAKS & BLACK MASTIC, 2% CHRYSOTILE (~60 S.F.)

NOT TO SCALE

NOTE: ALL LOCATIONS ARE APPROXIMATE

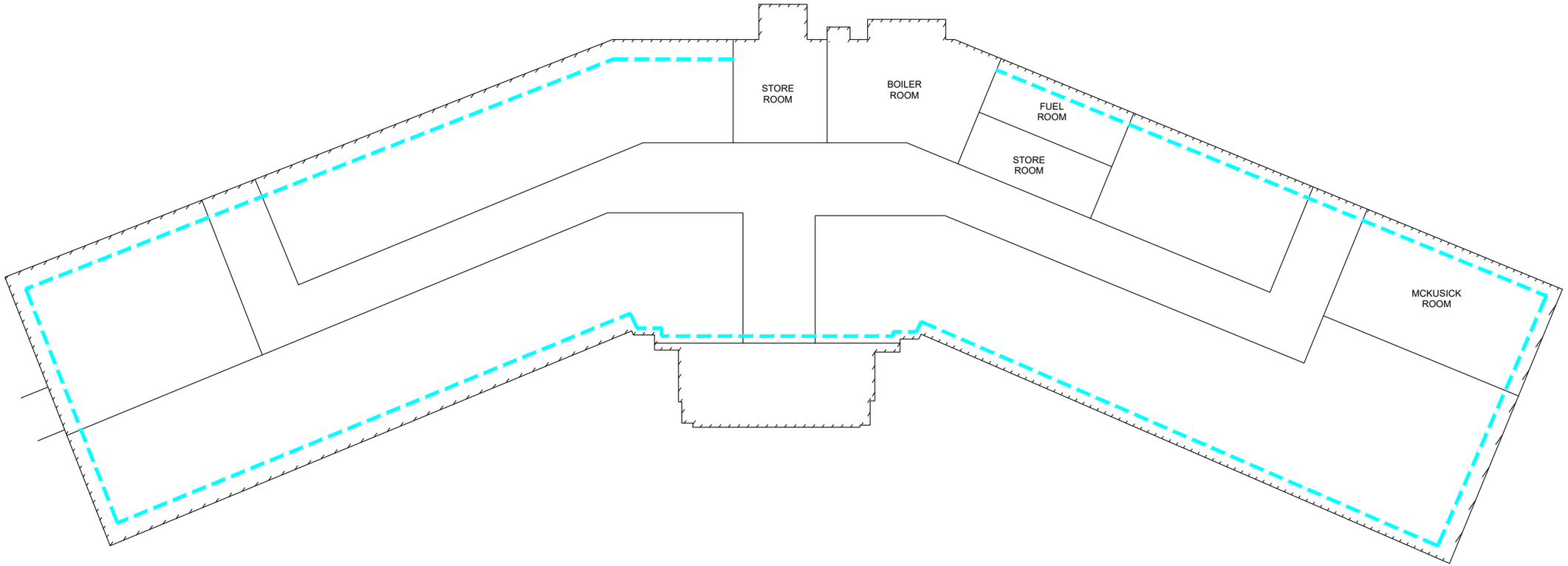
ACM LOCATION MAP
FIRST FLOOR
BULLION PLAZA CULTURAL CENTER & MUSEUM
150 N. PLAZA CIRCLE
MIAMI, AZ

FIGURE 7

PROJECT NUMBER: 1052000242
APPROVED BY: TH
DATE: 12/16/22
DRAWN BY: BK

ATLAS
9185 S. Farmer Ave., Ste. #111
Tempe, Arizona 85284-2912
Ph: (480) 894-2056 *** Fax: (480) 894-2497

S:\Projects-BST\Gila County\1052000242 Gila County Grant\Phase 4 Bullion Plaza\CADD\7_ACM_FLR1.dwg



LEGEND

M1 - ACM PIPE INSULATION, WHITE POWDERY, CHALKY, 50% CHRYSOTILE (~600 L. F.)

NOT TO SCALE

NOTE: ALL LOCATIONS ARE APPROXIMATE

S:\Projects-BST\Gila County\1052000242 Gila County Grant\Phase 4 Bullion Plaza\CADD\8_ACM_BASEMENT.dwg

PROJECT NUMBER: 1052000242	DATE: 12/16/22
APPROVED BY: TH	DRAWN BY: BK

FIGURE 8

ATLAS
9185 S. Farmer Ave., Ste. #111
Tempe, Arizona 85284-2912
Ph: (480) 894-2056 *** Fax: (480) 894-2497

ACM LOCATION MAP
BASEMENT
BULLION PLAZA CULTURAL CENTER & MUSEAUM
150 N. PLAZA CIRCLE
MIAMI, AZ

Appendix C

Analytical Laboratory Reports and Chain-of-Custody Documentation

eurofins | Built Environment Testing

Report for:

Robyn Steiner
Atlas Technical Consultants LLC: AZ
9185 S Farmer Ave Suite 111
Tempe, AZ 85284

Regarding: Eurofins Aerotech Built Environment Testing, Inc.
Project: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ
EML ID: 3090316

Approved by:

Approved Signatory
Renee Luna-Trepczynski

Dates of Analysis:
Asbestos PLM: 11-29-2022

Service SOPs: Asbestos PLM (EPA 40CFR App E to Sub E of Part 763 & EPA METHOD 600/R-93-116, SOP EM-AS-S-1267)
NVLAP Lab Code 500031-0

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

Summary of Samples with Asbestos Detected

Total Samples Submitted:	119
Total Samples Analyzed:	119
Total Layers Analyzed:	180

Total Samples with Layer Asbestos Content > 1%: 6

F19-A, Floor Tile & Mastic
Off-White Floor Tile
Black Mastic
F19-B, Floor Tile & Mastic
Off-White Floor Tile
Black Mastic
F19-C, Floor Tile & Mastic
Off-White Floor Tile
Black Mastic
M1-A, Pipe Insulation
Gray Pipe Insulation
M1-B, Pipe Insulation
Gray Pipe Insulation
M1-C, Pipe Insulation
Gray Pipe Insulation

Total Samples with Layer Asbestos Content < 1%: 0

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: F1-A, Residual Floor Mastic Lab ID-Version‡: 14918765-1

Sample Layers	Asbestos Content
Yellow Mastic	ND
Sample Composite Homogeneity:	Good

Location: F1-B, Residual Floor Mastic Lab ID-Version‡: 14918766-1

Sample Layers	Asbestos Content
Yellow Mastic	ND
Sample Composite Homogeneity:	Good

Location: F1-C, Residual Floor Mastic Lab ID-Version‡: 14918767-1

Sample Layers	Asbestos Content
Yellow Mastic	ND
Sample Composite Homogeneity:	Good

Location: F2-A, Carpet & Mastic Lab ID-Version‡: 14918768-1

Sample Layers	Asbestos Content
Blue Carpet	ND
Yellow Mastic	ND
Composite Non-Asbestos Content:	90% Synthetic Fibers
Sample Composite Homogeneity:	Moderate

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: F2-B, Carpet & Mastic Lab ID-Version‡: 14918769-1

Sample Layers	Asbestos Content
Blue Carpet	ND
Yellow Mastic	ND
Composite Non-Asbestos Content:	90% Synthetic Fibers
Sample Composite Homogeneity:	Moderate

Location: F2-C, Carpet & Mastic Lab ID-Version‡: 14918770-1

Sample Layers	Asbestos Content
Blue Carpet	ND
Yellow Mastic	ND
Composite Non-Asbestos Content:	90% Synthetic Fibers
Sample Composite Homogeneity:	Moderate

Location: F3-A, Carpet & Mastic Lab ID-Version‡: 14918771-1

Sample Layers	Asbestos Content
Red Carpet	ND
Yellow Mastic	ND
Light Brown Woven Material	ND
Composite Non-Asbestos Content:	75% Synthetic Fibers 15% Cellulose
Sample Composite Homogeneity:	Poor

Location: F3-B, Carpet & Mastic Lab ID-Version‡: 14918772-1

Sample Layers	Asbestos Content
Red Carpet	ND
Yellow Mastic	ND
Light Brown Woven Material	ND
Composite Non-Asbestos Content:	75% Synthetic Fibers 15% Cellulose
Sample Composite Homogeneity:	Poor

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: F3-C, Carpet & Mastic

Lab ID-Version‡: 14918773-1

Sample Layers	Asbestos Content
Red Carpet	ND
Yellow Mastic	ND
Light Brown Woven Material	ND
Composite Non-Asbestos Content:	75% Synthetic Fibers 15% Cellulose
Sample Composite Homogeneity:	Poor

Location: F4-A, Stair Tread & Mastic

Lab ID-Version‡: 14918774-1

Sample Layers	Asbestos Content
Red Flooring	ND
Dark Brown Mastic	ND
Sample Composite Homogeneity:	Moderate

Location: F4-B, Stair Tread & Mastic

Lab ID-Version‡: 14918775-1

Sample Layers	Asbestos Content
Red Flooring	ND
Dark Brown Mastic	ND
Sample Composite Homogeneity:	Moderate

Location: F4-C, Stair Tread & Mastic

Lab ID-Version‡: 14918776-1

Sample Layers	Asbestos Content
Red Flooring	ND
Dark Brown Mastic	ND
Sample Composite Homogeneity:	Moderate

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: F5-A, Carpet & Mastic

Lab ID-Version‡: 14918777-1

Sample Layers	Asbestos Content
Red Carpet	ND
Yellow Mastic	ND
Light Brown Woven Material	ND
Composite Non-Asbestos Content:	75% Synthetic Fibers 15% Cellulose
Sample Composite Homogeneity:	Poor

Location: F5-B, Carpet & Mastic

Lab ID-Version‡: 14918778-1

Sample Layers	Asbestos Content
Red Carpet	ND
Yellow Mastic	ND
Light Brown Woven Material	ND
Composite Non-Asbestos Content:	75% Synthetic Fibers 15% Cellulose
Sample Composite Homogeneity:	Poor

Location: F5-C, Carpet & Mastic

Lab ID-Version‡: 14918779-1

Sample Layers	Asbestos Content
Red Carpet	ND
Yellow Mastic	ND
Light Brown Woven Material	ND
Composite Non-Asbestos Content:	75% Synthetic Fibers 15% Cellulose
Sample Composite Homogeneity:	Poor

Location: F6-A, Vinyl Sheet Flooring

Lab ID-Version‡: 14918780-1

Sample Layers	Asbestos Content
Light Gray Sheet Flooring	ND
Sample Composite Homogeneity:	Good

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: F6-B, Vinyl Sheet Flooring Lab ID-Version‡: 14918781-1

Sample Layers	Asbestos Content
Light Gray Sheet Flooring	ND
Sample Composite Homogeneity:	Good

Location: F6-C, Vinyl Sheet Flooring Lab ID-Version‡: 14918782-1

Sample Layers	Asbestos Content
Light Gray Sheet Flooring	ND
Sample Composite Homogeneity:	Good

Location: F7-A, Floor Tile & Mastic Lab ID-Version‡: 14918783-1

Sample Layers	Asbestos Content
Red Floor Tile	ND
Yellow Mastic	ND
Sample Composite Homogeneity:	Moderate

Location: F7-B, Floor Tile & Mastic Lab ID-Version‡: 14918784-1

Sample Layers	Asbestos Content
Red Floor Tile	ND
Yellow Mastic	ND
Sample Composite Homogeneity:	Moderate

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: F7-C, Floor Tile & Mastic Lab ID-Version‡: 14918785-1

Sample Layers	Asbestos Content
Red Floor Tile	ND
Yellow Mastic	ND
Sample Composite Homogeneity:	Moderate

Location: F8-A, Floor Coating Lab ID-Version‡: 14918786-1

Sample Layers	Asbestos Content
Gray Coating	ND
Sample Composite Homogeneity:	Good

Location: F8-B, Floor Coating Lab ID-Version‡: 14918787-1

Sample Layers	Asbestos Content
Gray Coating	ND
Sample Composite Homogeneity:	Good

Location: F8-C, Floor Coating Lab ID-Version‡: 14918788-1

Sample Layers	Asbestos Content
Gray Coating	ND
Sample Composite Homogeneity:	Good

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: F9-A, Carpet & Mastic

Lab ID-Version‡: 14918789-1

Sample Layers	Asbestos Content
Red Carpet	ND
Yellow Mastic	ND
Light Brown Woven Material	ND
Composite Non-Asbestos Content:	75% Synthetic Fibers 15% Cellulose
Sample Composite Homogeneity:	Poor

Location: F9-B, Carpet & Mastic

Lab ID-Version‡: 14918790-1

Sample Layers	Asbestos Content
Red Carpet	ND
Yellow Mastic	ND
Light Brown Woven Material	ND
Composite Non-Asbestos Content:	75% Synthetic Fibers 15% Cellulose
Sample Composite Homogeneity:	Poor

Location: F9-C, Carpet & Mastic

Lab ID-Version‡: 14918791-1

Sample Layers	Asbestos Content
Red Carpet	ND
Yellow Mastic	ND
Light Brown Woven Material	ND
Composite Non-Asbestos Content:	75% Synthetic Fibers 15% Cellulose
Sample Composite Homogeneity:	Poor

Location: F10-A, Vinyl Sheet Flooring

Lab ID-Version‡: 14918792-1

Sample Layers	Asbestos Content
Multicolored Sheet Flooring	ND
Sample Composite Homogeneity:	Good

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: F10-B, Vinyl Sheet Flooring Lab ID-Version‡: 14918793-1

Sample Layers	Asbestos Content
Multicolored Sheet Flooring	ND
Sample Composite Homogeneity:	Good

Location: F10-C, Vinyl Sheet Flooring Lab ID-Version‡: 14918794-1

Sample Layers	Asbestos Content
Multicolored Sheet Flooring	ND
Sample Composite Homogeneity:	Good

Location: F11-A, Epoxy Coated Concrete Lab ID-Version‡: 14918795-1

Sample Layers	Asbestos Content
Gray Concrete Epoxy	ND
Gray Concrete	ND
Sample Composite Homogeneity:	Moderate

Location: F11-B, Epoxy Coated Concrete Lab ID-Version‡: 14918796-1

Sample Layers	Asbestos Content
Gray Concrete Epoxy	ND
Gray Concrete	ND
Sample Composite Homogeneity:	Moderate

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: F11-C, Epoxy Coated Concrete Lab ID-Version‡: 14918797-1

Sample Layers	Asbestos Content
Gray Concrete Epoxy	ND
Gray Concrete	ND
Sample Composite Homogeneity:	Moderate

Location: F12-A, Ceramic Tile & Grout Lab ID-Version‡: 14918798-1

Sample Layers	Asbestos Content
Beige Ceramic Tile Debris	ND
Sample Composite Homogeneity:	Good

Location: F12-B, Ceramic Tile & Grout Lab ID-Version‡: 14918799-1

Sample Layers	Asbestos Content
Beige Ceramic Tile Debris	ND
Sample Composite Homogeneity:	Good

Location: F12-C, Ceramic Tile & Grout Lab ID-Version‡: 14918800-1

Sample Layers	Asbestos Content
Beige Ceramic Tile Debris	ND
Sample Composite Homogeneity:	Good

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: F13-A, Carpet & Mastic Lab ID-Version‡: 14918801-1

Sample Layers	Asbestos Content
Brown Carpet	ND
Yellow Mastic	ND
Composite Non-Asbestos Content:	30% Synthetic Fibers
Sample Composite Homogeneity:	Moderate

Location: F13-B, Carpet & Mastic Lab ID-Version‡: 14918802-1

Sample Layers	Asbestos Content
Brown Carpet	ND
Yellow Mastic	ND
Composite Non-Asbestos Content:	30% Synthetic Fibers
Sample Composite Homogeneity:	Moderate

Location: F13-C, Carpet & Mastic Lab ID-Version‡: 14918803-1

Sample Layers	Asbestos Content
Brown Carpet	ND
Yellow Mastic	ND
Composite Non-Asbestos Content:	30% Synthetic Fibers
Sample Composite Homogeneity:	Moderate

Location: F14-A, Carpet & Mastic Lab ID-Version‡: 14918804-1

Sample Layers	Asbestos Content
Green Carpet	ND
Yellow Mastic	ND
Composite Non-Asbestos Content:	30% Synthetic Fibers
Sample Composite Homogeneity:	Moderate

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: F14-B, Carpet & Mastic Lab ID-Version‡: 14918805-1

Sample Layers	Asbestos Content
Green Carpet	ND
Yellow Mastic	ND
Composite Non-Asbestos Content:	30% Synthetic Fibers
Sample Composite Homogeneity:	Moderate

Location: F14-C, Carpet & Mastic Lab ID-Version‡: 14918806-1

Sample Layers	Asbestos Content
Green Carpet	ND
Yellow Mastic	ND
Composite Non-Asbestos Content:	30% Synthetic Fibers
Sample Composite Homogeneity:	Moderate

Location: F15-A, Vinyl Sheet Flooring Lab ID-Version‡: 14918807-1

Sample Layers	Asbestos Content
Light Gray Sheet Flooring with Fibrous Backing	ND
Composite Non-Asbestos Content:	5% Cellulose 2% Glass Fibers
Sample Composite Homogeneity:	Good

Location: F15-B, Vinyl Sheet Flooring Lab ID-Version‡: 14918808-1

Sample Layers	Asbestos Content
Light Gray Sheet Flooring with Fibrous Backing	ND
Composite Non-Asbestos Content:	5% Cellulose 2% Glass Fibers
Sample Composite Homogeneity:	Good

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: F15-C, Vinyl Sheet Flooring

Lab ID-Version‡: 14918809-1

Sample Layers	Asbestos Content
Light Gray Sheet Flooring with Fibrous Backing	ND
Composite Non-Asbestos Content:	5% Cellulose 2% Glass Fibers
Sample Composite Homogeneity:	Good

Location: F16-A, Ceramic Tile & Grout

Lab ID-Version‡: 14918810-1

Sample Layers	Asbestos Content
Beige Ceramic Tile	ND
Gray Grout	ND
Sample Composite Homogeneity:	Moderate

Location: F16-B, Ceramic Tile & Grout

Lab ID-Version‡: 14918811-1

Sample Layers	Asbestos Content
Beige Ceramic Tile	ND
Gray Grout	ND
Sample Composite Homogeneity:	Moderate

Location: F16-C, Ceramic Tile & Grout

Lab ID-Version‡: 14918812-1

Sample Layers	Asbestos Content
Beige Ceramic Tile	ND
Gray Grout	ND
Sample Composite Homogeneity:	Moderate

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: F17-A, Carpet & Mastic

Lab ID-Version‡: 14918813-1

Sample Layers	Asbestos Content
Brown/Gray Carpet	ND
Yellow Mastic	ND
Composite Non-Asbestos Content:	25% Synthetic Fibers
Sample Composite Homogeneity:	Moderate

Location: F17-B, Carpet & Mastic

Lab ID-Version‡: 14918814-1

Sample Layers	Asbestos Content
Brown/Gray Carpet	ND
Yellow Mastic	ND
Composite Non-Asbestos Content:	25% Synthetic Fibers
Sample Composite Homogeneity:	Moderate

Location: F17-C, Carpet & Mastic

Lab ID-Version‡: 14918815-1

Sample Layers	Asbestos Content
Brown/Gray Carpet	ND
Yellow Mastic	ND
Composite Non-Asbestos Content:	25% Synthetic Fibers
Sample Composite Homogeneity:	Moderate

Location: F18-A, Concrete

Lab ID-Version‡: 14918816-1

Sample Layers	Asbestos Content
Gray Concrete with Multilayered Coating	ND
Sample Composite Homogeneity:	Good

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: F18-B, Concrete Lab ID-Version‡: 14918817-1

Sample Layers	Asbestos Content
Gray Concrete with Multilayered Coating	ND
Sample Composite Homogeneity:	Good

Location: F18-C, Concrete Lab ID-Version‡: 14918818-1

Sample Layers	Asbestos Content
Gray Concrete with Multilayered Coating	ND
Sample Composite Homogeneity:	Good

Location: F19-A, Floor Tile & Mastic Lab ID-Version‡: 14918819-1

Sample Layers	Asbestos Content
Off-White Floor Tile	< 1% Chrysotile
Black Mastic	2% Chrysotile
Sample Composite Homogeneity:	Moderate

Location: F19-B, Floor Tile & Mastic Lab ID-Version‡: 14918820-1

Sample Layers	Asbestos Content
Off-White Floor Tile	< 1% Chrysotile
Black Mastic	2% Chrysotile
Sample Composite Homogeneity:	Moderate

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: F19-C, Floor Tile & Mastic Lab ID-Version‡: 14918821-1

Sample Layers	Asbestos Content
Off-White Floor Tile	< 1% Chrysotile
Black Mastic	2% Chrysotile
Sample Composite Homogeneity:	Moderate

Location: F20-A, Ceramic Tile Lab ID-Version‡: 14918822-1

Sample Layers	Asbestos Content
White Ceramic Tile	ND
Sample Composite Homogeneity:	Good

Location: F20-B, Ceramic Tile Lab ID-Version‡: 14918823-1

Sample Layers	Asbestos Content
White Ceramic Tile	ND
Sample Composite Homogeneity:	Good

Location: F20-C, Ceramic Tile Lab ID-Version‡: 14918824-1

Sample Layers	Asbestos Content
White Ceramic Tile	ND
Sample Composite Homogeneity:	Good

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: W1-A, Plaster Walls Lab ID-Version‡: 14918825-1

Sample Layers	Asbestos Content
Brown/Gray Plaster with Multilayered Paint	ND
Sample Composite Homogeneity:	Good

Location: W1-B, Plaster Walls Lab ID-Version‡: 14918826-1

Sample Layers	Asbestos Content
Brown/Gray Plaster with Multilayered Paint	ND
Sample Composite Homogeneity:	Good

Location: W1-C, Plaster Walls Lab ID-Version‡: 14918827-1

Sample Layers	Asbestos Content
Brown/Gray Plaster with Multilayered Paint	ND
Sample Composite Homogeneity:	Good

Location: W1-D, Plaster Walls Lab ID-Version‡: 14918828-1

Sample Layers	Asbestos Content
White Skim Coat with Multilayered Paint	ND
Brown/Gray Base Coat	ND
Sample Composite Homogeneity:	Moderate

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: W1-E, Plaster Walls Lab ID-Version‡: 14918829-1

Sample Layers	Asbestos Content
White Skim Coat with Multilayered Paint	ND
Brown/Gray Base Coat	ND
Sample Composite Homogeneity:	Moderate

Location: W1-F, Plaster Walls Lab ID-Version‡: 14918830-1

Sample Layers	Asbestos Content
White Plaster with Pink Paint	ND
Sample Composite Homogeneity:	Good

Location: W1-G, Plaster Walls Lab ID-Version‡: 14918831-1

Sample Layers	Asbestos Content
White Plaster with Pink Paint	ND
Sample Composite Homogeneity:	Good

Location: W2-A, Plaster Walls Lab ID-Version‡: 14918832-1

Sample Layers	Asbestos Content
Brown/Gray Plaster with White Paint	ND
Sample Composite Homogeneity:	Good

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: W2-B, Plaster Walls Lab ID-Version‡: 14918833-1

Sample Layers	Asbestos Content
Brown/Gray Plaster with White Paint	ND
Sample Composite Homogeneity:	Good

Location: W2-C, Plaster Walls Lab ID-Version‡: 14918834-1

Sample Layers	Asbestos Content
Brown/Gray Plaster with White Paint	ND
Sample Composite Homogeneity:	Good

Location: W2-D, Plaster Walls Lab ID-Version‡: 14918835-1

Sample Layers	Asbestos Content
Brown/Gray Plaster with White Paint	ND
Sample Composite Homogeneity:	Good

Location: W2-E, Plaster Walls Lab ID-Version‡: 14918836-1

Sample Layers	Asbestos Content
Brown/Gray Plaster with White Paint	ND
Sample Composite Homogeneity:	Good

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: W3-A, Vinyl Covered Drywall Lab ID-Version‡: 14918837-1

Sample Layers	Asbestos Content
White Skim Coat with Gray Paint	ND
Sample Composite Homogeneity:	Good

Location: W3-B, Vinyl Covered Drywall Lab ID-Version‡: 14918838-1

Sample Layers	Asbestos Content
White Skim Coat with Gray Paint	ND
Sample Composite Homogeneity:	Good

Location: W3-C, Vinyl Covered Drywall Lab ID-Version‡: 14918839-1

Sample Layers	Asbestos Content
White Skim Coat with Gray Paint	ND
Sample Composite Homogeneity:	Good

Location: W4-A, Cove Base & Mastic Lab ID-Version‡: 14918840-1

Sample Layers	Asbestos Content
Black Baseboard	ND
Dark Brown Mastic	ND
Sample Composite Homogeneity:	Moderate

