MEMORANDUM

Date: June 18, 2018

To: The Honorable Chairman and Members
Pima County Board of Supervisors

From: C.H. Huckelberry
County Administrator

Re: **Golden Pin Lanes Acquisition Update**

Recently, the Board of Supervisors authorized the acquisition of Golden Pin Lanes with a 45-day inspection contingency period, as standard procedure. County staff recently expressed the need to extend this period with the owner and he has agreed to another 45-day inspection period. This means that if the County concludes the acquisition, it will be after the August Board of Supervisors meeting. Therefore, if additional direction is necessary, we will update the Board prior to the August 2018 meeting.

To date, the inspection has yielded what was anticipated given the age of the building associated with asbestos materials. The attached June 12, 2018 memorandum, asbestos report and outside contractor cost estimate has been obtained (Attachment 1). Facilities Management staff believes the project cost estimate is between $280,000 to $380,000 as stated in the Risk Management memorandum. The largest variable is what is under the lanes once removed since these areas could not be easily tested. Most of the asbestos material is typically what we would find in a building of this age and can be abated during remodeling at costs that could be lower than anticipated based on competitive bidding.

Facilities Management staff has also performed a building assessment. The property contains two buildings; the main Golden Pin Lanes and the other, an older building used for storage which the County would demolish if we ultimately acquired the property. The mechanical units were inspected and found to be relatively new, aging from 2013 to 2017, with exception of one unit. The fire suppression and sprinkler system has been inspected and is sound. The waste collection system piping was inspected and also inspected by camera. The waste piping connection to the main building is vitreous clay, which has a useful life of 100 years or more and found to be in good condition. The vitreous clay pipe connection to the storage building was in disrepair; however, such is inconsequential since the County would demolish the storage building if the property is acquired.

The structure of the building is sound and is primarily cast in place concrete post and beams with a precast concrete roof system, both of which are in good condition.

Attachment 2 is a Condition report from Facilities Management.

The County has also performed preliminary programming associated with the leases, timing of lease expirations and relocations to new building and believe all of the existing leases can be accommodated within the building space with the exception of either the Adult or Juvenile Probation which will require construction of an addition to the existing building structure. The addition would be essentially a shell building construction, populated with systems furniture; hence, original estimates for remodel remain essentially the same for conceptual planning purposes.

Attachment 3 is the preliminary programming and space planning performed by Facilities Management to relocate leased functions to this proposed structure.

Finally, attached is a preliminary Title Report (Attachment 4) that shows no title easement encroachment issues that would influence our decision to acquire the building.

CHH/anc

Attachments

c: Jan Lesher, Chief Deputy County Administrator
Tom Burke, Deputy County Administrator for Administration
Dr. Francisco Garcia, Assistant County Administrator for Community and Health Services
Lisa Josker, Director, Facilities Management

ATTACHMENT 1

PIMA COUNTY
FINANCE & RISK MANAGEMENT

MEMORANDUM

Date: June 12, 2018

To: Lisa Josker
Director, Facilities Management

From: Jim Faas
Environmental Services Officer

Re: Golden Pin Lanes Asbestos Abatement Cost Estimate

The estimated cost for removal of asbestos-containing materials (ACMs) at the Golden Pin Lanes buildings is $380,000.00. This includes $325,000.00 for removal of ACMs inside the main building and free standing storage building and $55,000.00 for removal of ACM roofing on the main building.

The cost estimate is based on prevailing rates for asbestos removal, waste transport, and waste disposal in the Tucson area as of June 2018 and is the anticipated competitive bid price if the asbestos abatement work was scheduled to begin on July 1, 2018. The cost may be higher or lower in the future when actual abatement would be undertaken. This cost is also based on the following assumptions:

- All ACMs will be removed from inside the building as a single abatement project using a single contained work area with a 90 day completion time.
- All bowling equipment including pinsetter machines, lanes, ball returns, below lane supporting structures, seats, tables and installed fixtures will be removed.
- Asbestos removal areas will be free of fixtures, utilities, debris, and abandoned equipment.
- Ceiling tiles and grid work below ACM acoustical above lanes 1-32 will be removed, cleaned and disposed of as asbestos free waste.
- Plaster and drywall soffits above existing seating areas and above pinsetter machines will be demolished and removed along with the acoustic ACM. All plaster and drywall with acoustic material present will be removed, packaged and disposed of as asbestos-containing waste material.
- Plaster and drywall ceilings in the front office areas will be demolished and removed along with the acoustic ACM. All plaster and drywall with acoustic material present will be removed, packaged and disposed of as asbestos-containing waste material.
- Plaster and drywall walls in the front office area will be demolished and removed, packaged and disposed of as asbestos-containing waste material.
- Duct seam tape and wrap removal from HVAC ducts and equipment with be completed by removal and disposal of entire sections of ducts and equipment.
- Carpet over ACM adhesives will be removed. Only ACM adhesives will be removed. Non ACM adhesives will be left in place for removal by others.
- Owner will disconnect all electric and plumbing systems inside the building and provide temporary power panel (120 volts, 400 amp minimum) for abatement contractor use.
- Owner will provide temporary potable water source for abatement contractor use.

130 W. Congress, 6th Fl. Tucson, Arizona 85701-1317 • Phone: 520-724-8496

PIMA COUNTY

DEPARTMENT OF FINANCE AND RISK MANAGEMENT

Prepared For:

Jim Rossi
Acquisition Supervisor
Pima County Real Property
201 N. Stone Ave., 6th Floor
Tucson, AZ 85701

Submitted By:

James C. Faas, MPH, CIH

Asbestos Inspection Report
Golden Pin Lanes
1010 and 922 W. Miracle Mile
Tucson, AZ

Date Submitted:

June 12, 2018

1. EXECUTIVE SUMMARY

Pima County Risk Management Division completed an inspection for asbestos-containing materials (ACMs) in the Golden Pin Lanes buildings located at 1010 W. Miracle Mile in Tucson, AZ. Two buildings are located at the site; the main bowling alley and a small free standing storage building.

The inspection was performed on May 17, May 23, and June 6, 2018. Inspection and sampling activities were completed by EPA accredited asbestos building inspectors. This inspection did not include physical or hazard assessments of the ACMs identified. The inspection was limited to identifying the presence and locations of ACMs for use by Pima County. The scope of work did not include physical condition or hazard assessments of ACMs.

Materials found to contain asbestos include:

- Acoustical texture on ceilings in front office areas and above seating areas in front of bowling lanes 1-48
- Acoustical texture on precast concrete ceiling deck (above ceiling tiles) over lanes 1-32
- Acoustical texture on plaster soffits, walls and precast concrete ceiling deck behind (north of) bowling lanes 1-32
- Duct seam tape on HVAC units and ducts in the main building and in the storage building
- Floor tile in the north maintenance storage areas
- Flooring adhesives under carpet in the front lobby area
- Roof felts on the roof of the 1976 addition portion of the main building.

Drywall joint compound in the original portion of the building was found to contain less than one percent asbestos. Materials containing less than one percent asbestos are not regulated by EPA. However, OSHA regulations require special handling of materials containing less than one percent asbestos.

Materials tested and found to be asbestos free include:

- Drywall
- Drywall joint compound in the 1976 addition
- Ceiling tile – 24" x 24" and 24" x 48" (several types)
- Floor tile in the bowling seating area
- Adhesives under all floor tile
- Construction adhesive on the middle wall of the storage building
- Window glazing in the storage building
- Roof felts on some portions of the original building

Section 6 Findings contains details of the types, locations and quantities of ACMs found inside the building.

Users of this report are cautioned to read and understand the limitations of this inspection which are described in detail in Section 8 Limitations.

2. INTRODUCTION

This inspection was conducted as part of Pima County's due diligence inspection at the request of Jim Rossi of Pima County Real Property. The intent of the survey was to identify asbestos-containing materials (ACMs) inside the buildings for review by Pima County.

The property includes two separate buildings; the main bowling alley building and a small free standing storage building. The address of the bowling alley building is 1010 W. Miracle Mile. The small storage building was formerly assigned a separate addresses of 922 W. Miracle Mile.

3. SCOPE OF WORK

The purpose of this project was to identify ACMs located inside the buildings. The inspection was performed by EPA-accredited inspectors. Accessible suspect ACMs inside the building were evaluated as described in this report.

Samples were submitted to Fiberquant Analytical Services in Phoenix, AZ. Fiberquant is a NVLAP accredited laboratory. Asbestos analysis was performed in accordance with EPA Test Method EPA-EPA/600/R-93/116. Copies of laboratory reports are included in Appendix A.

4. TESTING PROCEDURES

Random samples of suspect asbestos-containing materials were collected. Random sample locations were determined in accordance with EPA's guidance document EPA560/5-85-030a, October 1985, *Asbestos in Buildings: Simplified Sampling Scheme for Friable Surfacing materials*. All testing utensils such as chisels, drills, and knives were cleaned between collection of each sample. Each sample container was labeled with a sequential ID# and also noted in the bulk sample log.

Suspect asbestos-containing materials in each building were categorized into homogeneous sampling areas in accordance with EPA's Asbestos Hazard Emergency Response Act (AHERA). Homogeneous sampling areas are those areas which contain similar suspect materials. Similar materials are those which have the same physical appearance and appear to be applied at the same time using the same methods.

5. HOMOGENEOUS MATERIALS IDENTIFIED AND SAMPLED

The following is a list of homogeneous areas of suspect ACMs identified inside the buildings that were sampled and analyzed for asbestos content.

- Acoustical texture type 1 – applied to plaster and drywall soffits over the seating area lanes 1-48, over the pinsetter machines for lanes 1-32, on precast concrete ceilings lanes 1-32, on the north wall behind the pinsetter machines for lanes 1-32, and in front office areas and the Pro Shop. This material is applied to precast concrete ceilings concealed by acoustic ceiling tiles over the bowling lanes. The material may also serve as fireproofing but will be referred to as acoustic texture for this report. Classified as suspect friable surfacing material.

- Acoustical texture type 2 – applied to plaster and drywall soffits over the pinsetter machines for lanes 33-38, on precast concrete ceilings behind pinsetter machines for lanes 33-48 and on the north wall behind the pinsetter machines for lanes 33-48. The material may also serve as fireproofing but will be referred to as acoustic texture type 2 for this report. This material can be differentiated from the acoustical material behind lanes 1-32 by texture and color. This type 2 acoustical material is more yellow in color, very soft to the touch and very rough surface compared to type 1. Classified as suspect friable surfacing material.

- Drywall wall system (including drywall and joint compound) in original building - located throughout all areas of the building. Classified as suspect non friable miscellaneous material.

- Ceiling tile, 24" x 24" – located on ceilings south of the bowling lanes (main upper area) in the original building and the 1976 addition. Classified as suspect friable miscellaneous material.

- Ceiling tile, 24" x 48" – located above the bowling lanes. Classified as suspect friable miscellaneous material.

- Ceiling tile, 24" x 48" – (three types) located in far east rooms in the 1976 addition. Classified as suspect friable miscellaneous material.

- Floor tile, 12"x12" off-white and associated adhesives – located in seating area in front bowling lanes. Classified as suspect non friable miscellaneous material.

- Floor tile, 12"x12" red and associated adhesives – located in north maintenance offices area. Classified as suspect non friable miscellaneous material.

- Residual flooring adhesives – located under carpeted areas in the south portion of the original building. Classified as suspect non friable miscellaneous material.

- Duct seam tape – located on HVAC units and ducts above the ceilings. Most of this material is covered with fiberglass insulation. Classified as suspect friable miscellaneous material.

- Duct seam tape and wrap – located on exposed HVAC duct in detached storage building. Classified as suspect friable miscellaneous material.

- Window Glazing Putty – located on window frames in detached storage building. Classified as suspect non friable miscellaneous material.

- Construction adhesive – located on one middle wall in detached storage building. Classified as suspect non friable miscellaneous material.

- Roofing felts – located on the main bowling alley roof. Classified as suspect non friable miscellaneous material.

6.0 FINDINGS

6.1 Asbestos-Containing Materials Present

The following materials were found to contain greater than one percent asbestos and are therefore classified as asbestos-containing materials:

Acoustical texture type 1

This material is friable ACM and is applied to plaster and drywall soffits over the seating area lanes 1-48, over the pinsetter machines for lanes 1-32, on precast concrete ceilings lanes 1-32, on the north wall behind the pinsetter machines for lanes 1-32, and in front office areas and the Pro Shop. Overspray material is also present on some drywall and bare concrete precast ceilings that extend south of the soffit over the seating area.

Estimated quantities of this ACM excluding overspray are as follows:

- 28,000 square feet applied to precast concrete ceiling.
- 15,800 square feet applied to plaster and drywall ceilings, soffits and walls.

The quantity of material present is greater than the floor square footage due to the configuration of the precast concrete and soffits.

Duct Seam Tape/Wrap

This material is friable ACM and is applied to HVAC units and ductwork in the main building and in the storage building. The ducts are covered with fiberglass insulation.

Estimated quantities of this ACM are as follows:

- 600 feet of duct in the main building (seam tape present).
- 30 feet of duct in the storage building (seam tape and wrap present).

The quantity of material refers to linear feet of ducts of various sizes with seam tape and/or complete duct wrap. The actual quantity of tape present cannot be determined unless the fiberglass wrapping is completely removed. This material is generally removed by cutting out large sections of duct with the seam tape and/or wrap in place.

Floor Tile, 12" x 12" in North Maintenance Office

This material is non friable ACM and is limited to the east and west storage areas. The adhesives were tested and found to be asbestos free.

Estimated quantity is 140 square feet.

Residual Flooring Adhesives

This material is non friable ACM and is located under some portions of carpet in the original portion of the lobby area (upper area in front of lanes 1-32) of the main building. The asbestos-containing adhesive is black in color and appears to be floor tile adhesive from areas under carpet where floor tiles were previously present.