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: W4-B, Cove Base & Mastic Lab ID-Version‡: 14918841-1

Sample Layers	Asbestos Content
Black Baseboard	ND
Dark Brown Mastic	ND
Sample Composite Homogeneity:	Moderate

Location: W4-C, Cove Base & Mastic Lab ID-Version‡: 14918842-1

Sample Layers	Asbestos Content
Black Baseboard	ND
Dark Brown Mastic	ND
Sample Composite Homogeneity:	Moderate

Location: W5-A, Glazed Wall Tile Lab ID-Version‡: 14918843-1

Sample Layers	Asbestos Content
White Cementitious Material	ND
Sample Composite Homogeneity:	Good

Location: W5-B, Glazed Wall Tile Lab ID-Version‡: 14918844-1

Sample Layers	Asbestos Content
White Cementitious Material	ND
Sample Composite Homogeneity:	Good

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: W5-C, Glazed Wall Tile

Lab ID-Version‡: 14918935-1

Sample Layers	Asbestos Content
White Cementitious Material	ND
Sample Composite Homogeneity:	Good

Location: W6-A, Concrete

Lab ID-Version‡: 14918936-1

Sample Layers	Asbestos Content
Off-White Compound with Multilayered Paint	ND
Gray Concrete	ND
Sample Composite Homogeneity:	Moderate

Location: W6-B, Concrete

Lab ID-Version‡: 14918937-1

Sample Layers	Asbestos Content
Off-White Compound with Multilayered Paint	ND
Gray Concrete	ND
Sample Composite Homogeneity:	Moderate

Location: W6-C, Concrete

Lab ID-Version‡: 14918938-1

Sample Layers	Asbestos Content
Off-White Compound with Multilayered Paint	ND
Gray Concrete	ND
Sample Composite Homogeneity:	Moderate

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: W7-A, Brick & Mortar Lab ID-Version‡: 14918939-1

Sample Layers	Asbestos Content
White Compound with Yellow Mastic	ND
Gray Brick	ND
Gray Mortar	ND
Sample Composite Homogeneity:	Poor

Location: W7-B, Brick & Mortar Lab ID-Version‡: 14918940-1

Sample Layers	Asbestos Content
White Compound with Yellow Mastic	ND
Gray Brick	ND
Gray Mortar	ND
Sample Composite Homogeneity:	Poor

Location: W7-C, Brick & Mortar Lab ID-Version‡: 14918941-1

Sample Layers	Asbestos Content
White Compound with Yellow Mastic	ND
Gray Brick	ND
Gray Mortar	ND
Sample Composite Homogeneity:	Poor

Location: C1-A, Plaster Ceilings Lab ID-Version‡: 14918942-1

Sample Layers	Asbestos Content
Gray Plaster with Multilayered Paint	ND
Sample Composite Homogeneity:	Good

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: C1-B, Plaster Ceilings Lab ID-Version‡: 14918943-1

Sample Layers	Asbestos Content
Gray Plaster with Multilayered Paint	ND
Sample Composite Homogeneity:	Good

Location: C1-C, Plaster Ceilings Lab ID-Version‡: 14918944-1

Sample Layers	Asbestos Content
Gray Plaster with Multilayered Paint	ND
Sample Composite Homogeneity:	Good

Location: C1-D, Plaster Ceilings Lab ID-Version‡: 14918945-1

Sample Layers	Asbestos Content
Gray Plaster with Multilayered Paint	ND
Sample Composite Homogeneity:	Good

Location: C1-E, Plaster Ceilings Lab ID-Version‡: 14918946-1

Sample Layers	Asbestos Content
Gray Plaster with Multilayered Paint	ND
Sample Composite Homogeneity:	Good

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: C1-F, Plaster Ceilings

Lab ID-Version‡: 14918947-1

Sample Layers	Asbestos Content
Gray Plaster with Multilayered Paint	ND
Sample Composite Homogeneity:	Good

Location: C1-G, Plaster Ceilings

Lab ID-Version‡: 14918948-1

Sample Layers	Asbestos Content
Gray Plaster with Multilayered Paint	ND
Sample Composite Homogeneity:	Good

Location: C2-A, Acoustical Ceiling Panes

Lab ID-Version‡: 14918949-1

Sample Layers	Asbestos Content
Gray Ceiling Tile with White Surface	ND
Composite Non-Asbestos Content:	40% Cellulose 20% Glass Fibers
Sample Composite Homogeneity:	Good

Location: C2-B, Acoustical Ceiling Panes

Lab ID-Version‡: 14918950-1

Sample Layers	Asbestos Content
Gray Ceiling Tile with White Surface	ND
Composite Non-Asbestos Content:	40% Cellulose 20% Glass Fibers
Sample Composite Homogeneity:	Good

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: C2-C, Acoustical Ceiling Panes

Lab ID-Version‡: 14918951-1

Sample Layers	Asbestos Content
Gray Ceiling Tile with White Surface	ND
Composite Non-Asbestos Content:	40% Cellulose 20% Glass Fibers
Sample Composite Homogeneity:	Good

Location: C2-D, Acoustical Ceiling Panes

Lab ID-Version‡: 14918952-1

Sample Layers	Asbestos Content
Gray Ceiling Tile with White Surface	ND
Composite Non-Asbestos Content:	40% Cellulose 20% Glass Fibers
Sample Composite Homogeneity:	Good

Location: C2-E, Acoustical Ceiling Panes

Lab ID-Version‡: 14918953-1

Sample Layers	Asbestos Content
Gray Ceiling Tile with White Surface	ND
Composite Non-Asbestos Content:	40% Cellulose 20% Glass Fibers
Sample Composite Homogeneity:	Good

Location: C2-F, Acoustical Ceiling Panes

Lab ID-Version‡: 14918954-1

Sample Layers	Asbestos Content
Gray Ceiling Tile with White Surface	ND
Composite Non-Asbestos Content:	40% Cellulose 20% Glass Fibers
Sample Composite Homogeneity:	Good

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: C2-G, Acoustical Ceiling Panes

Lab ID-Version‡: 14918955-1

Sample Layers	Asbestos Content
Gray Ceiling Tile with White Surface	ND
Composite Non-Asbestos Content:	40% Cellulose 20% Glass Fibers
Sample Composite Homogeneity:	Good

Location: C3-A, Fiberboard Ceiling

Lab ID-Version‡: 14918956-1

Sample Layers	Asbestos Content
Brown Fiberboard with Multilayered Paint	ND
Composite Non-Asbestos Content:	80% Cellulose
Sample Composite Homogeneity:	Good

Location: C3-B, Fiberboard Ceiling

Lab ID-Version‡: 14918957-1

Sample Layers	Asbestos Content
Brown Fiberboard with Multilayered Paint	ND
Composite Non-Asbestos Content:	80% Cellulose
Sample Composite Homogeneity:	Good

Location: C3-C, Fiberboard Ceiling

Lab ID-Version‡: 14918958-1

Sample Layers	Asbestos Content
Brown Fiberboard with Multilayered Paint	ND
Composite Non-Asbestos Content:	80% Cellulose
Sample Composite Homogeneity:	Good

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: C4-A, Concrete Lab ID-Version‡: 14918959-1

Sample Layers	Asbestos Content
Gray Concrete	ND
Sample Composite Homogeneity:	Good

Location: C4-B, Concrete Lab ID-Version‡: 14918960-1

Sample Layers	Asbestos Content
Gray Concrete	ND
Sample Composite Homogeneity:	Good

Location: C4-C, Concrete Lab ID-Version‡: 14918961-1

Sample Layers	Asbestos Content
Gray Concrete	ND
Sample Composite Homogeneity:	Good

Location: M1-A, Pipe Insulation Lab ID-Version‡: 14918962-1

Sample Layers	Asbestos Content
Gray Pipe Insulation	50% Chrysotile
Composite Non-Asbestos Content:	5% Cellulose
Sample Composite Homogeneity:	Good

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: M1-B, Pipe Insulation

Lab ID-Version‡: 14918963-1

Sample Layers	Asbestos Content
Gray Pipe Insulation	50% Chrysotile
Composite Non-Asbestos Content:	5% Cellulose
Sample Composite Homogeneity:	Good

Location: M1-C, Pipe Insulation

Lab ID-Version‡: 14918964-1

Sample Layers	Asbestos Content
Gray Pipe Insulation	50% Chrysotile
Composite Non-Asbestos Content:	5% Cellulose
Sample Composite Homogeneity:	Good

Location: M2-A, Patch Material

Lab ID-Version‡: 14918965-1

Sample Layers	Asbestos Content
White Compound	ND
Sample Composite Homogeneity:	Good

Location: M2-B, Patch Material

Lab ID-Version‡: 14918966-1

Sample Layers	Asbestos Content
White Compound	ND
Sample Composite Homogeneity:	Good

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: M2-C, Patch Material

Lab ID-Version‡: 14918967-1

Sample Layers	Asbestos Content
White Compound	ND
Sample Composite Homogeneity:	Good

Location: M3-A, Window Glazing Compound

Lab ID-Version‡: 14918968-1

Sample Layers	Asbestos Content
Red Window Glazing	ND
Composite Non-Asbestos Content:	< 1% Cellulose < 1% Wollastonite
Sample Composite Homogeneity:	Good

Location: M3-B, Window Glazing Compound

Lab ID-Version‡: 14918969-1

Sample Layers	Asbestos Content
Red Window Glazing	ND
Gray Non-Fibrous Material	ND
Composite Non-Asbestos Content:	< 1% Cellulose < 1% Wollastonite
Sample Composite Homogeneity:	Moderate

Location: M3-C, Window Glazing Compound

Lab ID-Version‡: 14918970-1

Sample Layers	Asbestos Content
Red Window Glazing	ND
Gray Non-Fibrous Material	ND
Composite Non-Asbestos Content:	< 1% Cellulose < 1% Wollastonite
Sample Composite Homogeneity:	Moderate

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

Eurofins Aerotech Built Environment Testing, Inc.
1501 West Knudsen Drive, Phoenix, AZ 85027
(800) 651-4802 www.eurofinsus.com/Built

Client: Atlas Technical Consultants LLC: AZ
C/O: Robyn Steiner
Re: ADEQ Bullion Plaza Cultural center; 150 N. Plaza Circle, Miami, AZ

Date of Sampling: 11-18-2022
Date of Receipt: 11-21-2022
Date of Report: 11-29-2022

ASBESTOS PLM REPORT

Location: M4-A, Transite Panels Lab ID-Version‡: 14918971-1

Sample Layers	Asbestos Content
Black Transite Panel with Green Paint	ND
Sample Composite Homogeneity:	Good

Location: M4-B, Transite Panels Lab ID-Version‡: 14918972-1

Sample Layers	Asbestos Content
Black Transite Panel with Green Paint	ND
Sample Composite Homogeneity:	Good

Location: M4-C, Transite Panels Lab ID-Version‡: 14918973-1

Sample Layers	Asbestos Content
Black Transite Panel with Green Paint	ND
Sample Composite Homogeneity:	Good

Inhomogeneous samples are separated into homogeneous subsamples and analyzed individually. ND means no fibers were detected. When detected, the minimum detection and reporting limit is less than 1% unless point counting is performed. Floor tile samples may contain large amounts of interference material and it is recommended that the sample be analyzed by gravimetric point count analysis to lower the detection limit and to aid in asbestos identification.
‡ A "Version" indicated by -"x" after the Lab ID# with a value greater than 1 indicates a sample with amended data. The revision number is reflected by the value of "x".

ATLAS

9185 South Farmer Avenue, Suite 111
Tempe, Arizona 85284
Phone: (480) 894-2056
Fax: (480) 894-2497

003090316

- CHAIN OF CUSTODY

Project Name: ADEQ Bullion Plaza Cultural Center + Museum Project Number: 1052000242

Project Location: 150 N. Plaza Circle, Miami, AZ Sample Date: 11/18/2022

Turn-Around Time/Due Date: Normal Turn Around Time

Special Instructions: Contact - Robyn Steiner, robyn.steiner@oncatlas.com

Samples Collected by: Chad Wells (Print Name) (Signature)

SAMPLE NUMBER	LAB ID	MATERIAL DESCRIPTION	SAMPLE LOCATION
F1-A		Residual Floor Mastic	
B		"	
C		"	
F2-A		Carpet + Mastic	
B		"	
C		"	
F3-A		Carpet + Mastic	
B		"	
C		"	
F4-A		Stair Tread + Mastic	
B		"	
C		"	
F5-A		Carpet + Mastic	
B		"	
C		"	
F6-A		Vinyl Sheet Flooring	
B		"	
C		"	
F7-A		Floor Tile + Mastic	
B		"	
C		"	
F8-A		Floor Coating	
B		"	
C		"	
F9-A		Carpet + Mastic	
B		"	
C		"	
F10-A		Vinyl Sheet Flooring	
B		"	
C		"	

Relinquished by:	Received by:	Date/Time:
(Print) Chad Wells	(Print)	11-21-22
(Signature)	(Signature)	9:45 am

ATLAS
9185 South Farmer Avenue, Suite 111
Tempe, Arizona 85284
Phone: (480) 894-2056
Fax: (480) 894-2497

003090316

LM - CHAIN OF CUSTODY

Project Name: ADEQ · Bullion Plaza Cultural Center + Museum Project Number: 1052000242

Project Location: 150 N. Plaza Circle, Miami, AZ Sample Date: 11/18/2022

Turn-Around Time/Due Date: Normal Turn Around Time

Special Instructions: Contact - Robyn Steiner, robyn.steiner@oncatlas.com

Samples Collected by: Chad Wells (Print Name) (Signature)

SAMPLE NUMBER	LAB ID	MATERIAL DESCRIPTION	SAMPLE LOCATION
F11-A		Epoxy Coated Concrete	
B		"	
C		"	
F12-A		Ceramic Tile + Grout	
B		"	
C		"	
F13-A		Carpet + Mastic	
B		"	
C		"	
F14-A		Carpet + Mastic	
B		"	
C		"	
F15-A		Vinyl Sheet Flooring	
B		"	
C		"	
F16-A		Ceramic Tile + Grout	
B		"	
C		"	
F17-A		Carpet + Mastic	
B		"	
C		"	
F18-A		Concrete	
B		"	
C		"	
F19-A		Floor Tile + Mastic	
B		"	
C		"	
F20-A		Ceramic Tile	
B		"	
C		"	

Relinquished by:	Received by:	Date/Time:
(Print) Chad Wells	(Print)	
(Signature)	(Signature)	

ATLAS

9185 South Farmer Avenue, Suite 111
Tempe, Arizona 85284
Phone: (480) 894-2056
Fax: (480) 894-2497

003090316

LM - CHAIN OF CUSTODY

Project Name: ADEQ · Bullion Plaza Cultural Center + Museum Project Number: 1052000242

Project Location: 150 N. Plaza Circle, Miami, AZ Sample Date: 11/18/2022

Turn-Around Time/Due Date: Normal Turn Around Time

Special Instructions: Contact - Robyn Steiner, robyn.steiner@oncatlas.com

Samples Collected by: Chad Wells (Print Name) (Signature)

SAMPLE NUMBER	LAB ID	MATERIAL DESCRIPTION	SAMPLE LOCATION
W1-A		Plaster walls	
B		"	
C		"	
D		"	
E		"	
F		"	
G		"	
W2-A		Plaster walls	
B		"	
C		"	
D		"	
E		"	
W3-A		Vinyl Covered Drywall	
B		"	
C		"	
W4-A		Cove Base + Mastic	
B		"	
C		"	
W5-A		Glazed Wall Tile	
B		"	
C		"	
W6-A		Concrete	
B		"	
C		"	
W7-A		Brick + Mortar	
B		"	
C		"	
C1-A		Plaster Ceilings	
B		"	
C		"	

Relinquished by:	Received by:	Date/Time:
(Print) Chad Wells	(Print)	
(Signature)	(Signature)	

ATLAS
9185 South Farmer Avenue, Suite 111
Tempe, Arizona 85284
Phone: (480) 894-2056
Fax: (480) 894-2497

003090316

_M - CHAIN OF CUSTODY

Project Name: ADEQ Bullion Plaza Cultural Center + Museum Project Number: 1052000242

Project Location: 150 N. Plaza Circle, Miami, AZ Sample Date: 11/18/2022

Turn-Around Time/Due Date: Normal Turn Around Time

Special Instructions: Contact - Robyn Steiner, robyn.steiner@oncatlas.com

Samples Collected by: Chad Wells (Print Name) (Signature)

SAMPLE NUMBER	LAB ID	MATERIAL DESCRIPTION	SAMPLE LOCATION
C1 - D		Plaster Ceilings	
E		"	
F		"	
G		"	
C2 - A		Acoustical Ceiling Panels	
B		"	
C		"	
D		"	
E		"	
F		"	
G		"	
C3 - A		Fiberboard Ceiling	
B		"	
C		"	
C4 - A		Concrete	
B		"	
C		"	
M1 - A		Pipe Insulation	
B		"	
C		"	
M2 - A		Patch Material	
B		"	
C		"	
M3 - A		Window Glazing Compound	
B		"	
C		"	
M4 - A		Transite Panels	
B		"	
C		"	

Relinquished by:	Received by:	Date/Time:
(Print) Chad Wells	(Print)	
(Signature)	(Signature)	

eurofins | Built Environment Testing

Report for:

Robyn Steiner
Atlas Technical Consultants LLC: AZ
9185 S Farmer Ave Suite 111
Tempe, AZ 85284

Regarding: Eurofins Aerotech Built Environment Testing, Inc.
Project: ADEQ Bullion Plaza Cultural Center; 150 N. Plaza Circle, Miami, AZ
EML ID: 3090316

Approved by:

Operations Manager
Joshua Cox

Dates of Analysis:
Asbestos PLM: 11-29-2022
Asbestos TEM Chatfield (sub-contracted): 12-29-2022

Project SOPs: Asbestos PLM (EPA 40CFR App E to Sub E of Part 763 & EPA METHOD 600/R-93-116, SOP EM-AS-S-1267)

All samples were received in acceptable condition unless noted in the Report Comments portion in the body of the report. Due to the nature of the analyses performed, field blank correction of results is not applied. The results relate only to the samples as received and tested.

Eurofins J3 Resources, Inc.
6110 W. 34th Street, Houston, Texas 77092
Phone: (713) 290-0221 Fax: (713) 290-0248
j3resources.com

eurofins | J3 Resources

Bulk Asbestos Fiber Analysis by Transmission Electron Microscopy (TEM)
EPA 600/R-93/116 – Section 2.5.5.2 (Chatfield Semi-Quantitative)

Shannon Nast
Eurofins Aerotech
1501 W Knudsen Drive
Phoenix, AZ 85027

EJ3 Order #: JH22142684
Project #: 3090316
Receipt Date: 21-Dec-2022
Analysis Date: 29-Dec-2022
Report Date: 29-Dec-2022

EMLab ID 3090316

Client ID	Material Description	Percent Organics	Percent Carbonate	Percent Residue	Asbestos Type(s)	Percent Asbestos
F7-A	Floor Tile	10.83%	87.25%	1.92%	**None Detected**	**<0.01%**
F7-A	Mastic	50.77%	1.54%	47.69%	**None Detected**	**<0.01%**
F7-B	Floor Tile	10.87%	87.44%	1.70%	**None Detected**	**<0.01%**
F7-B	Mastic	42.27%	16.49%	41.24%	**None Detected**	**<0.01%**
F7-C	Floor Tile	9.92%	88.94%	1.14%	**None Detected**	**<0.01%**
F7-C	Mastic	48.15%	5.56%	46.30%	**None Detected**	**<0.01%**
F19-A	Floor Tile	17.89%	69.40%	12.71%	**Chrysotile**	**2.54%**
F19-A	Mastic	65.67%	12.69%	21.64%	**Chrysotile**	**1.08%**
F19-B	Floor Tile	21.56%	66.71%	11.73%	**Chrysotile**	**2.35%**
F19-B	Mastic	50.47%	27.10%	22.43%	**Chrysotile**	**1.12%**
F19-C	Floor Tile	23.00%	65.50%	11.50%	**Chrysotile**	**2.30%**
F19-C	Mastic	52.68%	22.32%	25.00%	**Chrysotile**	**1.25%**
M1-A	Pipe Insulation	35.34%	21.85%	42.81%	**Chrysotile**	**17.12%**
M1-B	Pipe Insulation	30.59%	24.08%	45.34%	**Chrysotile**	**18.13%**
M1-C	Pipe Insulation	34.72%	14.35%	50.93%	**Chrysotile**	**20.37%**

Analyst: Scott M. Ward

Scott M. Ward, Ph. D. **Lab Director**

NVLAP Lab Code: 200525-0; TDSHS License: 30-0273

Revision #v9/MF
Revision Date: 8/27/2021

IH CHAIN OF CUSTODY

eurofins | J3 Resources

☐ Open Lab Fee

Eurofins J3 Order # (Lab Use only) 142684

Submitter Name:	Shannon Nast	**Bill to:**	Eurofins Aerotech
Company:	Eurofins EMLab P&K Phoenix	**Address:**	
Address:	1501 W Knudsen Drive		
		City/State:	**Zip:**
City/State:	Phoenix AZ **Zip:** 85027	**PO #:**	

Project Information

Project Name: EMLab ID 3090316	Project Manager: Shannon Nast
Project #:	Telephone – Office/Cell
Reports - Email Address: Shannon.Nast@et.eurofinsus.com	
Invoice - Email Address:	Notification By: Email: ☐ Verbal: ☐
Special Instructions: Chatfield method	

Turnaround Times – Please Select One

Emergency* ☐	1 Day ☐	2 Day ☐	3 Day ☐	5 Day ☑

ASBESTOS

PLM - Bulk	PCM - Air	TEM - Air	TEM - Bulk	TEM - Water	TEM - Dust	TEM/PLM Soil/Vermiculite/Ore
EPA 600/R-93/116 ○ Visual Estimation (<1%) ○ 400 Point Count 0.25% ○ 1,000 Point Count 0.1% ○ Gravimetric Reduction ○ Matrix Reduction (+/-) ○ **NIOSH 9002** ○ **OSHA ID-191**	○ **NIOSH 7400** ○ **ASTM D7201** ○ **ISO 8672** ○ **OSHA ID-160**	○ **AHERA** ○ **NIOSH 7402** ○ **ASTM D6281** ○ **ISO 10312** ○ **ISO 13794**	⊠ Gravimetric Reduction (<1%) ○ Matrix Reduction (+/-) ○ Qualitative (+/-) ○ Drop Mount ○ Filtration	○ **EPA 100.2** Drinking Water ○ >10 µm fibers ○ ≥0.5 µm fibers ○ **EPA 100.2** Effluent / WW Received on ice: ○ Yes ○ No Temp: _____	○ **ASTM D5755** Microvac ○ **ASTM D6480** Wipe ○ **600/J-93/167** Carpet - EPA ○ Bulk Dust Qualitative	○ **ASTM 7521**-TEM (+/-) ○ **ASTM 7521**-TEM (<1%) ○ **CARB 435**-Modified ○ Soil – PLM Only (+/-) ○ Vermiculite - TEM (+/-) ○ Vermiculite-Cincinnati ○ Erionite ID

METALS

Flame AA	Graphite Furnace AA - LEAD	ICP
○ Lead in Paint – **SW846 7420/3050B** ○ Lead in Air – **NIOSH 7082** ○ Lead in Wipes – **SW846 7420/3050B** ○ Lead in Soil – **SW846 7420/3050B** ○ TCLP – **SW846-7420/1311**	○ Drinking Water – **EPA 200.9** ○ Wastewater – **SW846-7421** ○ Soil/Sludge – **SW846-7421** ○ Air – **NIOSH 7105**	○ Elements in Air – **NIOSH 7300** ○ Wipe/Soil – **SW846-6010B** ○ Effluent – **SW846-6010B** ○ Welding Fume – **NIOSH 7300M**

SILICA/PARTICULATES

X-Ray Diffraction / Gravimetric / Combustion Byproduct
○ Respirable Crystalline Silica **NIOSH 7500 / OSHA 142** ○ **NIOSH 0500** – Total Particulates ○ **NIOSH 0600** – Respirable Particulates **ASTM 6602 - CBP** ○ PLM ○ TEM ○ SEM

Total Number of Samples Submitted: 15

Positive Stop: ⊡ NO ☐ YES ○ By Layer ○ By Sample

Signatures

Relinquished By:	[signature]	**Date:** 12/20/22	**Time:** 3:00 pm
Received By:	[signature]	**Date:** 12/21/22	**Time:** 11:30 AM
Relinquished By:		**Date:**	**Time:**
Received By:		**Date:**	**Time:**

** Emergency TAT requires prior lab notification. All samples analyzed outside normal business hours are charged at Emergency rate.*
***TAT's are in Business Days rather than Hours (i.e.1 Day TAT = End of Next Business Day)*

Revision #v7/MF
Revision Date: 3/09/2020

IH CHAIN OF CUSTODY

eurofins | J3 Resources

Project Name EMLab ID 3090316
Project Number _____

Page ____ of ____

SAMPLE IDENTIFICATION

SAMPLE NUMBER	SAMPLE LOCATION / MATERIAL	VOLUME/CONDITION
F7-A	Floor Tile & Mastic	
F7-B	Floor Tile & Mastic	
F7-C	Floor Tile & Mastic	
F19-A	Floor Tile & Mastic	
F19-B	Floor Tile & Mastic	
F19-C	Floor Tile & Mastic	
M1-A	Pipe Insulation	
M1-B	Pipe Insulation	
M1-C	Pipe Insulation	

Comments/Special Instructions:

Eurofins J3 Resources, Inc. • 6110 West 34th Street • Houston, Texas 77092 • tel: 713-290-0221 • fax: 713-290-0248
Eurofins J3 Resources, Inc. • 3113 Red Bluff Road • Pasadena, Texas 77503 • tel: 713-290-0223 • fax: 713-290-0248

Appendix D

Prior Reports

Asbestos and Lead Survey Report of Findings
150 North Plaza Circle
Miami, Arizona

Prepared for:

Arizona Department of Environmental Quality
1100 West Washington Street
Phoenix, Arizona 85007

Prepared by:

Amec Foster Wheeler Environment & Infrastructure, Inc.
4600 East Washington Street, Suite 600
Phoenix, Arizona

October 20, 2016

Project No. 14-2016-2027

October 20, 2016
Project No. 14-2016-2027

Arizona Department of Environmental Quality
1110 West Washington Street
Phoenix, Arizona 85007

Attn: Ms. Jennie E. Curé

Re: Asbestos and Lead Survey Report of Findings
FY17 ABRC TO – Bullion Plaza Cultural Center & Museum – Basement Areas
150 North Plaza Circle
Miami, Arizona
ADEQ No: ADEQ14-076786

Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) is pleased to submit this report of findings for the asbestos and lead survey conducted for the basement areas of the Bullion Plaza Cultural Center and Museum located at 150 North Plaza Circle in Miami, Arizona. Amec Foster Wheeler has performed the work outlined in the report's scope of services.