This area reportedly had a combination of floor tile and carpet with curved borders bisecting carpeted from tiled areas. Inspection revealed this adhesive to be randomly distributed consistent with the reported mix of tile and carpet.

The estimated quantity of adhesives is unknown and can only be determined by removing all of the carpet from the floors.

Roofing Felts

This material is non friable ACM and is located on the roof of the 1976 addition of the main bowling alley building.

Estimated quantity of roof area covered by multiple layers of ACM roofing is 14,000 square feet. As many as eight separate layers of roofing felts are present.

6.2 Materials Containing Less than One Percent Asbestos

Drywall joint compound in the original portion of the building (lanes 1-32) was found to contain trace amounts of asbestos (less than one percent). This material is not classified as ACM by EPA and is not subject to EPA regulations. OSHA does not classify this material as ACM but regulations do require certain precautions to be taken during removal or disturbance.

6.3 Materials Found to be Asbestos Free

The following materials were tested and found to be asbestos free:

- Drywall throughout the building
- Drywall joint compound in 1976 addition
- Acoustic material type 2 applied to precast concrete ceiling deck and walls in the 1976 addition
- Ceiling tiles all 24" x 24" and 24" x 48"
- Floor tile – 12" x 12" and associated adhesives in front of bowling lanes 1-48
- Residual construction adhesive in the storage building.
- Roof felt on the original portion of the main bowling alley.

Table 1 summarizes sampling locations and results of analysis for asbestos sampling at the building.

Table 1
Sample Descriptions and Collection Locations

Sample ID	Sample Description and Location	ACM
GP-01	Acoustic texture, ceiling in event center office	Yes
GP-02	Acoustic texture, ceiling in main office	Yes
GP-03	Acoustic texture, ceiling above bowling seating, lane 7	Yes
GP-04	Acoustic texture, ceiling above bowling seating, lane 20	Yes
GP-05	Acoustic texture, ceiling above bowling seating, lane 34	No*
GP-06	Acoustic texture, ceiling above bowling seating, lane 43	Yes
GP-07	Acoustic texture, behind (north) of lane 4, precast ceiling	Yes
GP-08	Acoustic texture, behind (north) of lane 16, north wall	Yes
GP-09	Acoustic texture, behind (north) of lane 30, plaster soffit	Yes
GP-10	Acoustic texture, behind (north) of lane 38, plaster soffit	No
GP-11	Acoustic texture, behind (north) of lane 38, precast ceiling	No
GP-12	Acoustic texture, behind (north) of lanes, far east ceiling	No
GP-13	Drywall joint compound, Off Track Betting, east wall	No*
GP-14	Drywall, outside of Pro Shop	No
GP-15	Drywall, soffit by lane 1 pin setter	No
GP-16a	Drywall, north maintenance office ceiling	No
GP-16b	Drywall texture/joint compound, north maintenance office ceiling	No*
GP-17	Drywall joint compound, north maintenance office ceiling	No*
GP-18	Drywall, west HVAC closet	No
GP-19	Drywall joint compound, west HVAC closet	No*
GP-20	Duct seam tape, HVAC unit, west HVAC closet	Yes
GP-21	Duct seam tape, HVAC duct, west HVAC closet	Yes
GP-22a	Floor tile, 12" x 12" red, north maintenance office	Yes
GP-22b	Floor tile adhesive, under GP-22a	No
GP-23a	Floor tile, 12" x 12", north maintenance office	Yes
GP-23b	Floor tile adhesive, under GP-23a	No
GP-24a	Floor tile, 12" x 12", bowling seating area, lanes 4-5	No
GP-24b	Floor tile adhesive, under GP-24a	No
GP-25a	Floor tile, 12" x 12", bowling seating area, lanes 10-11	No
GP-25b	Floor tile adhesive, under GP-25a	No
GP-26a	Floor tile, 12" x 12", bowling seating area, lanes 28-29	No
GP-26b	Floor tile adhesive, under GP-26a	No
GP-27a	Floor tile, 12" x 12", bowling seating area, lanes 38-39	No
GP-27b	Floor tile adhesive, under GP-27a	No
GP-28	Leveling compound, floor adjacent to lockers, under carpet	No
GP-29	Flooring adhesive, under carpet west main upper area	Yes
GP-30	Ceiling tile, 24" x 24", by main entry	No

* Less than 1% asbestos content, therefore not ACM by definition. See Section 7 Discussion for details

Table 1
Sample Descriptions and Collection Locations

Sample ID	Sample Description and Location	ACM
GP-31	Plaster overspray on ducts, main upper area across from lane 5	No
GP-32	Acoustic texture, on precast above ceiling tiles, over lane 6	Yes
GP-33	Ceiling tile, 24" x 48" over lane 6	No
GP-34	Acoustic texture, on precast above ceiling tiles, over lane 31	Yes
GP-35	Ceiling tile, 24" x 48" over lane 31	No
GP-36	Ceiling tile, 24" x 24", main corridor, across from lane 35	No
GP-37	Flooring adhesive, under carpet, upper main area across from lane 15	Yes
GP-38a	Drywall, Pro Shop storage room	No
GP-38b	Drywall texture/joint compound, Pro Shop storage room	No*
GP-39	Drywall, 1976 addition, behind lane 48	No
GP-40	Drywall joint compound, 1976 addition, behind lane 48	No
GP-41	Drywall, 1976 addition, east storage area	No
GP-42	Drywall joint compound, 1976 addition, east storage area	No
GP-43	Drywall, 1976 addition, east area by washing machine	No
GP-44	Drywall joint compound, 1976 addition, east area by washing machine	No
GP-45	Insulation board, 1976 addition, behind lane 48	No
GP-46	Ceiling tile, 24" x 48", long fissure pattern, 1976 addition, east room	No
GP-47	Ceiling tile, 24" x 48", pinhole w/fissures, 1976 addition, east room	No
GP-48	Ceiling tile, 24" x 48", rock salt-like finish, 1976 addition, east room	No
GPS-49	Storage building, duct seam tape/wrap	Yes
GPS-50	Storage building, window glazing putty, east	No
GPS-51	Storage building, window glazing putty, north	No
GPS-52	Storage building, residual wall adhesive	No
GPR-53	Roof felts, main building, 1976 addition north	Yes
GPR-54	Roof felts, main building, 1976 addition south	Yes
GPR-55	Roof felts, main building, original portion, north	No
GPR-56	Roof felts, main building, original portion, south	No

* Less than 1% asbestos content, therefore not ACM by definition. See Section 7 Discussion for details

7.0 DISCUSSION

Friable and non friable ACMs are present inside the building. EPA regulations govern removal and disturbance of ACMs in commercial buildings. EPA regulations (40 CFR 61, subpart M) require removal of ACMs prior to renovation or demolition of the building. Anticipated renovation work inside the building will result in disturbance of friable and non friable ACMs necessitating their removal prior to renovation.

Suspended ceiling tiles over lanes 1-32 are installed below friable ACM acoustic material. These ceiling tiles do not contain asbestos. However, some ACM acoustic debris was present on top of the tiles (considered typical for this type of installation and age) and are considered contaminated. OSHA regulations require a minimum of HEPA vacuum cleaning of the ceiling tiles by trained personnel before removing them.

Pima County Department of Environmental Quality (PCDEQ) has authority to enforce EPA regulations governing renovation and demolition activities involving ACMs. Advance notification must be provided to PCDEQ at least 10 business days prior to start of activities that would involve removal or disturbance of ACMs inside the building. An activity permit is also required by PCDEQ.

Drywall joint compound in the original portion of the bowling alley building contains less than one percent asbestos. EPA and OSHA regulations define ACM as material containing greater than one percent asbestos. Materials containing less than or equal to one percent asbestos are not classified as ACM. EPA does not regulate non ACM materials while OSHA does regulate them.

OSHA requires specific work practices and engineering controls when removing materials containing less than one percent asbestos. These work practices and engineering controls prevent uncontrolled removal of the drywall in the original building. Removal of drywall walls and ceilings should be performed in conjunction with other asbestos abatement activities.

This inspection did not include inspection for or sampling of all suspect ACMs which may be present in the building. Suspect ACMs that were not sampled along with potential impact are as follows:

- Construction adhesives (e.g. wall panel and mirror adhesives) – The presence of these materials is suspected but not confirmed. If present, these suspect materials are concealed by installed items and fixtures that would necessitate destruction of the items to collect samples. The potential cost impact of removing these materials is negligible. For example, drywall walls must be removed by an asbestos abatement contractor because of the presence of asbestos in the drywall joint compound. The presence of ACM wall panel adhesive on the drywall will not matter since the wall is already being removed by an asbestos abatement contractor.

- Plaster ceilings – All plaster ceilings identified in this inspection (front office areas, soffit over seating area, and soffit over pinsetter machines) are covered with ACM acoustical material. The most cost effective method of removal would be removal and disposal of the plaster and ACM acoustical together. This material was not sampled for asbestos content because there would be no cost impact for anticipated renovation activities.

- Window and door frame caulks – Window and door frame caulks frequently contain asbestos. Even new caulks and sealant sold today can contain asbestos. These materials should be assumed to contain asbestos. The cost for removal of these materials in conjunction with other asbestos removal work is less than the cost of sampling in many cases. These materials may be sampled in the future or removed as assumed ACM.

- Roofing felts (partial) – Roofing felts on the lower portion of the main building were not sampled. The roof felts were reported to have been removed and replaced approximately 2 years prior to this inspection. Roofing felts on the storage building were not sampled.

8.0 LIMITATIONS

This inspection was conducted for use by Pima County to determine potential impacts of ACMs on anticipated renovation work. This inspection was not a complete and comprehensive inspection of the two buildings. This report cannot be relied upon by third parties for compliance with the requirements of 40 CFR 61.145(a) and 29 CFR 1926.1101(k).

Suspect ACMs not identified in this report may be present. Inaccessible materials such as pipe insulation, duct insulation, sealants or other suspect materials may be present in concealed areas such as spaces between walls or under raised floors. Other ACMs may have been covered by renovation work over the past several years. If other suspect asbestos-containing materials are identified, they should be assumed to contain asbestos unless further testing proves otherwise.

Estimated quantities of ACMs provided in this report should not be relied upon for bidding purposes or compliance with 29 CFR 1926.1101(k)(2). All estimated quantities must be field verified prior to reliance on them.

9.0 PROJECT STAFF

James C. Faas and Vincent Tracey performed the inspections. Both are accredited building inspectors under the EPA AHERA accreditation program. Copies of asbestos inspector accreditation certificates are on file with Pima County Risk Management Division.

APPENDIX A

LABORATORY REPORTS

FIBERQUANT ANALYTICAL SERVICES

Polarized Light Microscope (PLM) Analysis for Asbestos in Bulk Sample

JobNumber: 201804947

Client: PIMA COUNTY RISK MGMT

130 W CONGRESS 9TH FLR

TUCSON, AZ 85701-0000

Office Phone: (520) 724-3078

FAX: (520) 798-1407

 # Samples: 29 PLM **Rec:** 5/22/2018 **Method:** EPA 600/R-93/116 The "New" Method; see below

Client Job: Golden Pins **PO Number:** MA 18*303

Report Date: 5/23/2018 **Date Analyzed:** 5/22/2018 **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 40 CFR 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 code #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: 201804947** Golden Pins

Sample Number / Layer	Color	Apparent Layer Type *	Lab Number	Apparent Sample Type * / *Asbestos Results*	Positive Layer Yes or No
Sample # **GP-01**			2018-04947- 1	Insulation	Positive Layer? Yes
Layer # 1	tan	insulation		*>1-2% chrysotile asbestos*	
Sample # **GP-02**			2018-04947- 2	Insulation	Positive Layer? Yes
Layer # 1	tan	insulation		*>1-2% chrysotile asbestos*	
Sample # **GP-03**			2018-04947- 3	Insulation	Positive Layer? Yes
Layer # 1	tan	insulation		*>1-2% chrysotile asbestos*	
Sample # **GP-04**			2018-04947- 4	Insulation	Positive Layer? Yes
Layer # 1	white	spray-on ceiling		*no asbestos detected*	
Layer # 2	tan	insulation		*>1-2% chrysotile asbestos*	
Sample # **GP-05**			2018-04947- 5	Wall System	Positive Layer? No
Layer # 1	white	texture/joint compound		*<=1% chrysotile asbestos*	
Layer # 2	tan	paper/cardboard		*no asbestos detected*	
Layer # 3	white	drywall core		*no asbestos detected*	
Sample # **GP-06**			2018-04947- 6	Insulation	Positive Layer? Yes
Layer # 1	tan	insulation		*>1-2% chrysotile asbestos*	
Sample # **GP-07**			2018-04947- 7	Insulation	Positive Layer? Yes
Layer # 1	tan	insulation		*>1-2% chrysotile asbestos*	
Sample # **GP-08**			2018-04947- 8	Insulation	Positive Layer? Yes
Layer # 1	tan	insulation		*>1-2% chrysotile asbestos*	
Sample # **GP-09**			2018-04947- 9	Insulation	Positive Layer? Yes
Layer # 1	tan	insulation		*>1-2% chrysotile asbestos*	
Sample # **GP-10**			2018-04947- 10	Insulation	Positive Layer? No
Layer # 1	tan	insulation		*no asbestos detected*	
Sample # **GP-11**			2018-04947- 11	Insulation	Positive Layer? No
Layer # 1	tan	insulation		*no asbestos detected*	
Sample # **GP-12**			2018-04947- 12	Insulation	Positive Layer? No
Layer # 1	tan	insulation		*no asbestos detected*	
Sample # **GP-13**			2018-04947- 13	Wall System	Positive Layer? No
Layer # 1	yellow	paint		*no asbestos detected*	
Layer # 2	off-white	paint		*no asbestos detected*	
Layer # 3	white	texture/joint compound		*<=1% chrysotile asbestos*	
Layer # 4	tan	paper/cardboard		*no asbestos detected*	
Layer # 5	white	texture/joint compound		*<=1% chrysotile asbestos*	
Sample # **GP-14**			2018-04947- 14	Wall System	Positive Layer? No
Layer # 1	white	drywall core		*no asbestos detected*	
Sample # **GP-15**			2018-04947- 15	Wall System	Positive Layer? No
Layer # 1	off-white	paint		*no asbestos detected*	
Layer # 2	tan	paper/cardboard		*no asbestos detected*	
Layer # 3	white	drywall core		*no asbestos detected*	
Sample # **GP-16**			2018-04947- 16	Wall System	Positive Layer? No
Layer # 1	white	texture/joint compound		*<=1% chrysotile asbestos*	
Layer # 2	tan	paper/cardboard		*no asbestos detected*	
Layer # 3	white	drywall core		*no asbestos detected*	
Sample # **GP-17**			2018-04947- 17	Wall System	Positive Layer? No
Layer # 1	white	texture/joint compound		*<=1% chrysotile asbestos*	
Sample # **GP-18**			2018-04947- 18	Wall System	Positive Layer? No
Layer # 1	white	drywall core		*no asbestos detected*	
Sample # **GP-19**			2018-04947- 19	Wall System	Positive Layer? No
Layer # 1	tan	texture/joint compound		*<=1% chrysotile asbestos*	
Layer # 2	tan	paper/cardboard		*no asbestos detected*	
Sample # **GP-20**			2018-04947- 20	TSI	Positive Layer? Yes
Layer # 1	off-white	duct tape		*10-20% chrysotile asbestos*	
Sample # **GP-21**			2018-04947- 21	TSI	Positive Layer? Yes
Layer # 1	off-white	duct tape		*10-20% chrysotile asbestos*	