This report describes the scope, procedures, summary of findings, and qualifications of the asbestos survey. The types, locations, and estimated quantities of asbestos and lead-containing materials are identified. Additionally, laboratory analysis reports and personnel accreditations are included in the report appendices.

Amec Foster Wheeler appreciates this opportunity to provide professional consulting services to the Arizona Department of Environmental Quality and we look forward to continuing our relationship.

Respectfully submitted,

Amec Foster Wheeler
Environment & Infrastructure, Inc.

Pamela Walrath
EPA Building Inspector

Reviewed by:

Tim Ostapuk, CIEC
Senior Project Manager

4600 East Washington Street, Suite 600
Phoenix, Arizona 85034
Tel (602) 733-6000
Fax (602)733-6100
www.amecfw.com

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

EXECUTIVE SUMMARY

At the request of the Arizona Department of Environmental Quality (ADEQ), Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) is providing this Asbestos and Lead Survey Report of Findings for the basement area of the Bullion Plaza Cultural Center & Museum located at 150 North Plaza Circle in Miami, Arizona (the site). The basement is comprised of four areas described as entry, boiler room, left room and right room as well as a crawlspace under the two wings of the building. Our survey is intended to provide information to ADEQ regarding the presence and location of asbestos-containing materials (ACMs) and lead-based paint that comprise these areas.

Of the 15 suspect materials identified by Amec Foster Wheeler, five (5) of the materials were determined by laboratory analysis to contain asbestos in excess of one percent (1%) or assumed to contain asbestos. Materials containing more than 1% are considered asbestos containing as defined by the United States Environmental Protection Agency (USEPA) and Occupational Safety and Health Administration. The five ACMs identified are:

- Material #3 (Thermal Systems Insulation (TSI), Straight Runs – Approximately 400 linear feet (lin. ft.) – Throughout Basement and Crawlspaces.
- Material #4 (Thermal Systems Insulation (TSI), Elbows) - Approximately 15 each – Throughout Basement Spaces (including confined space).
- Material #15 (Miscellaneous, Category I Non-Friable): Gray Gaskets – Approximately 2 each – Boiler room on equipment
- Assumed ACM (Thermal Systems Insulation (TSI), Boiler Insulation Wrap – Approximately 2 each – On Boiler Equipment
- Assumed ACM (Miscellaneous, Category I Non-Friable), Disposal Bags of Removed Building Material – Approximately 20 each

The building components tested for lead-based paints had concentrations of lead ranging from 200 to 3,900 parts per million (ppm). All of the building components tested by paint chip analysis contained concentrations of lead less than 5,000 parts per million milligrams (ppm) and or 0.5% by weight. Paint that contains concentrations of lead equal to or greater than 5,000 ppm and or 0.5% by weight is considered lead-based paint as defined by the United States Department of Housing and Urban Development and the USEPA. However, any detectable lead in paint makes it lead paint for purposes of complying with OSHA regulations and determining worker exposure.

1.0 PROJECT INFORMATION

At the request of the Arizona Department of Environmental Quality (ADEQ), Amec Foster Wheeler Environment & Infrastructure, Inc. (Amec Foster Wheeler) is providing this Asbestos and Lead Survey Report of Findings for the basement areas located at 150 North Plaza Circle in Miami, Arizona (the site) (**Figure 1**). The basement is comprised of four areas described as entry, boiler room, left room and right room as well as a crawlspace under the two wings of the building.

General construction of the basement consists of concrete floors and walls and plaster ceiling. Boilers are present in the boiler room and pipe runs extend from the boiler systems into the crawlspaces under each wing of the building. The pipe run insulation was generally in poor condition and had deteriorated in the basement rooms and crawlspaces. Disposal bags of removed building materials from other areas of the site were stored on the entry of the basement.

2.0 SCOPE OF SERVICES

2.1 Asbestos Survey

The scope of services for the asbestos survey included an inspection that consisted of bulk sampling and laboratory analyses of the building materials that comprised the basement areas located at the site. The primary intent of Amec Foster Wheeler's services was to assess the presence, extent, and condition of suspect asbestos-containing materials (ACM) in the structures (refer to **Figure 2**). Suspect ACM is defined as those classes of materials that have, in the past, been known to contain asbestos and in some formulations.

Amec Foster Wheeler's services included a physical inspection of the building materials that comprised the structure and the collection and analysis of samples to assess the presence of ACM. In accordance with the Asbestos Hazard Emergency Response Act (AHERA) protocol and American Society for Testing and Materials (ASTM) E 2356-14, "Standard Practices for Comprehensive Building Asbestos Survey," homogeneous areas (HAs) of suspect materials were classified as thermal systems insulation (TSI) and miscellaneous . Identified suspect materials were physically evaluated to determine friability.

The inspection included the identification of both "Friable" and nonfriable materials. Friable materials are those, which when dry, can be crumbled, pulverized, or reduced to powder by hand pressure. These materials were classified as regulated ACM, Category I nonfriable ACM, or Category II nonfriable ACM in accordance with National Emission Standard for Hazardous Air Pollutants regulations.

The field portion of the work included a visual inspection of the interior of the basement areas at the site and the collection and analysis of samples of suspect ACM.

Amec Foster Wheeler's certified AHERA Building Inspector, Ms. Pam Walrath (AHERA Certification #10051-1159397-143233), conducted the field portion of the work on September 27, 2016. A copy of her accreditation is available in **Appendix A**.

During the survey, suspect materials were noted and grouped by HA. For bulk sampling purposes, an HA is defined as an area that contains materials suspect of containing asbestos that seem by

texture and color to be uniform and applied or installed during the same general time period. Amec Foster Wheeler's inspectors also evaluated the friability of each material by physically assessing each of the suspect materials.

Amec Foster Wheeler collected bulk samples from the building materials identified during the asbestos survey shown in **Table 1**. The materials sampled, along with their physical characteristics, were collected in general accordance with AHERA bulk sampling and ASTM protocols as they apply to the number of samples for each HA. Samples were collected by Amec Foster Wheeler's accredited building inspector, the samples were labeled, and appropriate chain-of-custody documentation was completed.

Samples were delivered to Fiberquant Analytical Services, Inc. (Fiberquant) in Phoenix, Arizona, for visual inspection and microscopic analysis. Samples were analyzed using polarized light microscopy (PLM) coupled with dispersion staining as outlined in United States Environmental Protection Agency (USEPA) Method 600/R-93/116.

The percentage quantification of individual sample constituents was determined by visual estimation. Under regulations promulgated by the USEPA, ACMs are defined as those materials that contain more than one percent (1%) of specified asbestiform minerals. Bulk samples determined to contain more than 1% of specified asbestiform minerals are referred to as "positive." All the bulk samples collected during the inspection were analyzed. Material samples that were less than five percent (5%) asbestos-containing by PLM were analyzed using the point count method.

2.2 Lead Survey

Paint chips were collected of painted building components at the site. The materials sampled are listed in **Table 2**. The paint chip samples were delivered to Fiberquant for Atomic Absorption Flame (AAF) analysis.

3.0 SUMMARY OF ASBESTOS AND LEAD ANALYSIS

3.1 Asbestos Sampling Results

Of the 17 suspect materials identified by Amec Foster Wheeler, five (5) of the materials were determined by laboratory analysis to contain asbestos in excess of 1%. Materials containing more than 1% are considered asbestos containing as defined by the USEPA and Occupational Safety and Health Administration (OSHA). Copies of Fiberquant's laboratory reports are included in **Appendix B**.

- Material #3 (Thermal Systems Insulation (TSI), Straight Runs – Approximately 400 linear feet (lin. ft.) – Throughout Basement and Crawlspaces. The pipe run insulation was generally in poor condition and had deteriorated in the basement rooms and crawlspaces. The surrounding building surfaces and items stored in the basement and bare soil of the crawlspaces may be impacted by asbestos from the pipe insulation.
- Material #4 (Thermal Systems Insulation (TSI), Elbows) - Approximately 15 each – Throughout Basement Spaces (including confined space).

- Material #15 (Miscellaneous, Category I Non-Friable): Gray Gaskets – Approximately 2 each – Boiler room on equipment.
- Assumed ACM (Thermal Systems Insulation (TSI), Boiler Insulation Wrap – Approximately 2 each – On Boiler Equipment.
- Assumed ACM (Miscellaneous, Category I Non-Friable), Disposal Bags of Removed Building Material – Approximately 20 each.

3.2 Lead Survey Results

The building components tested for lead-based paints had concentrations of lead ranging from 200 to 3,900 parts per million (ppm). All of the building components tested by paint chip analysis contained concentrations of lead less than 5,000 parts ppm and or 0.5% by weight. Paint that contains concentrations of lead equal to or greater than 5,000 ppm and or 0.5% by weight is considered lead-based paint as defined by the United States Department of Housing and Urban Development and the USEPA. However, any detectable lead in paint makes it lead paint for purposes of complying with OSHA regulations and determining worker exposure. Fiberquant's results for AAF analysis report is provided in **Appendix B**.

4.0 SUMMARY AND RECOMMENDATIONS

- The following building materials at the basement areas contain asbestos at concentrations that would meet the definition of asbestos-containing material:
- Material #3 (Thermal Systems Insulation (TSI), Straight Runs – Approximately 400 linear feet (lin. ft.) – Throughout Basement and Crawlspaces.
- Material #4 (Thermal Systems Insulation (TSI), Elbows) - Approximately 15 each – Throughout Basement Spaces (including confined space).
- Material #15 (Miscellaneous, Category I Non-Friable): Gray Gaskets – Approximately 2 each – Boiler room on equipment.
- Assumed ACM (Thermal Systems Insulation (TSI), Boiler Insulation Wrap – Approximately 2 each – On Boiler Equipment.
- Assumed ACM (Miscellaneous, Category I Non-Friable), Disposal Bags of Removed Building Material – Approximately 20 each.
- The building components tested for lead-based paints had concentrations of lead ranging from 200 to 3,900 ppm. Of all the paint chips collected none were at concentrations at or above the 5,000 ppm that would be considered lead based paint. However, any detectable lead in paint makes it lead paint for purposes of complying with OSHA regulations and determining worker exposure.
- The identified ACM should be removed by a licensed asbestos abatement contractor. The surfaces of the basement as well as the items that are stored in the basement should be cleaned of any visible ducts that may contain asbestos. The crawlspace should also be

cleaned by the abatement contractor. The surfaces with lead-containing paint should also be removed if it is to be impacted by future renovation activities.

- The costs to remove the ACM will be determined following a future bid walk with abatement contractors.
- If any suspect materials not identified during this survey are to be disturbed during future construction activities, these materials should be inspected by an accredited AHERA Building Inspector or USEPA Lead Risk Assessor for the collection and analysis of asbestos or lead.

5.0 LIMITATIONS

Amec Foster Wheeler has endeavored to observe the existing conditions associated with areas described in this report using generally-accepted procedures and the degree of care that is ordinary for others performing similar services. Regardless of the thoroughness of any inspection, there is always a possibility that some areas containing asbestos or lead may be inaccessible or different in composition from those at specific sample locations. Therefore, conditions at individual locations may not be as anticipated. The findings presented in this report are relevant to the dates of our site work and the scope of included services and should not be relied on to represent conditions at substantially-later dates.

amec
foster
wheeler

TABLES

Table 1
Amec Foster Wheeler Sample Information and Results

Sample Numbers	HA Description and Location	Friable	Primary Color	Texture	Secondary Color	Condition	ACM?
Basement Areas – September 27, 2016							
1 A – C	Tan Wall Adhesive	No	Tan	Smooth	None	Good	No
2 A – C	Concrete Wall – Throughout Rooms	No	Gray	Hard	None	Fair	No
3 A - C	**Pipe Run Insulation – Straight Runs**	**Yes**	**Crème**	**Hard**	**White**	**Poor**	**50 – 80% Chrysotile**
4 A – C	**Pipe Elbows**	**Yes**	**Crème**	**Hard**	**White**	**Poor**	**10 - 20% Chrysotile**
5 A – C	Stair Concrete	No	Gray	Hard	Gray	Fair	No
6 A – C	Foundation	No	Gray	Hard	White	Poor	No
7 A – C	Concrete Deck – Entry	No	Gray	Hard	None	Good	No
8 A – C	Wall Patch – Entry	No	White	Hard	None	Fair	No
9 A – C	Gasket – Red	No	Red	Pliable	None	Fair	No

Sample Numbers	HA Description and Location	Friable	Primary Color	Texture	Secondary Color	Condition	ACM?
Basement Areas – September 27, 2016							
10 A – C	Plaster Ceiling – Boiler Room	Yes	Tan	Rough	White	Poor	No
11 A – C	Plaster Patch – Boiler Room	Yes	Tan	Rough	White	Poor	No
12 A – C	Window Putty	No	Red	Hard	None	Poor	No
13 A – C	Troweled Plaster Ceiling	No	Tan	Rough	None	Fair	No
14 A – C	White Patch – Ceiling	No	White	Hard	N/A	Fair	No
15 A – C	**Gasket – Gray**	**No**	**Gray**	**Hard**	**None**	**Fair**	**30 – 40% Chrysotile**
Assumed ACM	**Boiler Insulation Wrap**	**No**	**White**	**Soft**	**White**	**Fair**	**Assumed ACM**
Assumed ACM	**Disposal Bags of Removed Building Materials**	**Yes**	**Unknown**	**Unknown**	**Unknown**	**N/A**	**Assumed ACM**

Table 2

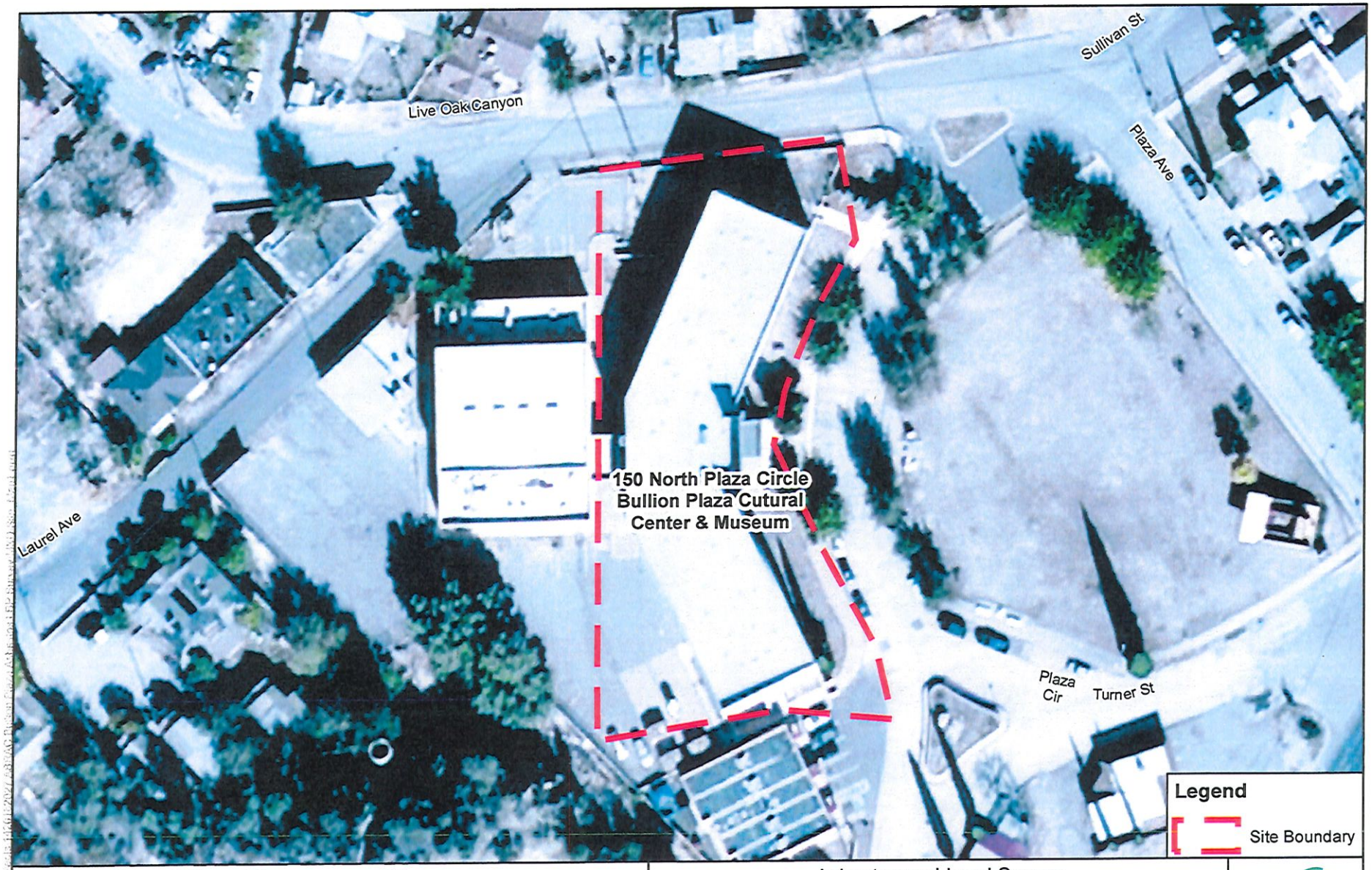
Lead Paint Chip Samples and Results

Sample Numbers	HA Description and Location	Primary Color	Texture	Secondary Color	Condition	Lead Results (ppm)
ADEQ-Pb-01	White Wall	White	Rough	None	Fair	200
ADEQ-Pb-02	Gray on Stairs	Gray	Smooth	None	Fair	3,800
ADEQ-Pb-03	Varnished Door	Varnish	Smooth	None	Good	3,900
ADEQ-Pb-04	Gray Paint on Wall	Gray	Smooth	None	Fair	1,600
ADEQ-Pb-05	Silver Pipe	Silver	Smooth	Black	Fair	1,700

Notes:
HA = homogenous area
ID = identification
ppm = parts per million
BRL = Below Reportable Limits

amec
foster
wheeler

FIGURES



0 37.5 75 150
Feet

Job No.:	1420162027
PM:	TO
Date:	10/3/2016
Scale:	1" = 75 feet

N

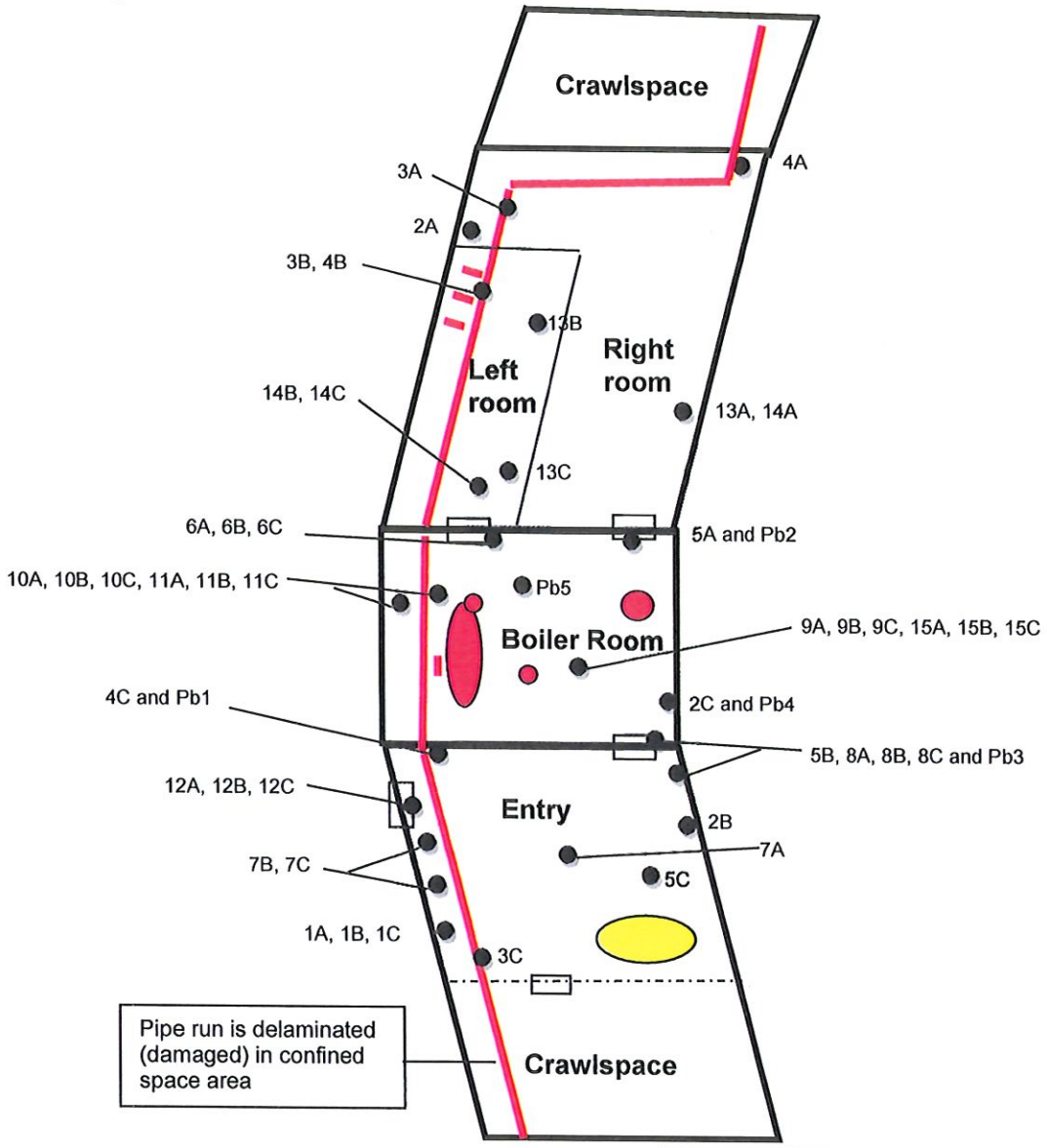
The map shown here has been created with all due and reasonable care and is strictly for use with Amec Foster Wheeler Project Number 1420162027. This map has not been certified by a licensed land surveyor, and any third party use of this map comes without warranties of any kind. Amec Foster Wheeler assumes no liability, direct or indirect, whatsoever for any such third party or unintended use.

Asbestos and Lead Survey
150 North Plaza Circle
Bullion Plaza Cultural Center & Museum

Site Map

FIGURE
1

amec foster wheeler



The map shown here has been created with all due and reasonable care and is strictly for use with Amec Foster Wheeler Project Number 1420162027. This map has not been certified by a licensed land surveyor, and any third party use of this map comes without warranties of any kind as AMEC assumes no liability, direct or indirect, whatsoever for any such third party or unintended use.	Job No.:	1420162027	Site Observation Diagram, Sampling and ACM Locations	
	PM:	Tim O.	Bullion Plaza Cultural Center and Museum 150 North Plaza Circle Miami, Arizona	Figure 2
	Design:	Pam W.		
	Date			

amec foster wheeler

amec
foster
wheeler

APPENDIX A

PERSONNEL ACCREDITATIONS

10051-1159397-143233

THE ASBESTOS INSTITUTE

Certifies that PAM WALRATH

has attended the EPA approved course

Building Inspector Refresher

and successfully passed and completed
the competency exam.