Sample #	**GP-22**			2018-04947- 22	Flooring	Positive Layer? Yes
	Layer # 1	red	floor tile	*2-5% chrysotile asbestos*		
	Layer # 2	black	mastic	*no asbestos detected*		
Sample #	**GP-23**			2018-04947- 23	Flooring	Positive Layer? Yes
	Layer # 1	gray	paint	*no asbestos detected*		
	Layer # 2	tan	mastic	*no asbestos detected*		
	Layer # 3	red	floor tile	*2-5% chrysotile asbestos*		
	Layer # 4	black	mastic	*no asbestos detected*		
Sample #	**GP-24**			2018-04947- 24	Flooring	Positive Layer? No
	Layer # 1	off-white	floor tile	*no asbestos detected*		
	Layer # 2	black	mastic	*no asbestos detected*		
	Layer # 3	off-white	leveling compound	*no asbestos detected*		
Sample #	**GP-25**			2018-04947- 25	Flooring	Positive Layer? No
	Layer # 1	off-white	floor tile	*no asbestos detected*		
	Layer # 2	black	mastic	*no asbestos detected*		
	Layer # 3	off-white	leveling compound	*no asbestos detected*		
Sample #	**GP-26**			2018-04947- 26	Flooring	Positive Layer? No
	Layer # 1	off-white	floor tile	*no asbestos detected*		
	Layer # 2	black	mastic	*no asbestos detected*		
	Layer # 3	off-white	leveling compound	*no asbestos detected*		
Sample #	**GP-27**			2018-04947- 27	Flooring	Positive Layer? No
	Layer # 1	off-white	floor tile	*no asbestos detected*		
	Layer # 2	tan	mastic	*no asbestos detected*		
	Layer # 3	black	mastic	*no asbestos detected*		
	Layer # 4	off-white	leveling compound	*no asbestos detected*		
Sample #	**GP-28**			2018-04947- 28	Flooring	Positive Layer? No
	Layer # 1	off-white	leveling compound	*no asbestos detected*		
	Layer # 2	tan	mastic	*no asbestos detected*		
Sample #	**GP-29**			2018-04947- 29	Adhesive/caulk	Positive Layer? Yes
	Layer # 1	tan	mastic	*no asbestos detected*		
	Layer # 2	black	mastic	*>1-2% 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 GP-01 **Lab Number** 2018-04947- 1 **Sampled:** 5/17/2018 **Condition:** acceptable
Analyzed By MCJ 5/22/2018 **An?** OK **Apparent Smp Type** Insulation Fibrous Mat
Homogeneous Yes **# Layers** 1 **Pos Layer?** Yes
Non-Fibrous Components (in approx. decreasing order): binder, mica/vermiculite,

Layers

#	Layer Type	%	Color	Friability
1	insulation	100	tan	3
	Total %	100	**Overall %**	

Percents of Each Fiber	Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
	>1-2%	-	-	-	-	-
Overall %	>1-2%	-	-	-	-	-
Fiber Identification:	chrysotile asbestos					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext
1	chrysotile asbestos	W	A	N	N	L	+	P
2								
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.

Sample GP-02 **Lab Number** 2018-04947- 2 **Sampled:** 5/17/2018 **Condition:** acceptable
Analyzed By MCJ 5/22/2018 **An?** OK **Apparent Smp Type** Insulation Fibrous Mat
Homogeneous Yes **# Layers** 1 **Pos Layer?** Yes
Non-Fibrous Components (in approx. decreasing order): binder, mica/vermiculite,

Layers

#	Layer Type	%	Color	Friability
1	insulation	100	tan	3
	Total %	100	**Overall %**	

Percents of Each Fiber	Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
	>1-2%	-	-	-	-	-
Overall %	>1-2%	-	-	-	-	-
Fiber Identification:	chrysotile asbestos					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext
1	chrysotile asbestos	W	A	N	N	L	+	P
2								
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.

Sample GP-03 **Lab Number** 2018-04947- 3 **Sampled:** 5/17/2018 **Condition:** acceptable
Analyzed By MCJ 5/22/2018 **An?** OK **Apparent Smp Type** Insulation Fibrous Mat
Homogeneous Yes **# Layers** 1 **Pos Layer?** Yes
Non-Fibrous Components (in approx. decreasing order): binder, mica/vermiculite,

Layers

#	Layer Type	%	Color	Friability
1	insulation	100	tan	3
	Total %	100	**Overall %**	

Percents of Each Fiber	Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
	>1-2%	-	-	-	-	-
Overall %	>1-2%	-	-	-	-	-
Fiber Identification:	chrysotile asbestos					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext
1	chrysotile asbestos	W	A	N	N	L	+	P
2								
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.

Sample GP-04 **Lab Number** 2018-04947- 4 **Sampled:** 5/17/2018 **Condition:** acceptable
Analyzed By MCJ 5/22/2018 **An?** OK **Apparent Smp Type** Insulation Fibrous Mat
Homogeneous No **# Layers** 2 **Pos Layer?** Yes
Non-Fibrous Components (in approx. decreasing order): binder, mica/vermiculite,

Layers

#	Layer Type	%	Color	Friability
1	spray-on ceiling	30	white	3
2	insulation	70	tan	3
	Total %	100	**Overall %**	

Percents of Each Fiber

	Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	n.d.	-	-	-	-	-
2	>1-2%	-	-	-	-	-
Overall %	>1-2%	-	-	-	-	-
Fiber Identification:	chrysotile asbestos					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext
1	chrysotile asbestos	W	A	N	N	L	+	P
2								
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.

Sample GP-05 **Lab Number** 2018-04947- 5 **Sampled:** 5/17/2018 **Condition:** acceptable
Analyzed By MCJ 5/22/2018 **An?** OK **Apparent Smp Type** Wall System Fibrous Solid
Homogeneous No **# Layers** 3 **Pos Layer?** No
Non-Fibrous Components (in approx. decreasing order): powder, binder,

Layers

#	Layer Type	%	Color	Friability
1	texture/joint compound	4	white	3
2	paper/cardboard	5	tan	2
3	drywall core	91	white	3
	Total %	100	**Overall %**	

Percents of Each Fiber

	Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	<=1%	n.d.	-	-	-	-
2	n.d.	90-100%	-	-	-	-
3	n.d.	<=1%	-	-	-	-
Overall %	<=1%	5-10%	-	-	-	-
Fiber Identification:	chrysotile asbestos	cellulose fiber				

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext
1	chrysotile asbestos	W	A	N	N	L	+	P
2	cellulose fiber	W	F	N	N	H	+	U
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 paint matrix using solvent. Procedure: dissolution of joint compound/texture matrix using acid. Point Count: Layer Number 1; 3 asbestos counts per 400 total counts = .75 percent.

Sample GP-06 **Lab Number** 2018-04947- 6 **Sampled:** 5/17/2018 **Condition:** acceptable
Analyzed By MCJ 5/22/2018 **An?** OK **Apparent Smp Type** Insulation Fibrous Mat
Homogeneous Yes **# Layers** 1 **Pos Layer?** Yes
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	insulation	100	tan	3	>1-2%	-	-	-	-	-
	Total %	100		**Overall %**	>1-2%	-	-	-	-	-
				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 GP-07 **Lab Number** 2018-04947- 7 **Sampled:** 5/17/2018 **Condition:** acceptable
Analyzed By MCJ 5/22/2018 **An?** OK **Apparent Smp Type** Insulation Fibrous Mat
Homogeneous Yes **# Layers** 1 **Pos Layer?** Yes
Non-Fibrous Components (in approx. decreasing order): binder, mica/vermiculite,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	insulation	100	tan	3	>1-2%	-	-	-	-	-
	Total %	100		**Overall %**	>1-2%	-	-	-	-	-
				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 GP-08 **Lab Number** 2018-04947- 8 **Sampled:** 5/17/2018 **Condition:** acceptable
Analyzed By MCJ 5/23/2018 **An?** OK **Apparent Smp Type** Insulation Fibrous Mat
Homogeneous Yes **# Layers** 1 **Pos Layer?** Yes
Non-Fibrous Components (in approx. decreasing order): binder, mica/vermiculite,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	insulation	100	tan	3	>1-2%	-	-	-	-	-
	Total %	100		**Overall %**	>1-2%	-	-	-	-	-
				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 GP-09 **Lab Number** 2018-04947- 9 **Sampled:** 5/17/2018 **Condition:** acceptable
Analyzed By MCJ 5/23/2018 **An?** OK **Apparent Smp Type** Insulation Fibrous Mat
Homogeneous Yes **# Layers** 1 **Pos Layer?** Yes
Non-Fibrous Components (in approx. decreasing order): binder, mica/vermiculite,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	Insulation	100	tan	3	>1-2%	-	-	-	-	-
	Total %	100		**Overall %**	>1-2%	-	-	-	-	-
				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 GP-10 **Lab Number** 2018-04947- 10 **Sampled:** 5/17/2018 **Condition:** acceptable
Analyzed By MCJ 5/23/2018 **An?** OK **Apparent Smp Type** Insulation Fibrous Mat
Homogeneous Yes **# Layers** 1 **Pos Layer?** No
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	insulation	100	tan	3	90-100%	-	-	-	-	-
	Total %	100		**Overall %**	90-100%	-	-	-	-	-
				Fiber Identification:	glass fiber					

Fibers		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations				
									Oil	Col Par	Col Per	RI Par	RI Per
1	glass fiber	CL	D	Y									
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps.

Sample GP-11 **Lab Number** 2018-04947- 11 **Sampled:** 5/17/2018 **Condition:** acceptable
Analyzed By MCJ 5/23/2018 **An?** OK **Apparent Smp Type** Insulation Fibrous Mat
Homogeneous Yes **# Layers** 1 **Pos Layer?** No
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	insulation	100	tan	3	90-100%	-	-	-	-	-
	Total %	100		**Overall %**	90-100%	-	-	-	-	-
				Fiber Identification:	glass fiber					

Fibers		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations				
									Oil	Col Par	Col Per	RI Par	RI Per
1	glass fiber	CL	D	Y									
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps.

Sample GP-12 **Lab Number** 2018-04947- 12 **Sampled:** 5/17/2018 **Condition:** acceptable
Analyzed By MCJ 5/23/2018 **An?** OK **Apparent Smp Type** Insulation Fibrous Mat
Homogeneous Yes **# Layers** 1 **Pos Layer?** No
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	Insulation	100	tan	3	90-100%	-	-	-	-	-
	Total %	100		**Overall %**	90-100%	-	-	-	-	-
				Fiber Identification:	glass fiber					

Fibers		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations				
									Oil	Col Par	Col Per	RI Par	RI Per
1	glass fiber	CL	D	Y									
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps.

Sample GP-13 **Lab Number** 2018-04947- 13 **Sampled:** 5/17/2018 **Condition:** acceptable
Analyzed By MCJ 5/23/2018 **An?** OK **Apparent Smp Type** Wall System Fibrous Solid
Homogeneous No **# Layers** 5 **Pos Layer?** No
Non-Fibrous Components (in approx. decreasing order): powder, binder,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	paint	10	yellow	1	n.d.	n.d.	-	-	-	-
2	paint	5	off-white	1	n.d.	n.d.	-	-	-	-
3	texture/joint compound	30	white	3	<=1%	n.d.	-	-	-	-
4	paper/cardboard	20	tan	2	n.d.	90-100%	-	-	-	-
5	texture/joint compound	35	white	3	<=1%	n.d.	-	-	-	-
	Total %	100		**Overall %**	<=1%	10-20%	-	-	-	-
				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. Procedure: dissolution of paint matrix using solvent. Procedure: dissolution of joint compound/texture matrix using acid. Point Count: Layer Number 2,4; 1 asbestos counts per 400 total counts = .25 percent. Note: the texture/joint compound layers were identical in appearance and asbestos content. One point count was used to quantify them.

Sample GP-14 **Lab Number** 2018-04947- 14 **Sampled:** 5/17/2018 **Condition:** acceptable

Analyzed By MCJ 5/23/2018 **An?** OK **Apparent Smp Type** Wall System Fibrous Solid

Homogeneous Yes **# Layers** 1 **Pos Layer?** No

Non-Fibrous Components (in approx. decreasing order): powder, ,

Layers

#	Layer Type	%	Color	Friability
1	drywall core	100	white	3
	Total %	100	**Overall %**	

Percents of Each Fiber

	Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
	<=1%	-	-	-	-	-
Overall %	<=1%	-	-	-	-	-
Fiber Identification:	cellulose					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext
1	cellulose	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.

Sample GP-15 **Lab Number** 2018-04947- 15 **Sampled:** 5/17/2018 **Condition:** acceptable

Analyzed By MCJ 5/23/2018 **An?** OK **Apparent Smp Type** Wall System Fibrous Solid

Homogeneous No **# Layers** 3 **Pos Layer?** No

Non-Fibrous Components (in approx. decreasing order): powder, binder,

Layers

#	Layer Type	%	Color	Friability
1	paint	2	off-white	1
2	paper/cardboard	18	tan	2
3	drywall core	80	white	3
	Total %	100	**Overall %**	

Percents of Each Fiber

	Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
	n.d.	-	-	-	-	-
	90-100%	-	-	-	-	-
	<=1%	-	-	-	-	-
Overall %	10-20%	-	-	-	-	-
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.

Sample GP-16 **Lab Number** 2018-04947- 16 **Sampled:** 5/17/2018 **Condition:** acceptable

Analyzed By MCJ 5/23/2018 **An?** OK **Apparent Smp Type** Wall System Fibrous Solid

Homogeneous No **# Layers** 3 **Pos Layer?** No

Non-Fibrous Components (in approx. decreasing order): powder, binder,

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	10	white	3	<=1%	n.d.	n.d.	-	-	-
2	paper/cardboard	30	tan	2	n.d.	90-100%	n.d.	-	-	-
3	drywall core	60	white	3	n.d.	<=1%	<=1%	-	-	-
	Total %	100		**Overall %**	<=1%	20-30%	<=1%	-	-	-
				Fiber Identification:	chrysotile asbestos	cellulose fiber	glass 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	glass fiber	CL	D	Y									
4													
5													
6													

Sample Analytical Note

Procedure: tweased apart using forceps. Procedure: dissolution of paint matrix using solvent. Procedure: dissolution of joint compound/texture matrix using acid. Point Count: Layer Number 1; 1 asbestos counts per 400 total counts = .25 percent.

Sample GP-17 **Lab Number** 2018-04947- 17 **Sampled:** 5/17/2018 **Condition:** acceptable

Analyzed By MCJ 5/23/2018 **An?** OK **Apparent Smp Type** Wall System Non-fibrous Solid

Homogeneous Yes **# Layers** 1 **Pos Layer?** No

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	white	3	<=1%	-	-	-	-	-
	Total %	100		**Overall %**	<=1%	-	-	-	-	-
				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. Procedure: dissolution of matrix using dilute HCl acid. Point Count: Layer Number 1; 2 asbestos counts per 400 total counts = .5 percent.

Sample GP-18 **Lab Number** 2018-04947- 18 **Sampled:** 5/17/2018 **Condition:** acceptable
Analyzed By MCJ 5/23/2018 **An?** OK **Apparent Smp Type** Wall System Fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No
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	drywall core	100	white	3	<=1%	-	-	-	-	-
	Total %	100		**Overall %**	<=1%	-	-	-	-	-
				Fiber Identification:	glass fiber					

Fibers		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations: Oil	Col Par	Col Per	RI Par	RI Per
1	glass fiber	CL	D	Y									
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps.

Sample GP-19 **Lab Number** 2018-04947- 19 **Sampled:** 5/17/2018 **Condition:** acceptable
Analyzed By MCJ 5/23/2018 **An?** OK **Apparent Smp Type** Wall System Non-fibrous Solid
Homogeneous No **# Layers** 2 **Pos Layer?** No
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	90	tan	3	<=1%	n.d.	-	-	-	-
2	paper/cardboard	10	tan	2	n.d.	90-100%	-	-	-	-
	Total %	100		**Overall %**	<=1%	5-10%	-	-	-	-
				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. Procedure: dissolution of matrix using dilute HCl acid. Point Count: Layer Number 1; 2 asbestos counts per 400 total counts = .5 percent.

Sample GP-20 **Lab Number** 2018-04947- 20 **Sampled:** 5/17/2018 **Condition:** acceptable
Analyzed By MCJ 5/23/2018 **An?** OK **Apparent Smp Type** TSI Fibrous Mat
Homogeneous Yes **# Layers** 1 **Pos Layer?** Yes
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%	10-20%	-	-	-	-
	Total %	100		**Overall %**	60-70%	10-20%	-	-	-	-
				Fiber Identification:	cellulose	chrysotile asbestos				

Fibers		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations: Oil	Col Par	Col Per	RI Par	RI Per
1	cellulose	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.

Sample GP-21 **Lab Number** 2018-04947- 21 **Sampled:** 5/17/2018 **Condition:** acceptable

Analyzed By MCJ 5/23/2018 **An?** OK **Apparent Smp Type** TSI Fibrous Mat

Homogeneous Yes **# Layers** 1 **Pos Layer?** Yes

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%	10-20%	-	-	-	-
	Total %	100		**Overall %**	60-70%	10-20%	-	-	-	-
				Fiber Identification:	cellulose	chrysotile asbestos				

Fibers		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations				
									Oil	Col Par	Col Per	RI Par	RI Per
1	cellulose	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.

Sample GP-22 **Lab Number** 2018-04947- 22 **Sampled:** 5/17/2018 **Condition:** acceptable

Analyzed By MCJ 5/23/2018 **An?** OK **Apparent Smp Type** Flooring Non-fibrous Solid

Homogeneous No **# Layers** 2 **Pos Layer?** Yes

Non-Fibrous Components (in approx. decreasing order): filler, polymer,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	floor tile	99	red	1	2-5%	-	-	-	-	-
2	mastic	1	black	1	n.d.	-	-	-	-	-
	Total %	100		**Overall %**	2-5%	-	-	-	-	-
				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. Procedure: dissolution of matrix using solvent.

Sample GP-23 **Lab Number** 2018-04947- 23 **Sampled:** 5/17/2018 **Condition:** acceptable

Analyzed By MCJ 5/23/2018 **An?** OK **Apparent Smp Type** Flooring Non-fibrous Solid

Homogeneous No **# Layers** 4 **Pos Layer?** Yes

Non-Fibrous Components (in approx. decreasing order): filler, polymer,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber: Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	paint	1	gray	1	n.d.	-	-	-	-	-
2	mastic	1	tan	1	n.d.	-	-	-	-	-
3	floor tile	97	red	1	2-5%	-	-	-	-	-
4	mastic	1	black	1	n.d.	-	-	-	-	-
	Total %	100	**Overall %**		2-5%	-	-	-	-	-
			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. Procedure: dissolution of matrix using solvent.

Sample GP-24 **Lab Number** 2018-04947- 24 **Sampled:** 5/17/2018 **Condition:** acceptable

Analyzed By MCJ 5/23/2018 **An?** OK **Apparent Smp Type** Flooring Non-fibrous Solid

Homogeneous No **# Layers** 3 **Pos Layer?** No

Non-Fibrous Components (in approx. decreasing order): filler, polymer,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber: Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	floor tile	96	off-white	1	n.d.	-	-	-	-	-
2	mastic	2	black	1	n.d.	-	-	-	-	-
3	leveling compound	2	off-white	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 solvent.

Sample GP-25 **Lab Number** 2018-04947- 25 **Sampled:** 5/17/2018 **Condition:** acceptable

Analyzed By MCJ 5/23/2018 **An?** OK **Apparent Smp Type** Flooring Non-fibrous Solid

Homogeneous No **# Layers** 3 **Pos Layer?** No

Non-Fibrous Components (in approx. decreasing order): filler, polymer,

Layers

#	Layer Type	%	Color	Friability
1	floor tile	96	off-white	1
2	mastic	2	black	1
3	leveling compound	2	off-white	3
	Total %	100	**Overall %**	

Percents of Each Fiber					
Fib 1	**Fib 2**	**Fib 3**	**Fib 4**	**Fib 5**	**Fib 6**
n.d.	-	-	-	-	-
n.d.	-	-	-	-	-
n.d.	-	-	-	-	-
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 GP-26 **Lab Number** 2018-04947- 26 **Sampled:** 5/17/2018 **Condition:** acceptable

Analyzed By MCJ 5/23/2018 **An?** OK **Apparent Smp Type** Flooring Non-fibrous Solid

Homogeneous No **# Layers** 3 **Pos Layer?** No

Non-Fibrous Components (in approx. decreasing order): filler, polymer,

Layers

#	Layer Type	%	Color	Friability
1	floor tile	96	off-white	1
2	mastic	2	black	1
3	leveling compound	2	off-white	3
	Total %	100	**Overall %**	

Percents of Each Fiber					
Fib 1	**Fib 2**	**Fib 3**	**Fib 4**	**Fib 5**	**Fib 6**
n.d.	-	-	-	-	-
n.d.	-	-	-	-	-
n.d.	-	-	-	-	-
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 GP-27 **Lab Number** 2018-04947- 27 **Sampled:** 5/17/2018 **Condition:** acceptable

Analyzed By MCJ 5/23/2018 **An?** OK **Apparent Smp Type** Flooring Non-fibrous Solid

Homogeneous No **# Layers** 4 **Pos Layer?** No

Non-Fibrous Components (in approx. decreasing order): filler, polymer,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber: Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	floor tile	94	off-white	1	n.d.	-	-	-	-	-
2	mastic	2	tan	1	n.d.	-	-	-	-	-
3	mastic	2	black	1	n.d.	-	-	-	-	-
4	leveling compound	2	off-white	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 solvent.

Sample GP-28 **Lab Number** 2018-04947- 28 **Sampled:** 5/17/2018 **Condition:** acceptable

Analyzed By MCJ 5/23/2018 **An?** OK **Apparent Smp Type** Flooring Non-fibrous Solid

Homogeneous No **# Layers** 2 **Pos Layer?** No

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	leveling compound	85	off-white	3	n.d.	-	-	-	-	-
2	mastic	15	tan	1	>1-2%	-	-	-	-	-
	Total %	100		**Overall %**	<=1%	-	-	-	-	-
				Fiber Identification:	synthetic fiber (extr					

Fibers		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations: Oil	Col Par	Col Per	RI Par	RI Per
1	synthetic fiber (extruded)	W	E	N	N	H	+	P					
2													
3													
4													
5													
6													

Sample Analytical Note

Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

PLM Analysis Details **Job Number:** **201804947** Golden Pins

Sample GP-29 **Lab Number** 2018-04947- 29 **Sampled:** 5/17/2018 **Condition:** acceptable

Analyzed By MCJ 5/23/2018 **An?** OK **Apparent Smp Type** Adhesive/caulk Non-fibrous Solid

Homogeneous No **# Layers** 2 **Pos Layer?** Yes

Non-Fibrous Components (in approx. decreasing order): filler, polymer,

Layers

#	Layer Type	%	Color	Friability
1	mastic	85	tan	1
2	mastic	15	black	1
	Total %	100	**Overall %**	

Percents of Each Fiber

	Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
	n.d.	-	-	-	-	-
	>1-2%	-	-	-	-	-
	<=1%	-	-	-	-	-
Fiber Identification:	chrysotile asbestos					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext
1	chrysotile asbestos	W	A	N	N	L	+	P
2								
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 matrix using solvent.

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: 23-May-18

Original Print Date: 23-May-18

Larry S. Pierce, Approved Accreditation Signatory

24 HOUR

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) Pima County Risk Management	
Address 130 W. Congress, 9th Floor	
City, State, Zip Code Tucson, AZ 85701	
Phone 520-724-3078	FAX 520-222-1407
Email jim.faas@pima.gov	

Invoice to (Company) Same	
Address	
City, State, Zip Code	
Phone	FAX

Contact (print) Jim Faas
Sampled by (signature) [signature]
Job Number or Project Name Golden Pins
PO Number

<Analysis Method [illegible] ONLY ONE [illegible]>		Turnaround time (check one) Rush	Norm	Ext.
Asbestos by PLM	Method > Improved ☒ or Interim ☐; Analyze > All ☐ or ATPF ☐; If ATPF then > by Layer ☐ or by Sample ☐; Single Layer Protocol > Yes ☒ or No ☐	Urg. Rush <3 hrs ☐; 24 hrs ☒	3-5 days ☐	15-30 days ☐
Fibers by PCM	Method > 7400(Area) ☐ ORM (Personal) ☐	<4 hr ☐	24hr ☐	-
Asbestos by TEM	In Air > AHERA ☐ Mod. AHERA ☐	<6hr ☐	24 hr ☐	3-5d ☐
	In Water* > Water ☐ Sludge ☐	1-2d ☐	3-5d ☐	N/A
	In Bulk (Annex2) > Chatfield ☐ Full Quant ☐			
	In Dust > Vacuum Dust (ASTM D-5755) ☐	3-5d ☐	5-10d ☐	N/A
Pb by FLAA	Analyte > Pb ☐ Other ☐	<6 hrs ☐	2-3 days ☐	N/A
	Matrix > Filter > MCE ☐			
	Matrix > Paint > by Area (mg/cm2) ☐ by Weight (ppm) ☐			
	Matrix > Soil > ☐			
	Matrix > Wipe > ☐			
	Check here certifying wipes used are ASTM E1792 compliant ☐			
Fungi	Air Sample > Zef ☐ Aller ☐ Oth ☐	<6 hrs ☐	1-2 days ☐	N/A
	Bulk > Sample ☐ Swab ☐			
	Tape Lift > Qualitative (%& type) ☐ or Quantitative (type/cm2) ☐			
Soot	ASTM D6602-03B Optical	<6 hrs ☐	1-2 days ☐	N/A
	ASTM D6602-03B Optical & TEM	1-2 days ☐	3-5days ☐	N/A
Other		Call	Call	

Sample # (1 per line)	Description/Location	Sample Date	Sample Time	Vol. or Area
1) GP-01		5/17/18		
2) GP-02		↓		
3) GP-03				
4) GP-04				
5) GP-05				
6) GP-06				
7) GP-07				
8) GP-08				
9) GP-09				
10) GP-10				
11) GP-11				
12) GP-12				
13) GP-13				
14) GP-14				
15) GP-15				
16) GP-16				
17) GP-17				
18) GP-18				
19) GP-19				
20) GP-20		↓		

1)Relinquished by: [signature]	Date: 5/18/18	Time:	3)Relinquished by:	Date:	Time:
2)Received by: [signature]	Date: 5-22-18	Time: 10:18	4)Received by:	Date:	Time:
* TEM Water: Sampler's name Required by State of Arizona	Print Name [signature]		Fiberquant assigned Job Number>	2018 04947	
Review of Analysis Request (Initials): [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.