This training meets all requirements for asbestos
accreditation under TSCA Title II.

Issue Date : 09-Dec 2015

Expiration Date : 09-Dec 2016

Approved Instructor

20033 N. 19th Avenue, Building 6, Phoenix, AZ 85027
602 -8 64 - 6564 - www.theasbestosinstitute.com

APPENDIX B

FIBERQUANT ANALYTICAL SERVICES LABORATORY REPORTS AND CHAIN OF CUSTODY DOCUMENTATION

FIBERQUANT ANALYTICAL SERVICES

Atomic Absorption Spectrometer (AAS) Analysis of Paint

JobNumber: **201609830**

Client: **AMEC FOSTER WHEELER**

4600 E WASHINGTON STE# 600

PHOENIX, AZ 85034-0000

Office Phone: (602) 733-6000

FAX: (602) 733-6100

 # Samples: 5 AA **Rec:** 9/27/2016 **Method:** Modified SW 846 3050b/7420 Pb in paint by weight AA Analysis

Client Job: 14-2016-2027 **PO Number:** Pending

Report Date: 9/30/2016 **Date Analyzed:** 9/30/2016 **Routing Number:** -

Method and Analysis Information: **Fiberquant Internal SOP:** AApw

The received samples were analyzed for Pb (total) using "Test Methods for Evaluating Solid Waste" (SW 846, December 1996 updates). The extraction/digestion method was SW 3050b. The analytical method is "flame atomic absorption, direct aspiration", SW 7420.. Briefly the procedures are as follows. The incoming paint samples are first homogenized by mixing and crushing. A sub-sample is weighed to 0.0001 gm into a 50ml centrifuge tube. To the run stream are added the quality assurance samples described below. Six mls of concentrated HNO3 and one ml of 30% H2O2 are added to each container. The tubes are caped and heated for 1 hour at 95 deg. C. After cooling, the contents of the centrifuge tube are brought up to exactly 25 mls, completing the digestion/extraction.

The sample and quality assurance extractions are then analyzed on a TJA M5 flame atomic absorption spectrometer. The wavelengths and other instrumental settings are set according to the manufacturer's recommendations, or as otherwise specified in the published method. Absorptions are recorded from sample and standard solutions. A calibration curve is fitted to at least three standard solutions, and the concentrations of the sample extracts are calculated from the curve. The ppm (ug/gm) and weight percent for each sample is calculated from the sub-sample weight, extract volume, and extract concentration.

The results from this analysis is generally compared to either the HUD guidelines, in which a sample is positive if it contains >0.5% (5000 ppm) Pb, or the Consumer Products Safety Commission (CPSC) limit, in which a paint or surface coating containing greater than 90 ppm is defined as lead-containing. The expected coefficient of variation for this method is approximately 20-30%. The results are reported to two significant figures. The Sample Reporting Limit (RL) listed below is twice the Sample Detection Limit, which is calculated for each sample from the experimentally determined Method Detection Limit. The limit of reliable quantitatiion is generally regarded as five to ten times the limit of detection. Therefore, samples smaller than 0.1 gm may give results too near the CPSC standard to be reliable. Problems in analysis or other information is provided in the "Analytical Notes" below. Blanks, if analyzed, are treated the same as samples and are not used for correcting non-blank results.

The following on-going quality assurance program was followed to ensure reproducible and dependable results: All analysts are degreed chemists trained extensively in-house for at least six months prior to un-supervised runs. Blank matrix samples are analyzed at a rate of 5% (at least one per run). Reference standards are analyzed at a rate of 5% (at least one per run), and compared to statistical records via control charts. Spiked matrix samples are analyzed at a rate of 5% (at least one per run), and compared to statistical records via control charts. Duplicate samples are analyzed at a rate of 5% (at least one per run), and compared to statistical records via control charts. For each instrumental run, the spectrometer is checked for sensitivity and stability. The calibration standards are made fresh weekly, and checked each run against a calibration verification standard from another source. All calculations are performed twice - once in a calibration spreadsheet, and once during the report generation, and also checked by hand. All quality checks performed for these samples were in control except as detailed in the "Analytical Notes" below. Fiberquant participates in the Environmental Lead Proficiency Analytical Testing (ELPAT) program, is accredited by AIHA-LAP, LLC for environmental lead in paint (Lab # 101593), and is recognized by the National Lead Laboratory Accreditation Program (NLLAP) for the analysis of Pb in paint. Accreditation does not imply endorsement by the EPA, any other United States governmental agency or any private agency or association. Each lab analysis refers only to the sample tested, and may not, due to the sampling process, be representative of the material sampled. This report may not be reproduced except in full, without the approval of Fiberquant Analytical Services.

Some results may have been calculated using client supplied data, such as volume or area sampled, for which Fiberquant assumes no liability for accuracy.

Job Analysis Notes:

Calibration Curve:

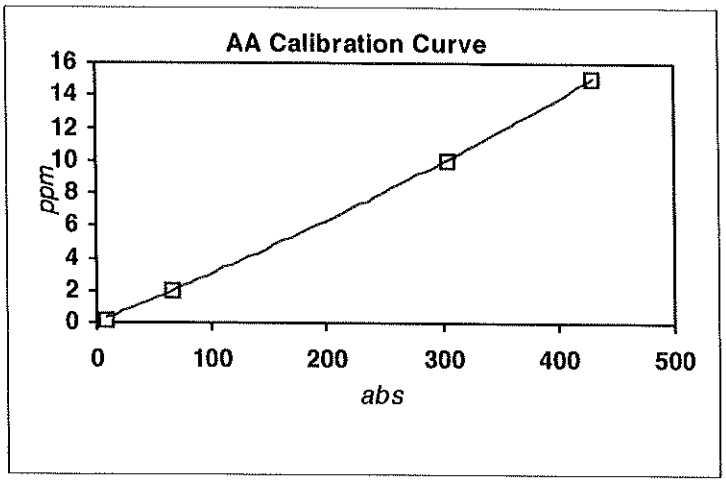
Pb

Run # 11912 ***9/29/2016***

Instrument: M5-2

Standards:	ppm	avg. mAbs.
1	0.2	8
2	2	66
3	10	304
4	15	431

ax2	0.00001416
bx	0.02866955
c	0.00102403
R2	0.99997368



Analysis Results:

Job Number:	201609830

AApw

Lab Number	Client Number	Date	Condition	Weight (gm)	ug/ml	ml	Dil	Analyte	wt %	ppm	RL(ppm)
2016-09830- 1	Pb 1	9/27/2016	acceptable	0.1518	1.2301	25	1	Pb	0.02	200	33
2016-09830- 2	Pb 2	9/27/2016	acceptable	0.0928	14.216	25	1	Pb	0.38	3800	54
2016-09830- 3	Pb 3	9/27/2016	acceptable	0.0156	2.4162	25	1	Pb	0.39	3900	320
2016-09830- 4	Pb 4	9/27/2016	acceptable	0.1443	9.322	25	1	Pb	0.16	1600	35
2016-09830- 5	Pb 5	9/27/2016	acceptable	0.0462	3.1358	25	1	Pb	0.17	1700	110

Martin Esquer

Analyst: MARTIN A. ESQUER

Printed: 30-Sep-16

Original Print Date: 30-Sep-16

Larry S. Pierce

Larry S. Pierce, Approved Accreditation Signatory

FIBERQUANT ANALYTICAL SERVICES

Fiberquant Analytical Services 5025 S. 33rd St.; Phoenix, AZ 85040; Phone: 602-276-6139; FAX: 602-276-4558; info@fiberquant.com

Analysis Request/Chain-of-Custody Form

Submitted by (Company)	AMEC FOSTER WHEELER
Address	4600 E. WASHINGTON STE 600
City, State, Zip Code	Phx AZ
Phone	FAX
Email	pam.walrath@amecfw.com

Invoice to (Company)	AMEC FW
Address	
City, State, Zip Code	
Phone	FAX

Contact (print)	PAM WALRATH
Sampled by (signature)	
Job Number or Project Name	14-2016-2027
PO Number	

<Analysis Method Requested> ONLY ONE METHOD per COC			Turn-around-time (circle one)			
			Rush		Norm	Ext.
Asbestos by PLM	Method > Improved Interim		Urgent Rush <3 hrs	<6 hrs	1-3 days	15-30 days
	Analyze > All ATPF					
	If ATPF then > by Layer by Sample					
	Single Layer Protocol > Yes No					
Fibers by PCM	Method > 7400 (Area) ORM (Personal)		<4 hrs		24 hrs	-
Asbestos by TEM	In Air > AHERA Mod. AHERA		<6 hrs		24 hrs	3-5 days
	In Water* > Water Sludge		1-2 days		3-5 days	N/A
	In Bulk (Annex2) > Chatfield Full Quant.					
	In Dust > ASTM D5755		3-5 days		5-10 days	N/A
Pb by FLAA	Analyte > Pb Other		<6 hrs		2-3 days	N/A
	Matrix > Filter > MCE FG					
	Paint > by Area (mg/cm²) by Weight (ppm)					
	Soil >					
	Wipe >					
	Initial here certifying wipes used are ASTM E1792 compliant ____					
Fungi	Air Sample > Zefon Aller Other		<6 hrs		1-2 days	N/A
	Bulk > Sample Swab					
	Tape Lift > Qualitative (% & type)					
	Quantitative (type/cm2)					
Soot	ASTM D6602-03b	Optical	<6 hrs		1-2 days	N/A
		Optical & TEM	1-2 days		3-5 days	N/A
Other			Call		Call	

Sample # (1 per line)	Description/Location	Sample Date	Sample Time	Vol. or Area
1) Pb1	WHITE WALL	9/27/16		BY WEIGHT
2) Pb2	GRAY ON STAIRS			
3) Pb3	VARNISHED DOOR			
4) Pb4	GRAY PAINT ON WALL			
5) Pb5	SILVER PIPE			
6)				
7)				
8)				
9)				
10)				
11)				
12)				
13)				
14)				
15)				
16)				
17)				
18)				
19)				
20)				

1)Relinquished by:	Date: 9/27/16	Time: 2:50	3)Relinquished by:	Date:	Time:
2)Received by:	Date: 9/27/16	Time: 2:50	4)Received by:	Date:	Time:
* TEM Water: Sampler's name: Certified by State of Arizona	Print Name		Fiberquant assigned Job Number>	20160930	
Review of Analysis Request (Initials):				Page of	

Note: Data completed by client (including number and identity of samples) is assumed to be correct until it is verified at time of sample preparation.

FIBERQUANT ANALYTICAL SERVICES

Polarized Light Microscope (PLM) Analysis for Asbestos in Bulk Sample

JobNumber: 201609831

Client: AMEC FOSTER WHEELER

4600 E WASHINGTON STE# 600

PHOENIX, AZ 85034-0000

Office Phone: (602) 733-6000
FAX: (602) 733-6100

 # Samples: 45 PLM **Rec:** 9/27/2016 **Method:** EPA 600/R-93/116 The "New" Method; see below

Client Job: 14-2016-2027 **PO Number:** Pending

Report Date: 9/29/2016 **Date Analyzed:** 9/28/2016 **Routing Number:** -

Method and Analysis Information: **Fiberquant Internal SOP:** PLMn

Each bulk sample is first dissected under a 7-30x magnification stereo-microscope. This examination is used to determine the general type of sample, how many and what type of layers it has, and initial estimates of fiber types and quantities. Second, liquid media mounts are made of each layer - such mounts may be of selected fibers (used solely for identification purposes) or may be representative of the layer as a whole (used for quantitation purposes). The mounts may be made in a synthetic Canadian balsam, one of several solvents, or in refractive index oils (media of known refractive index). Generally, a variety of different mounts are made: some optimized for fiber visibility, some optimized for fiber identification, and some optimized for fiber quantitation. The mounted slides are then examined at 50-400x magnification on a Nikon Labphot-pol microscope. Optical characteristics are used to identify each observed fiber type; the optical data are contained for each sample on its detail analysis sheet, attached.

Current EPA and NESHAP regulations designate a result of <=1 % asbestos as "negative" and >1 % asbestos as "positive". Samples containing layers that have been determined to be "positive" may have to be handled differently during a renovation or demolition than samples whose layers have been determined to be "negative."

The method of fiber identification and quantitation is the "Standard Operating Procedures for the Analysis of Asbestos in Bulk Samples using Polarized Light Microscopy", Chapter 7 of the Quality Assurance and Management Manual. This SOP and its associated reporting have been designed to satisfy all requirements in both EPA Method 600/M4-82-020 (The Interim Method) and EPA Method 600/R-93/116 (The New Method). The Interim Method is the required method for AHERA (US EPA 40 CFR Pt. 763), but this method calls for the reporting of composited results of multi-layered samples that is no longer an acceptable reporting practice in most circumstances. Current EPA rules, such as NESHAP (US EPA 40CFT Pt. 61), as well as NVLAP accreditation policies, call for separate reporting for each layer of multi-layered samples. The New Method contains the same procedures for identification and quantification of asbestos as does the Interim Method, except that multi-layered samples are reported to comply with the latest US EPA rule. Fiberquant not only reports the asbestos content of each layer of multi-layered samples separately (satisfying current EPA and NVLAP reporting requirements), but Fiberquant also reports what percentage of the sample each layer comprises. Therefore, the results may be arithmetically composited to satisfy the reporting requirements of the Interim Method. The method of fiber quantitation is an estimation technique in which the analysts quantitation is routinely calibrated by reference quantitation standards, and which has been shown to be equivalent in precision and accuracy to point counting. Friability is estimated for the purposes of deciding when to point count. Friabilities determined in the field take precedence over those determined in the laboratory. Those sample layers which are friable and estimated by the analyst to contain <= 1% asbestos are point counted using 400 points. Such point counting is required by NESHAP (National Emission Standards for Hazardous Air Polutants, Nov. 1990) in order to rely on analytical results that are <= 1%. The coefficient of variation for the estimation quantitation technique is 100% in the range 0-5%. This means that PLM analysis is not capable of conclusively determining whether a layer containing close to 1% asbestos is actually "positive" or "negative". For this reason, Fiberquant refers to results where asbestos was detected but <= 1% as "borderline negative", and results where asbestos was >1 % but <= 2% as "borderline positive" to indicate the uncertainty in assigning a "positive" or "negative" label. In the sample summary, "ND" means that no asbestos was detected during the analysis. A "Tr" or "Trace" of asbestos reported is defined for our purposes as the detection of several asbestos fibers during the analysis; this level would be right at the limit of detection for the method. Trace is only reported on the analysis detail - in the summary a trace would be reported as <=1%. The limit of detection (the smallest % of asbestos that can be detected) varies greatly depending on the matrix in which the asbestos is found. As little as 0.001% asbestos can be detected in favorable samples, while detection in unfavorable samples may approach the detection limit of 1% stated in the method. During the analysis, the analyst, for Fiberquant identification purposes only, determines the "apparent sample type" and "apparent layer types." It must be emphasized that these types are only what is apparent. Often, different materials appear similar or identical after sampling, so the analyst may assign a type other than what was sampled.

Floor tiles present a special problem for PLM asbestos analysis. Floor tile can contain chrysotile fibers so thin that they cannot be resolved by optical methods. In such a case, we may observe a percentage of asbestos which is lower than the actual percentage, or not observe asbestos at all when some is present. For this reason, floor tiles reported as negative should be confirmed to be negative using transmission electron microscope (TEM) analysis. Likewise, vermiculite insulation materials containing traces of asbestiform asbestos present a problem for routine PLM analysis - the amphiboles are sometimes present in trace amounts inhomogeneously distributed. For this reason, loose vermiculite samples reported as negative should be confirmed to contain no amphibole using hydroseparation techniques.

The samples were analyzed under the following ongoing quality assurance program: Blank samples are routinely analyzed to maintain contamination-free materials. Each analyst has at least a bachelor's degree in physical science, and has also completed extensive training specific to asbestos analysis for 1-3 months before being allowed to analyze client samples. Qualitative reference samples are routinely analyzed to assure that analysts can identify asbestos and asbestos-look-alike fibers. Quantitative reference samples are routinely analyzed to calibrate and characterize the

estimation procedure. Microscope alignment is checked each day. Refractive index oils are calibrated at least quarterly. At least 10% of client samples are re-analyzed from scratch by a different analyst than the original, and any discrepancies are resolved for the sample and similar sample types before the results are reported. All quality checks performed for these samples were in control except as detailed in the "Analytical Notes" below. All analysts participate in interlab round robins and proficiency testing to assure competence. Fiberquant is accredited by NVLAP (Lab #101031) for the analysis of bulk samples for asbestos using PLM. Accreditation does not imply endorsement by the EPA, any other United States governmental agency or any private agency or association. Each lab analysis refers only to the sample tested, and may not, due to the sampling process, be representative of the material sampled. This report may not be reproduced except in full, without the approval of Fiberquant Analytical Services.

Some results may have been calculated using client supplied data, such as volume or area sampled, for which Fiberquant assumes no liability for accuracy.

Job Analysis Notes:

PLM Analysis Summary: **Job Number: 201609831** 14-2016-2027

Sample Number / Layer	Color	Apparent Layer Type *	Lab Number / Asbestos Results	Apparent Sample Type *	Positive Layer Yes or No
Sample # 1A			2016-09831- 1	Adhesive/caulk	Positive Layer? No
Layer # 1	tan	mastic	*no asbestos detected*		
Layer # 2	white	texture/joint compound	*no asbestos detected*		
Sample # 1B			2016-09831- 2	Adhesive/caulk	Positive Layer? No
Layer # 1	tan	mastic	*no asbestos detected*		
Layer # 2	white	texture/joint compound	*no asbestos detected*		
Sample # 1C			2016-09831- 3	Adhesive/caulk	Positive Layer? No
Layer # 1	tan	mastic	*no asbestos detected*		
Layer # 2	white	texture/joint compound	*no asbestos detected*		
Sample # 2A			2016-09831- 4	Cementitious	Positive Layer? No
Layer # 1	gray	concrete	*no asbestos detected*		
Layer # 2	off-white	miscellaneous	*no asbestos detected*		
Sample # 2B			2016-09831- 5	Cementitious	Positive Layer? No
Layer # 1	gray	paint	*no asbestos detected*		
Layer # 2	gray	concrete	*no asbestos detected*		
Sample # 2C			2016-09831- 6	Cementitious	Positive Layer? No
Layer # 1	gray	paint	*no asbestos detected*		
Layer # 2	gray	concrete	*no asbestos detected*		
Sample # 3A			2016-09831- 7	TSI	Positive Layer? Yes
Layer # 1	off-white	duct tape	*60-70% chrysotile asbestos*		
Sample # 3B			2016-09831- 8	TSI	Positive Layer? Yes
Layer # 1	off-white	duct tape	*50-60% chrysotile asbestos*		
Sample # 3C			2016-09831- 9	TSI	Positive Layer? Yes
Layer # 1	off-white	duct tape	*70-80% chrysotile asbestos*		
Sample # 4A			2016-09831- 10	TSI	Positive Layer? Yes
Layer # 1	off-white	insulation wrap	*no asbestos detected*		
Layer # 2	gray	insulation mud	*10-20% chrysotile asbestos*		
Sample # 4B			2016-09831- 11	TSI	Positive Layer? Yes
Layer # 1	off-white	insulation wrap	*no asbestos detected*		
Layer # 2	gray	insulation mud	*10-20% chrysotile asbestos*		
Sample # 4C			2016-09831- 12	TSI	Positive Layer? Yes
Layer # 1	off-white	paint	*no asbestos detected*		
Layer # 2	white	texture/joint compound	*no asbestos detected*		
Layer # 3	off-white	insulation wrap	*no asbestos detected*		
Layer # 4	gray	insulation mud	*10-20% chrysotile asbestos*		
Sample # 5A			2016-09831- 13	Cementitious	Positive Layer? No
Layer # 1	gray	concrete	*no asbestos detected*		
Sample # 5B			2016-09831- 14	Cementitious	Positive Layer? No
Layer # 1	gray	paint	*no asbestos detected*		
Layer # 2	gray	concrete	*no asbestos detected*		
Sample # 5C			2016-09831- 15	Cementitious	Positive Layer? No
Layer # 1	gray	paint	*no asbestos detected*		
Layer # 2	gray	concrete	*no asbestos detected*		
Sample # 6A			2016-09831- 16	Cementitious	Positive Layer? No
Layer # 1	gray	concrete	*no asbestos detected*		
Sample # 6B			2016-09831- 17	Cementitious	Positive Layer? No
Layer # 1	gray	concrete	*no asbestos detected*		
Sample # 6C			2016-09831- 18	Cementitious	Positive Layer? No
Layer # 1	gray	concrete	*no asbestos detected*		
Sample # 7A			2016-09831- 19	Cementitious	Positive Layer? No
Layer # 1	white	sealant	*no asbestos detected*		
Layer # 2	gray	concrete	*no asbestos detected*		
Sample # 7B			2016-09831- 20	Cementitious	Positive Layer? No
Layer # 1	white	sealant	*no asbestos detected*		
Layer # 2	gray	concrete	*no asbestos detected*		

Sample # **7C**			2016-09831- 21	Cementitious	Positive Layer? No
Layer # 1	white	sealant	*no asbestos detected*		
Layer # 2	gray	concrete	*no asbestos detected*		
Sample # **8A**			2016-09831- 22	Wall System	Positive Layer? No
Layer # 1	tan	texture/joint compound	*no asbestos detected*		
Sample # **8B**			2016-09831- 23	Wall System	Positive Layer? No
Layer # 1	tan	texture/joint compound	*no asbestos detected*		
Sample # **8C**			2016-09831- 24	Wall System	Positive Layer? No
Layer # 1	tan	texture/joint compound	*no asbestos detected*		
Sample # **9A**			2016-09831- 25	Adhesive/caulk	Positive Layer? No
Layer # 1	red	gasket	*no asbestos detected*		
Sample # **9B**			2016-09831- 26	Adhesive/caulk	Positive Layer? No
Layer # 1	red	gasket	*no asbestos detected*		
Sample # **9C**			2016-09831- 27	Adhesive/caulk	Positive Layer? No
Layer # 1	red	gasket	*no asbestos detected*		
Sample # **10A**			2016-09831- 28	Wall System	Positive Layer? No
Layer # 1	off-white	plaster	*no asbestos detected*		
Sample # **10B**			2016-09831- 29	Wall System	Positive Layer? No
Layer # 1	off-white	paint	*no asbestos detected*		
Layer # 2	white	plaster (top coat)	*no asbestos detected*		
Layer # 3	tan	plaster (scratch coat)	*no asbestos detected*		
Sample # **10C**			2016-09831- 30	Wall System	Positive Layer? No
Layer # 1	off-white	paint	*no asbestos detected*		
Layer # 2	white	plaster (top coat)	*no asbestos detected*		
Layer # 3	tan	plaster (scratch coat)	*no asbestos detected*		
Sample # **11A**			2016-09831- 31	Wall System	Positive Layer? No
Layer # 1	off-white	plaster	*no asbestos detected*		
Sample # **11B**			2016-09831- 32	Wall System	Positive Layer? No
Layer # 1	off-white	plaster	*no asbestos detected*		
Sample # **11C**			2016-09831- 33	Wall System	Positive Layer? No
Layer # 1	off-white	plaster	*no asbestos detected*		
Sample # **12A**			2016-09831- 34	Adhesive/caulk	Positive Layer? No
Layer # 1	red	sealant	*no asbestos detected*		
Sample # **12B**			2016-09831- 35	Adhesive/caulk	Positive Layer? No
Layer # 1	red	sealant	*no asbestos detected*		
Sample # **12C**			2016-09831- 36	Adhesive/caulk	Positive Layer? No
Layer # 1	red	sealant	*no asbestos detected*		
Sample # **13A**			2016-09831- 37	Wall System	Positive Layer? No
Layer # 1	off-white	plaster	*no asbestos detected*		
Sample # **13B**			2016-09831- 38	Wall System	Positive Layer? No
Layer # 1	off-white	plaster	*no asbestos detected*		
Sample # **13C**			2016-09831- 39	Wall System	Positive Layer? No
Layer # 1	off-white	plaster	*no asbestos detected*		
Sample # **14A**			2016-09831- 40	Wall System	Positive Layer? No
Layer # 1	white	powder	*no asbestos detected*		
Sample # **14B**			2016-09831- 41	Wall System	Positive Layer? No
Layer # 1	white	powder	*no asbestos detected*		
Sample # **14C**			2016-09831- 42	Wall System	Positive Layer? No
Layer # 1	white	powder	*no asbestos detected*		
Sample # **15A**			2016-09831- 43	Insulation	Positive Layer? Yes
Layer # 1	gray	gasket	*30-40% chrysotile asbestos*		
Sample # **15B**			2016-09831- 44	Insulation	Positive Layer? Yes
Layer # 1	gray	gasket	*30-40% chrysotile asbestos*		
Sample # **15C**			2016-09831- 45	Insulation	Positive Layer? Yes
Layer # 1	gray	gasket	*30-40% chrysotile asbestos*		

* Apparent Sample Types and Apparent Layer Types are as they appeared to the analyst. Since many types of materials appear similar after sampling damage, the apparent type of material may not be the actual type of material.