24 HOUR

FIBERQUANT ANALYTICAL SERVICES

Fiberquant Analytical Services 5025 S. 33rd St.; Phoenix, AZ 85040; Phone: 602-276-6139; FAX: 602-276-4556; info@fiberquant.com

Analysis Request/Chain-of-Custody Form

Submitted by (Company)	Pima County Risk Management
Address	130 W. Congress, 9th Floor
City, State, Zip Code	Tucson, AZ 85701
Phone	520-724-3078 — FAX 520-222-1407
Email	jim.faas@pima.gov

Invoice to (Company)	Same
Address	
City, State, Zip Code	
Phone	FAX

Contact (print)	Jim Faas
Sampled by (signature)	J. Faas
Job Number or Project Name	Golden Pins
PO Number	

<Analysis Method Requested> ONLY ONE METHOD PER COC		Turn-around-time (choose one) Rush	Norm	Ext
Asbestos by PLM	Method > Improved ☒ or Interim ☐; Analyze > All ☐ or ATPF ☐; If ATPF then > by Layer ☐ or by Sample ☐; Single Layer Protocol > Yes ☐ or No ☐	Urg. Rush <3 hrs ☐; <24 hrs ☐	1-3 days ☐	10-30 days ☐
Fibers by PCM	Method > 7400(Area) ☐ ORM (Personal) ☐	<4 hr ☐	24hr ☐	-
Asbestos by TEM	In Air > AHERA ☐ Mod. AHERA ☐	<6hr ☐	24 hr ☐	3-5d ☐
	In Water* > Water ☐ Sludge ☐	1-2d ☐	3-5d ☐	N/A
	In Bulk (Annex2) > Chatfield ☐ Full Quant ☐			
	In Dust > Vacuum Dust (ASTM D-5755) ☐	3-5d ☐	5-10d ☐	N/A
Pb by FLAA	Analyte > Pb ☐ Other ☐; Matrix > Filter > MCE ☐; Paint > by Area (mg/cm2) ☐ by Weight (ppm) ☐; Soil > ☐; Wipe > ☐; Check here certifying wipes used are ASTM E1792 compliant ☐	<6 hrs ☐	2-3 days ☐	N/A
Fungi	Air Sample > Zef ☐ Aller ☐ Oth ☐; Bulk > Sample ☐ Swab ☐; Tape Lift > Qualitative (%& type) ☐ or Quantitative (type/cm2) ☐	<6 hrs ☐	1-2 days ☐	N/A
Soot	ASTM D6602-03B — Optical	<6 hrs ☐	1-2 days ☐	N/A
	ASTM D6602-03B — Optical & TEM	1-2 days ☐	3-5days ☐	N/A
Other		Call	Call	

Sample # (1 per line)	Description/Location	Sample Date	Sample Time	Vol. or Area
1) GP-21		5/17/18		
2) GP-22		↓		
3) GP-23		↓		
4) GP-24		↓		
5) GP-25		↓		
6) GP-26		↓		
7) GP-27		↓		
8) GP-28		↓		
9) GP-29		↓		
10)				
11)				
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1)Relinquished by: [signature]	Date: 5/18/18	Time:	3)Relinquished by:	Date:	Time:
2)Received by: [signature]	Date: 5-22-18	Time: 1015	4)Received by:	Date:	Time:
* TEM Water: Sampler's name Required by State of Arizona	Print Name RX		Fiberquant assigned Job Number>	20180 4947	

Review of Analysis Request (Initials): QH

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: 201805016

Client: PIMA COUNTY RISK MGMT
130 W CONGRESS 9TH FLR

TUCSON, AZ 85701-0000
Office Phone: (520) 724-3078
FAX: (520) 798-1407

 # Samples: 23 PLM **Rec:** 5/24/2018 **Method:** EPA 600/R-93/116 The "New" Method; see below
Client Job: G Pins & Storage **PO Number:** MA 18*303
Report Date: 5/24/2018 **Date Analyzed:** 5/24/2018 **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 40 CFR 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 code #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: 201805016** G Pins & Storage

Sample Number / Layer	Color	Apparent Layer Type *	Lab Number / Asbestos Results	Apparent Sample Type *	Positive Layer Yes or No
Sample # **GP-30**			2018-05016- 1	Acoustical Tile	Positive Layer? No
Layer # 1	white	paint	*no asbestos detected*		
Layer # 2	gray	acoustical tile	*no asbestos detected*		
Sample # **GP-31**			2018-05016- 2	Sprayed Material	Positive Layer? No
Layer # 1	off-white	fireproofing	*no asbestos detected*		
Layer # 2	yellow	insulation	*no asbestos detected*		
Sample # **GP-32**			2018-05016- 3	Sprayed Material	Positive Layer? Yes
Layer # 1	white	paint	*no asbestos detected*		
Layer # 2	gray	fireproofing	*2-5% chrysotile asbestos*		
Sample # **GP-33**			2018-05016- 4	Acoustical Tile	Positive Layer? No
Layer # 1	white	paint	*no asbestos detected*		
Layer # 2	gray	acoustical tile	*no asbestos detected*		
Sample # **GP-34**			2018-05016- 5	Sprayed Material	Positive Layer? Yes
Layer # 1	white	paint	*no asbestos detected*		
Layer # 2	gray	fireproofing	*2-5% chrysotile asbestos*		
Sample # **GP-35**			2018-05016- 6	Acoustical Tile	Positive Layer? No
Layer # 1	white	paint	*no asbestos detected*		
Layer # 2	gray	acoustical tile	*no asbestos detected*		
Sample # **GP-36**			2018-05016- 7	Acoustical Tile	Positive Layer? No
Layer # 1	white	paint	*no asbestos detected*		
Layer # 2	gray	acoustical tile	*no asbestos detected*		
Sample # **GP-37**			2018-05016- 8	Adhesive/caulk	Positive Layer? Yes
Layer # 1	yellow	mastic	*no asbestos detected*		
Layer # 2	black	mastic	*5-10% chrysotile asbestos*		
Sample # **GP-38**			2018-05016- 9	Wall System	Positive Layer? No
Layer # 1	white	paint	*no asbestos detected*		
Layer # 2	white	texture/joint compound	*no asbestos detected*		
Layer # 3	off-white	paint	*no asbestos detected*		
Layer # 4	white	texture/joint compound	*<=1% chrysotile asbestos*		
Layer # 5	tan	paper/cardboard	*no asbestos detected*		
Layer # 6	white	drywall core	*no asbestos detected*		
Sample # **GP-39**			2018-05016- 10	Wall System	Positive Layer? No
Layer # 1	tan	paper/cardboard	*no asbestos detected*		
Layer # 2	white	drywall core	*no asbestos detected*		
Sample # **GP-40**			2018-05016- 11	Wall System	Positive Layer? No
Layer # 1	off-white	paint	*no asbestos detected*		
Layer # 2	white	texture/joint compound	*no asbestos detected*		
Sample # **GP-41**			2018-05016- 12	Wall System	Positive Layer? No
Layer # 1	tan	paper/cardboard	*no asbestos detected*		
Layer # 2	white	drywall core	*no asbestos detected*		
Sample # **GP-42**			2018-05016- 13	Wall System	Positive Layer? No
Layer # 1	white	texture/joint compound	*no asbestos detected*		
Sample # **GP-43**			2018-05016- 14	Wall System	Positive Layer? No
Layer # 1	white	texture/joint compound	*no asbestos detected*		
Sample # **GP-44**			2018-05016- 15	Wall System	Positive Layer? No
Layer # 1	tan	paper/cardboard	*no asbestos detected*		
Layer # 2	white	drywall core	*no asbestos detected*		
Sample # **GP-45**			2018-05016- 16	Miscellaneous	Positive Layer? No
Layer # 1	black	surface	*no asbestos detected*		
Layer # 2	brown	insulation	*no asbestos detected*		
Sample # **GP-46**			2018-05016- 17	Acoustical Tile	Positive Layer? No
Layer # 1	white	paint	*no asbestos detected*		
Layer # 2	gray	acoustical tile	*no asbestos detected*		
Sample # **GP-47**			2018-05016- 18	Acoustical Tile	Positive Layer? No
Layer # 1	white	paint	*no asbestos detected*		
Layer # 2	brown	acoustical tile	*no asbestos detected*		

Sample # **GP-48**			2018-05016- 19	Acoustical Tile	Positive Layer? No
Layer # 1	white	paint	*no asbestos detected*		
Layer # 2	gray	acoustical tile	*no asbestos detected*		
Sample # **GPS-49**			2018-05016- 20	TSI	Positive Layer? Yes
Layer # 1	off-white	duct tape	*50-60% chrysotile asbestos*		
Sample # **GPS-50**			2018-05016- 21	Adhesive/caulk	Positive Layer? No
Layer # 1	off-white	putty	*no asbestos detected*		
Sample # **GPS-51**			2018-05016- 22	Adhesive/caulk	Positive Layer? No
Layer # 1	brown	paint	*no asbestos detected*		
Layer # 2	off-white	putty	*no asbestos detected*		
Sample # **GPS-52**			2018-05016- 23	Adhesive/caulk	Positive Layer? No
Layer # 1	brown	mastic	*no asbestos detected*		

* 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 GP-30 **Lab Number** 2018-05016- 1 **Sampled:** 5/23/2018 **Condition:** acceptable
Analyzed By DMS 5/24/2018 **An?** OK **Apparent Smp Type** Acoustical Tile Fibrous Mat
Homogeneous No **# Layers** 2 **Pos Layer?** No
Non-Fibrous Components (in approx. decreasing order): perlite, powder, binder

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	paint	1	white	1	n.d.	n.d.	-	-	-	-
2	acoustical tile	99	gray	3	10-20%	5-10%	-	-	-	-
	Total %	100		**Overall %**	10-20%	5-10%	-	-	-	-
				Fiber Identification:	cellulose fiber	glass 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	glass fiber	CL	D	Y									
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of paint matrix using solvent. Procedure: dissolution of acoustical tile using acid.

Sample GP-31 **Lab Number** 2018-05016- 2 **Sampled:** 5/23/2018 **Condition:** acceptable
Analyzed By DMS 5/24/2018 **An?** OK **Apparent Smp Type** Sprayed Material Non-fibrous Solid
Homogeneous No **# Layers** 2 **Pos Layer?** No
Non-Fibrous Components (in approx. decreasing order): powder, mica/vermiculite,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	fireproofing	99	off-white	3	n.d.	-	-	-	-	-
2	insulation	1	yellow	4	90-100%	-	-	-	-	-
	Total %	100		**Overall %**	<=1%	-	-	-	-	-
				Fiber Identification:	glass fiber					

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations				
									Oil	Col Par	Col Per	RI Par	RI Per
1	glass fiber	CL	D	Y									
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample GP-32 **Lab Number** 2018-05016- 3 **Sampled:** 5/23/2018 **Condition:** acceptable
Analyzed By DMS 5/24/2018 **An?** OK **Apparent Smp Type** Sprayed Material Fibrous Solid
Homogeneous No **# Layers** 2 **Pos Layer?** Yes
Non-Fibrous Components (in approx. decreasing order): mica/vermiculite, powder,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	paint	2	white	1	n.d.	-	-	-	-	-
2	fireproofing	98	gray	4	2-5%	-	-	-	-	-
	Total %	100		**Overall %**	2-5%	-	-	-	-	-
				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	vb/g	pb/r	1.556	1.549
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample GP-33 **Lab Number** 2018-05016- 4 **Sampled:** 5/23/2018 **Condition:** acceptable
Analyzed By DMS 5/24/2018 **An?** OK **Apparent Smp Type** Acoustical Tile Fibrous Mat
Homogeneous No **# Layers** 2 **Pos Layer?** No
Non-Fibrous Components (in approx. decreasing order): perlite, powder, binder

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber: Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	paint	1	white	1	n.d.	n.d.	-	-	-	-
2	acoustical tile	99	gray	3	10-20%	5-10%	-	-	-	-
	Total %	100		**Overall %**	10-20%	5-10%	-	-	-	-
				Fiber Identification:	cellulose fiber	glass 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	glass fiber	CL	D	Y									
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of paint matrix using solvent. Procedure: dissolution of acoustical tile using acid.

Sample GP-34 **Lab Number** 2018-05016- 5 **Sampled:** 5/23/2018 **Condition:** acceptable
Analyzed By DMS 5/24/2018 **An?** OK **Apparent Smp Type** Sprayed Material Fibrous Solid
Homogeneous No **# Layers** 2 **Pos Layer?** Yes
Non-Fibrous Components (in approx. decreasing order): mica/vermiculite, powder,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber: Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	paint	2	white	1	n.d.	-	-	-	-	-
2	fireproofing	98	gray	4	2-5%	-	-	-	-	-
	Total %	100		**Overall %**	2-5%	-	-	-	-	-
				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	vb/g	pb/r	1.556	1.549
2													
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using dilute HCl acid.

Sample GP-35 **Lab Number** 2018-05016- 6 **Sampled:** 5/23/2018 **Condition:** acceptable
Analyzed By DMS 5/24/2018 **An?** OK **Apparent Smp Type** Acoustical Tile Fibrous Mat
Homogeneous No **# Layers** 2 **Pos Layer?** No
Non-Fibrous Components (in approx. decreasing order): perlite, powder, binder

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber: Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	paint	1	white	1	n.d.	n.d.	-	-	-	-
2	acoustical tile	99	gray	3	10-20%	5-10%	-	-	-	-
	Total %	100		**Overall %**	10-20%	5-10%	-	-	-	-
				Fiber Identification:	cellulose fiber	glass 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	glass fiber	CL	D	Y									
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of paint matrix using solvent. Procedure: dissolution of acoustical tile using acid.

Sample GP-36 **Lab Number** 2018-05016- 7 **Sampled:** 5/23/2018 **Condition:** acceptable
Analyzed By DMS 5/24/2018 **An?** OK **Apparent Smp Type** Acoustical Tile Fibrous Mat
Homogeneous No **# Layers** 2 **Pos Layer?** No
Non-Fibrous Components (in approx. decreasing order): perlite, powder, binder

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	paint	2	white	1	n.d.	n.d.	-	-	-	-
2	acoustical tile	98	gray	3	10-20%	5-10%	-	-	-	-
	Total %	100		**Overall %**	10-20%	5-10%	-	-	-	-
				Fiber Identification:	cellulose fiber	glass 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	glass fiber	CL	D	Y									
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of paint matrix using solvent. Procedure: dissolution of acoustical tile using acid.

Sample GP-37 **Lab Number** 2018-05016- 8 **Sampled:** 5/23/2018 **Condition:** acceptable
Analyzed By DMS 5/24/2018 **An?** OK **Apparent Smp Type** Adhesive/caulk Sticky
Homogeneous No **# Layers** 2 **Pos Layer?** Yes
Non-Fibrous Components (in approx. decreasing order): filler, polymer, bitumen

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	mastic	98	yellow	1	<=1%	n.d.	-	-	-	-
2	mastic	2	black	1	n.d.	5-10%	-	-	-	-
	Total %	100		**Overall %**	<=1%	<=1%	-	-	-	-
				Fiber Identification:	synthetic fiber (extr	chrysotile asbestos				

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations				
									Oil	Col Par	Col Per	RI Par	RI Per
1	synthetic fiber (extruded)	W	E	N	N	H	+	P					
2	chrysotile asbestos	W	A	N	N	L	+	P	1.550	vb/g	pb/r	1.556	1.549
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of matrix using solvent.

Sample GP-38 **Lab Number** 2018-05016- 9 **Sampled:** 5/23/2018 **Condition:** acceptable
Analyzed By DMS 5/24/2018 **An?** OK **Apparent Smp Type** Wall System Fibrous Solid
Homogeneous No **# Layers** 6 **Pos Layer?** No
Non-Fibrous Components (in approx. decreasing order): powder, binder,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	paint	2	white	1	n.d.	n.d.	-	-	-	-
2	texture/joint compound	15	white	3	n.d.	n.d.	-	-	-	-
3	paint	1	off-white	1	n.d.	n.d.	-	-	-	-
4	texture/joint compound	15	white	3	<=1%	n.d.	-	-	-	-
5	paper/cardboard	2	tan	2	n.d.	90-100%	-	-	-	-
6	drywall core	65	white	3	n.d.	<=1%	-	-	-	-
	Total %	100		**Overall %**	<=1%	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	vb/g	pb/r	1.556	1.549
2	cellulose fiber	W	F	N	N	H	+	U					
3													
4													
5													
6													

Sample Analytical Note
Procedure: tweased apart using forceps. Procedure: dissolution of paint matrix using solvent. Procedure: dissolution of joint compound/texture matrix using acid. Point Count: Layer Number 4; 1 asbestos counts per 400 total counts = .25 percent.

Sample GP-39 **Lab Number** 2018-05016- 10 **Sampled:** 5/23/2018 **Condition:** acceptable
Analyzed By DMS 5/24/2018 **An?** OK **Apparent Smp Type** Wall System Fibrous Solid
Homogeneous No **# Layers** 2 **Pos Layer?** No
Non-Fibrous Components (in approx. decreasing order): powder, binder,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	paper/cardboard	5	tan	2	90-100%	-	-	-	-	-
2	drywall core	95	white	3	<=1%	-	-	-	-	-
	Total %	100		**Overall %**	5-10%	-	-	-	-	-
				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.

Sample GP-40 **Lab Number** 2018-05016- 11 **Sampled:** 5/23/2018 **Condition:** acceptable
Analyzed By DMS 5/24/2018 **An?** OK **Apparent Smp Type** Wall System Non-fibrous Solid
Homogeneous No **# Layers** 2 **Pos Layer?** No
Non-Fibrous Components (in approx. decreasing order): powder, polymer, filler

Layers

#	Layer Type	%	Color	Friability
1	paint	1	off-white	1
2	texture/joint compound	99	white	3
	Total %	100	**Overall %**	

Percents of Each Fiber	Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
	n.d.	-	-	-	-	-
	n.d.	-	-	-	-	-
	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 paint matrix using solvent. Procedure: dissolution of joint compound/texture matrix using acid.

Sample GP-41 **Lab Number** 2018-05016- 12 **Sampled:** 5/23/2018 **Condition:** acceptable
Analyzed By DMS 5/24/2018 **An?** OK **Apparent Smp Type** Wall System Fibrous Solid
Homogeneous No **# Layers** 2 **Pos Layer?** No
Non-Fibrous Components (in approx. decreasing order): powder, binder,

Layers

#	Layer Type	%	Color	Friability
1	paper/cardboard	5	tan	2
2	drywall core	95	white	3
	Total %	100	**Overall %**	

Percents of Each Fiber	Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
	90-100%	-	-	-	-	-
	<=1%	-	-	-	-	-
	5-10%	-	-	-	-	-
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.

Sample GP-42 **Lab Number** 2018-05016- 13 **Sampled:** 5/23/2018 **Condition:** acceptable
Analyzed By DMS 5/24/2018 **An?** OK **Apparent Smp Type** Wall System Non-fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No
Non-Fibrous Components (in approx. decreasing order): powder, ,

Layers

#	Layer Type	%	Color	Friability
1	texture/joint compound	100	white	3
	Total %	100	**Overall %**	

Percents of Each Fiber	Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
	n.d.	-	-	-	-	-
	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 GP-43 **Lab Number** 2018-05016- 14 **Sampled:** 5/23/2018 **Condition:** acceptable
Analyzed By DMS 5/24/2018 **An?** OK **Apparent Smp Type** Wall System Non-fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No
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	white	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 GP-44 **Lab Number** 2018-05016- 15 **Sampled:** 5/23/2018 **Condition:** acceptable
Analyzed By DMS 5/24/2018 **An?** OK **Apparent Smp Type** Wall System Fibrous Solid
Homogeneous No **# Layers** 2 **Pos Layer?** No
Non-Fibrous Components (in approx. decreasing order): powder, binder,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber: Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	paper/cardboard	5	tan	2	90-100%	-	-	-	-	-
2	drywall core	95	white	3	<=1%	-	-	-	-	-
	Total %	100		**Overall %**	5-10%	-	-	-	-	-
				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.

Sample GP-45 **Lab Number** 2018-05016- 16 **Sampled:** 5/23/2018 **Condition:** acceptable
Analyzed By DMS 5/24/2018 **An?** OK **Apparent Smp Type** Miscellaneous Fibrous Mat
Homogeneous No **# Layers** 2 **Pos Layer?** No
Non-Fibrous Components (in approx. decreasing order): bitumen, powder,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber: Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	surface	5	black	1	80-90%	-	-	-	-	-
2	insulation	95	brown	4	90-100%	-	-	-	-	-
	Total %	100		**Overall %**	90-100%	-	-	-	-	-
				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 solvent.

Sample GP-46 **Lab Number** 2018-05016- 17 **Sampled:** 5/23/2018 **Condition:** acceptable
Analyzed By DMS 5/24/2018 **An?** OK **Apparent Smp Type** Acoustical Tile Fibrous Mat
Homogeneous No **# Layers** 2 **Pos Layer?** No
Non-Fibrous Components (in approx. decreasing order): perlite, powder, binder

Layers

#	Layer Type	%	Color	Friability
1	paint	1	white	1
2	acoustical tile	99	gray	3
	Total %	100	**Overall %**	

Percents of Each Fiber	Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
	n.d.	n.d.	-	-	-	-
	10-20%	10-20%	-	-	-	-
Overall %	10-20%	10-20%	-	-	-	-
Fiber Identification:	cellulose fiber	glass fiber				

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext
1	cellulose fiber	W	F	N	N	H	+	U
2	glass fiber	CL	D	Y				
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 acoustical tile using acid.

Sample GP-47 **Lab Number** 2018-05016- 18 **Sampled:** 5/23/2018 **Condition:** acceptable
Analyzed By DMS 5/24/2018 **An?** OK **Apparent Smp Type** Acoustical Tile Fibrous Mat
Homogeneous No **# Layers** 2 **Pos Layer?** No
Non-Fibrous Components (in approx. decreasing order): perlite, ,

Layers

#	Layer Type	%	Color	Friability
1	paint	1	white	1
2	acoustical tile	99	brown	3
	Total %	100	**Overall %**	

Percents of Each Fiber	Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
	n.d.	-	-	-	-	-
	80-90%	-	-	-	-	-
Overall %	80-90%	-	-	-	-	-
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.

Sample GP-48 **Lab Number** 2018-05016- 19 **Sampled:** 5/23/2018 **Condition:** acceptable
Analyzed By DMS 5/24/2018 **An?** OK **Apparent Smp Type** Acoustical Tile Fibrous Mat
Homogeneous No **# Layers** 2 **Pos Layer?** No
Non-Fibrous Components (in approx. decreasing order): perlite, powder, binder

Layers

#	Layer Type	%	Color	Friability
1	paint	1	white	1
2	acoustical tile	99	gray	3
	Total %	100	**Overall %**	

Percents of Each Fiber	Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
	n.d.	n.d.	-	-	-	-
	10-20%	5-10%	-	-	-	-
Overall %	10-20%	5-10%	-	-	-	-
Fiber Identification:	cellulose fiber	glass fiber				

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext
1	cellulose fiber	W	F	N	N	H	+	U
2	glass fiber	CL	D	Y				
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 acoustical tile using acid.

Sample GPS-49 **Lab Number** 2018-05016- 20 **Sampled:** 5/23/2018 **Condition:** acceptable
Analyzed By DMS 5/24/2018 **An?** OK **Apparent Smp Type** TSI Fibrous Mat
Homogeneous Yes **# Layers** 1 **Pos Layer?** Yes
Non-Fibrous Components (in approx. decreasing order): binder, ,

Layers

#	Layer Type	%	Color	Friability
1	duct tape	100	off-white	3
	Total %	100	**Overall %**	

Percents of Each Fiber					
Fib 1	**Fib 2**	**Fib 3**	**Fib 4**	**Fib 5**	**Fib 6**
50-60%	10-20%	-	-	-	-
50-60%	10-20%	-	-	-	-

Fiber Identification: chrysotile asbestos, cellulose fiber

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext
1	chrysotile asbestos	W	A	N	N	L	+	P
2	cellulose fiber	W	F	N	N	H	+	U
3								
4								
5								
6								

Refractive Index Determinations

Oil	Col Par	Col Per	RI Par	RI Per
1.550	vb/g	sb/o	1.556	1.553

Sample Analytical Note
Procedure: tweased apart using forceps.

Sample GPS-50 **Lab Number** 2018-05016- 21 **Sampled:** 5/23/2018 **Condition:** acceptable
Analyzed By DMS 5/24/2018 **An?** OK **Apparent Smp Type** Adhesive/caulk Non-fibrous Solid
Homogeneous Yes **# Layers** 1 **Pos Layer?** No
Non-Fibrous Components (in approx. decreasing order): powder, ,

Layers

#	Layer Type	%	Color	Friability
1	putty	100	off-white	2
	Total %	100	**Overall %**	

Percents of Each Fiber					
Fib 1	**Fib 2**	**Fib 3**	**Fib 4**	**Fib 5**	**Fib 6**
n.d.	-	-	-	-	-
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 GPS-51 **Lab Number** 2018-05016- 22 **Sampled:** 5/23/2018 **Condition:** acceptable
Analyzed By DMS 5/24/2018 **An?** OK **Apparent Smp Type** Adhesive/caulk Non-fibrous Solid
Homogeneous No **# Layers** 2 **Pos Layer?** No
Non-Fibrous Components (in approx. decreasing order): powder, ,

Layers

#	Layer Type	%	Color	Friability
1	paint	1	brown	1
2	putty	99	off-white	2
	Total %	100	**Overall %**	

Percents of Each Fiber					
Fib 1	**Fib 2**	**Fib 3**	**Fib 4**	**Fib 5**	**Fib 6**
n.d.	-	-	-	-	-
n.d.	-	-	-	-	-
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.

PLM Analysis Details **Job Number:** **201805016** G Pins & Storage

Sample GPS-52 **Lab Number** 2018-05016- 23 **Sampled:** 5/23/2018 **Condition:** acceptable

Analyzed By DMS 5/24/2018 **An?** OK **Apparent Smp Type** Adhesive/caulk Sticky

Homogeneous Yes **# Layers** 1 **Pos Layer?** No

Non-Fibrous Components (in approx. decreasing order): polymer, filler,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	mastic	100	brown	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. Minor adhering wall materials, paint and/or texture, etc. were not analyzed.