Sample 1A **Lab Number** 2016-09831- 1 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/28/2016 **An?** OK **Apparent Smp Type** Adhesive/caulk Non-fibrous Solid
Homogeneous No **# Layers** 2 **Pos Layer?** No **# Sub-Samples** 6
Non-Fibrous Components (in approx. decreasing order): filler, polymer,

Layers

#	Layer Type	%	Color	Friability
1	mastic	40	tan	1
2	texture/joint compound	60	white	3
	Total %	100		

Percents of Each Fiber	Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
	n.d.	-	-	-	-	-
	n.d.	-	-	-	-	-
Overall %	n.d.	-	-	-	-	-
Fiber Identification:	none					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations: Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using solvent.

Sample 1B **Lab Number** 2016-09831- 2 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/28/2016 **An?** OK **Apparent Smp Type** Adhesive/caulk Non-fibrous Solid
Homogeneous No **# Layers** 2 **Pos Layer?** No **# Sub-Samples** 6
Non-Fibrous Components (in approx. decreasing order): filler, polymer,

Layers

#	Layer Type	%	Color	Friability
1	mastic	40	tan	1
2	texture/joint compound	60	white	3
	Total %	100		

Percents of Each Fiber	Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
	n.d.	-	-	-	-	-
	n.d.	-	-	-	-	-
Overall %	n.d.	-	-	-	-	-
Fiber Identification:	none					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations: Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using solvent.

Sample 1C **Lab Number** 2016-09831- 3 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/28/2016 **An?** OK **Apparent Smp Type** Adhesive/caulk Non-fibrous Solid
Homogeneous No **# Layers** 2 **Pos Layer?** No **# Sub-Samples** 6
Non-Fibrous Components (in approx. decreasing order): filler, polymer,

Layers

#	Layer Type	%	Color	Friability
1	mastic	40	tan	1
2	texture/joint compound	60	white	3
	Total %	100		

Percents of Each Fiber	Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
	n.d.	-	-	-	-	-
	n.d.	-	-	-	-	-
Overall %	n.d.	-	-	-	-	-
Fiber Identification:	none					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations: Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using solvent.

Sample 2A **Lab Number** 2016-09831- 4 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/28/2016 **An?** OK **Apparent Smp Type** Cementitious Non-fibrous Solid
Homogeneous No **# Layers** 2 **Pos Layer?** No **# Sub-Samples** 5
Non-Fibrous Components (in approx. decreasing order): powder, rock,

Layers

#	Layer Type	%	Color	Friability
1	concrete	80	gray	1
2	miscellaneous	20	off-white	1
	Total %	100		

Percents of Each Fiber	Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
	n.d.	-	-	-	-	-
	n.d.	-	-	-	-	-
Overall %	n.d.	-	-	-	-	-
Fiber Identification:	none					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext
1	none							
2								
3								
4								
5								
6								

Refractive Index Determinations	Oil	Col Par	Col Per	RI Par	RI Per

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample 2B **Lab Number** 2016-09831- 5 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/28/2016 **An?** OK **Apparent Smp Type** Cementitious Non-fibrous Solid
Homogeneous No **# Layers** 2 **Pos Layer?** No **# Sub-Samples** 4
Non-Fibrous Components (in approx. decreasing order): powder, rock,

Layers

#	Layer Type	%	Color	Friability
1	paint	2	gray	1
2	concrete	98	gray	1
	Total %	100		

Percents of Each Fiber	Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
	n.d.	-	-	-	-	-
	n.d.	-	-	-	-	-
Overall %	n.d.	-	-	-	-	-
Fiber Identification:	none					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext
1	none							
2								
3								
4								
5								
6								

Refractive Index Determinations	Oil	Col Par	Col Per	RI Par	RI Per

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample 2C **Lab Number** 2016-09831- 6 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/28/2016 **An?** OK **Apparent Smp Type** Cementitious Non-fibrous Solid
Homogeneous No **# Layers** 2 **Pos Layer?** No **# Sub-Samples** 4
Non-Fibrous Components (in approx. decreasing order): powder, rock,

Layers

#	Layer Type	%	Color	Friability
1	paint	2	gray	1
2	concrete	98	gray	1
	Total %	100		

Percents of Each Fiber	Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
	n.d.	-	-	-	-	-
	n.d.	-	-	-	-	-
Overall %	n.d.	-	-	-	-	-
Fiber Identification:	none					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext
1	none							
2								
3								
4								
5								
6								

Refractive Index Determinations	Oil	Col Par	Col Per	RI Par	RI Per

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample 3A **Lab Number** 2016-09831- 7 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/28/2016 **An?** OK **Apparent Smp Type** TSI Fibrous Mat
Homogeneous Yes **# Layers** 1 **Pos Layer?** Yes **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): binder, ,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	duct tape	100	off-white	3	60-70%	20-30%	-	-	-	-
	Total %	100		Overall %	60-70%	20-30%	-	-	-	-
				Fiber Identification:	chrysotile asbestos	cellulose fiber				

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations				
									Oil	Col Par	Col Per	RI Par	RI Per
1	chrysotile asbestos	W	A	N	N	L	+	P	1.550	db/ly	sb/o	1.561	1.553
2	cellulose fiber	W	F	N	N	H	+	U					
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps.

Sample 3B **Lab Number** 2016-09831- 8 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/28/2016 **An?** OK **Apparent Smp Type** TSI Fibrous Mat
Homogeneous Yes **# Layers** 1 **Pos Layer?** Yes **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): binder, ,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	duct tape	100	off-white	3	50-60%	30-40%	-	-	-	-
	Total %	100		Overall %	50-60%	30-40%	-	-	-	-
				Fiber Identification:	chrysotile asbestos	cellulose fiber				

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations				
									Oil	Col Par	Col Per	RI Par	RI Per
1	chrysotile asbestos	W	A	N	N	L	+	P	1.550	db/ly	sb/o	1.561	1.553
2	cellulose fiber	W	F	N	N	H	+	U					
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps.

Sample 3C **Lab Number** 2016-09831- 9 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/28/2016 **An?** OK **Apparent Smp Type** TSI Fibrous Mat
Homogeneous Yes **# Layers** 1 **Pos Layer?** Yes **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): binder, ,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	duct tape	100	off-white	3	70-80%	2-5%	-	-	-	-
	Total %	100		Overall %	70-80%	2-5%	-	-	-	-
				Fiber Identification:	chrysotile asbestos	cellulose fiber				

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations				
									Oil	Col Par	Col Per	RI Par	RI Per
1	chrysotile asbestos	W	A	N	N	L	+	P	1.550	db/ly	sb/o	1.561	1.553
2	cellulose fiber	W	F	N	N	H	+	U					
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps.

Sample 4A **Lab Number** 2016-09831- 10 **Sampled:** 9/27/2016 **Condition:** acceptable

Analyzed By MCJ 9/28/2016 **An?** OK **Apparent Smp Type** TSI Fibrous Mat

Homogeneous No **# Layers** 2 **Pos Layer?** Yes **# Sub-Samples** 5

Non-Fibrous Components (in approx. decreasing order): powder, powder,

Layers

#	Layer Type	%	Color	Friability
1	insulation wrap	20	off-white	2
2	insulation mud	80	gray	3
	Total %	100	**Overall %**	

Percents of Each Fiber					
Fib 1	**Fib 2**	**Fib 3**	**Fib 4**	**Fib 5**	**Fib 6**
40-50%	n.d.	-	-	-	-
n.d.	10-20%	-	-	-	-
5-10%	10-20%	-	-	-	-
Fiber Identification:	cellulose fiber	chrysotile asbestos			

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext
1	cellulose fiber	W	F	N	N	H	+	U
2	chrysotile asbestos	W	A	N	N	L	+	P
3								
4								
5								
6								

Refractive Index Determinations

Oil	Col Par	Col Per	RI Par	RI Per
1.550	db/ly	sb/o	1.561	1.553

Sample Analytical Note

Procedure: tweased apart using forceps. Procedure: dissolution of polymer matrix using solvent.

Sample 4B **Lab Number** 2016-09831- 11 **Sampled:** 9/27/2016 **Condition:** acceptable

Analyzed By MCJ 9/28/2016 **An?** OK **Apparent Smp Type** TSI Fibrous Mat

Homogeneous No **# Layers** 2 **Pos Layer?** Yes **# Sub-Samples** 5

Non-Fibrous Components (in approx. decreasing order): powder, powder,

Layers

#	Layer Type	%	Color	Friability
1	insulation wrap	20	off-white	2
2	insulation mud	80	gray	3
	Total %	100	**Overall %**	

Percents of Each Fiber					
Fib 1	**Fib 2**	**Fib 3**	**Fib 4**	**Fib 5**	**Fib 6**
40-50%	n.d.	-	-	-	-
n.d.	10-20%	-	-	-	-
5-10%	10-20%	-	-	-	-
Fiber Identification:	cellulose fiber	chrysotile asbestos			

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext
1	cellulose fiber	W	F	N	N	H	+	U
2	chrysotile asbestos	W	A	N	N	L	+	P
3								
4								
5								
6								

Refractive Index Determinations

Oil	Col Par	Col Per	RI Par	RI Per
1.550	db/ly	sb/o	1.561	1.553

Sample Analytical Note

Procedure: tweased apart using forceps. Procedure: dissolution of polymer matrix using solvent.

Sample 4C **Lab Number** 2016-09831- 12 **Sampled:** 9/27/2016 **Condition:** acceptable

Analyzed By MCJ 9/28/2016 **An?** OK **Apparent Smp Type** TSI Fibrous Mat

Homogeneous No **# Layers** 4 **Pos Layer?** Yes **# Sub-Samples** 10

Non-Fibrous Components (in approx. decreasing order): powder, powder,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	paint	1	off-white	1	n.d.	n.d.	-	-	-	-
2	texture/joint compound	5	white	3	n.d.	n.d.	-	-	-	-
3	insulation wrap	19	off-white	2	40-50%	n.d.	-	-	-	-
4	insulation mud	75	gray	3	n.d.	10-20%	-	-	-	-
	Total %	100	**Overall %**		5-10%	10-20%	-	-	-	-
			Fiber Identification:		cellulose fiber	chrysotile asbestos				

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations				
									Oil	Col Par	Col Per	RI Par	RI Per
1	cellulose fiber	W	F	N	N	H	+	U					
2	chrysotile asbestos	W	A	N	N	L	+	P	1.550	db/ly	sb/o	1.561	1.553
3													
4													
5													
6													

Sample Analytical Note

Procedure: tweased apart using forceps. Procedure: dissolution of polymer matrix using solvent.

Sample 5A **Lab Number** 2016-09831- 13 **Sampled:** 9/27/2016 **Condition:** acceptable

Analyzed By MCJ 9/28/2016 **An?** OK **Apparent Smp Type** Cementitious Non-fibrous Solid

Homogeneous Yes **# Layers** 1 **Pos Layer?** No **# Sub-Samples** 3

Non-Fibrous Components (in approx. decreasing order): powder, rock,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	concrete	100	gray	1	n.d.	-	-	-	-	-
	Total %	100	**Overall %**		n.d.	-	-	-	-	-
			Fiber Identification:		none					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations				
									Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note

Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample 5B **Lab Number** 2016-09831- 14 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/28/2016 **An?** OK **Apparent Smp Type** Cementitious Non-fibrous Solid
Homogeneous No **# Layers** 2 **Pos Layer?** No **# Sub-Samples** 4
Non-Fibrous Components (in approx. decreasing order): powder, rock,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	paint	2	gray	1	n.d.	-	-	-	-	-
2	concrete	98	gray	1	n.d.	-	-	-	-	-
	Total %	100		Overall %	n.d.	-	-	-	-	-
				Fiber Identification:	none					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations				
									Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample 5C **Lab Number** 2016-09831- 15 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/28/2016 **An?** OK **Apparent Smp Type** Cementitious Non-fibrous Solid
Homogeneous No **# Layers** 2 **Pos Layer?** No **# Sub-Samples** 4
Non-Fibrous Components (in approx. decreasing order): powder, rock,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	paint	2	gray	1	n.d.	-	-	-	-	-
2	concrete	98	gray	1	n.d.	-	-	-	-	-
	Total %	100		Overall %	n.d.	-	-	-	-	-
				Fiber Identification:	none					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations				
									Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample 6A **Lab Number** 2016-09831- 16 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Cementitious Non-fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): powder, rock,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	concrete	100	gray	1	n.d.	-	-	-	-	-
	Total %	100		Overall %	n.d.	-	-	-	-	-
				Fiber Identification:	none					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations				
									Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample 6B **Lab Number** 2016-09831- 17 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Cementitious Non-fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): powder, rock,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber: Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	concrete	100	gray	1	n.d.	-	-	-	-	-
	Total %	100		Overall %	n.d.	-	-	-	-	-
				Fiber Identification:	none					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations: Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample 6C **Lab Number** 2016-09831- 18 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Cementitious Non-fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): powder, rock,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber: Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	concrete	100	gray	1	n.d.	-	-	-	-	-
	Total %	100		Overall %	n.d.	-	-	-	-	-
				Fiber Identification:	none					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations: Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample 7A **Lab Number** 2016-09831- 19 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Cementitious Non-fibrous Solid
Homogeneous Yes **# Layers** 2 **Pos Layer?** No **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): powder, rock,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber: Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	sealant	40	white	1	n.d.	-	-	-	-	-
2	concrete	60	gray	1	n.d.	-	-	-	-	-
	Total %	100		Overall %	n.d.	-	-	-	-	-
				Fiber Identification:	none					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations: Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample 7B **Lab Number** 2016-09831- 20 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Cementitious Non-fibrous Solid
Homogeneous No **# Layers** 2 **Pos Layer?** No **# Sub-Samples** 4
Non-Fibrous Components (in approx. decreasing order): powder, rock,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber: Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	sealant	40	white	1	n.d.	-	-	-	-	-
2	concrete	60	gray	1	n.d.	-	-	-	-	-
	Total %	100		Overall %	n.d.	-	-	-	-	-
				Fiber Identification:	none					

Fibers		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations: Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample 7C **Lab Number** 2016-09831- 21 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Cementitious Non-fibrous Solid
Homogeneous No **# Layers** 2 **Pos Layer?** No **# Sub-Samples** 4
Non-Fibrous Components (in approx. decreasing order): powder, rock,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber: Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	sealant	40	white	1	n.d.	-	-	-	-	-
2	concrete	60	gray	1	n.d.	-	-	-	-	-
	Total %	100		Overall %	n.d.	-	-	-	-	-
				Fiber Identification:	none					

Fibers		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations: Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample 8A **Lab Number** 2016-09831- 22 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Wall System Non-fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): powder, ,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber: Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	texture/joint compound	100	tan	3	n.d.	-	-	-	-	-
	Total %	100		Overall %	n.d.	-	-	-	-	-
				Fiber Identification:	none					

Fibers		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations: Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample 8B **Lab Number** 2016-09831- 23 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Wall System Non-fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): powder, ,

Layers

#	Layer Type	%	Color	Friability
1	texture/joint compound	100	tan	3
	Total %	100		

Percents of Each Fiber	Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
	n.d.	-	-	-	-	-
Overall %	n.d.	-	-	-	-	-
Fiber Identification:	none					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext
1	none							
2								
3								
4								
5								
6								

Refractive Index Determinations	Oil	Col Par	Col Per	RI Par	RI Per

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample 8C **Lab Number** 2016-09831- 24 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Wall System Non-fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): powder, ,

Layers

#	Layer Type	%	Color	Friability
1	texture/joint compound	100	tan	3
	Total %	100		

Percents of Each Fiber	Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
	n.d.	-	-	-	-	-
Overall %	n.d.	-	-	-	-	-
Fiber Identification:	none					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext
1	none							
2								
3								
4								
5								
6								

Refractive Index Determinations	Oil	Col Par	Col Per	RI Par	RI Per

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample 9A **Lab Number** 2016-09831- 25 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Adhesive/caulk Non-fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): filler, binder,

Layers

#	Layer Type	%	Color	Friability
1	gasket	100	red	1
	Total %	100		

Percents of Each Fiber	Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
	n.d.	-	-	-	-	-
Overall %	n.d.	-	-	-	-	-
Fiber Identification:	none					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext
1	none							
2								
3								
4								
5								
6								

Refractive Index Determinations	Oil	Col Par	Col Per	RI Par	RI Per

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using solvent.

Sample 9B **Lab Number** 2016-09831- 26 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Adhesive/caulk Non-fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): filler, binder,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	gasket	100	red	1	n.d.	-	-	-	-	-
	Total %	100		Overall %	n.d.	-	-	-	-	-
				Fiber Identification:	none					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using solvent.

Sample 9C **Lab Number** 2016-09831- 27 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Adhesive/caulk Non-fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): filler, binder,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	gasket	100	red	1	n.d.	-	-	-	-	-
	Total %	100		Overall %	n.d.	-	-	-	-	-
				Fiber Identification:	none					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using solvent.

Sample 10A **Lab Number** 2016-09831- 28 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Wall System Non-fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): powder, rock, polymer

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	plaster	100	off-white	2	<=1%	-	-	-	-	-
	Total %	100		Overall %	<=1%	-	-	-	-	-
				Fiber Identification:	cellulose fiber					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations Oil	Col Par	Col Per	RI Par	RI Per
1	cellulose fiber	W	F	N	N	H	+	U					
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample 10B **Lab Number** 2016-09831- 29 **Sampled:** 9/27/2016 **Condition:** acceptable

Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Wall System Non-fibrous Solid

Homogeneous No **# Layers** 3 **Pos Layer?** No **# Sub-Samples** 7

Non-Fibrous Components (in approx. decreasing order): powder, rock, binder

Layers

#	Layer Type	%	Color	Friability
1	paint	5	off-white	1
2	plaster (top coat)	5	white	2
3	plaster (scratch coat)	90	tan	2
	Total %	100	**Overall %**	

Percents of Each Fiber

	Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	n.d.	-	-	-	-	-
2	n.d.	-	-	-	-	-
3	<=1%	-	-	-	-	-
Overall %	<=1%	-	-	-	-	-
Fiber Identification:	cellulose fiber					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext
1	cellulose fiber	W	F	N	N	H	+	U
2								
3								
4								
5								
6								

Refractive Index Determinations

Oil	Col Par	Col Per	RI Par	RI Per

Sample Analytical Note

Procedure: tweased apart using forceps. Procedure: dissolution of paint matrix using solvent. Procedure: dissolution of plaster matrix using acid.

Sample 10C **Lab Number** 2016-09831- 30 **Sampled:** 9/27/2016 **Condition:** acceptable

Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Wall System Non-fibrous Solid

Homogeneous No **# Layers** 3 **Pos Layer?** No **# Sub-Samples** 7

Non-Fibrous Components (in approx. decreasing order): powder, rock, binder

Layers

#	Layer Type	%	Color	Friability
1	paint	1	off-white	1
2	plaster (top coat)	1	white	2
3	plaster (scratch coat)	98	tan	2
	Total %	100	**Overall %**	

Percents of Each Fiber

	Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	n.d.	-	-	-	-	-
2	n.d.	-	-	-	-	-
3	<=1%	-	-	-	-	-
Overall %	<=1%	-	-	-	-	-
Fiber Identification:	cellulose fiber					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext
1	cellulose fiber	W	F	N	N	H	+	U
2								
3								
4								
5								
6								

Refractive Index Determinations

Oil	Col Par	Col Per	RI Par	RI Per

Sample Analytical Note

Procedure: tweased apart using forceps. Procedure: dissolution of paint matrix using solvent. Procedure: dissolution of plaster matrix using acid.

Sample 11A **Lab Number** 2016-09831- 31 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Wall System Non-fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): powder, rock, polymer

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber: Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	plaster	100	off-white	2	n.d.	-	-	-	-	-
	Total %	100		Overall %	n.d.	-	-	-	-	-
				Fiber Identification:	none					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations: Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample 11B **Lab Number** 2016-09831- 32 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Wall System Non-fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): powder, rock, polymer

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber: Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	plaster	100	off-white	2	n.d.	-	-	-	-	-
	Total %	100		Overall %	n.d.	-	-	-	-	-
				Fiber Identification:	none					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations: Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample 11C **Lab Number** 2016-09831- 33 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Wall System Non-fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): powder, rock, polymer

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber: Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	plaster	100	off-white	2	n.d.	-	-	-	-	-
	Total %	100		Overall %	n.d.	-	-	-	-	-
				Fiber Identification:	none					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations: Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample 12A **Lab Number** 2016-09831- 34 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Adhesive/caulk Non-fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): filler, binder,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	sealant	100	red	1	n.d.	-	-	-	-	-
	Total %	100		Overall %	n.d.	-	-	-	-	-
				Fiber Identification:	none					

Fibers		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations				
									Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using solvent.

Sample 12B **Lab Number** 2016-09831- 35 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Adhesive/caulk Non-fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): filler, binder,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	sealant	100	red	1	n.d.	-	-	-	-	-
	Total %	100		Overall %	n.d.	-	-	-	-	-
				Fiber Identification:	none					

Fibers		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations				
									Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using solvent.

Sample 12C **Lab Number** 2016-09831- 36 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Adhesive/caulk Non-fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): filler, binder,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	sealant	100	red	1	n.d.	-	-	-	-	-
	Total %	100		Overall %	n.d.	-	-	-	-	-
				Fiber Identification:	none					

Fibers		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations				
									Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using solvent.

Sample 13A **Lab Number** 2016-09831- 37 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Wall System Non-fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): powder, rock, polymer

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	plaster	100	off-white	2	n.d.	-	-	-	-	-
	Total %	100		Overall %	n.d.	-	-	-	-	-
				Fiber Identification:	none					

Fibers		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations				
									Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample 13B **Lab Number** 2016-09831- 38 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Wall System Non-fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): powder, rock, polymer

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	plaster	100	off-white	2	n.d.	-	-	-	-	-
	Total %	100		Overall %	n.d.	-	-	-	-	-
				Fiber Identification:	none					

Fibers		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations				
									Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample 13C **Lab Number** 2016-09831- 39 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Wall System Non-fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): powder, rock, polymer

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	plaster	100	off-white	2	n.d.	-	-	-	-	-
	Total %	100		Overall %	n.d.	-	-	-	-	-
				Fiber Identification:	none					

Fibers		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations				
									Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample 14A **Lab Number** 2016-09831- 40 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Wall System Non-fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): powder, ,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber: Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	powder	100	white	4	n.d.	-	-	-	-	-
	Total %	100		Overall %	n.d.	-	-	-	-	-
				Fiber Identification:	none					

Fibers		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations: Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample 14B **Lab Number** 2016-09831- 41 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Wall System Non-fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): powder, ,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber: Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	powder	100	white	4	n.d.	-	-	-	-	-
	Total %	100		Overall %	n.d.	-	-	-	-	-
				Fiber Identification:	none					

Fibers		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations: Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample 14C **Lab Number** 2016-09831- 42 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Wall System Non-fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): powder, ,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber: Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	powder	100	white	4	n.d.	-	-	-	-	-
	Total %	100		Overall %	n.d.	-	-	-	-	-
				Fiber Identification:	none					

Fibers		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations: Oil	Col Par	Col Per	RI Par	RI Per
1	none												
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample 15A **Lab Number** 2016-09831- 43 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Insulation Fibrous Mat
Homogeneous Yes **# Layers** 1 **Pos Layer?** Yes **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): binder, ,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	gasket	100	gray	1	30-40%	-	-	-	-	-
	Total %	100		Overall %	30-40%	-	-	-	-	-
				Fiber Identification:	chrysotile asbestos					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations				
									Oil	Col Par	Col Per	RI Par	RI Per
1	chrysotile asbestos	W	A	N	N	L	+	P	1.550	db/ly	sb/o	1.561	1.553
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps.