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: DAVID M. SCHALLER

Printed: 24-May-18

Original Print Date: 24-May-18

Larry S. Pierce, Approved Accreditation Signatory

24h

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)	Pima County Risk Management
Address	130 W. Congress, 9th Floor
City, State, Zip Code	Tucson, AZ 85701
Phone 520-724-3078	FAX 520-222-1407
Email	jim.faas@pima.gov

Invoice to (Company)	Same
Address	
City, State, Zip Code	
Phone	FAX

Contact (print)	Jim Faas
Sampled by (signature)	JF
Job Number or Project Name	GPins
PO Number	

<Analysis Method Requested> ONLY ONE METHOD PER CODE			Turn-around-time (choose one): Rush	Norm	Ext.
Asbestos by PLM	Method > Improved ☒ or Interim ☐		Ug Rush ☐ / <8 hrs ☐ / <3 hrs ☐	1-3 days ☐	16-30 days ☐
	Analyze > All ☒ or ATPF ☐				
	If ATPF then > by Layer ☐ or by Sample ☐				
	Single Layer Protocol > Yes ☒ or No ☐				
Fibers by PCM	Method > 7400(Area) ☐ ORM (Parsched) ☐		<4 hr ☐	24hr ☐	
Asbestos by TEM	In Air > AHERA ☐ Mod. AHERA ☐				3-5d ☐
	In Water* > Wet ☐ Settled ☐				NIA
	In Bulk (Annex2) > Qualitative ☐ Full Quant ☐				
	In Dust > Vacuum Cast (ASTM D-6480) ☐				NIA
Pb by FLAA	Analyte > Pb ☐ Other ☐		<6 hrs ☐	2-3 days ☐	NIA
	Matrix > Filter > MCE ☐				
	Paint > by Area (mg/cm2) ☐ by Weight (ppm) ☐				
	Soil > ☐				
	Wipe > ☐				
	Check here certifying wipes used are ASTM E1792 compliant ☐				
Fungi	Air Sample > Zef ☐ Aller ☐ Oth ☐		<6 hrs ☐	1-2 days ☐	NIA
	Bulk > Sample ☐ Swab ☐				
	Tape Lift > Qualitative (%& type) ☐ or Quantitative (type/cm2) ☐				
Soot	ASTM D6602-03B	Optical	<6 hrs ☐	1-2 days ☐	NIA
		Optical & TEM	1-2 days ☐	3-5days ☐	NIA
Other			Call	Call	

24 HOUR

Sample # (1 per line)	Description/Location	Sample Date	Sample Time	Vol. or Area
1) GP-30		5/23/18		
2) 31				
3) 32				
4) 33				
5) 34				
6) 35				
7) 36				
8) 37				
9) 38				
10) 39				
11) 40				
12) 41				
13) 42				
14) 43				
15) 44				
16) 45				
17) 46				
18) 47				
19) 48				
20)				

1)Relinquished by: JF	Date: 5/23/18	Time: [illegible]	3)Relinquished by:	Date:	Time:
2)Received by: [signature]	Date: 5-24-18	Time: 10:17	4)Received by:	Date:	Time:
* TEH/Water: Sampler's name Required by State of Arizona	Print Name: FIX		Fiberquant assigned Job Number>	20180516	
Review of Analysis Request (Initials): LLK				Page 1 of 2	

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.

24 hr

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)	Pima County Risk Management
Address	130 W. Congress, 9th Floor
City, State, Zip Code	Tucson, AZ 85701
Phone	520-724-3078 FAX 520-222-1407
Email	jim.faas@pima.gov

Invoice to (Company)	Same
Address	
City, State, Zip Code	
Phone	FAX

Contact (print)	Jim Faas
Sampled by (signature)	[signature]
Job Number or Project Name	G Pits Storage
PO Number	

<Analysis Method Requested> ONLY ONE METHOD PER COC		Turn-around-time (choose one): Rush	Norm	Ext
Asbestos by PLM	Method > Improved ☒ or Interim ☐; Analyze > All ☒ or ATPF ☐; If ATPF then > by Layer ☐ or by Sample ☐; Single Layer Protocol > Yes ☐ No	Urg. Rush <3 hrs ☐ / <6 hrs ☒	1-3 days ☐	15-30 days ☐
Fibers by PCM	Method > 7400(Area) ☐ CRM (Personal) ☐	<4 hr ☐	24hr ☐	-
Asbestos by TEM	In Air > AHERA ☐ Mod. AHERA ☐	<6hr ☐	24 hr ☐	3-5d ☐
	In Water* > Water ☐ Sludge ☐	1-2d ☐	3-5d ☐	N/A
	In Bulk (Annex2) > Chatfield ☐ Full Quant ☐			
	In Dust > Vacuum Dust (ASTM D-5755) ☐	3-5d ☐	5-10d ☐	N/A
Pb by FLAA	Analyte > Pb ☐ Other ☐; Matrix > Filter > MCE ☐; Paint > by Area (mg/cm2) ☐ by Weight (ppm) ☐; Soil > ☐; Wipe > ☐; Check here certifying wipes used are ASTM E1792 compliant ☐	<6 hrs ☐	2-3 days ☐	N/A
Fungi	Air Sample > Zef ☐ Aller ☐ Oth ☐; Bulk > Sample ☐ Swab ☐; Tape Lift > Qualitative (%& type) ☐ or Quantitative (type/cm2) ☐	<6 hrs ☐	1-2 days ☐	N/A
Soot	ASTM D6602-03B: Optical	<6 hrs ☐	1-2 days ☐	N/A
	ASTM D6602-03B: Optical & TEM	1-2 days ☐	3-5days ☐	N/A
Other		Call	Call	

Sample # (1 per line)	Description/Location	Sample Date	Sample Time	Vol. or Area
1) GPS-49		5/23/18		
2) GPS-50		↓		
3) GPS-51		↓		
4) GPS-52		↓		
5)				
6)				
7)				
8)				
9)				
10)				
11)				
12)				
13)				
14)				
15)				
16)				
17)				
18)				
19)				
20)				

1)Relinquished by: [signature]	Date: 5/23/18	Time:	3)Relinquished by:	Date:	Time:
2)Received by: [signature]	Date: 5-24-18	Time: 10:07	4)Received by:	Date:	Time:
* TEM Water: Sampler's name Required by State of Arizona	Print Name		Fiberquant assigned Job Number>	20180 5016	
Review of Analysis Request (Initials): ELK				Page 2 of 2	

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: 201805360

Client: PIMA COUNTY RISK MGMT
130 W CONGRESS 9TH FLR

TUCSON, AZ 85701-0000
Office Phone: (520) 724-3078
FAX: (520) 798-1407

 # Samples: 4 PLM **Rec:** 6/7/2018 **Method:** EPA 600/R-93/116 The "New" Method; see below
Client Job: Golden Pin **PO Number:** MA 13*573
Report Date: 6/7/2018 **Date Analyzed:** 6/7/2018 **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 40 CFR 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 code #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: 201805360** Golden Pin

Sample Number / Layer	Color	Apparent Layer Type *	Lab Number / Asbestos Results	Apparent Sample Type *	Positive Layer Yes or No
Sample # **GPR-53**			2018-05360- 1	Roofing	Positive Layer? Yes
Layer # 1	white	coating	*no asbestos detected*		
Layer # 2	black	roof ply	*no asbestos detected*		
Layer # 3	silver	paint	*no asbestos detected*		
Layer # 4	black	roof ply	*no asbestos detected*		
Layer # 5	black	roof ply	*no asbestos detected*		
Layer # 6	silver	paint	*>1-2% chrysotile asbestos*		
Layer # 7	black	roof ply	*10-20% chrysotile asbestos*		
Layer # 8	black	roof ply	*10-20% chrysotile asbestos*		
Layer # 9	black	roof ply	*10-20% chrysotile asbestos*		
Layer # 10	tan	insulation	*no asbestos detected*		
Sample # **GPR-54**			2018-05360- 2	Roofing	Positive Layer? Yes
Layer # 1	white	coating	*no asbestos detected*		
Layer # 2	black	roof ply	*no asbestos detected*		
Layer # 3	silver	paint	*no asbestos detected*		
Layer # 4	black	roof ply	*no asbestos detected*		
Layer # 5	black	roof ply	*no asbestos detected*		
Layer # 6	black	roof ply	*no asbestos detected*		
Layer # 7	silver	paint	*>1-2% chrysotile asbestos*		
Layer # 8	black	roof ply	*10-20% chrysotile asbestos*		
Layer # 9	black	roof ply	*10-20% chrysotile asbestos*		
Layer # 10	black	roof ply	*10-20% chrysotile asbestos*		
Layer # 11	black	roof ply	*10-20% chrysotile asbestos*		
Layer # 12	tan	insulation	*no asbestos detected*		
Sample # **GPR-55**			2018-05360- 3	Roofing	Positive Layer? No
Layer # 1	white	coating	*no asbestos detected*		
Layer # 2	silver	paint	*no asbestos detected*		
Layer # 3	black	roof ply/bitumen	*no asbestos detected*		
Layer # 4	tan	insulation	*no asbestos detected*		
Sample # **GPR-56**			2018-05360- 4	Roofing	Positive Layer? No
Layer # 1	white	coating	*no asbestos detected*		
Layer # 2	silver	paint	*no asbestos detected*		
Layer # 3	black	roof ply/bitumen	*no asbestos detected*		
Layer # 4	tan	insulation	*no asbestos detected*		

* 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 GPR-53 **Lab Number** 2018-05360- 1 **Sampled:** 6/6/2018 **Condition:** acceptable
Analyzed By MAC 6/7/2018 **An?** OK **Apparent Smp Type** Roofing Fibrous Solid
Homogeneous No **# Layers** 10 **Pos Layer?** Yes
Non-Fibrous Components (in approx. decreasing order): bitumen, polymer, binder

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	coating	3	white	1	n.d.	n.d.	n.d.	n.d.	-	-
2	roof ply	2	black	1	10-20%	n.d.	n.d.	n.d.	-	-
3	paint	1	silver	1	n.d.	n.d.	n.d.	n.d.	-	-
4	roof ply	14	black	1	n.d.	10-20%	n.d.	n.d.	-	-
5	roof ply	20	black	1	n.d.	10-20%	n.d.	n.d.	-	-
6	paint	1	silver	1	n.d.	n.d.	>1-2%	n.d.	-	-
7	roof ply	14	black	1	n.d.	<=1%	10-20%	10-20%	-	-
8	roof ply	15	black	1	n.d.	<=1%	10-20%	10-20%	-	-
9	roof ply	15	black	1	n.d.	<=1%	10-20%	10-20%	-	-
10	insulation	15	tan	3	n.d.	n.d.	n.d.	70-80%	-	-
	Total %	100		**Overall %**	<=1%	5-10%	5-10%	20-30%	-	-
				Fiber Identification:	synthetic fiber (extr	glass fiber	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	synthetic fiber (extruded)	W	E	N	N	H	+	P					
2	glass fiber	CL	D	Y									
3	chrysotile asbestos	W	A	N	N	L	+	P	1.550	db/ly	sb/o	1.561	1.553
4	cellulose fiber	W	F	N	N	H	+	U					
5													
6													

Sample Analytical Note

Procedure: tweased apart using forceps. Procedure: dissolution of matrix using solvent. Note: chrysotile in paint layer 6 may be contamination from roof ply layer 7.

Sample GPR-54 **Lab Number** 2018-05360- 2 **Sampled:** 6/6/2018 **Condition:** acceptable
Analyzed By MAC 6/7/2018 **An?** OK **Apparent Smp Type** Roofing Fibrous Solid
Homogeneous No **# Layers** 12 **Pos Layer?** Yes
Non-Fibrous Components (in approx. decreasing order): bitumen, polymer, binder

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber					
					Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	coating	3	white	1	n.d.	n.d.	n.d.	n.d.	-	-
2	roof ply	2	black	1	10-20%	n.d.	n.d.	n.d.	-	-
3	paint	1	silver	1	n.d.	n.d.	n.d.	n.d.	-	-
4	roof ply	4	black	1	n.d.	10-20%	n.d.	n.d.	-	-
5	roof ply	17	black	1	n.d.	10-20%	n.d.	n.d.	-	-
6	roof ply	20	black	1	n.d.	10-20%	n.d.	n.d.	-	-
7	paint	1	silver	1	n.d.	n.d.	>1-2%	n.d.	-	-
8	roof ply	11	black	1	n.d.	<=1%	10-20%	10-20%	-	-
9	roof ply	12	black	1	n.d.	<=1%	10-20%	10-20%	-	-
10	roof ply	12	black	1	n.d.	<=1%	10-20%	10-20%	-	-
11	roof ply	12	black	1	n.d.	<=1%	10-20%	10-20%	-	-
12	insulation	5	tan	3	n.d.	n.d.	n.d.	70-80%	-	-
	Total %	100		**Overall %**	<=1%	5-10%	5-10%	10-20%	-	-
				Fiber Identification:	synthetic fiber (extr	glass fiber	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	synthetic fiber (extruded)	W	E	N	N	H	+	P					
2	glass fiber	CL	D	Y									
3	chrysotile asbestos	W	A	N	N	L	+	P	1.550	db/ly	sb/o	1.561	1.553
4	cellulose fiber	W	F	N	N	H	+	U					
5													
6													

Sample Analytical Note

Procedure: tweased apart using forceps. Procedure: dissolution of matrix using solvent. Note: chrysotile in paint layer 7 may be contamination from roof ply layer 8.

PLM Analysis Details **Job Number:** **201805360** Golden Pin

Sample GPR-55 **Lab Number** 2018-05360- 3 **Sampled:** 6/6/2018 **Condition:** acceptable

Analyzed By MAC 6/7/2018 **An?** OK **Apparent Smp Type** Roofing Fibrous Solid

Homogeneous No **# Layers** 4 **Pos Layer?** No

Non-Fibrous Components (in approx. decreasing order): bitumen, polymer,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber: Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	coating	10	white	1	n.d.	n.d.	-	-	-	-
2	paint	5	silver	1	n.d.	n.d.	-	-	-	-
3	roof ply/bitumen	50	black	1	5-10%	n.d.	-	-	-	-
4	insulation	35	tan	3	n.d.	90-100%	-	-	-	-
	Total %	100		**Overall %**	2-5%	30-40%	-	-	-	-
				Fiber Identification:	glass fiber	cellulose fiber				

Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations: Oil	Col Par	Col Per	RI Par	RI Per
1	glass fiber	CL	D	Y									
2	cellulose fiber	W	F	N	N	H	+	U					
3													
4													
5													
6													

Sample Analytical Note

Procedure: tweased apart using forceps. Procedure: dissolution of matrix using solvent.