Sample 15B **Lab Number** 2016-09831- 44 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Insulation Fibrous Mat
Homogeneous Yes **# Layers** 1 **Pos Layer?** Yes **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): binder, ,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	gasket	100	gray	1	30-40%	-	-	-	-	-
	Total %	100		Overall %	30-40%	-	-	-	-	-
				Fiber Identification:	chrysotile asbestos					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations				
									Oil	Col Par	Col Per	RI Par	RI Per
1	chrysotile asbestos	W	A	N	N	L	+	P	1.550	db/ly	sb/o	1.561	1.553
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps.

Sample 15C **Lab Number** 2016-09831- 45 **Sampled:** 9/27/2016 **Condition:** acceptable
Analyzed By MCJ 9/29/2016 **An?** OK **Apparent Smp Type** Insulation Fibrous Mat
Homogeneous Yes **# Layers** 1 **Pos Layer?** Yes **# Sub-Samples** 3
Non-Fibrous Components (in approx. decreasing order): binder, ,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	gasket	100	gray	1	30-40%	-	-	-	-	-
	Total %	100		Overall %	30-40%	-	-	-	-	-
				Fiber Identification:	chrysotile asbestos					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations				
									Oil	Col Par	Col Per	RI Par	RI Per
1	chrysotile asbestos	W	A	N	N	L	+	P	1.550	db/ly	sb/o	1.561	1.553
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps.

Fr=Friability: 1=very non-friable; 2= non-friable; 3=friable; 4=highly friable
Colors: B=black;BL=blue;BR=brown;CL=clear;G=Green;GY=gray;OR=orange;OW=off-white;PN=pink;PU=purple;R=red;TN=tan;W=white;Y=yellow;V=various
Fiber Morphology: A=fine fibers/bundles, white, sinewy, flexible; B=fine fibers/bundles, w-br, straight, broomed ends; C=fine fibers/bundles, blue, straight, broomed ends; D=fine to coarse fibers, CL-B, brittle; E=coarse fibers,CL or dyed, striated; F=coarse fibers or splinters, W-BR, ribbon-like; G=lath-like or shards, low aspect ratio, may taper
Iso=isotropism - may be yes or no; Pleo=pleochroism - may be yes or no; Bi=birefringence - may be None, Low, Medium or High
Elg=sign of elongation - may be +, - or B (both); Ext=extinction - may be Parallel, Oblique, None or Undulating; Oil=medium used to for dispersion staining
Col Par=dispersion staining colors parallel to the fiber (fiber/halo): b/w=black/white; dg/py=dark gray/pale yellow; vg/y=violet gray/yellow; db/ly=dark blue/lemon yellow; vb/g= vivid blue/gold; sb/o=sky blue/orange; pb/r=pale blue/red; gb/dr=gray blue/dark red; w/b=white/black. Col Perp=same only perpendicular to fiber.
RI Par=refractive index parallel to fiber; RI Perp=refractive index perpendicular to fiber

Analyst: MARK C. JEFFERSON

Printed: 29-Sep-16

Original Print Date: 29-Sep-16

Larry S. Pierce, Approved Accreditation Signatory

FIBERQUANT ANALYTICAL SERVICES

Fiberquant Analytical Services 5025 S. 33rd St.;
Phoenix, AZ 85040; Phone: 602-276-6139; FAX: 602-276-4558;
info@fiberquant.com

Analysis Request/Chain-of-Custody Form

Submitted by (Company): AMEC FOSTER WHEELER
Address: 4600 E. WASHINGTON STE 600
City, State, Zip Code: PHX AZ
Phone: | FAX:
Email:

Invoice to (Company): AMEC FW
Address:
City, State, Zip Code:
Phone: | FAX:

Contact (print): PAM WALRATH
Sampled by (signature):
Job Number or Project Name: 14-2016-2027
PO Number:

<Analysis Method Requested> ONLY ONE METHOD per COC			Turn-around-time (circle one) Rush		Norm	Ext.
Asbestos by PLM	Method > Improved	Interim	Urgent Rush <3 hrs	<6 hrs	1-3 days	15-30 days
	Analyze > All	ATPF				
	If ATPF then > by Layer	by Sample				
	Single Layer Protocol > Yes	No				
Fibers by PCM	Method > 7400 (Area)	ORM (Personal)	<4 hrs		24 hrs	-
Asbestos by TEM	In Air > AHERA	Mod. AHERA	<6 hrs		24 hrs	3-5 days
	In Water* > Water	Sludge	1-2 days		3-5 days	N/A
	In Bulk (Annex2) > Chatfield	Full Quant.				
	In Dust > ASTM D5755		3-5 days		5-10 days	N/A
Pb by FLAA	Analyte > Pb	Other	<6 hrs		2-3 days	N/A
	Matrix > Filter > MCE	FG				
	Paint > by Area (mg/cm²)	by Weight (ppm)				
	Soil >					
	Wipe >					
	Initial here certifying wipes used are ASTM E1792 compliant					
Fungi	Air Sample > Zefon	Aller Other	<6 hrs		1-2 days	N/A
	Bulk > Sample	Swab				
	Tape Lift > Qualitative (% & type)					
	Quantitative (type/cm2)					
Soot	ASTM D6602-03b Optical		<6 hrs		1-2 days	N/A
	Optical & TEM		1-2 days		3-5 days	N/A
Other			Call		Call	

Sample # (1 per line)	Description/Location	Sample Date	Sample Time	Vol. or Area
1) 1 A-C	TAN WALL ADHESIVE	9/27/16		
2) 2 A-C	CONCRETE WALL			
3) 3 A-C	PIPE RUN INSULATION - STRAIGHT			
4) 4 A-C	PIPE ELBOWS			
5) 5 A-C	STAIRS			
6) 6 A-C	FOUNDATION			
7) 7 A-C	CONCRETE DECK - FENTRY			
8) 8 A-C	WALL PATCH - FENTRY			
9) 9 A-C	GASKETS - RED			
10) 10 A-C	PLASTER CEILING - BOILER ROOM			
11) 11 A-C	PLASTER PATCH - BOILER ROOM			
12) 12 A-C	WINDOW PUTTY			
13) 13 A-C	TROWELED PLASTER			
14) 14 A-C	WHITE PATCH - CEILING & WALL			
15) 15 A-C	GASKETS - GRAY			
16)				
17)				
18)				
19)				
20)				

1)Relinquished by:	Date: 9/27/16	Time:	3)Relinquished by:	Date:	Time:
2)Received by:	Date: 9/27/16	Time: 959	4)Received by:	Date:	Time:
* TEM Water: Sample's name required by State of Arizona	Print Name		Fiberquant assigned Job Number>	20160983 1	
Review of Analysis Request (Initials):				Page of	

Note: Data completed by client (including number and identity of samples) is assumed to be correct until it is verified at time of sample preparation.

30th August 2022

Hello Teresa,

Please find enclosed ...Material I have in my file here at Bullion. I'm sure the Town of Miami has more complete documentation if needed. Hopefully, some of this will be helpful for you.

I thought Jennie's comment on incorporating the crawl space into the basement project was interesting. Time has passed, budgets changed, maybe now is the time to finish the project off and clean up the remaining mess.

By the way - Bullion Plaza is leased from the Town of Miami by BPCCM, and I am not employed by the Town, although we work together at various times. So as we move forward we will need to bring them into the conversation.

Enjoyed talking with you and thanks for your time.

Regards,

Thomas N. Foster
Executive Director
Bullion Plaza Cultural Center & Museum
PO Box 786
Miami, Arizona 85539

Mobile: 602.432.7474

BULLION PLAZA CULTURAL CENTER & MUSEUM
928-473-3700

2016

ADEQ

Basement

$7,835.00

Town of Miami

Bullion Plaza Museum

Vikins

Native

Vikins

CRS

REMEDIATION, EMERGENCY AND CONSTRUCTION SERVICES

CRS 24/7 Emergency Response

333 East Osborn Road
Suite 300
Phoenix, AZ 85012

Cell: 602-478-7672

KEN KNUTSON
Senior Estimator
ken.knutson@crs-info.com
www.crs-info.com
Arizona Contractors License 275441
1GPA #14-156 / AZ State Contract Number ADSP012-033251

TOWN OF MIAMI
"Copper Center of the World"

500 W. Sullivan St.
Miami, AZ 85539
928-473-4403

July 22, 2016

Jennie Curé
Brownfields Coordinator
Arizona Department of Environmental Quality
1110 West Washington Street
Phoenix, AZ 85007

Dear Ms. Curé

The Town of Miami requests funding in the amount of $7, 835 for a State Response Grant (SRG) from the Arizona Department of Environmental Quality (ADEQ) Brownfields Program to perform an asbestos and lead based paint survey on the basement of the Historic Bullion Plaza School Building (BPS). The BPS is located on a 2.0 acre property at 150 N. Plaza Circle, Miami, AZ. The site is not located in a WQARF or Superfund area and the Town of Miami is not a responsible party for the contamination. ADEQ will be the project manager under the Arizona Brownfields Response Contract (ABRC).

The Site

The site is located at 150 N Plaza Circle, Miami, Arizona. The site is 2.0 acres with Gila County assessor parcel number 204-15-012A. The Town of Miami currently owns the property, having purchased it from the Miami Unified School District #40 in 1997.

The Redevelopment

The BPS, which is a historical structure listed on the National Registry of Historic Places, is significant for its association with the history of Mexican American and Native American school segregation in Arizona and as an example of late Neo-Classical Revival architecture in public buildings in Miami. The BPS currently houses the Bullion Plaza Cultural Center and Museum (BPCCM), a 501(c)3 non-profit organization. The Museum's exhibits document the economic, social and cultural history of Miami. The BPCCM offers the use of their meeting and conference rooms for public and commercial events. The BPCCM regularly hosts a speaking series on historical and educational topics. The BPCCM, working with the Town of Miami has sought and received grants that have been used to abate hazardous materials throughout the building, restore the interior and exterior of the building and create new exhibits for the Museum. The basement of BPS has remained off limits due the dangers posed by asbestos and lead paint contamination. The future use of the BPS basement following abatement of asbestos and lead-based paint is to renovate the building allowing the Museum to expand its exhibit space to provide a site for a proposed underground mine tunnel display. The Town and the BPCCM believe that the renovation of the Bullion Plaza School will generate interest in preservation of historical buildings in Miami leading to the development of commercial businesses and other viable activities benefiting the community.

Dale Metz, Town of Miami Civil Engineering Technician, will be the key contact person to receive site update and any correspondence form ADEQ.

Fwd: Bullion Plaza School Grant

Friday, July 21, 2017 3:20 PM

From: "D Metz" <dmetzmiami@gmail.com>

To: "Tom Foster" <az.terr1912@yahoo.com>

---------- Forwarded message ----------
From: **Jennie E. Curé** <Cure.Jennie@azdeq.gov>
Date: Tue, Jul 18, 2017 at 2:32 PM
Subject: RE: Bullion Plaza School Grant
To: D Metz <dmetzmiami@gmail.com>

Hello Dale,

I have $62,850 in the budget for the abatement project on the museum. I am working on getting projects lined up and would like to be able to receive your grant request the week of August 14. Please send in the request letter asking for the $62,850 and I can start the paperwork that week. If you put it in the mail on Friday, August 11 that should work. Use the previous letter for a template but ask for the $62,850 for asbestos abatement.

Please do not hesitate to contact me with any questions or concerns you may have.

Sincerely,

Jennie

From: D Metz [mailto:dmetzmiami@gmail.com]
Sent: Tuesday, July 18, 2017 2:25 PM
To: Jennie E. Curé <Cure.Jennie@azdeq.gov>
Subject: Bullion Plaza School Grant

Hi Jennie,

Tom Foster is applying for a USDA grant to install an elevator in the building to make all levels handicapped accessible. If he can show other money or grants being invested in the building it will improve the chances for approval. Are there any funds set aside for the upcoming abatement project that we can show as an authorized grant? If so what amount can we list? Thanks for any help you can provide.

Regards,

Dale Metz
Town of Miami

Subject: Proposal - Bullion Plaza Boiler & Storage Abatement

From: Kristy Huggins (KHuggins@nativeaz.com)

To: az.terr1912@yahoo.com;

Cc: JRiggs@nativeaz.com; DKnutson@nativeaz.com;

Date: Monday, March 30, 2015 9:39 AM

Good morning Mr. Foster,

Native's proposal for asbestos abatement at the Bullion Plaza is attached. Please contact us with any questions.

Thank you,

Kristy Huggins

Project Manager

Native Environmental, LLC

602.254.0122 Phone

602.254.0144 Fax

602.570.3115 Cell

khuggins@nativeaz.com

NATIVE Environmental, LLC

"Environmental Solutions for the Next Generation"

Agreement Between Contractor and Owner

Native Environmental, LLC
3250 S. 35th Ave. - Phoenix, AZ 85009
Office (602) 254-0122 Fax (602) 254-0144

Bid Number: JR15-123

THIS AGREEMENT, entered into Monday, March 30, 2015 by and between Native Environmental and ATTN:

Client Information	Project Information
Thomas N. Foster **Executive Director** **Bullion Plaza Cultural Center & Museum** **az.terr1912@yahoo.com**	**Project Name: Boiler & Storage Abatement** **Project Location: Bullion Plaza**

THE PARTIES AGREE TO THE FOLLOWING:

1. **Scope of Work:** Native Environmental agrees to provide the following Contracting Services:

A. Basement Stairwell

Remove and dispose of bags containing asbestos material. HEPA vacuum and wet-wipe the area

Bid Price	Tax	Other	Total
$1,150.00	N/A	N/A	$1,150.00

B. Boiler – Asbestos Abatement

Bid Price	Tax	Other	Total
$9,700.00	N/A	N/A	$9,700.00

C. Boiler – Cut & Remove

Bid Price	Tax	Other	Total
$4,300.00	N/A	N/A	$4,300.00

D. Room 3 – NW Room: Remove 20 LF of fallen 8" TSI. HEPA vac and wet-wipe all surfaces.
NOTE: This room should be immediately sealed due to the high amounts of airborne asbestos

Bid Price	Tax	Other	Total
$3,300.00	N/A	N/A	$3,300.00

E. Room 4 – NE Storage

Remove 30 LF of 8" TSI. HEPA vac and wet-wipe all surfaces

Bid Price	Tax	Other	Total
$2,300.00	N/A	N/A	$2,300.00

2. **Price includes:** All labor, materials, personal protective equipment, air monitoring, vehicles, transportation, and travel/per diem as applicable to the scope of work.

3. **Schedule:** This job will be performed Monday through Friday, during the hours necessary to meet your schedule unless prior arrangements have been made. Please keep in mind that weekend and holiday work may incur additional overtime costs.

4. Payment for Invoices is due 30 days from the invoice date. Interest shall accrue on past due invoices at 2% per month or no greater than 24% annually on all unpaid invoices.

5. Any alterations or deviations from the specified scope of work will be completed upon written consent from authorized personnel. This proposal shall become part of the contract document and by signing, you agree to all conditions listed within.

6. Bid price is good for 60 calendar days, at which time Owner and Native Environmental can confer with one another on current market price.

NOTES:

A. Compliance with Federal, State and Local regulations.
B. Per occurrence $5 million A++ rated Insurance.
C. Arizona Contractors License #161563
D. MSHA Contractor ID U916

Native Environmental appreciates the opportunity to bid on your work. If you have any questions or concerns regarding the content of this proposal please do not hesitate one of our Estimators

_____

Submitted by:
Jon Riggs
Native Environmental, LLC

_____

Accepted by:

Date: _____

Fwd: Proposal with abatement contractor price included Wednesday, January 4, 2017 1:58 PM

From: "D Metz" <dmetzmiami@gmail.com>

To: "Tom Foster" <az.terr1912@yahoo.com>

Full Headers Printable View

1 Files 57KB Download All

PDF 57KB

PV16-12-10 Miami Bullion.pdf

Save

Tom,

Here is the proposal for the BPM&CC abatement. Let me know if you have any questions.

Dale

---------- Forwarded message ----------
From: **Walrath, Pam** <pam.walrath@amecfw.com>
Date: Wed, Jan 4, 2017 at 1:22 PM
Subject: Proposal with abatement contractor price included
To: "dmetzmiami@gmail.com" <dmetzmiami@gmail.com>
Cc: "Jennie E. Curé" <Cure.Jennie@azdeq.gov>, "Ostapuk, Tim" <Tim.Ostapuk@amecfw.com>

Dale,
Please find attached the proposal for the Miami Bullion Cultural Center Basement abatement work.
Please let me know if you have any questions and Happy New Year!

Best Regards,

Pamela Walrath
Environmental Scientist
AMEC Foster Wheeler
Environment & Infrastructure Americas
4600 E. Washington Street, Suite 600
Phoenix, Az 85034-1917, USA
T + 1 602-733-6091 M + 480-217-1225
pam.walrath@amecfw.com
www.amecfw.com

amec foster wheeler

Begin June July 2017
Basement Abatement
Called Dale Metz OK

Proposal
Time and Materials Price

Amec Foster Wheeler Environment & Infrastructure, Inc.
4600 East Washington Street, Suite 600
Phoenix, Arizona 85034
Phone: 602-733-6000 Fax: 602-733-6110

amec foster wheeler

PARTIES

This project coordinated this 4th day of January 2017, between:

Town of Miami	and	**Amec Foster Wheeler Environment & Infrastructure, Inc.**
500 West Sullivan Street		4600 East Washington Street, Suite 600
Miami, Arizona 85539		Phoenix, Arizona 85034
Attn: Mr. Dale Metz		Attn: Mrs. Pam Walrath
hereinafter called "Client"		hereinafter called "Amec Foster Wheeler"

PROJECT

Client engages Amec Foster Wheeler Environment and Infrastructure, Inc. (Amec Foster Wheeler) to provide services in connection with this proposal, PV16-12-10 dated January 4, 2017.

For the following site:

Asbestos and Lead Abatement Oversight
Miami Bullion Plaza and Cultural Center – Basement (Phase 1) & Crawlspace (Phase 2)
150 North Plaza Circle, Miami AZ

SCOPE OF SERVICES

Amec Foster Wheeler understands that the Client is requesting asbestos abatement and lead stabilization oversight of materials located in the four rooms of the basement and crawlspaces of Miami Bullion Cultural Center (the site). The abatement and stabilization will be performed in two phases: Phase I will include materials located in the four rooms of the basement and Phase II will include the pipe run insulation located in the crawlspaces.

Phase I Materials:

- Material #3 (Thermal Systems Insulation (TSI), Straight Runs – Approximately 400 linear feet (lin. ft.) – Throughout Basement and Crawlspaces.
- Material #4 (Thermal Systems Insulation (TSI), Elbows) - Approximately 15 each – Throughout Basement Spaces (including confined space).
- Material #15 (Miscellaneous, Category I Non-Friable): Gray Gaskets – Approximately 2 each – Boiler Room on Equipment.
- Assumed ACM (Thermal Systems Insulation (TSI), Boiler Insulation Wrap – Approximately 2 each – On Boiler Equipment.
- Assumed ACM (Miscellaneous, Category I Non-Friable), Disposal Bags of Removed Building Material – Approximately 20 each
- Lead containing white wall (200 ppm)
- Lead containing gray on stairs (3,800 ppm)
- Lead containing varnished door (3,900 ppm)
- Lead containing gray paint on wall (1,600 ppm)
- Lead containing silver pipe (1,700 ppm)

Phase II Materials:

- Material #3 (Thermal Systems Insulation (TSI), Straight Runs – Approximately 400 linear feet (lin. ft.) – Throughout Basement and Crawlspaces.
- Material #4 (Thermal Systems Insulation (TSI), Elbows) - Approximately 15 each – Throughout Basement Spaces (including confined space).

For each phase of work Amec Foster Wheeler will perform the following tasks:

Task 1
Amec Foster Wheeler will attend a pre-abatement meeting on-site. The meeting will include members of Town of Miami, Arizona Department of Environmental Quality and the abatement contractor.

Amec Foster Wheeler will prepare an Asbestos and Lead Abatement Work Plan, which will include sections relating to the summary of work, job site administration, codes and regulations, worker protection, work area preparation, asbestos and lead removal procedures, waste disposal, project clearance and submittals. Amec Foster Wheeler will provide copies of the Asbestos and Lead Abatement Work Plan to the asbestos and lead abatement contractor.

Task 2
Amec Foster Wheeler will provide an Asbestos Hazard Emergency Response Act-certified Contractor/Supervisor (C/S) to perform full-time oversight. The C/S will observe abatement contractor's work while abatement activities are being performed. During the removal and cleaning phases of the abatement, Amec Foster Wheeler will collect area air samples from outside the work Area to provide an indication of the effectiveness of the contractor's abatement and cleaning methods. Air Samples will be analyzed by Fiberquant Analytical Services in general accordance with the NIOSH 7400 Method for Phase Contrast Microscopy (PCM) on a RUSH turnaround, to determine airborne fiber concentrations. The abatement contractor will be responsible for personal air monitoring required for the health and safety of its own workers.

Following the abatement contractor's completion of abatement activities, Amec Foster Wheeler will conduct a visual inspection of the containment area to determine that all surfaces are free of debris, residue, dust, or other visible matter. The final visual will be performed in general accordance with the "Standard Practice for Visual Inspection of Asbestos Abatement Projects," ASTM Designation: E 1368-14.
After the C/S determines that the containment areas are visually clean, final clearance air samples will be collected, which will be analyzed using PCM methodology in accordance with the method specified in the Work Procedure. Following visual and final air clearances, Amec Foster Wheeler will document and ensure the completion of any punch list items.

Task 3
At the completion of the project, Amec Foster Wheeler will document the abatement activities in a Final Report of Abatement. The report will include a summary project information, contractor abatement reports and close-out documentation, field and photographic documentation, air sampling results, and consultant's accreditations. Amec Foster Wheeler will provide the Client with one original and one electronic copy of the final report.

Client agrees that all services not expressly included are excluded from Amec Foster Wheeler's Scope of Services.

COMPENSATION

Phase 1 – Cost Estimate for Miami Bullion Plaza and Cultural Center – Basement				
Task 1 – Pre-Abatement Meeting and Development of Abatement Work Plan	**Units**	**Quantity**	**Unit Cost**	**Totals**
Professional Level III	hour	8	$126.00	$1,008.00
Professional Level II	hour	12	$94.50	$1,134.00
Support Staff III	hour	4	$63.00	$252.00
Task 1 Subtotal				**$2,394.00**
Task 2 - Asbestos Removal and Lead Stabilization Oversight	**Units**	**Quantity**	**Unit Cost**	**Totals**
Professional Level III	hour	8	$126.00	$1,008.00

Professional Level II	hour	120	$94.50	$11,340.00
Support Staff III	hour	6	$63.00	$378.00
Travel Expenses	lump	1	$1,200	$1,200.00
PLM Analysis	each	45	$17.25	$776.25
Shipping Costs	lump	1	$200.00	$200.00
Task 2 Subtotal				**$14,902.25**
Task 3 - Report Preparation	**Units**	**Quantity**	**Unit Cost**	**Totals**
Professional Level III	hour	4	$126.00	$504.00
Professional Level II	hour	10	$94.50	$945.00
Support Staff III	hour	8	$63.00	$504.00
Task 3 Subtotal				**$1,953.00**
Amec Foster Wheeler Phase 1 TOTAL				**$19,249.25**

Phase 2 – Cost Estimate for Miami Bullion Plaza and Cultural Center – Crawlspace (Phase 2)				
Task 1 – Pre-Abatement Meeting and Development of Abatement Work Plan	**Units**	**Quantity**	**Unit Cost**	**Totals**
Professional Level III	hour	8	$126.00	$1,008.00
Professional Level II	hour	12	$94.50	$1,134.00
Support Staff III	hour	6	$63.00	$378.00
Task 1 Subtotal				**$2,520.00**
Task 2 - Asbestos Removal	**Units**	**Quantity**	**Unit Cost**	**Totals**
Professional Level III	hour	8	$126.00	$1,008.00
Professional Level II	hour	130	$94.50	$12,285.00
Support Staff III	hour	8	$63.00	$504.00
Travel Expenses	lump	1	$1,200	$1,200.00
PLM Analysis	each	45	$17.25	$776.25
Shipping Costs	lump	1	$200.00	$200.00
Task 2 Subtotal				**$15,973.25**
Task 3 - Report Preparation	**Units**	**Quantity**	**Unit Cost**	**Totals**
Professional Level III	hour	4	$126.00	$504.00
Professional Level II	hour	10	$94.50	$945.00
Support Staff III	hour	8	$63.00	$504.00
Task 3 Subtotal				**$1,953.00**
TOTAL				**$20,446.25**
Amec Foster Wheeler Phase 1 and Phase 2 Total				***$39,695.50***
Total Project Cost's Breakdown				
CRS Environmental Phase 1				*$34,987.00*
CRS Environmental Phase 2				*$112,000.00*
CRS Phase 1 and Phase 2 TOTAL				*146,987.00*
Project Estimate with Amec Foster Wheeler and CRS Environmental Totals TOTAL				***$186,682.50***

Amec Foster Wheeler's fees will be based on our Statewide Environmental Consulting Services for Asbestos and Lead No. **ADEQ17-140276**. This proposal is valid for 90 days from the date of issuance. If notice to proceed is received after that period, Amec Foster Wheeler reserves the right to review this proposal and revise costs in response to changed assumptions or increases in material or labor costs as a result of economic changes.

Fwd: Bullion Plaza School

Monday, December 19, 2016 5:10 PM

From: "D Metz" <dmetzmiami@gmail.com>

To: "Tom Foster" <az.terr1912@yahoo.com>

Tom, FYI

Dale

---------- Forwarded message ----------
From: **Jennie E. Curé** <Cure.Jennie@azdeq.gov>
Date: Mon, Dec 19, 2016 at 2:08 PM
Subject: RE: Bullion Plaza School
To: D Metz <dmetzmiami@gmail.com>
Cc: "pam.walrath@amecfw.com" <pam.walrath@amecfw.com>

Dale,

I have bids in from three contractors for the abatement of the basement and crawl space. The crawl space will be a difficult and expensive project and I do not believe a good use of the Brownfields grant funds, therefore when we do the project we will be providing funding for the basement only. The basement project bid from CRS for the abatement was the most accurate and reasonable at $34,987.00. The oversight portion of the project was bid at $19,250 by AMEC. Due to the total combined cost of $54,237.00 for the basement project I will award funding with FY18 grant funds which will be available in July, 2017. As we approach that date I will be in touch to request an application for the project. If anything changes with the status of currently available funds I will notify you.

Happy Holidays,

Sincerely,

Jennie

Jennie E. Curé
Brownfields Coordinator
Voluntary Remediation Program Unit/Remedial Projects Section
AZ Department of Environmental Quality
1110 W. Washington St.
Phoenix, AZ 85007
(602) 771-2296
jec@azdeq.gov
www.azdeq.gov

Environmental Resources Roadshows support citizen efforts to maintain and beautify community.
Learn more here.

From: D Metz [mailto:dmetzmiami@gmail.com]
Sent: Monday, December 19, 2016 1:50 PM
To: Jennie E. Curé <Cure.Jennie@azdeq.gov>
Subject: Bullion Plaza School

Hi Jennie,

I have been out of Town for the last two weeks and I haven't heard from anyone since the walk thru. Has there been any progress on the abatement bids?

Dale Metz
Town of Miami

Compose

ADEQ
Arizona Department
of Environmental Quality

Another Project Partially Funded By The Arizona Department of Environmental Quality's Brownfields Program

ADEQ Brownfields Grant: Town of Miami
Asbestos and Lead Based Paint Abatement
Old Bullion Plaza School

ADEQ Contract No: ADEQ18-182186

Si usted tiene preguntas, o para informacion en espaiiol sobre este proyecto, por favor llamar al Maria Lopez, Town of Miami, 928-473-4403

The Arizona Department of Environmental Quality (ADEQ) is providing funding on behalf of the Town of Miami through a Brownfields State Response Grant to conduct Asbestos and Lead Based Paint Abatement at the Old Bullion Plaza School, 150 N Plaza Circle, Miami, Arizona beginning on October 23rd 2017.

FOR MORE INFORMATION PLEASE CONTACT:
Dale Metz Town of Miami 928-473-9024

Bullion Plaza Update

Tuesday, November 14, 2017 11:18 AM

From: "Dylan Whitwer" <dwhitwer@geotekusa.com>

To: "jec@azdeq.gov" <jec@azdeq.gov> "dmetzmiami@gmail.com" <dmetzmiami@gmail.com>
"AZ.terr1912@yahoo.com" <AZ.terr1912@yahoo.com>

Cc: "steve.beirl@crs-info.com" <steve.beirl@crs-info.com> "Tod Whitwer" <twhitwer@geotekusa.com>

All –

I wanted to give a quick project update:

Last week, the remainder of the TSI, boiler, associated pipe runs/elbows, ACM debris bags, and other miscellaneous debris were abated and disposed of at their appropriate landfills. The PCB-containing light ballasts were removed from the second floor and basement and also disposed of.

Yesterday, the gray lead-containing paint on the stairs was scraped and painted over. I obtained my lead wipe clearance samples and submitted them to the laboratory.

At this point we are waiting on the landfills to send back their signed waste manifests as well as waiting for the laboratory results from the lead wipe samples. We anticipate to have the manifests/laboratory reports returned to us by the end of this week or early next week. We will submit the draft report to the Town of Miami/ADEQ by mid-to-late next week. Please let me know if this schedule is acceptable.

In addition, the link below is photographs I obtained throughout the project. Please feel free to download and use as you see best fit.
https://www.dropbox.com/sh/r0d0kxtdblw5bbn/AABeReOaT3MNNV3NhvvTncHGa?dl=0

Please let me know if you have any comments or concerns.

Thank you,

Dylan Whitwer
Environmental Specialist
GeoTek, Inc.
4050 East Cotton Center Boulevard, Suite 49
Phoenix, Arizona 85040
Cell: (623) 556-6455

GEOTEK

SPRAY SYSTEMS ENVIRONMENTAL

Environmental Response, Inc.
A Wholly Owned Subsidiary of Spray Systems Environmental

Colorado Lic. #81-0443330
Nevada Lic. #30882, New Mexico Lic. #60610
Arizona Lic. ROC 244331, ROC 244330 Commercial & Residential • USDOT #548193
ASBESTOS, MOLD & LEAD REMOVAL • ENVIRONMENTAL REMEDIATION
EMERGENCY RESPONSE • HAZARDOUS MATERIAL TRANSPORTER
WEB SITE: WWW.SPRAYSYSTEMSERI.COM

JON VARRELMAN
Supervisor

2202 W. Medtronic Way, Suite 108
Tempe, AZ 85281
Email: jvarrelman@spray-eri.com

Office: (480) 967-8300
Mobile: (602) 757-6886
Fax: (480) 894-1966

Basement Walk
thru —
21 Nov. Monday
Basement.
Billion Plaza.

REMEDIATION, EMERGENCY AND CONSTRUCTION SERVICES

CRS 24/7 Emergency Response

333 East Osborn Road
Suite 300
Phoenix, AZ 85012

Cell: 602-478-7672

KEN KNUTSON
Senior Estimator
ken.knutson@crs-info.com
www.crs-info.com
Arizona Contractors License 275441
1GPA #14-156 / AZ State Contract Number ADSP012-033251

Viking
Specialty Contracting

Jeff Burns

Jeff@Viking-az.com | C: 602-686-2886 | O: 480-568-8228
Physical: 1008A E. Vista Del Cerro Dr., Tempe, AZ 85281
Billing: 25249 S. 194th St., Queen Creek, AZ 85142
License: KB-1 ROC283086

TOWN OF MIAMI

"Copper Center of the World"

Joshua Derhammer

ANIMAL CONTROL & CODE ENFORCEMENT

MIAMI TOWN HALL
500 W. Sullivan Street
Miami, AZ 85539

Phone: (928) 473-9052
Fax: (928) 473-3003
Animal- miamiaco@cableone.net
Code- miamicodeenforcement@cableone.net

Fwd: Bid Walk for Bullion Cultural Center and Museum, Miami Az

Monday, October 24, 2016 4:22 PM

From: "D Metz" <dmetzmiami@gmail.com>

To: "Tom Foster" <az.terr1912@yahoo.com>

Full Headers Printable View

2 Files 2 MB Download All

PDF 2 MB — Asbestos Report of Findings_ — Save

ICS 2KB — invite.ics — Save

Tom, here is the asbestos and lead paint survey report. The pre bid walk through is scheduled for 10:00 am on November 11th.

Dale Metz
Town of Miami

---------- Forwarded message ----------
From: **Walrath, Pam** <pam.walrath@amecfw.com>
Date: Mon, Oct 24, 2016 at 9:33 AM
Subject: Bid Walk for Bullion Cultural Center and Museum, Miami Az
To: "chad@spray-eri.com" <chad@spray-eri.com>, "jeff@viking-az.com" <jeff@viking-az.com>, "Ken Knutson (ken.knutson@crs-info.com)" <ken.knutson@crs-info.com>, "Jennie E. Cure' (jec@azdeq.gov)" <jec@azdeq.gov>, "Ostapuk, Tim" <Tim.Ostapuk@amecfw.com>, "dmetzmiami@gmail.com" <dmetzmiami@gmail.com>

All,
Please find the report of findings for the project listed above. The bid walk will be November 11th and out of town so please allow time for travel and possible road construction in that area. Let me know if you have any questions. Parking is limited in the front with additional parking behind the building. Thank you!!

amec foster wheeler

APPENDIX J

RESPIRATORY PROTECTION PROGRAM

RESPIRATORY PROTECTION PROGRAM

1.0 INTRODUCTION

This written Respiratory Protection Program was prepared specifically for use during maintenance and emergency operations which may disturb asbestos-containing materials (ACMs) at the Subject Property. The manual was designed for the use of respiratory protection in atmospheres containing asbestos fibers and, therefore, should not be used for other types of hazards (e.g., lead, chlorine).

The use of respiratory protection, coupled with effective engineering controls and work practices, is the principal method by which employees will be protected until such time as the ACMs are removed from the building. The respiratory protection program is required by various federal regulations and recommended by several guidelines. Accordingly, the following guidelines and regulations were relied upon for the development of this program:

- American National Standards Institute, Inc. (1984) American National Standard for Respirator Protection - Respirator Use - Physical Qualifications for Personnel, ANSI Z88.6-1992. New York: ANSI, Inc.

- Bollinger, N. J. and R. H. Schultz (l987) NIOSH Guide To Industrial Respiratory Protection. NIOSH Publication No. 87-116, Cincinnati, OH.

- Code of Federal Regulations, Title 29, Part 1910, Section 134, Revised July 1, 1986.

- Code of Federal Regulations, Title 29, Part 1910, Section 1101, August 10, 1994.

- Code of Federal Regulations, Title 29, Part 1926, Section 1101, August 10. 1994.

- Noona, G. P., Linn, H. I., and Reed, L. D. (1986) Guide to Respiratory Protection for the Asbestos Abatement Industry, EPA publication no. DW75932235001-01 Washington, D.C.: U.S. Environmental Protection Agency, Office of Pesticide and Toxic Substance.

2.0 PROGRAM ADMINISTRATOR

The day-to-day implementation and enforcement of the Respiratory Protection Program will be the responsibility of the designated Asbestos Operation and Maintenance (O&M) Plan Coordinator.

3.0 SELECTION AND USE OF RESPIRATORY PROTECTIVE EQUIPMENT

Respirators used shall be selected from those approved by the National Institute for Occupational Safety and Health (NIOSH). An approved respirator contains the following: an assigned identification number placed on each unit; a label identifying the type of hazard the respirator is designed to protect against; additional information on the label which indicates limitations and identifies the component parts approved for use with the basic unit.

The approved respirator shall be used for existing working conditions as follows:

1. Air Purifying Respirators: The minimum respiratory protection to be worn will include a reusable air purifying half-face respirator equipped with two screw-in filter cartridges. This type of respirator will be permitted for use according to the following table.

CONTAMINANT	ACTIVITY	MAXIMUM CONCENTRATION
Asbestos	Operations and Maintenance	0.1 f/cc

The provisions of this respiratory protection program specifically prohibit employees from entering any areas where an oxygen deficient atmosphere may exist (e.g., less than 19.5% oxygen) or asbestos fiber concentrations require respiratory protection greater than that offered by a half-face respirator. Should it become apparent during the course of work that oxygen deficient atmospheres may reasonably be encountered, or a full-face or powered air purifying respirator required, the Program Administrator must be contacted for guidance.

4.0 MEDICAL SURVEILLANCE

Only those individuals who are medically able to wear respiratory protective equipment shall be issued one. Before being issued a respirator, an employee will receive pertinent tests for medical and physical conditions. Medical tests considered include: pulmonary function tests (FVC and FEV), chest X-ray, electrocardiogram, and any others deemed appropriate by the examining physician. Medical factors to be considered by a physician include: emphysema, asthma, chronic bronchitis, heart disease, anemia, hemophilia, poor eyesight, poor hearing, hernia, lack of use of fingers or hands, epileptic seizures, and other factors which may inhibit the ability of an employee to wear respiratory equipment.

More specific information regarding the medical surveillance provisions are included in the Medical Surveillance Program found in Appendix K of the written Asbestos O&M Program.

5.0 RESPIRATOR FIT-TESTS

Each individual who will wear a negative pressure respirator will be qualitatively fit-tested upon receiving the equipment, and semi-annually thereafter. The qualitative fit-test method will be the irritant fume method as described in attachment B to this manual. All fit-tests must be performed by a qualified industrial hygienist, or under his supervision. A record of the fit-test will be maintained and kept with the individual's medical records,

Problems in fitting a respirator may result if facial hair prevents a good seal from forming between the skin and sealing surface. Corrective lenses that have temple bars or straps may prevent proper sealing and contact lenses should not be worn while wearing a respirator. A properly fitted respirator may stretch the skin around the eyes, thus increasing the possibility that the contact lens will fall out.

6.0 RESPIRATOR ASSIGNMENT AND MAINTENANCE

All negative pressure respirators will be assigned to individuals for their exclusive use. Each respirator will be identified with a marking to avoid confusion among many respirators of the same type.

A. Cleaning Procedures

Respirators shall be thoroughly cleaned and disinfected after each use. The following procedure will be used:

1. Before leaving the work area, each user must "wipe-down" the respirator with a wet cloth to remove any contaminant which may have settled on the face piece.

2. Respirator equipment shall be washed with detergent in warm water using a brush. If possible, detergents containing a bactericide will be used. Organic solvents will not be used, as they deteriorate the rubber face piece. If bactericide detergent is not available, the detergent wash will be followed with a disinfecting rinse. Two types of disinfectants may be made from readily available household solutions. A hypochlorite solution (50 ppm) can be made by adding two tablespoons chlorine bleach to one gallon of water. An aqueous solution of iodine (50 ppm) can be made by adding one teaspoon tincture of iodine to one gallon of water. A two minute immersion of the respirator into either solution would be sufficient for disinfection.

3. Respiratory equipment shall be thoroughly rinsed in warm clean water (120°F maximum) to remove all traces of detergent, cleaner and sanitizer, and disinfectant.
4. Respiratory equipment shall be allowed to air dry on a clean surface or hung from a horizontal wire.

B. Storage of Respirators

When not in use, respiratory equipment shall be sealed in plastic bags, stored in individual employee lockers, and stored in a single layer with the face piece and exhalation valve in a non-distorted position. The respirator shall not be stored inside any contaminated area.

7.0 INSPECTION AND REPAIR OF RESPIRATORS

Inspection for defects in respiratory equipment must be done before and after each use and during cleaning. The primary defects to look for in the inspection of component parts of the respirator and corrective actions where appropriate are itemized below:

A. Half-face air purifying respirators

1. Rubber face piece - check for:
   excessive dirt (clean all dirt from face piece)
   cracks, tears, or holes (obtain new face piece)
   distortion (allow face piece to "sit" free from any constraints and see if distortion disappears; if not, obtain new face piece)

2. Head straps - check for:
   breaks or tears (replace head straps)
   loss of elasticity (replace head straps)
   broken or malfunctioning buckles or attachments (obtain new buckles), and allow the face piece to slip (replace head strap)

3. Inhalation valve, exhalation valve - check for:
   detergent residue, dust particles, or dirt on valve or valve seat (clean residue with soap and water)
   cracks, tears, or distortion in the valve material or valve seat, and missing or defective valve cover (obtain valve cover)

4. Filter clement(s) - check for:
   proper filter for the hazard
   approval designation
   missing or worn gaskets (contact manufacturer for replacement)

worn threads - both filter threads and face piece threads (replace filter or face piece, whichever is applicable)

Any repair or replacement of component parts must be performed by the Program Administrator or his/her designated, qualified respirator equipment technician. The substitution of parts from a different brand or type of respirator will invalidate the NIOSH approval.

8.0 SPECIAL PROBLEMS

The following are special problems which may be encountered in the wearing and use of respiratory protective equipment:

A. Facial Hair - Facial hair, including beards, sideburns, mustaches, or even a few days growth of stubble, must not be permitted on employees who are required to wear respirators that rely on a tight face piece fit to achieve maximum protection. Facial hair between the wearer's skin and the sealing surfaces of the respirator will prevent a good seal. A respirator that permits negative air pressure inside the face piece during inhalation may allow leakage of asbestos and, in the case of positive pressure devices, will either reduce service time or waste breathing air. An employee should not enter a contaminated work area when conditions prevent a good seal of the respirator face piece to the face.

B. Contact Lenses - Workers are not, under any circumstances, permitted to wear contact lenses when wearing any type of respiratory device.

C. Facial Deformities - Facial deformities, such as scars, deep skin creases, prominent cheekbones, severe acne, and the lack of teeth or dentures, can prevent a respirator from sealing properly.

D. Communications - Talking while wearing a respirator equipped with a face piece can break the seal of the face piece. Workers who must speak should be cautioned to keep jaw movement to a minimum.

9.0 DONNING AND DOFFING RESPIRATORS

The specific procedure for donning (putting on) and doffing (taking off) the respiratory protection equipment will differ slightly depending on the individual respirator and the specific application. However, several general principles apply to the use of all respirators at this location. Respirators will be donned prior to entering the contaminated area and upon exiting the contaminated area. These activities are performed in the following sequence:

WHEN PUTTING THE RESPIRATOR ON . . .

1. Inspect respirator for defects and cleanliness.
2. Place respirator on face by putting the chin in the chin cup first and rotating the mask over the nose.
3. Tighten straps from bottom to top until the respirator is snug (but comfortable),
4. Perform negative and positive pressure fit checks.
5. Place hood of disposable coveralls over the straps of the respirator.

WHEN TAKING THE RESPIRATOR OFF . . .

1. Wet wipe exterior of respirator while it is still on the face, using a damp paper towel to remove visible debris and dust.
2. Remove respirator only after exiting the contaminated area and taking off the disposable coveralls and dispose of cartridges.
3. Clean and disinfect respirator.
4. Inspect respirator for defects.
5. Allow to air dry.
6. Install new cartridges and store in a clean location.

10.0 TRAINING PROVISIONS

Formal instruction in the use and care of the respiratory protection will be performed for each employee will be covered in the 16-hour asbestos O&M training program. Refresher respirator training will be conducted periodically to reinforce these principles. The initial 16-hour O&M training will include the following topics:

- instruction in the nature of the hazards and their potential health effects
- how contaminants enter the body
- how cigarette smoking increases risk of adverse health effects of asbestos exposure
- explanation of why respirators are needed
- discussion of the consequences of not wearing respirators in exposure situations
- discussion of why the respirator selected is the proper type for use
- instruction, training, and actual hands-on use of the respirator to include proper fitting, practice in wearing and adjusting the respirator, testing the face piece-to-face seal, performing job functions, and limitations of respirator use
- inspection and maintenance of the respirator

ATTACHMENT A

RESPIRATORY PROTECTION TRAINING RECORD

RESPIRATORY PROTECTION TRAINING RECORD

Before signing, be sure you understand each of the following items. If you do not understand any item below, please discuss this with the Respiratory Program Administrator.

1. Explanation of the ramification of misuses
2. Discussion of why engineering controls cannot be used instead of respiratory equipment
3. Why the particular respirator was selected
4. Limitation of the selected respirator
5. Putting on the respirator
6. Wearing the respirator
7. Maintenance of the respirator
8. Recognizing and handling emergency situations
9. Use of air-purifying respirator
10. Purpose of medical evaluation
11. Proper fit-testing techniques

I understand the use, care, and inspection of the respirator(s) I may use at Historic Bullion Plaza Cultural Center and Museum in Miami, Arizona.

Signature

Date

ATTACHMENT B

QUALITATIVE FIT TEST PROCEDURES

IRRITANT FUME PROTOCOL

A. Respirator Selection

1. The test subject shall be allowed to pick the most comfortable respirator from a selection including respirators of various sizes from different manufacturers. The selection shall include at least five sizes of elastomeric half face pieces, from at least two manufacturers.

2. The selection process shall be conducted in a room separate from the fit-test chamber to prevent odor fatigue. Prior to the selection process, the test subject shall be shown how to put on a respirator, how it should be positioned on the face, how to set strap tension, and how to determine a "comfortable" respirator. A mirror shall be available to assist the subject in evaluating the fit and positioning of the respirator. This instruction may not constitute the subject's formal training on respirator use, as it is only a review.

3. The test subject should understand that the employee is being asked to select the respirator which provides the most comfortable fit. Each respirator represents a different size and shape and, if fit properly and used properly, will provide adequate protection.

4. The test subject holds each face piece up to the face and eliminates those which obviously do not give a comfortable fit. Normally, selection will begin with a half-mask and if a good fit cannot be found, the subject will be asked to test the full face piece respirators. (A small percentage of users will not be able to wear any half-mask).

5. The more comfortable face pieces are noted; the most comfortable mask is donned and worn at least five minutes to assess comfort. All donning and adjustments of the face piece shall be performed by the test subject without assistance from the test conductor or other person. Assistance in assessing comfort can be given by discussing the points in #6 below. If the test subject is not familiar with using a particular respirator, the test subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper tension on the straps.

6. Assessment of comfort shall include reviewing the following points with the test subject and allowing the test subject adequate time to determine the comfort of the respirator:

   - Positioning of mask on nose.
   - Room for eye protection.

- Room to talk.
- Positioning mask on face and cheeks.

7. The following criteria shall be used to help determine the adequacy of the respirator fit:

    - Chin properly placed.
    - Strap tension.
    - Fit across nose bridge.
    - Distance from nose to chin.
    - Tendency to slip.
    - Self-observation in mirror.

8. The test subject shall conduct the conventional negative and positive-pressure fit checks. Before conducting the negative- or positive-pressure test, the subject shall be told to "seat" the mask by rapidly moving the head from side-to-side and up and down, while taking a few deep breaths.

9. The test subject is now ready for fit testing.

10. After passing the fit test, the test subject shall be questioned again regarding the comfort of the respirator. If it has become uncomfortable, another model of respirator shall be tried.

11. The employee shall be given the opportunity to select a different face piece and be retested if the chosen face piece becomes increasingly uncomfortable at any time.

B. Fit Test

1. The test subject shall be allowed to smell a weak concentration of the irritant smoke to familiarize the subject with the characteristic odor.

2. The test subject shall properly don the respirator selected as above and wear it for at least 10 minutes before starting the fit test. Each respirator shall be equipped with a combination of high-efficiency and acid-gas cartridges.

3. The test conductor shall review this protocol with the test subject before testing.

4. The test subject shall perform the conventional positive pressure and negative pressure fit checks (see ANSI Z88.2 1980). Failure of either check shall be cause to select an alternate respirator.

5. Break both ends of a ventilation smoke tube containing stannic oxychloride, such as the Mine Safety Appliances Part Number 45645, or equivalent. Attach a short length of tubing to one end of the smoke tube. Attach the other end of the smoke tube to a low pressure air pump set to deliver 200 millimeters per minute.

6. Advise the test subject that the smoke can be irritating to the eyes and instruct the subject to keep the eyes closed while the test is performed.

7. The test conductor shall direct the stream of irritant smoke from the tube toward the face seal area of the test subject. The person conducting the test shall begin with the tube at least 12 inches from the face piece and gradually move to within one inch, moving around the whole perimeter of the mask.

8. The test subject shall be instructed to do the following exercises while the respirator is being challenged by the smoke. Each exercise shall be performed for one minute.

    I. Breathe normally

    ii. Breathe deeply. Be certain breaths are deep and regular.

    iii. Turn head all the way from one side to the other. Be certain movement is complete. Inhale on each side. Do not bump the respirator against the shoulders.

    iv. Nod head up and down. Be certain motions are complete and made every second. Inhale when head is in the full up position (looking toward ceiling). Do not bump the respirator against the chest.

    v. Talking. Talk aloud and slowly for several minutes. The following paragraph is called the Rainbow Passage. Reading it will result in a wide range of facial movements and, thus, be useful to satisfy this requirement. Alternative passages which serve the same purpose may also be used.

    Rainbow Passage
    When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above and its two ends

apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond his reach, his friends say he is looking for the pot of gold at the end of the rainbow.

vi. Jogging in Place.

vii. Breathing normally.

9. The test subject shall indicate to the test conductor if the irritant smoke is detected. If smoke is detected, the test conductor shall stop the test. In this case, the tested respirator is rejected and another respirator shall be selected..

10. Each test subject passing the smoke test (i.e., without detecting the smoke) shall be given a sensitivity check of smoke from the same tube to determine if the test subject reacts to the smoke. Failure to evoke a response shall void the fit test.

11. Steps B4, B9, and B10 of this fit test protocol shall be performed in a location with exhaust ventilation sufficient to prevent general contamination of the testing area by the test agents.