Sample GPR-56 **Lab Number** 2018-05360- 4 **Sampled:** 6/6/2018 **Condition:** acceptable

Analyzed By MAC 6/7/2018 **An?** OK **Apparent Smp Type** Roofing Fibrous Solid

Homogeneous No **# Layers** 4 **Pos Layer?** No

Non-Fibrous Components (in approx. decreasing order): bitumen, polymer,

Layers

#	Layer Type	%	Color	Friability	Percents of Each Fiber: Fib 1	Fib 2	Fib 3	Fib 4	Fib 5	Fib 6
1	coating	5	white	1	n.d.	n.d.	-	-	-	-
2	paint	5	silver	1	n.d.	n.d.	-	-	-	-
3	roof ply/bitumen	75	black	1	5-10%	n.d.	-	-	-	-
4	insulation	15	tan	3	n.d.	90-100%	-	-	-	-
	Total %	100		**Overall %**	5-10%	10-20%	-	-	-	-
				Fiber Identification:	glass fiber	cellulose fiber				

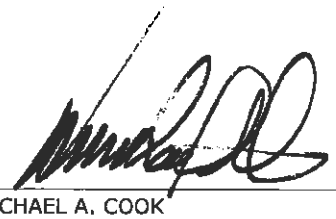
Fibers

		Color	Mrph	Iso	Pleo	Bi	Elg	Ext	Refractive Index Determinations: Oil	Col Par	Col Per	RI Par	RI Per
1	glass fiber	CL	D	Y									
2	cellulose fiber	W	F	N	N	H	+	U					
3													
4													
5													
6													

Sample Analytical Note

Procedure: tweased apart using forceps. Procedure: dissolution of matrix using solvent.

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: MICHAEL A. COOK

Printed: 07-Jun-18

Original Print Date: 07-Jun-18

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)	Pima County Risk Management
Address	130 W. Congress, 9th Floor
City, State, Zip Code	Tucson, AZ 85701
Phone	520-724-3078 FAX 520-222-1407
Email	jim.faas@pima.gov

Invoice to (Company)	Same
Address	
City, State, Zip Code	
Phone	FAX

Contact (print)	Jim Faas
Sampled by (signature)	[signature]
Job Number or Project Name	Golden Pin
PO Number	

24 HOUR

<Analysis Method Requested> ONLY ONE METHOD PER COC		Turnaround time (check one) Rush	Norm	Ext
Asbestos by PLM	Method > Standard or Point Count; Analyze > All or ATPF; If ATPF then > by Layer or by Sample; Single Layer Protocol > Yes or No	Ultra Rush ☐ / Rush ☐ <3 hrs ☐	1-5 days ☐	15-30 days ☐
Fibers by PCM	Method > 7400(Area) ☐ ORM (Personal) ☐	<4 hr ☐	24hr ☐	-
Asbestos by TEM	In Air > AHERA ☐ Mod. AHERA ☐	<6hr ☐	24 hr ☐	3-5d ☐
	In Water* > Water ☐ Sludge ☐	1-2d ☐	3-5d ☐	N/A
	In Bulk (Annex2) > Chatfield ☐ Full Quant ☐			
	In Dust > Vacuum Dust (ASTM D-5755) ☐	3-5d ☐	6-10d ☐	N/A
Pb by FLAA	Analyte > Pb ☐ Other ☐; Matrix > Filter > MCE ☐; Paint > by Area (mg/cm2) ☐ by Weight (ppm) ☐; Soil > ☐; Wipe > ☐; Check here certifying wipes used are ASTM E1792 compliant ☐	<6 hrs ☐	2-3 days ☐	N/A
Fungi	Air Sample > Zef ☐ Aller ☐ Oth ☐; Bulk > Sample ☐ Swab ☐; Tape Lift > Qualitative (%& type) ☐ or Quantitative (type/cm2) ☐	<6 hrs ☐	1-2 days ☐	N/A
Soot	ASTM D6602-03B: Optical	<6 hrs ☐	1-2 days ☐	N/A
	Optical & TEM	1-2 days ☐	3-5days ☐	N/A
Other		Call	Call	

Sample # (1 per line)	Description/Location	Sample Date	Sample Time	Vol. or Area
1) GPR-53	Roof	6/6/18		
2) GPR-54	"	↓		
3) GPR-55	"			
4) GPR-56	"			
5)				
6)				
7)				
8)				
9)				
10)				
11)				
12)				
13)				
14)				
15)				
16)				
17)				
18)				
19)				
20)				

1)Relinquished by:	Date:	Time:	3)Relinquished by:	Date:	Time:
2)Received by: [signature]	Date: 6-7-18	Time: 1046	4)Received by:	Date:	Time:
* TEM Water Sampler's name Required by State of Arizona	Print Name	FV	Fiberquant assigned Job Number>	201805360	
Review of Analysis Request (Initials): EJH				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.

SHC
Solving Environmental Concerns Since 1982
Southwest Hazard Control, Inc.

June 15, 2018

Jim Faas
Pima County Risk Management
130 West Congress
Tucson, AZ 85701

Mr. Faas,

Southwest Hazard Control worked with you to develop an estimated cost for removing asbestos-containing materials at the Golden Pins bowling alley. The $325,000 estimate for inside asbestos removal is based on the type, locations and quantities of asbestos your inspection found inside the building. The $55,000 estimate for removal of roofing includes removal of six to eight layers of roofing felt. The lab report shows that many separate layers of roof felt present.

The estimates provided should not be considered firm bid prices. You should anticipate the actual costs may vary by as much as 15% from these estimates.

The assumptions listed in your June 12, 2018 cost estimate memorandum to Lisa Josker are the same as we discussed when working up the estimate. Costs will increase if these assumptions are not correct. If bowling equipment and fixtures are still present or if asbestos removal has to be conducted in multiple phases the cost will increase.

Please let me know if you need any additional assistance. I can be reached at 520-305-6461 and my email address is mkring@swhaz.com.

Sincerely yours

Mitch Kring
Estimator

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www.swhaz.com

ATTACHMENT 2

Facilities Condition Report

Pima County Facilities Management

Golden Pin Lanes Building

1010 West Miracle Mile

DRAFT REPORT
6-18-2018

Facilities management shops personnel went to the Golden Pins building on Friday, June 15, 2018 to conduct a building and site assessment. Present were two Architects, our Deputy Director for Maintenance and Operations and Supervisors from the plumbing, electrical, electronic and mechanical (HVAC) shops. Following are their observations:

Site:

In general the pavement is in poor condition. Asphalt cracking exists throughout as well as a few potholes. The original plans indicate 1 1/2" of asphalt which is a substandard thickness. It is unknown if the parking lot paving has been replaced since the original placement.

Buildings:

There are two buildings on the site, the main bowling alley and a smaller older building used as storage located at the road frontage. The storage building was not easily accessed but observations on exterior wall, ceiling and other structural elements indicates there could be structural issues. This building could be left as storage or removed.

The Storage Building at approximately 1,734 square foot, sits at the street frontage just off the southeast corner of the main Golden Pins building. It is currently used for general storage. It is in dilapidated condition and appears to be structurally compromised. Electrical to the building is turned off and it has been determined that the sewer line from the building has collapsed. In its current state the building would be a liability to the County and is thus recommended to be demolished. Because of its location and date of original construction, this building is considered to be within the Period of Significance for Historic Means within the Miracle Mile Historic District. Further investigation is needed to determine what impact this would have on possible plans to demolish the building.

The Main Building, roughly 50,000 square feet in size, is constructed of a concrete post and beam system with both single-tee and double-tee roof systems. There is masonry infill between the concrete posts and the structure appears to be sound. The main building has asbestos containing materials (ACM) present as evidenced by the June 12, 2018 report and estimate from Risk Management. The project cost, which includes both hard and soft costs, to demolish and abate the ACM's is estimated to be between $280,000 and $380,000. The wide difference is suggested because the structure under the bowling lanes could not be seen and sampled. Also, it is estimated that this work will not start for a year therefore, cost escalation is considered. The presence and amount of ACM's in a building of this age is not uncommon and considering the need to remove most of the interior elements during remodeling, this work can be easily accomplished once the building is empty.

ADA Access:

The eastern restrooms are not ADA compliant and will need to be expanded while bringing them into compliance in order to provide the same number of fixtures.
A pedestrian sidewalk will need to be added to connect the sidewalk along the Miracle Mile right of way to the entry doors of the building.
At the parking for the disabled, the access aisles are non-compliant. Each access aisle has a curb ramp within the access aisle zone in order to transition up to the sidewalk. The sidewalk should be replaced with one that is at the same elevation as the parking lot in the area of the parking for the disabled.

Roof:

Roof appears to be in good condition but in need of some minor repair at expansion joints, flashing and roof penetrations. No evidence of roof leaks. It appears to be a 3 and 4 ply built up roof with metal and paper flashing in appropriate locations.

Mechanical:

1 unit from 2013

2 units from 2014

1 unit from 2017 (needs sunshield installed)

1 older unit looks to be about 12 to 15 years old

The makeup air evaporative cooler for the kitchen exhaust hood above the grill was unplugged not sure if it is operational it does look to be only a couple years old. This cooler should come on when the exhaust fan is in operation.

There are a few pieces of abandoned equipment on the roof that should be removed.

All units have digital thermostats and temp tested out ok.

Fresh air filters are very dirty and the exposed unit filters, observed without opening the units up, were due to be changed.

There is a boiler on the west side of the building that is not used and should be removed.

Fire Suppression System:

Fire Alarm Panel: No panel exists nor provisions for outside monitoring.

Kitchen Hood Suppression system:

1. Ansul Fire system
2. Last inspected Oct 2017
3. 8’ x 8’ hood with equipment on both sides.
4. Front; 12’’ griddle – 36’’ griddle – (2ea) 16’’ fryers
5. Back 12’’ 2 burner range – Chain Broiler
6. Fire system is piped correctly for equipment installed
7. Last fume hood cleaning was 4-25-18

Sprinkler system: Existing 4’’ Riser

1. Last system 5-year internal valve inspection performed Oct 2014. Next 5-year valve inspection due Oct 2019.
2. Gauges replaced Oct 2017

3. Sprinkler system has no tamper and monitoring for flow. Would install as part of the remodel
4. System has a water motor gong.

Plumbing System:

Exterior pipes: Main underground sewer pipes to both the storage and the main building were found to be 4"vitreous clay pipe; not surprising given the age of the buildings. A camera was used to determine the condition of the main building clay pipes and were observed to 100 feet. Given their age, the pipes to the main building are in adequate condition. The clay pipe to the old frontage storage building was broken and the camera went only 20 feet. It's likely this pipe ties into the main building pipe. All the pipes had roots in them. Staff could find no water supply to the storage building.

Water Heaters: There are three water heaters in the main building, two 40 gallon and one 50 gallon; all looked to be in good shape. A separate 20 gallon electric water heater supplies a restroom, washing machine and utility sink, also in good shape.

Interior pipes: Cast iron pipes were found within the interior. Due to the age of the pipes these would be removed and replaced with appropriate plastic piping as part of the remodel.

Electrical System:

Main Service Section: 2000AMP 120/208 Volt 3 Phase: The overall condition of the existing electrical service is fair based in limited inspection access. The Square D switchboard is the more modern portion of the two sections that make up the entire electrical service. The older General Electric equipment had obvious rust decay and are no longer watertight. One of the 400 AMP 3 phase disconnects when opened revealed damaged mechanical and electrical components, which was preventing the switch from opening. The load side conductors in this same switch were insufficiently sized. The entire system would be upgraded in a remodel.

Interior sub panels and disconnects: The overall condition of the sub panels is fair with some discrepancies noted. A subpanel in the southeast corner of the building is missing a dead front with only a lightweight piece of sheet metal screwed to the front. In the west air handler room, access to the equipment disconnects and electrical controls was poor with limited clearance and working room. Roughly 90% of the interior sub panels and disconnects would require repair or replacement.

Roof Equipment: The majority of the electrical disconnects were poorly supported which could make using or operating difficult. The operation of the electrical roof equipment could not be verified. Many unused openings were observed and electrical conduit was not properly supported. Much of the equipment would be upgraded and replaced in a remodel.

Emergency lighting and exit signs: Emergency lighting and exit signs were adequate and functional throughout the public areas and pin setting areas. Random lights and exit signs were tested and verified as operational. Placement and functionality of the exit/emergency lighting was good.

General purpose wall outlets and GFCI's: the kitchen area has GFCI outlets but location prevented staff from testing. The toilet rooms did not have outlets. Various outlets were randomly tested by a circuit tester and verified operational. The overall placement and condition of general purpose and appliance outlets is good.

General lighting interior and exterior: A variety of fluorescent lighting is used in the public areas and the non-public staff areas. Most of the lighting in the bowling area are 2x4 lay-in type using T-8 lamps. The kitchen has recessed cans and compact fluorescent plug-in lamps. Other areas have 4-foot fluorescent strip lights. The exterior building lighting is a combination HPS wall packs and flood lighting. The parking lot lighting is High Pressure Sodium fixtures mounted on 25-foot poles. The overall condition of the lighting system and fixtures is good although not all the lighting circuits could be tested.

Junction Box by gas meter is open and wiring is exposed to weather.

Outlet at outside rear east of structure is not weather proof and hanging from wiring.

The phone and IT system infrastructure needs upgrading.

Conclusion:

Overall the main building is in very good condition overall and no existing condition was a surprise to the team considering the building age. All items of any concern would be rectified, replaced or upgraded in the building remodel under consideration.

ATTACHMENT 3