12. At least two face pieces shall be selected by the test protocol. The test subject shall be given the opportunity to wear them for one week to choose the one which is more comfortable to wear.

13. Respirators successfully tested by the protocol may be used in contaminated atmospheres up to ten times the OSHA PEL for asbestos.

14. The test shall not be conducted if there is any hair growth between the skin and the face piece sealing surface.

15. If hair growth or apparel interferes with a satisfactory fit, then they shall be altered or removed so as to eliminate interference and allow a satisfactory fit. If a satisfactory fit is still not attained, the test subject must use a positive-pressure respirator such as a powered air-purifying respirator, supplied air respirator, or self-contained breathing apparatus.

16. If a test subject exhibits difficulty in breathing during the test, he or she shall be referred to the examining physician identified in the Medical Surveillance Program.

17. Qualitative fit testing shall be repeated at least every six months.

18. In addition, because the sealing of the respirator may be affected, qualitative fit testing shall be repeated immediately when the test subject has a:

    1. Weight change of 20 pounds or more,
    2. Significant facial scarring in the area of the face piece seal,
    3. Significant dental changes; i.e., multiple extractions without prosthesis, or acquiring dentures,
    4. Reconstructive or cosmetic surgery, or
    5. Any other condition that may interfere with face piece sealing.

C. Record keeping

A summary of all test results shall be maintained for 3 years by the O&M Program Coordinator. The summary shall include:

1. Name of test subject.
2. Date of testing.
3. Name of test conductor.
4. Respirators selected (indicate manufacturer, model, size, and approval number).
5. Testing agent.

ATTACHMENT C

QUALITATIVE FIT TEST RECORD

RESPIRATOR QUALITATIVE FIT TEST RECORD

Employee Name (Please Print) _____
Department _____
Social Security Number _____
Prescription Glasses Required Yes _____ No _____

Respirator Manufacturer/Type/Model/Size: _____
_____
_____

Initial Fit OK	Yes	_____	No	_____
Negative Pressure Test	Yes	_____	No	_____
Positive Pressure Test	Yes	_____	No	_____
Irritant Smoke Test	Yes	_____	No	_____
Sweetener Test	Yes	_____	No	_____
Isoamyl Acetate Test	Yes	_____	No	_____

_____
Employee Signature

_____
Date

_____
Signature of the O&M Program Administrator

Periodic reevaluations will be performed in accordance with the written Respiratory Protection Program.

APPENDIX K

MEDICAL SURVEILLANCE PROGRAM

MEDICAL SURVEILLANCE PROGRAM

1.0 PROGRAM SUMMARY

In order to minimize any unnecessary exposure to asbestos fibers, the Subject Property has instituted an Asbestos O&M Plan. This program consists of a set of prescribed practices and procedures designed to minimize asbestos exposure to building occupants and guests.

2.0 PURPOSE OF THE MEDICAL SURVEILLANCE PROGRAM

If the Subject Property owner has established a "Hands off" approach to ACM repair/removal or other response actions and has made a policy decision regarding the use of the services of an EPA AHERA licensed Abatement Contractor and Consultant to perform these tasks, then the Medical Surveillance Program included in this document is for necessary reference and is not required to be implemented by the Subject Property, if the "Hands-off" policy is in effect.

If the Subject Property staff engineers and maintenance personnel are trained to conduct asbestos O&M activities and have been provided with respirators to perform these activities safely, this program will require implementation. Accordingly, each employee will participate in medical surveillance to determine whether he/she may wear a respirator without impairment to his/her health.

3.0 PROGRAM PARTICIPANTS

Asbestos O&M Plan participants will include those staff engineers and maintenance personnel who have received 16-hour O&M training, have been given medical clearance to wear a negative pressure respirator, and have passed respirator qualitative fit testing. Other building occupants are not included in this medical surveillance program. Contracted services, maintenance, and other personnel who will wear respiratory protection to perform subcontract tasks in the Subject Property shall also participate in their employer's medical surveillance program essentially similar to the program described herein.

4.0 PROGRAM ADMINISTRATION

The duties and responsibilities of the Asbestos O&M Plan Coordinator include selecting a licensed physician, providing the physician with the required information (Attachment A), enrolling identified personnel (staff engineers and maintenance workers) into the medical surveillance program, implementing physician's recommendations for each worker regarding any limitation for wearing respirators or performing work, providing a copy of the physician's written opinion to the worker within 30 days from receipt, and record keeping.

The Plan Coordinator is: Mr./Ms_____

5.0 PROGRAM ELEMENTS

Medical surveillance will be conducted in accordance with guidelines described in 29 CFR 1926.1101 OSHA Construction Industry Standard for Asbestos. All medical examinations and procedures will be performed by or under the supervision of a licensed physician and at no cost to the employee.

Program participants will be subjected to the following procedures (unless they have had the same examination within the previous year) and any additional tests deemed necessary by the licensed physician.

- Medical and work history questionnaire
- Pulmonary function test
- Chest X-ray (at the discretion of the physician)
- General physical examination, including blood pressure, vision, blood and urine analysis, etc.

6.0 FREQUENCY OF MEDICAL EXAMINATIONS

Program participants will receive the examination described above on an annual basis (with the substitution of the annual questionnaire for the initial questionnaire). Also, an employee enrolled in the medical surveillance program will receive an outgoing examination upon termination of employment.

7.0 INFORMATION PROVIDED TO LICENSED PHYSICIAN BY EMPLOYER

The physician selected to conduct medical monitoring will be provided with pertinent information including:

- Expected exposures of asbestos;
- Description of work duties at site;
- Type of respirator and protective clothing employees will use;
- Any previous medical data available for each employee;
- Copies of 29 CFR 1926.1101 medical monitoring guidelines highlighted.

An example notification package is included in Attachment A.

8.0 INFORMATION PROVIDED TO EMPLOYER BY THE PHYSICIAN

The examining physician's written opinion for each employee examined will be forwarded to the Asbestos O&M Plan Coordinator. The written opinion will not contain specific information unrelated to occupational exposure, but will provide the following:

- The results of the medical examination and tests;
- The physicians opinion as to whether the employee has pre-existing medical conditions that would increase the risk of employee health impairment if he/she worked on site;
- The physician's recommended limitations on the employee's assignment work;
- The physician's opinion as to whether the employee is physically fit to wear the type of respirator and protective equipment that will be used on the project;
- A statement that the employee has been informed by the physician of the results of the medical examination and any medical condition that requires further determination or treatment;
- A statement by the physician that the employee has been informed of the combined effect of working with asbestos and smoking tobacco products.

The Asbestos O&M Program Coordinator will forward a copy of the physician's opinion to the employee within 30 days of receipt.

9.0 RECORD KEEPING

The examining physician will establish and maintain an accurate record for each employee enrolled in the medical surveillance program. The records will include, at a minimum, the following information:

- Name and social security number of the employee;
- A copy of the employee's medical examination results, including the medical questionnaire, results of any tests, and physician recommendations;
- Physician's written opinions;
- Any employee medical complaints related to asbestos exposure;
- A copy of the information provided to the examining physician by the employer.

The employer shall ensure that these records are maintained for the duration of employment plus thirty (30) years.

ATTACHMENT A

PHYSICIAN'S NOTIFICATION PACKAGE

EXAMPLE INFORMATION LETTER TO EXAMINING PHYSICIAN

Dr. _____
Asbestos Busters Clinic
50/50 Lifeline Avenue
Las Vegas, Arizona 89123

RE: Physicals For Employees Conducting Asbestos O&M Activities

Dear Dr. _____

Historic Bullion Plaza Cultural Center and Museum is anticipating sending staff engineers and maintenance personnel to you for medical examinations and procedures as outlined in OSHA Asbestos Construction Standard 29 CFR 1926.1101. This letter serves to provide pertinent information as related to employee duties and anticipated exposures as well as medical surveillance requirements of the standard.

Historic Bullion Plaza Cultural Center and Museum has instituted an Asbestos O&M Program to minimize employee and guest exposure to asbestos-containing materials (ACMs). As part of this program, all staff engineers and maintenance personnel are being enrolled in a medical surveillance and respiratory protection program.

It is not anticipated that staff engineers and maintenance personnel will be handling or disturbing ACM. If an emergency should arise, work tasks which might involve disturbance of ACM are anticipated to be of small scale and short duration. Exposures are anticipated to be low. Concentrations outside the respirators should not exceed the OSHA permissible exposure level of 0.1 fibers/cubic centimeters.

For your information and review, the following items are attached:

- The medical surveillance plan.
- Portion of respirator program describing respiratory equipment specified.
- Copy of the OSHA Asbestos Standard for the Construction Industry.
- Initial and annual medical questionnaires.

Sections 5.0 and 8.0 of the Medical Surveillance Program outline the specific requirements of the physician.

APPENDIX L

EMPLOYER NOTIFICATION FORM

AUTHORIZATION TO PROCEED FORM FOR CONTRACTORS
[TO BE REPRODUCED ON LETTERHEAD]

Date Requested: _____ Start Date: _____

Contractor Name: _____

Contractor's Rep. Signature: _____

Requested By: _____

Contract Number / Job Number: _____

Activity Planned: _____

Employer has been informed of ACM as designated by the O&M Plan and agrees to perform all work in accordance with this Plan:

Additional ACMs may be present in inaccessible areas of the Subject Property. If suspect materials such as pipe insulation, duct insulation or fireproofing become visible during a demolition/renovation task, please stop and notify the O&M Program Coordinator. Un-sampled suspect materials at the Subject Property should be treated as ACMs until sampling is conducted.

TO BE FILLED OUT BY MANAGEMENT OFFICE

PRESENCE OF ASBESTOS-CONTAINING MATERIALS.

_____ ACMs are not present in work vicinity.

_____ ACM is present, and may be disturbed. All asbestos-related work will be done by approved asbestos contractors only

If any asbestos is discovered or inadvertently disturbed, Contractor will stop work immediately and inform the Asbestos Program Manager. Asbestos Program Manager will coordinate all asbestos related work before allowing contractor to resume work.

_____ _____

Signature-Asbestos Program Manager Signature-Contractor

Date_____ Date_____

APPENDIX M

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY –
NESHAP NOTIFICATION OF DEMOLITION AND RENOVATION

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY
ASBESTOS NESHAP NOTIFICATION FOR RENOVATION AND DEMOLITION ACTIVITIES

National Emission Standards for Hazardous Air Pollutants (NESHAP)

1. TYPE OF NOTIFICATION: ☐Original ☐Revision 1 ☐Revision 2 ☐Revision 3 ☐Revision 4 ☐Revision 5 ☐Revision 6 Revision _____ ☐Cancel

2a. FACILITY OWNER INFORMATION

Name of Company or Individual:			
Address:			
City/Community:		State:	Zip:
Contact Person:	Contact No.:	Email:	

2b. ASBESTOS REMOVAL CONTRACTOR/OPERATOR:

Address:			
City:		State:	Zip:
Contact Person:	Contact No.:	Email:	

2c. DEMOLITION CONTRACTOR/OPERATOR:

Address:			
City:		State:	Zip:
Contact Person:	Contact No.:	Email:	

3. TYPE OF OPERATION: ☐ Renovation ☐ Emergency Renovation ☐ Demolition ☐ Ordered Demolition ☐ Annual Non-scheduled Operations

4. **PROVIDE DATE OF THOROUGH INSPECTION OF FACILITY, OR AFFECTED PART BY AN AHERA (Asbestos Hazard Emergency Response Act) CERTIFIED BUILDING INSPECTOR**	**DATE:**

5. FACILITY DESCRIPTION (Attach site location map for multiple structures at one street address or installation)

Building Name:	Area/Location of Activities: (building # - floor # - units - equipment - identifying features)		
Street Address:	City:	Zip:	**County:**

6. PROCEDURE, INCLUDING ANALYTICAL METHOD, EMPLOYED TO DETECT THE PRESENCE OF RACM AND CATEGORY I AND CATEGORY II NONFRIABLE ACM. ☐ Polarized Light Microscopy-PLM ☐ Point Counting ☐ Assumed ☐ Other _____

NVLAP Laboratory Name_____ Number of Samples _____ Date Analyzed _____

7. APPROXIMATE AMOUNT OF ASBESTOS, INCLUDING: *NOTE: Update notice as necessary including when the amount of asbestos affected changes by a least 20%	**Amount of RACM to be Removed or Generated**	**Amount of Nonfriable ACM to be removed**		**Amount of Nonfriable ACM not to be removed during demo**	
		CAT I	CAT II	CAT I	CAT II
On Facility Components; Pipes (Linear Feet)					
On Facility Components; Surface Area (Square Feet)					
Off Facility Components; Volume (Cubic Feet)					

8. DATES FOR ASBESTOS REMOVAL
Start Date: Completion Date:
Days of Operations: M T W TH F SA SU ☐ ☐ ☐ ☐ ☐ ☐ ☐
Hours of Operations:

9. DATES FOR DEMOLITION
Start Date: Completion Date:
Days of Operations: M T W TH F SA SU
Hours of Operations:

MAIL / DELIVER TO:

ADEQ - Asbestos NESHAP Program
1110 West Washington Street
Phoenix, Arizona 85007
(602) 771-2333 or (602) 771-4553

THIS AREA FOR NESHAP REGULATORY AGENCY USE ONLY

U.S. Postal Service Postmark Date:	**Commercial / Hand Delivery Date:**

10. DESCRIPTION OF PLANNED DEMOLITION/RENOVATION WORK: (Check all that apply)

☐ Thermal System Insulation ☐ Ceiling Texture/Tiles ☐ Duct/Seam Tape ☐ Regulated Drywall System ☐ Asbestos-Containing Roof Removal
☐ Asbestos Cement Pipe ☐ Asbestos Cement Shingles ☐ VAT/Mastic ☐ Asbestos Cement Siding ≥5580 sq ft w/rotating blade cut
Other, please specify:_____

REMOVAL METHODS: ☐ Hand/Non-Mechanical Tools ☐ Mechanical/Power Tools ☐ Mastic Solvents
Other:_____

11. DESCRIPTION OF WORK PRACTICES AND ENGINEERING CONTROLS TO BE USED TO PREVENT ASBESTOS EMISSIONS: (Check all that apply)

☐ Adequately Wet ☐ Full Containment ☐ Critical Barriers ☐ Negative Air Machines
☐ Glove-Bag ☐ Leak-Tight Wrap ☐ 6-mil Bags ☐ Mini-containment
☐ Decontamination Unit with Hot/Cold Water and Soap for OSHA Class I work Other:_____

12a. ASBESTOS WASTE TRANSPORTER #1:			
Company Name:			
Address:			
City:		State:	Zip:
Contact Person:	Contact No.:	Email:	

12b. ASBESTOS WASTE TRANSPORTER #2:			
Company Name:			
Address:			
City:		State:	Zip:
Contact Person:	Contact No.:	Email:	

13. ASBESTOS WASTE DISPOSAL SITE:			
Company Name:			
Address:			
City:		State:	Zip:
Contact Person:	Contact No.:	Email:	

14. FOR ORDERED DEMOLITIONS (40 CFR 61, §61.145(A)(3), ATTACH A COPY OF THE AGENCY'S ORDERED DEMOLITION LETTER	
Name:	Title:
State or Local Government Agency:	Authority:
Date of Order (MM/DD/YY):	Date Demolition Ordered to Begin (MM/DD/YY):

15. FOR EMERGENCY RENOVATIONS (40 CFR 61, §61.145(a)(4)(iv))
Date and Hour of Emergency (MM/DD/YY - HH:MM):
Description of the Sudden, Unexpected Event:
Explanation of how the event caused unsafe conditions or would cause equipment damage or an unreasonable financial burden:

16. In the event that unexpected RACM is found or discovered or CATEGORY I or CATEGORY II NONFRIABLE ACM becomes crumbled, pulverized, or reduced to powder the following procedures will be followed: Stop Work, Notify Owner, Revise Notification , Follow 40 CFR 61, §61.145(c) Procedures with an AHERA Certified Contractor/Supervisor on-site.

17. I CERTIFY THAT AT LEAST ONE AHERA CERTIFIED CONTRACTOR/SUPERVISOR WILL SUPERVISE THE STRIPPING AND REMOVAL OF RACM DESCRIBED IN THIS NOTIFICATION AND THAT THE TRAINING CERTIFICATE WILL BE POSTED OR READILY AVAILABLE **ON-SITE**.

(Print Name: Owner/Operator) (Title) (Signature of Owner/Operator) (Date)

18. CERTIFICATION OF INSPECTION BY AN AHERA CERTIFIED ASBESTOS BUILDING INSPECTOR (All areas of Arizona):

(Print Name of Inspector) (Training Provider) (AHERA Certificate Number) (Expiration Date)

19. I CERTIFY THAT THE ABOVE INFORMATION IS CORRECT: Company Name:_____

(Print Name: Owner/Operator) (Title) (Signature of Owner/Operator) (Date)

References: Title 40, Code of Federal Regulations, Part 61, Subpart M, Asbestos NESHAP §61.145(b): Arizona Revised Statutes. Title 49 §49-421 & 471 et. seq.: and Arizona Administrative Code. Title 18, Chapter 2, Air Pollution Control, Article II. §R18-2-1101.

APPENDIX N

ASBESTOS NESHAP REGULATIONS FOR RENOVATION AND DEMOLITION ACTIVITIES

What is the Asbestos Renovation & Demolition Notification Requirement?

Revised on: October 16, 2020 - 10:43am

This notification is for the planned or emergency renovation of a facility, or for the scheduled demolition of a facility, known to contain threshold amounts of regulated asbestos-containing material (RACM). The notification is required by the National Emission Standards for Hazardous Air Pollutants (NESHAP). This notification should be submitted to ADEQ at least ten working days prior to the renovation or demolition activity, unless the renovation activity is due to an emergency, in which case the notification should be submitted to ADEQ immediately following the activity. The notification is valid for the life of the renovation or demolition activity that is described in the notification form.

Requirements

Prior to beginning renovation or demolition activities of a facility, a certified AHERA (Asbestos Hazard Emergency Response Act) building inspector should thoroughly inspect the facility or part of the facility where the renovation or demolition operation will occur for the presence of asbestos, including friable and non-friable asbestos containing materials.

Under section 61.145(b) of the Asbestos NESHAP, a written notification is required for renovation and demolition operations. Only completed notification forms are accepted. For NESHAP activities for the jurisdictional 12 counties that ADEQ regulates, the notification should be postmarked or delivered to ADEQ no later than 10 working days prior to the beginning of the asbestos activity or demolition. For all demolitions (even when no asbestos is present) and renovation activities involving threshold amounts of regulated asbestos-containing material (RACM), provide the Asbestos NESHAP agency overseeing the project site with a NESHAP notification at least 10 working days prior to the demolition or renovation activity. Threshold amounts of RACM are:

- 260 linear feet or more on pipes
- 160 square feet or more on other facility components
- 35 cubic feet or more off facility components

Fees

There are no state notification or permitting fees involved with this program for jurisdictional counties. The Region 9 Asbestos Program charges no fees for work on Tribal Lands. Maricopa, Pinal, and Pima counties have fees for their notification process. To learn more about Maricopa, Pinal, and Pima counties regulations and fees vist there county websites. Some cities may have separate permit fees, and AHERA inspectors may charge a fee for their inspection.

CONTACT PERMIT LIAISONS

Air Quality Permit Liaison
602-771-2338
Email >

Water Quality Permit Liaison
602-771-1440
Email >

Waste Permit Liaisons
For: Solid and Biohazardous
Ph: 602-771-4670
For: Hazardous Waste
Ph: 602-771-0349
Email >
For: Underground Storage Tanks
Ph: 602-771-4196
Email >

FORMS

Asbestos NESHAP Notification for Renovation/Demolition Activities >
DWAR 02B | Asbestos Analysis >
DWAR 02C | Composite Asbestos Analysis >

SEE MORE

Asbestos | NESHAP Waste Disposal Checklist >
Asbestos Renovation & Demolition Notification Requirements >
Asbestos | NESHAP Renovation/Demolition Checklist >

Notification Renovation/Demolition Activities | Download Form >

ADEQ Arizona Department of Environmental Quality

Asbestos NESHAP Checklist
Renovation/Demolition Operations

Applicability		Comments
Does this source meet the definition of **a facility and/or facility component** and subject to the Asbestos NESHAP Standard. [A.A.C. R18-2-1101(A)(8) 40 CFR §61.140 & §61.141]	N/A	
Was the affected asbestos NESHAP **facility thoroughly inspected** for the presence, amounts and categories of asbestos containing materials prior to demolition and threshold amounts of renovation activities? [A.A.C. R18-2-1101(A)(8) 40 CFR §61.145(a)]	N/A	

Notification Requirements		Comments
Was an asbestos NESHAP **notification submitted 10 working days** prior to start of ***renovation*** activities involving threshold amounts of regulated asbestos containing materials? [A.A.C. R18-2-1101(A)(8) 40 CFR §61.1459(b)(1)]	N/A	
Was an asbestos NESHAP notification submitted 10 working days prior to start of demolition activities even when no asbestos is present? [A.A.C. R18-2-1101(A)(8) 40 CFR §61.145(b)(1) / §61.145(b)(3)(i)]	N/A	
Did operations start on date contained in the original asbestos NESHAP notification, and if not was a new start date provided by completing a revised notification? [A.A.C. R18-2-1101(A)(8) 40 CFR §61.145(b)(3)(iv)]	N/A	
If the activity is an ***emergency renovation*** was the asbestos NESHAP **notification submitted no later than the following working day** and meets the requirements of unexpected event, equipment damage, unsafe condition, unreasonable financial burden. [A.A.C. R18-2-1101(A)(8) 40 CFR §61.145(b)(1) §61.145(b)(4)(xv)]	N/A	
If the activity is an ***ordered demolition*** was the asbestos NESHAP **notification submitted no later than the following working day** with letter of authority of order attached to notification? [A.A.C. R18-2-1101(A)(8) 40 CFR §61.145(b)(4)(xiv)]	N/A	

Work Practice Procedures - Emissions Controls		Comments
Was all identified regulated asbestos containing materials (RACM) removed from the regulated facility prior to the start of the renovation and/or demolition activity? [A.A.C. R18-2-1101(A)(8) 40 CFR §61.145(c)(1)]	N/A	
Was at least **one on-site trained representative** maintained at all times during which regulated asbestos containing materials (RACM) is being stripped, removed or otherwise handled at the effected asbestos NESHAP facility. [A.A.C. R18-2-1101(A)(8) 40 CFR §61.145(c)(8)]	N/A	
Was identified regulated asbestos containing materials (RACM) **adequately wetted** while being stripped from facility components which have been taken out as a unit or in sections from a facility? [A.A.C. R18-2-1101(A)(8) 40 CFR §61.145(c)(4)(i) (c)(6)(1)]	N/A	

Work Practice Procedures - Emissions Controls		Comments
Are regulated asbestos containing materials (RACM), that included materials that have been removed or stripped **adequately wetted** and have **remain wet until collected** and contained or treated in preparation for disposal. [A.A.C. R18-2-1101(A)(8) 40 CFR §61.145(c)(6)(1)]	N/A	
Were facility components that are covered with or coated with regulated asbestos containing materials (RACM) **contained in a leak-tight wrapping** after they have been taken out of an affected asbestos NESHAP facility. [A.A.C. R18-2-1101(A)(8) 40 CFR §61.145(c)(4)]	N/A	
Visible emissions were not observed being discharged to the outside air generated from regulated asbestos containing material (RACM) handling operations? [A.A.C. R18-2-1101(A)(8) 40 CFR §61.145 (c) / 40 CFR §61.150(a)]	N/A	

Waste Transportation and Disposal		Comments
Is the **OSHA warning label(s)** present on containers or wrapped asbestos containing waste materials? [A.A.C. R18-2-1101(A)(8) 40 CFR §61.150(a)(1)(iv)]	N/A	
Are **labels** present containing the name of **waste generator and the location** at which the waste was generated on asbestos containing waste materials that are going to be transported off facility site? [A.A.C. R18-2-1101(A)(8) 40 CFR §61.150(a)(1)(v)]	N/A	
Did the waste generator **dispose of** all asbestos containing waste materials as **soon as practical at an approved disposal site?** [A.A.C. R18-2-1101(A)(8) 40 CFR §61.150(b)(1)]	N/A	
Were vehicles marked **that are used to transport asbestos containing waste materials** during the loading and unloading **of waste from asbestos NESHAP regulated facility, so that the signs are visible, and contain required markings.** [A.A.C. R18-2-1101(A)(8) 40 CFR §61.149(d)(1)(i),(ii), and (iii) 40 CFR §61.150(c)]	N/A	
Was waste shipment records maintained for all asbestos containing waste materials transported from an asbestos NESHAP facility site using a form that includes all required information? [A.A.C. R18-2-1101(A)(8) 40 CFR §61.150(d)(1)]	N/A	